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CHANGE OF CORRESPONDENCE ADDRESS *Application*

Address to:
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Application Number	13/089,986
Filing Date	April 19, 2011
First Named Inventor	Christopher Cooper
Art Unit	4187
Examiner Name	Kimberly Coghill
Attorney Docket Number	DE-1

Please change the Correspondence Address for the above-identified patent application to:

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I am the:

- ☐ Applicant/Inventor
- ☐ Assignee of record of the entire interest.
Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96).
- ☒ Attorney or agent of record. Registration Number 26,325.
- ☐ Registered practitioner named in the application transmittal letter in an application without an executed oath or declaration. See 37 CFR 1.33(a)(1). Registration Number _____.

Signature /Stephen L. Peterson/

Typed or Printed
Name Stephen L. Peterson

Date April 22, 2020

Telephone
(202) 251-9367

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☐ *Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: **Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	39237357
Application Number:	13089986
International Application Number:	
Confirmation Number:	1497
Title of Invention:	METHOD OF GENERATING ENERGY AND 4HE USING THREE DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS
First Named Inventor/Applicant Name:	Christopher H. Cooper
Correspondence Address:	Stephen L. Peterson - PO BOX 319 - CRESTON CA 93432-0319 US - steve @petersonipc.com
Filer:	Stephen Leroy Peterson
Filer Authorized By:	
Attorney Docket Number:	DE-1
Receipt Date:	22-APR-2020
Filing Date:	19-APR-2011
Time Stamp:	18:54:43
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Change of Address	sb0122slp.pdf	542068	no	2
			22c117a34ba156956eb484f32a900ea779eb297c		

Warnings:

Information:

Total Files Size (in bytes):	542068
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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

13/089,986

04/19/2011

Christopher H. Cooper

DE-1

1497

7590

02/10/2020

Stephen L. Peterson

PO BOX 319

CRESTON, CA 93432-0319

EXAMINER

DAVIS, SHARON M

ART UNIT

PAPER NUMBER

3646

MAIL DATE

DELIVERY MODE

02/10/2020

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte CHRISTOPHER H. COOPER et al.

Appeal 2020-002457
Application 13/089,986
Technology Center 3600

APPEAL DOCKETING NOTICE

The Patent Trial and Appeal Board received the appeal in the above-identified application from the Technology Center on February 06, 2020, and has assigned it the appeal number indicated above.

The recipient of this notice is reminded of its ongoing duty, within 20 days of any change during the proceeding, to update its mandatory notices to identify the real party-in-interest and each judicial or administrative proceeding that could affect, or be affected by, the Board proceeding. 37 C.F.R. § 41.8. For example, another docketed appeal in a related application may have the potential to affect, or be affected by, the Board proceeding.

In all future communications regarding this appeal, please include both the application number and the appeal number. Telephone inquiries can be made by calling 571-272-9797 and referencing the appeal number listed above. The mailing address for the Board is:

PATENT TRIAL and APPEAL BOARD
UNITED STATES PATENT AND TRADEMARK OFFICE
P.O. BOX 1450
ALEXANDRIA, VIRGINIA 22313-1450



UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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13/089,986

04/19/2011

Christopher H. Cooper

DE-1

1497

7590

01/13/2020

Stephen L. Peterson

PO BOX 319

CRESTON, CA 93432-0319

EXAMINER

DAVIS, SHARON M

ART UNIT

PAPER NUMBER

3646

MAIL DATE

DELIVERY MODE

01/13/2020

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

In re Application of :
Cooper et al. :
Application No. 13/089,986 :
Filed: 19 Apr 2011 : **DECISION ON PETITION**
For: METHOD OF GENERATING ENERGY :
AND 4HE USING THREE DIMENSIONAL :
NANOSTRUCTURED CARBON :
MATERIALS :

This is a decision on the petition under the unintentional provisions of 37 CFR 1.137(a), filed August 27, 2019, to revive the above-identified application.

The petition is **GRANTED**.

The above-identified application became abandoned for failure to timely pay the appeal forwarding fee required by 37 CFR 41.45(b) within two months of the mailing of the Examiner's Answer, mailed March 20, 2019. As an appeal forwarding fee was not filed within the time period set forth in 37 CFR 41.45(a), the appeal was dismissed and the proceedings as to the rejected claims were terminated. See 37 CFR 41.45(b). As no claim was allowed, due to non-payment of the appeal forwarding fee, the application became abandoned by operation of law on May 21, 2019. A Notice of Abandonment was mailed on June 5, 2019.

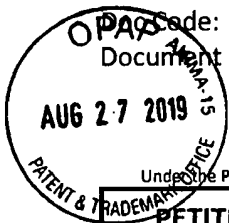
The petition satisfies the requirements of 37 CFR 1.137(a) in that petitioner has supplied (1) the reply in the form of an appeal forwarding fee of \$560.00, (2) the petition fee of \$500.00, and (3) a proper statement of unintentional delay.

This application is being referred to Technology Center Art Unit 3646 for appropriate action in the normal course of business on the reply received August 27, 2019.

Telephone inquiries concerning this decision should be directed to Jamice Brantley at (571) 272-3814.

/ANDREA M SMITH/
Andrea Smith
Lead Paralegal Specialist, Office of Petitions

TW
D AC



Case Code: PET.OP

Document Description: Petition for Review by the Office of Petitions

PTO/SB/64 (01-18)

Approved for use through 11/30/2020. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

**PETITION FOR REVIVAL OF AN APPLICATION FOR PATENT
ABANDONED UNINTENTIONALLY UNDER 37 CFR 1.137(a)**

Docket Number (Optional)

DE-1

Page 1 of 2

First named inventor: Christopher H. Cooper

Application No.: 13/089,986

Art Unit: 3646

Filed: April 19, 2011

Examiner: Davis, Sharon M.

Title: **Method of Generating Energy and 4He Using Three Dimensional Nanostructured Carbon Materials**

Attention: Office of Petitions

Mail Stop Petition

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

FAX (571) 273-8300

NOTE: If information or assistance is needed in completing this form, please contact the Office of Petitions at (571) 272-3282.

The above-identified application became abandoned for failure to file a timely and proper reply to a notice or action by the United States Patent and Trademark Office. The date of abandonment is the day after the expiration date of the period set for reply in the Office notice or action plus any extensions of time actually obtained.

APPLICANT HEREBY PETITIONS FOR REVIVAL OF THIS APPLICATION.

NOTE: A grantable petition requires the following items:

- (1) Petition fee;
- (2) Reply and/or issue fee;
- (3) Terminal disclaimer with disclaimer fee – required for all utility and plant applications filed before June 8, 1995, and for all design applications; and
- (4) Statement that the entire delay was unintentional.

1. Petition fee

☐ Small entity fee \$ _____ (37 CFR 1.17(m)). Applicant asserts small entity status. See 37 CFR 1.27.

☒ Micro entity fee \$ 500.00 (37 CFR 1.17(m)). Applicant certifies micro entity status. See 37 CFR 1.29. Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ Undiscounted fee \$ _____ (37 CFR 1.17(m)).

2. Reply and/or fee

A The reply and/or fee to the above-noted Office notice or action in the form of

Transmittal of Appeal Forwarding Fee (identify the type of reply):

☐ has been filed previously on _____.

☒ is enclosed herewith.

B The issue fee and publication fee (if applicable) of \$ _____

☐ has been paid previously on _____.

☐ is enclosed herewith.

This collection of information is required by 37 CFR 1.137(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11, 1.14 and 41.6. This collection is estimated to take 1 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop Petition, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

**PETITION FOR REVIVAL OF AN APPLICATION FOR PATENT
ABANDONED UNINTENTIONALLY UNDER 37 CFR 1.137(a)**

Page 2 of 2

3. Terminal disclaimer with disclaimer fee

- ☒ Since this utility/plant application was filed on or after June 8, 1995, no terminal disclaimer is required.
- ☐ A terminal disclaimer (and disclaimer fee (37 CFR 1.20(d)) of \$ _____) disclaiming the required period of time is enclosed herewith (see PTO/SB/63).

4. STATEMENT: The entire delay in filing the required reply from the due date for the required reply until the filing of a grantable petition under 37 CFR 1.137(a) was unintentional. [NOTE: The United States Patent and Trademark Office may require additional information if there is a question as to whether either the abandonment or the delay in filing a petition under 37 CFR 1.137(a) was unintentional (MPEP 711.03(c), subsections (III)(C) and (D)).]

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

Stephen L. Peterson
Signature

August 23, 2019

Date

Stephen L. Peterson

Typed or Printed Name

26,325

Registration Number, if applicable

PO Box 319

Address

202 251 9367

Telephone Number

Creston, CA 93432

Address

Enclosures:

- ☒ Fee Payment
- ☐ Reply
- ☐ Terminal Disclaimer Form
- ☒ Additional sheet(s) containing statements establishing unintentional delay
- ☐ Other: _____

CERTIFICATE OF MAILING OR TRANSMISSION [37 CFR 1.8(a)]

I hereby certify that this correspondence is being:

- ☒ Deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to: Mail Stop Petition, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450.
- ☐ Transmitted by facsimile on the date shown below to the United States Patent and Trademark Office at (571) 273-8300.

August 23, 2019

Date

Stephen L. Peterson
Signature

Stephen L. Peterson

Typed or printed name of person signing certificate



PATENT
Customer No. 117724
Attorney Docket No. DE-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)	
)	
Christopher H. Cooper et. al.	)	Group Art Unit: 3646
)	
Application No.: 13/089,986	)	Examiner: Davis, Sharon M.
)	
Filed: April 19, 2011	)	Confirmation No.: 1497
)	
For: METHOD OF GENERATING)	
ENERGY AND ⁴ He USING THREE)	
DIMENSIONAL NANOSTRUCTURED)	
CARBON MATERIALS)	

Mail Stop Petition

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

**PETITION FOR REVIVAL OF AN APPLICATION FOR PATENT
ABANDONED UNINTENTIONALLY UNDER 37 CFR 1.137(a)**

On June 5, 2019, the Office mailed a Notification of Abandonment in the above-identified application. The Notification of Abandonment states that Applicant failed to pay the "Forwarding Appeal Fee" and because there were no allowable claims, the application was abandoned. Applicant respectfully submits that the abandonment of this application was unintentional and petitions for revival of this application.

On June 4, 2019 administrative personnel at the USPTO mailed the undersigned a communication stating that Applicants failed to pay the "forwarding appeal fee" and

the application had been forwarded to the Examiner for consideration. On June 5, 2019 the Examiner mailed Applicants the Notice of Abandonment.

The dismissal of the Applicant's appeal is based on 37CFR 41.45(b) which states:

37 CFR 41.45 Appeal forwarding fee

(a) Timing. Appellant in an application or ex parte reexamination proceeding must pay the fee set forth in § 37 CFR 41.20(b)(4) within the later of two months from the date of either the examiner's answer, or a decision refusing to grant a petition under § 1.181 of this chapter to designate a new ground of rejection in an examiner's answer.

(b) Failure to pay appeal forwarding fee. On failure to pay the fee set forth in § 37 CFR 41.20(b)(4) within the period specified in paragraph (a) of this section, the appeal will stand dismissed. (emphasis added)

Applicant's failure to pay the Appeal forwarding fee was unintentional.

Accordingly, Applicant hereby petitions for revival of this application due to unintentional abandonment. The petition fee of \$500.00 is enclosed.

Applicant further petitions that the appeal of the present application be reinstated. Applicants submit herewith the payment of the Appeal Forwarding Fee of \$560.00 for a micro-entity. The revival of this application for unintentional abandonment and the payment of the Appeal Forwarding Fee places this application in the same condition as would have been the case if the Appeal Forwarding Fee was timely paid.

To revive this application and reopen the examination process or to require the Applicants to file a Request for Continuing Application is a waste of the resources of the USPTO and the Applicants. Extensive examination over seven years has focused the

issues for the Board of Appeals and forwarding the application to the Board of Appeals
is respectfully requested.

Respectfully submitted,

Dated: August 23, 2019

By: Stephen L. Peterson
Stephen L. Peterson
Reg. No. 26,325
202 251 9367

Attachments:

- Submission of Appeal Forwarding Fee with fee
- SB-0064 form

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Trademarks, P.O. Box 1451, Alexandria, Virginia 22313-1451 on the date shown below:

Stephen L. Peterson

(Typed or Printed Name of Person Signing Certificate)

Stephen L. Peterson
(Signature)

Aug 23, 2019
(Date)



PATENT
Customer No. 117724
Attorney Docket No. DE-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)
)
Christopher H. Cooper et. al.) Group Art Unit: 3646
)
Application No.: 13/089,986) Examiner: Davis, Sharon M.
)
Filed: April 19, 2011) Confirmation No.: 1497
)
For: METHOD OF GENERATING)
ENERGY AND ⁴He USING THREE)
DIMENSIONAL NANOSTRUCTURED)
CARBON MATERIALS)

Mail Stop Petition

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

TRANSMITTAL OF APPEAL FORWARDING FEE

In accordance with 37 CFR 41.20(b)(4) Applicants herewith enclose a check in the amount of \$560.00, the Appeal Forwarding Fee for a microentity.

Respectfully submitted,

Dated: August 23, 2019

By: Stephen L. Peterson
Stephen L. Peterson
Reg. No. 26,325
202 251 9367

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Trademarks, P.O. Box 1451, Alexandria, Virginia 22313-1451 on the date shown below:

Stephen L. Peterson

(Typed or Printed Name of Person Signing Certificate)

Stephen L. Peterson
(Signature)

Aug 23, 2019
(Date)



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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13/089,986

04/19/2011

Christopher H. Cooper

DE-1

1497

7590

06/05/2019

Stephen L. Peterson

PO BOX 319

CRESTON, CA 93432-0319

EXAMINER

DAVIS, SHARON M

ART UNIT

PAPER NUMBER

3646

MAIL DATE

DELIVERY MODE

06/05/2019

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of Abandonment	Application No.	Applicant(s)
	13/089,986	Cooper et al.
	Examiner	Art Unit
	SHARON M DAVIS	3646

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

This application is abandoned in view of:

1. ☐ Applicant's failure to timely file a proper reply to the Office letter mailed on _____.
 - (a) ☐ A reply was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply (including a total extension of time of _____ month(s)) which expired on _____.
 - (b) ☐ A proposed reply was received on _____, but it does not constitute a proper reply under 37 CFR 1.113 to the final rejection. (A proper reply under 37 CFR 1.113 to a final rejection consists only of: (1) a timely filed amendment which places the application in condition for allowance; (2) a timely filed Notice of Appeal (with appeal fee); or (3) if this is utility or plant application, a timely filed Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. Note that RCEs are not permitted in design applications.)
 - (c) ☐ A reply was received on _____ but it does not constitute a proper reply, or a bona fide attempt at a proper reply, to the non-final rejection. See 37 CFR 1.85(a) and 1.111. (See explanation in box 7 below).
 - (d) ☐ No reply has been received.
2. ☐ Applicant's failure to timely pay the required issue fee and publication fee, if applicable, within the statutory period of three months from the mailing date of the Notice of Allowance (PTOL-85).
 - (a) ☐ The issue fee and publication fee, if applicable, was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the statutory period for payment of the issue fee (and publication fee) set in the Notice of Allowance (PTOL-85).
 - (b) ☐ The submitted fee of \$ _____ is insufficient. A balance of \$ _____ is due.
The issue fee required by 37CFR 1.18 is \$ _____. The publication fee, if required by 37 CFR 1.18(d), is \$ _____.
 - (c) ☐ The issue fee and publication fee, if applicable, has not been received.
3. ☐ Applicant's failure to timely file corrected drawings as required by, and within the three-month period set in, the Notice of Allowability (PTO-37).
 - (a) ☐ Proposed corrected drawings were received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply.
 - (b) ☐ No corrected drawings have been received.
4. ☐ The letter of express abandonment which is signed by the attorney or agent of record or other party authorized under 37 CFR 1.33 (b). See 37 CFR 1.138(b).
5. ☐ The letter of express abandonment which is signed by an attorney or agent (acting in a representative capacity under 37 CFR 1.34) upon the filing of a continuing application.
6. ☐ The decision by the Board of Patent Appeals and Interference rendered on _____ and because the period for seeking court review of the decision has expired and there are no allowed claims.
7. ☒ The reason(s) below:

See communication dated 06/04/19. The appeal was dismissed because of a failure to pay forwarding appeal fee. There are no allowable claims, so the application is abandoned. MPEP 1208.01, 1215.04

/SHARON M DAVIS/
Primary Examiner, Art Unit 3646

Petitions to revive under 37 CFR 1.137, or requests to withdraw the holding of abandonment under 37 CFR 1.181, should be promptly filed to minimize any negative effects on patent term.



UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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13/089,986

04/19/2011

Christopher H. Cooper

DE-1

1497

7590

06/04/2019

Stephen L. Peterson

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EXAMINER

DAVIS, SHARON M

ART UNIT

PAPER NUMBER

3646

MAIL DATE

DELIVERY MODE

06/04/2019

PAPER

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APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR/ PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
13/089,986	04/19/2011	Cooper et al.	DE-1

Stephen L. Peterson PO BOX 319 CRESTON, CA 93432-0319		EXAMINER	
		Tracey M Young	
		ART UNIT	PAPER
		OPAC	20190531A

DATE MAILED: _____

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Commissioner for Patents

See attachments

/Tracey M Young/
Patent Appeal Specialist

571-272-1644

<i>Communication Re: Appeal</i>	Application No. 13/089,986	Applicant(s) Cooper et al.	
	Examiner DAVIS, SHARON M	Art Unit 3646	AIA Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

1. ☐ The Notice of Appeal filed on _____ is not acceptable because:
- (a) ☐ it was not timely filed.
- (b) ☐ the statutory fee for filing the appeal was not submitted. See 37 CFR 41.20(b)(1).
- (c) ☐ the appeal fee received on _____ was not timely filed.
- (d) ☐ the submitted fee of \$ _____ is insufficient. The appeal fee required by 37 CFR 41.20(b)(1) is \$ _____.
- (e) ☐ the appeal is not in compliance with 37 CFR 41.31(a)(1) in that no claim has been twice rejected.
- (f) ☐ a Notice of Allowability, PTO-37, was mailed by the Office on _____.
2. ☐ The appeal brief filed on _____ is NOT acceptable for the reason(s) indicated below:
- (a) ☐ the brief and/or brief fee is untimely. See 37 CFR 41.37(a).
- (b) ☐ the statutory fee for filing the brief has not been submitted. See 37 CFR 41.20(b)(2).
- (c) ☐ the submitted brief fee of \$ _____ is insufficient. The brief fee required by 37 CFR 41.20(b)(2) is \$ _____.
- The appeal in this application will be dismissed unless corrective action is taken to timely submit the brief and requisite fee. See 37CFR 41.37(a)(1). Extensions of time may be obtained under 37 CFR 1.136(a). See 37CFR 41.37(e).**
3. ☒ The appeal in this application is DISMISSED because:
- (a) ☐ the statutory fee for filing the brief as required under 37 CFR 41.20(b)(2) was not timely submitted and the period for obtaining an extension of time to file the brief under 37 CFR 1.136(a) has expired.
- (b) ☐ the brief was not timely filed and the period for obtaining an extension of time to file the brief under 37 CFR 1.136(a) has expired.
- (c) ☐ a Request for Continued Examination (RCE) under 37 CFR 1.114 was filed on _____.
- (d) ☒ other: failure to pay forwarding appeal fee, see 41.45(b).
4. ☒ Because of the dismissal of the appeal, this application:
- (a) ☐ is abandoned because there are no allowed claims.
- (b) ☐ is before the examiner for final disposition because it contains allowed claims. Prosecution on the merits remains CLOSED.
- (c) ☒ is before the examiner for consideration.

/TRACEY M YOUNG/ (571)272-1644	Patent Appeal Specialist
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PATENT
Customer No. 117724
Attorney Docket No. DE-1

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)
)
Christopher H. Cooper et. al.) Group Art Unit: 3646
)
Application No.: 13/089,986) Examiner: Davis, Sharon M.
)
Filed: April 19, 2011) Confirmation No.: 1497
)
For: METHOD OF GENERATING)
ENERGY AND ^4He USING THREE)
DIMENSIONAL NANOSTRUCTURED)
CARBON MATERIALS)

Attention: Mail Stop Appeal Brief-Patents

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REQUEST FOR ORAL HEARING


The Examiner filed an Examiners Answer for this Appeal on March 20, 2019.

Applicants' filed a Reply Brief contemporaneously with this Request for Oral
Hearing on May 20, 2019.

Applicants respectfully request that a date for the Oral Hearing be set and
Applicants be advised of that date.

Respectfully submitted,

Dated: May 20, 2019

By: 
Stephen L. Peterson
Reg. No. 26,325
202 251 9367

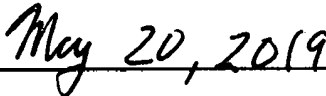
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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REPLY TO THE EXAMINER'S ANSWER

This is a Reply Brief under 37C.F.R. § 41.41 to the Examiner's Answer mailed March 20, 2019. Filed herewith is a Request for Oral Hearing and the requisite fee.

Argument

Applicants Appeal Brief set out why the Examiner's Final Rejection, that is based on equating "cold fusion" with the Applicants' invention, is both semantically and factually in error. It was also shown how those errors compound the legal errors the Examiner makes in applying the law. Those errors are continued in the Examiner's Answer.

Semantics

It is clear from the prosecution of this application, unless the Applicants and the Examiner use terms that mean the same thing to both, constructive discourse is impossible. For purposes of this appeal Applicants' propose the following definitions of key terms be used, with the understanding that neither the Examiner nor the USPTO is admitting that any mentioned reactions exist. The use of these definitions is merely to facilitate meaningful discussion by use of consistent terminology. The proposed definitions are:

1. Fusion – a nuclear reaction where atoms are joined to form another atomic species and emit energy.
2. Atomic species – an element in the Periodic Table.
3. Transmutation – a process by which one atomic species is created from another.
4. Low Energy Nuclear Reaction (a/k/a LENR) – a process where atoms are joined in a reaction to form another atomic species and emit energy at or near room temperatures.
5. Cold fusion – an electrochemical process in which electrodes are immersed in solutions of metal salts and heavy water. Electric current is sent through the apparatus sometimes producing excess heat, nuclear particles and transmutation byproducts.
6. Hot fusion – a nuclear reaction in which atoms are joined at extremely high temperatures and pressures to form another atomic species and create energy.
7. Applicants' process – a process where three-dimensional nanostructured carbon materials are contacted with deuterium to form helium (^4He) atoms and energy.

8. Theory – an assertion of reality that comports with factual evidence supporting that theory.
9. Fact – a demonstrable reality.

Using consistent terms is critical to this appeal because the Examiner asserts that the scientific work and criticism related to the electrochemical process of Pons-Fleischmann, known popularly as “cold fusion” to be relevant to Applicants’ invention when, as set out in detail in Applicants’ Appeal Brief at pp.8-10 they are two entirely different processes. They may both be LENR concepts, because they occur at or near room temperature and some form of nuclear reaction takes place. To assert they are the same ignores the facts. The following chart from page 10 of Applicant’s Appeal Brief makes that clear to any open-minded individual.

Technology	“cold fusion”	the present invention
Fuel	Deuterium	Deuterium
Operative material	Metal compound	Elemental Carbon
Material structure	Metal hydride	Three dimensional CNT
Crystalline structure	NaCl (see App. A)	Uniquely tubular (see App B)
Inducement for reaction	Electrical energy	None
Result of the reaction	Heat	Radiation

But wrongly equating Applicants’ invention with cold fusion (as the Examiner uses the term) allows the Examiner to use case law and reasoning based on the shortcomings of the Pons-Fleischmann technology. It is logical and legal error to alter the statutory criteria for invention on the basis of a faulty factual association.

Fact Versus Theory

The Examiner’s Final Rejection is based, in part, on a theory (as that term is used herein) that nuclear fusion can **only** occur under certain conditions. These

conditions are found in a 1956 paper and are known as the Lawson Criteria. By definition, it is a theory because it is impossible to provide proof of a negative theory. Lawson has not provided evidence for **every possible condition** and the theory is based on then current theory. The Lawson Criteria are supported by hot fusion (as defined herein) but the Lawson Criteria are in conflict with the observations of many, including the Applicants.

It is incumbent on the Examiner to admit that when theory is in conflict with demonstrable facts, such a theory may not be correct. Even the universally recognized meaning of the word "theory" and its difference from the meaning of the word "fact" demonstrates that a currently recognized theory may or may not be correct. History is replete with theories that have been shown to be demonstrably false.

As an example, Applicants have shown how the scientific understanding of the properties of water has recently changed. "New state of water molecule discovered," April 26, 2016,¹ the author quoted from research conducted at Oak Ridge National Laboratory and indicated that (in 2016) the interaction of three-dimensional nanostructured carbon materials (specifically carbon nanotubes) with water is being reconsidered. (clarification added) These articles were not cited to prove the existence of fusion reactions or the operability of the present invention, but to show, contrary to the assertions of the Examiner, science is not static and scientific theories are constantly being changed. In this example scientists understanding of the interaction of

¹ <http://phys.org/news/201604statemolecule> (of record in this application)

water (and hence D₂O which is inherently present in water) with carbon nanotubes was evolving in 2016.

In addition, Applicants have shown, by five bodies of work that the theory asserted by the Examiner (the "Lawson Criteria") setting out conditions that **MUST** exist for fusion is wrong. While the dictated conditions of the Lawson Criteria are certainly applicable to hot fusion. Clearly thermonuclear warheads and the sun achieve sustained fusion by meeting the Lawson Criteria. Many researchers are spending billions of dollars trying to achieve fusion on a macro scale under the conditions set out by the Lawson Criteria. Some have achieved fusion, but none can sustain those conditions for meaningful lengths of time.

But the concepts of pressure and temperature on the atomic level are not completely understood. Nor is the interaction of carbon nanotubes and water, as noted above.

Applicants agree that for there to be a fusion reaction between deuterium atoms, the inherent repulsion between the atoms must somehow be overcome. The repulsion force associated with a single pair of deuterium atoms is not the same as in a macro amount of deuterium. On the atomic level the only force necessary to induce fusion between a single pair of deuterium atoms would be the force to overcome the repulsion forces of those two atoms, not billions of them as required in a conventional fusion reaction.

While Applicants' are not bound to explain the mechanism of their invention, it is Applicant's belief that the unique electronic environment inside a multiwalled carbon nanotube, or between the walls of a multiwalled carbon nanotube, or even inside a

single-walled carbon nanotube may be sufficient to disassociate deuterium gas into atoms and overcome the repulsive Coulomb forces of adjacent deuterium atoms.

What would support such a theory? - when measurable energy and detectable amounts of transmutation byproducts are produced by such a combination without the input of external energy. That is the very evidence Applicants' have provided.

As will be demonstrated below, the Examiner either ignores Applicant's evidence without comment, rejects it without any factual basis, or asserts it is contrary to the Lawson Criteria.

Specific Third-Party Confirmation

Pages 18-20 of Applicants' Appeal Brief set out detailed proof that combining three-dimensional nanostructured carbon materials such as carbon nanotubes with deuterium will transmute the deuterium in water to Helium (^4He) atoms and energy. In Guo et al., "Visible-Light-Induced Water-Splitting in Channels of Carbon Nanotubes," J. Phys. Chem. B, 110, No. 4, (2006)1571-1575², the researchers noted the production of energy when water (inherently containing deuterium as "heavy water, D_2O ") was combined with carbon nanotubes but not with "micro graphite." Id. at 1574. In addition, the results of their gas analysis unequivocally showed significant quantities of the transmutation byproduct helium. It should be noted that the entire focus of that work was to determine the composition of any gases produced when light was impinged on water containing several forms of carbon, including carbon nanotubes.

² Of record in this application and extensively considered by the Examiner.

The Examiner's Answer incorporates by reference previous criticisms of the Guo article found in previous rejections of this application (all of which have been addressed in Applicants' Appeal Brief) and in the Examiner's Answer asserts that Guo et al were using "light water H₂O" (Examiner's Answer p. 13). The Examiner is apparently inferring that heavy water (D₂O) or deuterium was not present in their work.

The Examiner states "[t]he Guo article further does not meet the nexus requirement because the present invention is directed to an interaction between deuterium and carbon nanotubes." Examiner's Answer id. The inference that Guo et al used only H₂O (without deuterium) is demonstrably false. As set out in footnote 6 of Applicants Appeal Brief, it is beyond scientific question that ALL water inherently contains D₂O, hence deuterium. While removal of the D₂O in ordinary water is readily accomplished (hence the commercial availability of "heavy water") there is nothing in the Guo et al article to indicate that the D₂O was removed from the water they used and that it consisted exclusively of H₂O. The Examiner's inference is not supported by the Guo et al article and is conjecture.

The Examiner's Answer does not even address the most significant finding of the Guo article – the production of significant quantities of helium. Instead, the Examiner focuses on elements at 3 AMU (the unlabeled peak in Fig. 2 of Guo) and never discusses the importance of the peak at 4AMU that is labeled "Helium" in that same figure. Fig. 2 is reproduced on page 19 of Applicants' Appeal Brief. The existence of helium is proof that some kind of nuclear reaction took place because transmutation of one atomic species to another is not possible by a chemical reaction and is a characteristic of a nuclear reaction.

Importantly, this finding of Guo et al is in conflict with the Lawson Criteria because the pressure and temperature requirements of that "Criteria" for fusion are not met. Which is more logical – that the Lawson Criteria does not apply on the atomic level or the work reported in the Guo et al paper is flawed and the transmutation product helium was not produced? When theory does not comport with demonstrable facts, it is theory that must change.

It should be noted that it is possible to produce transmutation byproducts in some materials by the application of extremely high energy, without there being a fusion or fission reaction. In "Helium Generated in Stainless Steel and Nickel," A. A. Bauer and M. Kangilaski, *Journal of Nuclear Materials*, 42(1) pp. 91-95, January 1972 it states: "[h]elium contents of up to 2000 ppm atomic have been measured in stainless steel specimens irradiated in the ETR³." While the energy associated with fast neutrons in a nuclear fission reactor have the energy to create helium, Guo et al applied energy in the form of visible light to the water and carbon nanotubes. Applicants are not aware of any work that induced the production of helium or any other transmutation byproduct from materials by use of light energy, without the presence of deuterium and a three-dimensional nanostructured carbon material. In addition, the possibility that the light energy alone induced helium production in this work is in conflict with the reported result in Guo et al where no energy or transmutation byproducts were produced from the same process when "micro-graphite" was used. Guo et al, p. 1574. That means that the production of energy and helium was not the result simply of impinging light energy on

³ A fast neutron nuclear fission reactor.

carbon in the presence of deuterium, but was the result of the carbon being a three-dimensional nanostructured carbon material set out in the claims of this application – the structure of a carbon nanotube.

The results reported in Guo et al are not the only technical facts the Examiner ignores or denigrates attempting to support the Final Rejection.

General Third-Party Confirmation

In 2009 the U.S. Defense Intelligence Agency reported on the state of the art for LENR research in DIA-08-0911-003, 13 November 2009. At that time LENR and “cold fusion” (both as defined herein) were synonymous. Thus, the DIA report is directed to cold fusion (as defined herein), not Applicant’s invention.

Applicants did not cite the DIA report to prove that the invention of this application is operable. The DIA report was cited to show that many credible scientists observed unexplained heat generation that was likely not chemical, the existence of atomic particles and transmutation byproducts without the extremely high pressures and temperatures required by the Lawson Criteria. Specifically, the DIA report states that “[s]cientists worldwide have been reporting anomalous excess heat production, as well as evidence of nuclear particles,⁴ and transmutation⁴”. Id. p. 2.

Thus, the foundation on which the Examiner bases the Final Rejection as set out in the Examiner’s Answer is fundamentally flawed – unbiased third parties have shown that atomic level nuclear reactions can occur under conditions outside the Lawson Criteria. Logically, when nuclear particles and transmutation products are produced at

⁴ Three citations omitted.

or near room temperatures, atomic level nuclear processes are **not** impossible. They may be difficult to duplicate or replicate because cold fusion (as defined herein - Pons-Fleischmann technology) is the process being used, but the existence of atomic level nuclear processes at or near room temperature cannot be logically denied.

Both Guo et al and the research cited in the DIA report unequivocally demonstrate that Lawson Criteria are not necessary for atomic level nuclear reactions. Other work by credible third parties also supports this fact.

Applicant-funded Work at Lawrence Livermore National Laboratory (LLNL)

Pages 16 and 17 of Applicants Appeal Brief describe work done at LLNL that was paid for by Applicants. At the time of that work (2006) Applicants believed external energy input was needed to induce the reaction and that the generation of neutrons would be unequivocal proof of a nuclear reaction. As set out in Applicants Appeal Brief, both assumptions were later learned to be incorrect. But the work done at LLNL unequivocally demonstrates that the Lawson Criteria are not applicable to atomic level nuclear reactions because neutrons were produced.

The LLNL report states at page 27, that "analysis of the ^3He proportional counter neutron data revealed a number of events associated with the CNT samples that are above normal background levels. Of these, the CNT sample event of October 13, 2006 at 16:14 provides evidence for a DD fusion source." (emphasis added).

On page 11 of the Examiner's Answer it denigrates the reported results because the complete report was not provided to the USPTO. As noted in Applicant's Appeal

Brief (p. 16), while Applicants (referred to as the "Sponsor" in the LLNL contract) may report the results of the work, the report cannot be published without consent of LLNL.⁵

The Examiner also asserted that Applicants have not provided sufficient detail about the work asserting that what was provided to the USPTO does not provide "irrefutable proof of cold fusion because there is no description that would make this statement (the results on page 27 of the LLRL report set out above) "believable" to one of ordinary skill in the art." Examiner's Answer p. 11. (clarification added). To the extent this assertion is understood, it is not relevant to this appeal for two reasons. First, the work at LLNL was not directed to cold fusion, as that term is defined herein. Second, the work at LLNL alone is not being asserted as proof of the invention. But the results reported by LLNL quoted above should demonstrate to any open-minded individual that there are conditions under which nuclear reactions can occur that are not entirely understood and that are outside the Lawson Criteria.

Examiner's speculation as to why Applicants should or did not disclose more of the LLNL report to the USPTO is irrelevant. If the LLNL report that states that multiple events show measured neutrons and that there was evidence of a D-D fusion event on a specific date and time, any number of pages discussing the experimental set up, data entry, and data analysis are not going to impact the Examiner's belief that Applicants must demonstrate that cold fusion (as defined herein) is operable. Moreover, the Examiner ignores the self-evident fact that the authors of the quoted statement made

⁵ The very last thing Applicants need is to spend time and resources in a legal dispute with LLNL as to whether or not the results were "published" in violation of the LLNL contract with Applicants.

the quoted statement after they considered all of the details of the work, including the experimental set up, data entry, and data analysis.

The logical ramification of the work at LLNL is further proof that the Lawson Criteria are not applicable for atomic level nuclear reactions.

Which is more logical – that Lawson Criteria does not apply on the atomic level or the LLNL report of the production of neutrons and detection of a D-D fusion reaction and Gou et al's report of helium production and the body of work reporting nuclear byproducts in the DIA Report are **all** flawed? Again, when theory does not comport with demonstrable facts, it is theory that must change.

As noted above, Applicant's analysis of the work at LLNL, and the consideration of the above noted limitations (energy input and neutron detection) changed their plans for subsequent research.

Applicant-funded Work in Bend Oregon

That subsequent research was funded by the Applicant's and done in a private laboratory in Bend Oregon. It is fully described in the as-filed application at paragraphs [0059-0078]. The Examiner has never shown this work to be flawed in any respect.

In this work deuterium gas and carbon nanotubes were combined in a vacuum system with no external energy input. State of the art detectors were placed downstream from various vacuum pumps that evacuated the system, before introduction of the reactants and after the reaction. The detectors determined if helium was produced in the vacuum system by a reaction between the deuterium and carbon nanotubes. The results unequivocally showed the reaction of carbon nanotubes and

deuterium produced helium in quantities that far exceeded any possible helium that could have been present in the system from helium in the air surrounding the apparatus.

This body of work, besides proving that Applicants have disclosed and claimed a new process for making usable energy, also demonstrates that the foundation on which the Examiner bases the Final Rejection is flawed – credible, unchallenged research demonstrates that atomic-level nuclear reactions occur under conditions outside the Lawson Criteria.

The work of Guo et al, the research cited in the DIA report, the work at LLNL, and the work at Bend all demonstrate that Lawson's Criteria are not necessary for atomic level nuclear reactions to occur. There is more support for that demonstrable FACT.

Applicants Initial (2005) and Follow-up (2015) Research

Before the initial research in 2005 is discussed it should be noted that Applicants believed, prior to any experimental work, that a fusion reaction was possible. Obviously, the efficiency of the reaction and the type and amount of radiation produced per unit mass of the reactants was unknown. Thus, out of understandable safety concerns, the mass of the samples was intentionally small (in milligrams) and the reaction vessels were shielded. To put it in more graphic terms, none of the Applicants wanted to be irradiated if the reaction was greater than they anticipated.

As a result of the small sample size, the measured radiation in some cases was close to the detected background. Nevertheless, the sophisticated detectors (presently unavailable to the Assignee or Mr. Loan) and X-ray film used in the initial discovery, and the ordinary Geiger counter used in measuring the 2005 sample in 2015 and reported in

the Loan Declarations in this application showed radiation being emitted over background levels.

This work is completely described in two Declarations of James Loan, of record in this application. Specifically, the Declarations of James Loan filed August 24, 2015 and the second on October 6, 2015.

The Examiner predictably considers the level of radiation over background in the Loan Declarations to be “insignificant” (Examiner’s Answer p. 10-11). Applicants disagree because any measurable radiation over background levels is technical significant, especially when the radiation is from a 10 milligram⁶ sample and is being measured ten years after it was first made.

Applicant’s Further Research in 2010

As extensively disclosed in the as-filed application in paragraphs [0081] to [0099] Applicants combined carbon nanotubes and deuterium gas within metal tubes having a quartz “window” adjacent a CCD detector. No external energy was input to the system. The CCD detector counted pulses of emitted light indicative of energy being emitted when deuterium gas was combined with carbon nanotubes.

This is consistent with the results noted in this Reply at pp. 3-6, where Guo et al irradiated water (inherently containing deuterium) in combination with carbon nanotubes and observed the emission of light energy.

The Examiner has never asserted that this work of the Applicant’s is flawed in any respect. Again, this work also demonstrates that the foundation on which the

⁶ If a new US dollar bill is cut into 100 pieces, one of those pieces would weigh about 10 milligrams.

Examiner bases the Final Rejection has been shown to be error – credible, unchallenged research demonstrates that atomic-level nuclear reactions occur under conditions outside the Lawson Criteria.

The Validity of the Lawson Criteria Has Been Rebutted

Applicants have more than met their burden to come forward with proof to rebut the factual assertions of the Examiner. In addition, the Examiner has completely failed to put forth any facts to contradict or criticize the Applicant's proof contained in the application itself, the two working examples of paragraphs [0059-78] and [0080-0099] that are described above.⁷ In fact the Examiner misstates on page 16 of the Examiner's Answer that "[t]he absence of working examples indicates one of ordinary skill in the art would not have been enabled to make the claims invention."

Thus, the rejection of the present application under 35 USC 101 and 112 has been overcome.

The Examiner's Answer to Applicants Argument A

The Examiner's Answer uses circular "logic." By equating the Lawson Criteria to "well-documented and accepted fact" and then asserting that the Criteria are not met in either Applicant's invention or the Pons-Fleischmann work, the Examiner asserts that Applicants' invention must be cold fusion (as the Examiner uses the term – i.e. Pons-Fleischmann "cold fusion"). As the Examiner states on Page 5 of the Answer, "This conclusion [the differences between the Pons-Fleischmann technology and Applicants' invention set out in its Brief at pp.8-10] ignores the main basis of the Examiner's

⁷ "Applicant-funded Work in Bend Oregon" p. 12-13 and "Applicant's Further Research in 2010" p.14.

characterization of the present invention as cold fusion: it does not achieve the conditions necessary to initiate fusion. Any differences between the present invention and the Fleishman-Pons devices do not undermine this fundamental fact.”

This assertion makes no sense – because neither process meet the Lawson Criteria does not mean they are the same, they merely share a characteristic. Because a jet airplane and a shoulder-fired rocket both are incapable of achieving orbit around the earth does not make them the same. Yet they both fail to meet the criteria for achieving orbit.

The Examiner’s Answer to Applicants Argument B

On page 6 of the Examiner’s answer it states:

Applicant cites a DIA report, alleging that such a report provides "clear evidence that some type of nuclear reaction can take place at low temperatures" and "prove[s] that if current scientific theory indicates that fusion cannot take place at low temperatures, then current scientific theory must be wrong because it conflicts with observable facts." This is a blatant misinterpretation of the findings of this report.

The Board can decide from the plain language of the DIA report if Applicant is misinterpreting the DIA report.

It is important to note what the DIA Report was reporting and what it was not. It was reporting that international research on LENR (actually, the Pons-Fleischmann technology) has shown that some nuclear process is taking place that is not well understood. It acknowledged that LENR is controversial, LENR is contrary to existing theory, and work reporting success at LENR has been widely criticized. The Report was not taking a position that the authors of the DIA Report’s understanding of LENR was superior to the LENR critics, just that

numerous researchers are getting results that cannot be explained by current understanding of nuclear physics. In other words, it was not evaluating the research, it was compiling it to show that there is evidence of a new type of nuclear process, and that such technology has great potential.

The Examiner quotes a portion of the Report: "if LENR can produce nuclear-origin energy at room temperatures" and then asserts that this quote "illustrates that DIA, at the time of the assessment, could not make a determination that LENR produces energy." Examiner's answer p. 6. The entire sentence states: "DIA assesses with high confidence that if LENR can produce nuclear-origin energy at room temperatures, this disruptive technology could revolutionize energy production and storage, since nuclear reactions release millions of times more energy per unit mass than do any known chemical fuel." DIA Report p. 1. The entire sentence makes it clear the "if" related to the unpredictable nature of LENR (the Pons-Fleischmann technology), but the major thought of the sentence is LENR's technical potential. In other words, if Pons-Fleischmann technology works, then it could revolutionize energy production and storage, because In that sentence the DIA was speculating about the impact of the Pons-Fleischmann technology, not evaluating LENR research in general.

Applicants have not "blatantly misrepresented" the DIA report as alleged by the Examiner. They have merely stated the ramifications of what is explicitly stated in the report - "[s]cientists worldwide have been reporting anomalous excess heat production, as well as evidence of nuclear particles,⁸ and transmutation⁸". Citing 6 technical papers. Id. p. 2.

⁸ Three citations omitted.

The DIA Report then lists twelve additional scientific studies that support the fact that some type of nuclear reaction is taking place using the Pons-Fleischmann technology and then the DIA Report concludes:

“This body of research has produced evidence that nuclear reactions may be occurring under conditions not previously believed possible.” Id. p. 3
(emphasis added).

The Examiner ignores this conclusion, most likely because it uses the word “may.” The “may” in that sentence merely reflected mainstream science’s skepticism of “[t]his body of work” and the unpredictable nature of Pons-Fleischmann “cold fusion.”

The Examiner also asserted that “the DIA report ignores the research generated by the scientific community that asserts that the “results” of cold fusion experiments can in fact be attributed to experimental error or to chemical phenomena.” Answer p. 6.

The intent of the DIA report was to summarize and cite work around the world that demonstrates that unexplained heat, nuclear particles, and transmutation products were being produced by the Pons-Fleischmann technology. But the Report also acknowledged the controversy surrounding this technology and acknowledged that the technology is contrary to known science and has been criticized. See the box entitled “Nuclear Fusion” on page 3 of the Report where it states: “‘Hot’ fusion researchers do not believe fusion can occur at near-room temperatures based on the Coulomb barrier that repels like nuclear charges and have dismissed much of the “cold fusion” research conducted since 1989. As a result, such research has received limited funding and support over the past 20 years.”

The DIA Report does not ignore the asserted shortcomings of the Pons-Fleischmann technology, it acknowledges it, but reports research that found that "nuclear reactions may be occurring under conditions not previously believed possible." Id. p. 3.

The Examiner's Answer to Applicants Argument C

The first of two of the Examiner's positions on Applicants assertion that a body of research supports the existence of nuclear reactions at low temperatures can be summarized by the following assertion from the Examiner's Answer:

The present invention is disclosed to operate by a mechanism that does not obey the laws of physics as currently understood by the scientific community⁹, so substantial empirical proof of operability that has been rigorously evaluated by objective scientists skilled in the art would be required to demonstrate operability. Id. p. 8.

Before dealing with the impediments to the evaluation of Applicant's technology by "objective scientists," Applicants strongly object to the inference that only non-objective or biased scientists have reported results that support Applicants technology. Guo et al have no relationship with Applicants. The results obtained at LLNL were not influenced by who the sponsor of the research was. The meager resources of the Assignee were nothing compared to the billions of dollars LLNL was getting for its hot fusion research. Nor was the research scientist in Bend, that performed the research reported in the application, biased. And the scientists whose work is cited in the DIA Report have no relationship to Applicants.

⁹ Here the Examiner recognized that "current" theory is just that, and it can change.

But there are two major impediments to any scientist investigating LENR technology. First is impact of errors made in the early promotion and disclosure of the Pons-Fleischmann technology. Pons and Fleischmann claimed to have solved the energy crisis and when the results could not be repeated or replicated and errors were noted in the Pons-Fleischmann technical paper they lost all credibility. In addition, there is some unknown factor that impacts the Pons-Fleischmann technology resulting in it working as hoped and then, under the same conditions with the same materials, not working at all.¹⁰ As a result, when the positive results could not be duplicated by independent researchers or errors were made in attempts to confirm the technology, mainstream nuclear physicists asserted the entire concept was bogus. The "cold fusion" fiasco ruined the careers of Drs. Pons and Fleischmann and became synonymous with bogus science. Major technical publication would not publish "cold fusion" papers and US government funding for "cold fusion" research was stopped. See "Background," DIA Report Page 1.

So why would an unbiased member of the scientific community write a paper investigating LENR? It would not be published in any major technical journal. And, if the results were contrary to known science, the author would share the same fate as Drs. Pons and Fleischmann, professional ridicule. Moreover, who would fund any scientific work to confirm LENR technology? And why would the scientists receiving billions of research dollars directed toward hot fusion give up that funding, take a major professional risk, and investigate LENR?

Clearly Applicants do not control what papers are written by third party scientists or what they investigate. But the history of LENR research and the "cold fusion" debacle has impeded

¹⁰ Private communications with SRI International scientists who worked on Pons-Fleischmann technology.

inquiry into the validity of both LENR (as here defined) and Applicants technology. Thus, it is factually incorrect for the Examiner to assert that the lack of independent confirmation of Applicants technology is due to it being inoperable.

In addition, it is impossible for Applicants to “shift the balance of the totality of evidence in the record towards patentability” as required by the Examiner¹¹ because the weight of evidence the Examiner is considering opposing Applicant’s technology is the massive body of work criticizing Pons-Fleischmann technology. While both are LENR (as defined herein) they are not the same technology. Thus, the balance the Examiner considers probative is irrelevant to patentability of the Applicant’s technology.

Second, the Examiner’s determination to equate Applicants technology with Pons-Fleischmann cold fusion is nowhere more apparent than this statement: “The present invention is disclosed and claimed to produce energy . However, there is no disclosure whatsoever of any calorimetry experiments that would verify this claim.” Answer p. 11.

Applicants’ process produces energy in the form of radiation. It is not known to produce excessive or unexplained amounts of heat. That is a characteristic of Pons-Fleischmann cold fusion. Moreover, heat generation is not exclusively the result of a nuclear event. Chemical reactions produce heat, so calorimetry would not unequivocally demonstrate a low energy nuclear reaction. By contrast, the production of helium with no external energy input does, and that is what is shown in the working example of the present application at paragraphs [0059-0078].

¹¹ Examiner’s Answer p. 7.

The Examiner's Answer to Applicants Argument D

Applicants have dealt with the Examiners assertions with respect to Argument D throughout this Reply. It should be noted that the Examiner has commented on some of the evidence proving the existence of a low energy nuclear reaction when carbon nanotube and deuterium are combined, but the Examiner does not show how the proof of the invention in the working examples in the patent application itself are in any way deficient.

The work described in paragraphs [0059-0078] shows helium being produced at or near room temperature and the work described in paragraphs [0080-0099] confirmed the results disclosed by Guo et al because light was emitted when carbon nanotubes were combined with deuterium.

The Examiner's Rejection Under 35 USC 102

Applicants admit that the word deuterium and a three-dimensional nanostructured carbon material (called a "fullerene" in the reference) are found within the cited Hagelstein reference. But even using the reasoning of the Examiner, this reference does not disclose the Applicant's invention. The Examiner asserts: "Even if a reference discloses an inoperative device, it is prior art for all that it teaches." Beckman Instruments v. LKB Produkter AB, 892 F. 2d 1547, 1551, 13 USPQ2d 1301, 1304 (Fed. Cir. 1989).

Applicants have clearly addressed what this reference "teaches" in its Appeal Brief at pages 21-24.¹² It discloses the inclusion of a myriad of materials having no discernable bounds can be included in any number of ways in Pons-Fleischmann

¹² The Board is respectfully invited to read Hagelstein in its entirety and answer the question – what does it teach?

electrochemical technology. Nowhere does it teach or suggest that the combination of fullerenes and deuterium would produce energy and helium as claimed in the present application.

The Examiner states:

Applicant argues that Hagelstein fails to disclose the generation of energy by contacting carbon materials with deuterium. The examiner disagrees. Paragraph (0274] states (with emphasis added) "molecular deuterium 25 fuses into another helium 37 thereby releasing energy into the lattice structure...Some of the energy release from the molecular transformations is lost to the metal lattice 31 and appears as heat energy." Answer p. 14.

There is no disclosure of a "fullerene" involved in this process and it cannot be "the metal lattice 31" because Hagelstein discloses the meaning of the metal lattice 31:

. . . we can state as a requirement that we need deuterium in the metal deuteride to support the d+d branch of the reaction. In the case of the p+d branch of the reaction, we require a mixed hydride and deuteride in the host lattice (which can be a metal or other hydrogen loaded material). Paragraph [0077].

The rejection under 35 USC 102 is not supported by the cited reference, the reasoning of the Examiner in the Answer, or the law.

The Rejection under 35 U.S.C. 112, first paragraph as lacking enablement

The invention of the present application is a method of producing energy and helium by combining deuterium and a three-dimensional nanostructured material, for example carbon

nanotubes. Applicants believe some kind of nuclear reaction takes place in that process, but it takes no complex technology or process to practice the invention.

As set out in the present application, and in the Loan Declarations regarding the "Wands Factors," all that is required is to mix heavy water (D_2O , being the source of the deuterium) and a three-dimensional nanostructured material like carbon nanotubes. The respective ratios are not known to be critical, nor is the temperature, the nature of the container, the pressure, nor is any external energy needed to induce the reaction. The amount of "skill" involved in practicing the invention using heavy water is the skill necessary to mix carbon nanotubes with water. That same level of skill applies when the source of the deuterium is deuterium gas. The only skills involved in practicing the present invention are keeping the light carbon nanotubes, that are easily dispersed by air currents, inside a container and monitoring the level of energy produced by the resulting reaction.

The Examiner's assertions of technical difficulties may be applicable to Pons-Fleischmann technology, but not that of the Applicants.

Because it takes no particular skill to practice Applicants invention, the rejection under 35 U.S.C. 112, first paragraph as lacking enablement is not supported by the facts.

35 U.S.C. 103 Obviousness

Nowhere in the Examiner's Answer is there a more insupportable statement than the claimed invention would have been obvious to one of ordinary skill in the art.

The Examiner has asserted that the claimed invention is contrary to known science, it is in violation of the Lawson Criteria that mainstream science believes **MUST** be present for fusion to take place, that LENR (as defined herein) has been shown to be

inoperable by reputable scientists, and that the evidence supporting the existence of Applicants technology is not credible.

The Examiner then cites Hagelstein, a reference that is mindbogglingly obtuse, unclear, unfocused, containing conjecture, theory, and the combination of an untold number of materials in an electrochemical process using metal deuterides as the critical component, requiring electrical input to initiate a reaction of the deuterium in the metal deuteride and then asserts one skilled in the art would, in light of that reference, find Applicants invention obvious.

To take that position requires the Examiner to contradict all that the Examiner and mainstream science has asserted that any LENR is impossible. There cannot be more evidence of a teaching away from the Applicant's invention than is present in this case.

The rejection of the claims of this application as being obvious in view of the prior art is inconsistent, unsupported by the facts, and in conflict with settled law. Simply stated, something contrary to known science cannot be obvious.

Conclusion

Applicants have demonstrated the invention is useful, operable, readily practiced without undue experimentation, and nowhere disclosed or suggested in the prior art. In supporting the Final Rejection of this application, the Examiner has wrongfully equated Applicant's invention with Pons-Fleischmann "cold fusion" technology. Nothing supports the assertion that these two technologies are the same.

The role of the US Patent and Trademark Office is to "promote science and the useful arts" not to stand as Horatio at the bridge and decide what

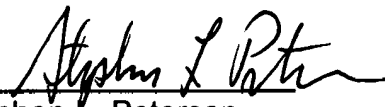
technology shall pass. When credible evidence demonstrates facts that are in conflict with theory, the questionable theory cannot be used to prevent the conventional application of the law. The Lawson Criteria have been proved to be inapplicable for atomic level reactions. When viewed on its merits the specification and claims of this application meet all statutory criteria for patentability.

Reversal of the Final Rejection and allowance of the claims is respectfully requested.

There were no new grounds of rejection in the Examiner's Answer.

Respectfully submitted,

Dated: May 20, 2019

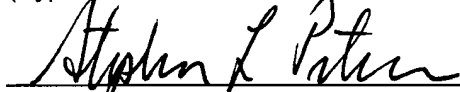
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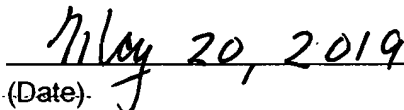
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EXAMINER

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PAPER

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Application Number: 13/089,986

Filing Date: 19 Apr 2011

Appellant(s): Cooper et al.

Stephen L. Peterson
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 01/15/19.

(1) Grounds of Rejection to be Reviewed on Appeal

Every ground of rejection set forth in the Office action dated 02/08/18 from which the appeal is taken is being maintained by the examiner except for the grounds of rejection (if any) listed under the subheading "WITHDRAWN REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

(2) Response to Argument

Background: The claimed invention is directed to a nuclear fusion method (Claim 1: "method of generating ^4He atoms and energy...comprising...transmuting the deuterium to ^4He atoms and energy"; see also [0017] and [0054]). Its asserted utility is "generating non-ionizing radiation or non-ionizing ^4He " ([002] as well as "meeting current and future energy needs" [004]).

Nuclear fusion is known to occur at extremely high temperatures and pressures (e.g., in the core of the sun and other stars). In man-made nuclear fusion devices, energy must be input to achieve what is known in the art as the "Lawson Criteria" to initiate nuclear fusion reactions. For the deuterium-deuterium fusion reaction that purportedly occurs in the present invention, temperatures of hundreds of degrees Kelvin are required to provide sufficient energy for the deuterium atoms to fuse (see Lawson "Some Criteria for a Power Producing Thermonuclear Reactor" in the OA Appendix). The present invention is disclosed to operate at temperatures near room temperature, far below what is recognized in the art as necessary to achieve nuclear fusion. Accordingly, the examiner has characterized the present invention as directed to what is known in the art as "cold fusion."

The alleged mode of operation of the present invention is similar to the "Fleishman-Pons" class of devices named for the scientists who pioneered the field of "cold fusion" in the 1990s. Fleischman-Pons devices purportedly lower the energy barrier to nuclear fusion reactions by concentrating hydrogen isotope ions from heavy water in the crystal lattice of a material with high affinity for

hydrogen—palladium (citation provided in final office action). The present invention loads hydrogen isotope ions into the crystal lattice of a carbon-based material ([005-6]).

Cold fusion has been theorized for several decades, but the scientific community has repeatedly disproven such claims. The examiner set forth a factual explanation of this in the office actions of 01/12/16 (see paras. 5-20) and 08/01/16 (see paras. 19-35). In short, the scientific literature as a whole suggests that cold fusion does not and cannot occur, i.e., that any invention that involves cold fusion is wholly inoperable.

Claim rejections under 35 U.S.C. 101 and 112: Based on the technological field of the present invention—cold fusion—and the state of the art in this field, one of ordinary skill in the art would have cause to doubt the asserted utility of the present invention. To properly reject a claimed invention under 35 U.S.C. 101, the Office must (A) make a prima facie showing that the claimed invention lacks utility, and (B) provide a sufficient evidentiary basis for factual assumptions relied upon in establishing the prima facie showing. *In re Gaubert*, 524 F.2d 1222, 1224, 187 USPQ 664, 666 (CCPA 1975) "Accordingly, the PTO must do more than merely question operability - it must set forth factual reasons which would lead one skilled in the art to question the objective truth of the statement of operability." If the Office cannot develop a proper prima facie case and provide evidentiary support for a rejection under 35 U.S.C. 101, a rejection on this ground should not be imposed. See, e.g., *In re Oetlker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992) ("[T]he examiner bears the initial burden, on review of the prior art or on any other ground, of presenting a prima facie case of unpatentability. If that burden is met, the burden of coming forward with evidence or argument shifts to the applicant. If examination at the initial stage does not produce a prima facie case of unpatentability, then without more the applicant is entitled to grant of the patent."). See also *Fregeau v. MossInghoff*, 776 F.2d 1034, 227 USPQ 848 (Fed. Cir. 1985) (applying prima facie case law to 35 U.S.C. 101); *In re Piasecki*, 745 F.2d 1468, 223 USPQ 785 (Fed. Cir. 1984). MPEP 2107.02(IV).

The examiner has provided a proper showing that the claimed invention lacks utility by stating on the record that the present invention is directed to cold fusion (see, e.g., Office action 01/12/16, paras. 6-7). Furthermore, evidentiary basis for this statement was provided (see, e.g., Office action 01/12/16, paras. 8-20). Consequently, the burden of proving operability and utility shifted to Applicant.

Applicant has attempted to meet this burden by filing declarations (08/25/15 and 10/06/15), referencing an experimental study performed by LLNL (in the declaration of 08/25/15; report not made of record); and various NPL (Guo, which is not of record, and as filed on the IDS of 08/25/15). These submissions are insufficient to demonstrate operability and utility of the present invention, for the reasons set forth previously, and as detailed in the final office action (referring to MPEP 2107.02 and 716.01(c)).

Appeal Brief Argument A: Applicant argues that the examiner has mischaracterized the present invention as cold fusion (pp. 8-10). The examiner respectfully disagrees. It is well-documented and accepted fact in the art that nuclear fusion requires extremely high temperatures. There is no evidence of record that the present invention achieves the conditions necessary to initiate nuclear fusion reactions. It is for this reason that the examiner has characterized the present invention as cold fusion. Furthermore, there are some similarities between the present invention and the Fleishman-Pons scheme also characterized as cold fusion. Applicant correctly notes that there are also some differences between the present invention and the Fleishman-Pons cold fusion experiments. However, Applicant concludes “[t]o equate the two processes, by ignoring the fundamental characteristics of the operative materials and calling two materials solids is to obscure the facts.” This conclusion ignores the main basis of the Examiner’s characterization of the present invention as cold fusion: it does not achieve the conditions necessary to initiate fusion. Any differences between the present invention and the Fleishman-Pons devices do not undermine this fundamental fact.

Appeal Brief Argument B: Applicant further argues that Fleishman-Pons cold fusion process are operative (pp. 10-11). Applicant cites a DIA report, alleging that such a report provides “clear evidence that some type of nuclear reaction can take place at low temperatures” and “prove[s] that if current scientific theory indicates that fusion cannot take place at low temperatures, then current scientific theory must be wrong because it conflicts with observable facts.” This is a blatant misinterpretation of the findings of this report. DIA concludes in the executive summary “DIA assesses with high confidence that *if LENR can produce nuclear-origin energy at room temperatures*, this disruptive technology could revolutionize energy production and storage.” In fact, the phrase “if LENR can produce nuclear-origin energy at room temperatures” in the conclusion illustrates that DIA, at the time of the assessment, could not make a determination that LENR produces energy. The report also includes the phrase “[i]f nuclear reactions in LENR experiments are real and controllable,” indicating that the DIA analysts did not believe that the research detailed in the report was sufficient to conclude that LENR is a real and controllable phenomenon. There is another flaw in Applicant’s argument that the DIA report should be weighed as evidence in favor of operability of the present invention: the DIA report ignores the research generated by the scientific community that alleged “results” of cold fusion experiments can in fact be attributed to experimental error or to chemical phenomena. For example, the following discrepancies were documented during scrutiny of cold fusion experiments by the scientific community:

- After Fleischmann and Pons announced their fusion device competing researchers attempted to reproduce their results. The results of these attempts were primarily negative. The few initial positive results were either retracted or later shown to be in error by subsequent experiments (citation provided in final office action).
- The general consensus by those skilled in the art and working at these various laboratories is that the fusion conclusion made by Fleischmann and Pons was based on experimental error (citation provided in final office action).

- Experimenters who previously found evidence of excess heat could not reproduce their results when better calorimetry equipment was used (citation provided in final office action).
- Experimenters at the Naval Research Laboratory had mistakenly reported the production of particular palladium isotopes by neutron transmutation in cold fusion cells (citation provided in final office action).

Appeal Brief Argument C: Applicant argues that “the Applicants have shown, in four different types of experiments that their technology produces energy consistent with some type of low temperature nuclear reaction” (pp. 12-17). The examiner disagrees. At a minimum, as shown by the extensive scrutiny, evaluation, and rigorous verification attempts by the scientific community cited by the Examiner, results showing “energy consistent with some type of low energy nuclear reaction” cannot be construed as evidence of operability in cold fusion experiments. Over several decades, many experiments have demonstrated results “consistent with” cold fusion. However, upon further analysis (as documented above and throughout prosecution), these results, in fact, were attributed to non-nuclear phenomena.

The examiner does not agree that the experimental testing of the present invention demonstrates operability and should be accepted as facts. The alleged “facts” of the performance of the present invention have not been rigorously evaluated and scrutinized by the scientific community as a whole, they do not shift the balance of the totality of evidence in the record towards patentability. Because many previous cold fusion experiments producing “results consistent with nuclear fusion” were later—under further scrutiny and more rigorous evaluation—found to be inoperable, the examiner cannot accept the experimental results of record as irrefutable proof that nuclear fusion occurs in the present invention.

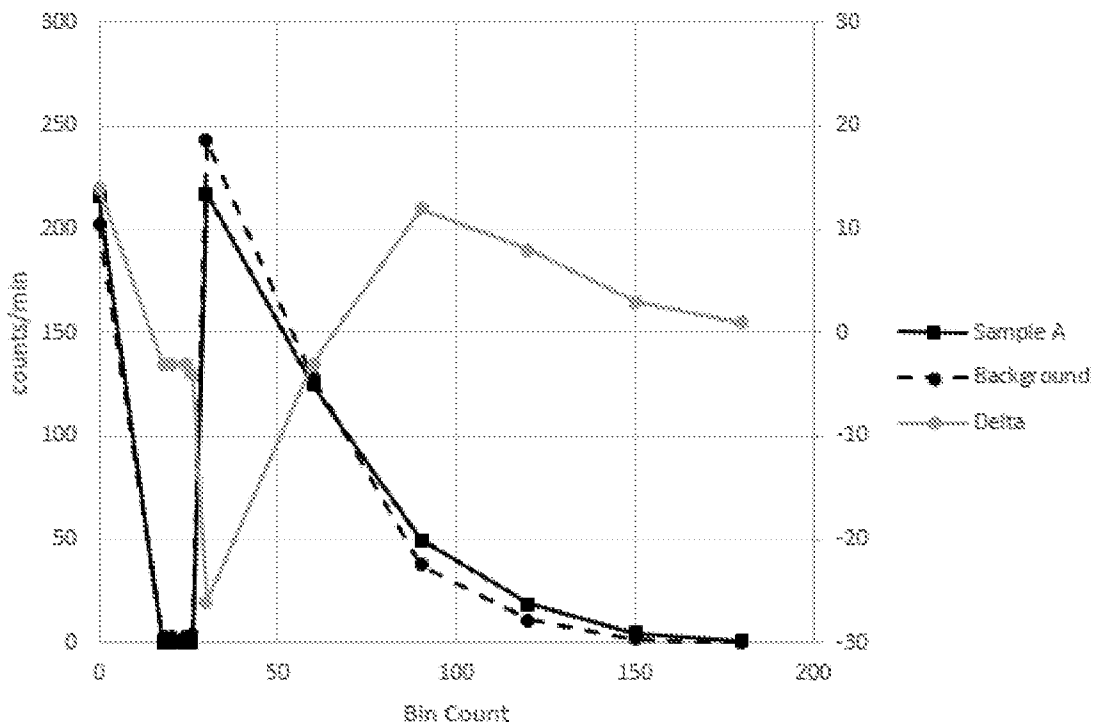
Because the examiner's position in challenging the asserted utility of the present invention is based on established scientific beliefs and principles, evidence of similar weight would have to be made of record to rebut the finding of inoperability and lack of utility. There is no predetermined amount or character of evidence that must be provided by an applicant to support an asserted utility, therapeutic or otherwise. Rather, the character and amount of evidence needed to support an asserted utility will vary depending on what is claimed (*Ex parte Ferguson*, 117 USPQ 229 (Bd. App. 1957)), and whether the asserted utility appears to contravene established scientific principles and beliefs. *In re Gazave*, 379 F.2d 973, 978, 154 USPQ 92, 96 (CCPA 1967); *In re Chilowsky*, 229 F.2d 457, 462, 108 USPQ 321, 325 (CCPA 1956).

The present invention is disclosed to operate by a mechanism that does not obey the laws of physics as currently understood by the scientific community, so substantial empirical proof of operability that has been rigorously evaluated by objective scientists skilled in the art would be required to demonstrate operability. The bar for demonstrating operability is quite high for the present invention because of the large number of similar experiments allegedly demonstrating cold fusion that were subsequently disproven when subjected to more rigorous scrutiny. Lindstrom ("Believable statements of uncertainty and believable science" provided in the OA Appendix) addresses this issue:

"Anomalous observations may indeed point to new phenomena, but simple explanations are usually most probably. 'The first principle is that you must not fool yourself—and you are the easiest person to fool' (R. P. Feynman, 1974 Caltech commencement address). Science is a communal activity whose practitioners build upon each other's work. To exploit the literature we must understand its limitations, which is possible only if the authors of publications understand the uncertainties in their measurements and conclusions, and make us, the readers, understand them in the same way."

The experimental results of record are insufficient to demonstrate that the present invention achieves nuclear fusion in view of the large body of evidence that indicates that cold nuclear fusion cannot occur. To paraphrase Lindstrom, the evidence provided is not believable because it is not supported by a discussion of uncertainties and does not rule out simple explanations for the observed results. For example,

- The first Loan affidavit provides radiation count data purportedly obtained by placing a radiation detector near the present invention. However, the data obtained does not appear to be statistically different from the background radiation also collected. In fact, in many instances, the background radiation is higher than the radiation supposedly emanating from the invention. Displaying this data in a different format (below), one of ordinary skill in the art would be unconvinced that the results definitely prove that the present invention provides a radiation output above background radiation. In fact, the close correlation with the sample and the background indicates that there is no real difference between the two measurements. Notably, the report of these results does not indicate the error bar associated with the particular instrumentation used or any documentation of calibrating the instrumentation, so one cannot determine whether the difference between the measurements is meaningful or whether it falls within the expected error level of the instrumentation.



Furthermore, the detector used in these experiments does not detect neutrons, which would be a key signature indicating fusion was occurring. A key factor in disclosing a significant and meaningful result is collecting data from multiple experiments and consolidating that data together. Such experimentation provides an indication of the reproducibility of the results. It is the reproducibility issue that has been the downfall of previous cold fusion experiments, as discussed above.

- The second Loan affidavit provides additional "data" purportedly collected from the present invention. However, this data clearly has not been subjected to the rigorous examination required by the scientific method. For example, the chart between paragraphs 21 and 22 has no labels on its axes, so it is impossible to tell what is being displayed. Furthermore, Loan admits "the fact that the detector we used detected gamma rays, X-rays and neutrons, the fact the sample sizes were small, and the presence of polypropylene shielding....prevented us from determining the exact amount and nature of any radiation produced." It would seem however, that an experiment designed to prove the existence of cold fusion would, in fact, necessarily

need to provide an indication of the "exact amount and nature of any radiation produced." This experimentation, accordingly, seems to be flawed.

- The quotation of a single sentence in what probably is a several-hundred page report produced by LLNL is insufficient evidence of operability. Loan himself admits "the experiments produced mixed results." Again, the Examiner notes that the downfall of cold fusion experimentation has historically been reproducibility. The LLNL report that has not been made of record in this application allegedly states "Of these [various test results] the CNT sample event of October 25, 2006 at 16:14 provides evidence for a DD fusion source." Accordingly, it appears that *a single moment in a single experiment among many* provided an indication consistent with fusion. The overall conclusions of the LLNL report have not been made of record. The experimental details have not been made of record. The experimental results have not been made of record. Accordingly, there is no indication that the LLNL report provides irrefutable proof of cold fusion because there is no description that would make this statement "believable" to one of ordinary skill in the art.

- The present invention is disclosed and claimed to produce energy. However, there is no disclosure whatsoever of any calorimetry experiments that would verify this claim.

Regarding the alleged testing of the present invention in experiments conducted at LLNL, the examiner finds the information submitted to be insufficient for demonstrating operability (as discussed in the foregoing paragraph). The previous examiner has made a request for information to evaluate any such report of experimental evaluation. Applicant has responded by stating that the report is unavailable. However, the standard non-publication clause of a typical government contract report is insufficient to establish that the referenced experimental evidence is not able to be made of record. This clause is directed to publication of the report, and specifically states (with emphasis added), "Sponsor

may disclose the content of any report provided to the Sponsor by the Contractor resulting from the work under this Agreement."

The examiner notes that the request for information was made in this application based on declaration statements that additional empirical evidence may exist to overcome the Examiner's position that the present invention is inoperable and therefore lacking utility. Applicant's refusal to provide evidence that possibly could shift the determination of patentability in favor of Applicant is perplexing. It would seem that if the inventors possessed information that would prove the present invention is operable, they would be eager to provide this to the Office as well as to publish it in scientific journals to prove to the scientific community that the dismissal of cold fusion is in error.

Applicant concludes (p. 21) "if the facts are in conflict with current scientific theory, it is the theory that must be changed to conform with the facts. Discounting indisputable facts because they are in conflict with current theory is scientifically and legally indefensible." Applicant is suggesting that the examiner should ignore decades of research conducted by hundreds of scientists that was collectively found by the scientific community as a whole to disprove the existence of cold fusion in favor of some experimental "facts" that have not been subjected to the same level of scrutiny! The examiner emphatically disagrees that the experimental results of record can be considered to be "indisputable." There is no evidence of record that Applicants have sought peer review of the experimental results of the present invention, which would be the only path to changing current scientific theory. The examiner—and the USPTO—does not have the ability, mission, or responsibility to change scientific theory. It is the function of the scientific community utilizing the scientific method to observe, hypothesize, validate, disprove. Only through these activities can current scientific theory undergo change.

Appeal Brief Argument D: There are peer-reviewed journal articles supporting Applicant's position that cold fusion occurs in the present invention (pp. 18-21). The Examiner respectfully disagrees

that the referenced NPL publications provide evidentiary support of the operability of the present invention. The findings of Guo were addressed in detail at paras. 9-13 of the Office action of 08/01/16. The NPL publications of the IDS of 08/26/17 are similarly insufficient in overcoming the totality of evidence presented by the Examiner in support of inoperability. The finding of inoperability and lack of utility of the present invention is based entirely on the fact that the present invention requires that nuclear fusion occur. Accordingly, any objective evidence in support of operability must demonstrate that nuclear fusion occurs in the present invention. Without such a connection, the evidence fails to meet the nexus requirement (see MPEP 716.01(b)).

- Guo describes a chemical interaction between water (light water, H₂O) molecules and carbon nanotubes, resulting in the production of hydrogen gas via electrolysis. It contains no support for the production of helium or tritium via nuclear fusion. Guo explicitly discloses "[t]he non-labeled peaks are either attributable to the fragments of [He, CH₄, H₂O, CO, C₂H₆, and CO₂] or are rather insignificant." Accordingly, Guo attributes the peak at AU 3 to instrumental noise, rather than to tritium, as the Loan affidavit alleges. Furthermore, the Loan affidavit argues that the peak at AU 3 "can only be made by ³He (Helium 3) or T (tritium ³H). Both of these gases are transmutation byproducts of a nuclear reaction." Loan ignores the fact that ³He is a naturally occurring isotope as well as the fact that H-D would also have an AU of 3. Accordingly, the non-labeled peak at AU 3 that Guo dismisses as not exceeding the signal-to-noise ratio of its instrumentation is attributable to naturally occurring substances and cannot be taken alone to be statistically significant evidence of nuclear fusion. The Guo article further does not meet the nexus requirement because the present invention is directed to an interaction between deuterium and carbon nanotubes.
- Moreover, the NPL documents of the IDS of 08/26/17 fail to meet the nexus requirement. The publications describe the discovery of an interesting quantum interaction between water (light

water, H₂O) molecules and beryl (beryllium aluminum silicate), resulting in proton delocalization. There is no indication that the interaction produces helium or nuclear fusion. It similarly does not meet the nexus requirement because the present invention is directed to the interaction of deuterium and carbon materials.

Rejections under 35 U.S.C. 102: Regarding the claim rejections under 35 U.S.C. 102, Applicant's arguments (pp. 21-27) are unpersuasive. Applicant's arguments seem to be conflating issues of enablement under 35 U.S.C. 112(a) with issues of anticipation under 35 U.S.C. 102. Accordingly, Applicant's argument that "Hagelstein fails to provide an enabling disclosure with respect to the claimed subject matter" is moot. "Even if a reference discloses an inoperative device, it is prior art for all that it teaches." *Beckman Instruments v. LKB Produkter AB*, 892 F.2d 1547, 1551, 13 USPQ2d 1301, 1304 (Fed. Cir. 1989). Therefore, "a non-enabling reference may qualify as prior art for the purpose of determining obviousness under 35 U.S.C. 103." *Symbol Techs. Inc. v. Opticon Inc.*, 935 F.2d 1569, 1578, 19 USPQ2d 1241, 1247 (Fed. Cir. 1991). MPEP § 2121.

Furthermore, Applicant argues that Hagelstein fails to disclose the generation of energy by contacting carbon materials with deuterium. The examiner disagrees. Paragraph [0274] states (with emphasis added) "molecular deuterium 25 fuses into another helium 37 thereby releasing energy into the lattice structure...Some of the energy release from the molecular transformations is lost to the metal lattice 31 and appears as heat energy." In one of the embodiments of the invention the material 202 of the metal lattice is carbon-based (see [0322]) and comprises molecular deuterium ([0312]). That Hagelstein fails to explicitly disclose all of the claim elements in a single paragraph or section is moot.

A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984). "The use of patents as references is not limited to what the patentees describe as their own inventions or to the problems with which they are

concerned. They are part of the literature of the art, relevant for all they contain." *In re Heck*, 699 F.2d 1331,1332-33, 216 USPQ 1038, 1039 (Fed. Cir. 1983) (quoting *In re Lemelson*, 397 F.2d 1006, 1009,158 USPQ 275, 277 (CCPA 1968)). A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including nonpreferred embodiments. *Merck & Co. v. Biocraft Laboratories*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert, denied, 493 U.S. 975 (1989). See also *Celerita Technologies Ltd. v. Rockwell International Corp.*, 150 F.3d 1354, 1361, 47 USPQ2d 1516,1522-23 (Fed. Cir. 1998) (The court held that the prior art anticipated the claims even though it taught away from the claimed invention. "The fact that a modem with a single carrier data signal is shown to be less than optimal does not vitiate the fact that it is disclosed.") Although Hagelstein discloses many examples of materials that can perform its energy production method, disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments. *In re Susi*, 440 F.2d 442,169 USPQ423 (CCPA 1971).

Rejection under 35 U.S.C. 112, first paragraph as lacking enablement: Applicant argues that the present invention is enabled because the August Loan Declaration addresses the Wands Factors (pp. 30-31). The examiner respectfully disagrees. Loan's analysis does not consider the evidence as a whole. Based on the evidence regarding the below factors (*In re Wands*, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988)), the specification at the time the application was filed, would not have taught one skilled in the art how to make the full scope of the claimed invention without undue experimentation.

Based on the evidence as a whole:

- The claims are overly broad because one of ordinary skill in the art would not be able to use the claimed process to achieve nuclear fusion. There is no description of conditions in the claims that would allow the claimed process to result in nuclear fusion.
- The nature of the invention—cold fusion— and the state of the art with respect to cold fusion necessitates that an enabling disclosure must include exact conditions and

experimentation that would allow one of ordinary skill in the art to achieve nuclear fusion.

- The level of one of ordinary skill in the art would not have enabled one to make the claimed invention given the lack of literature available that would guide one to achieve nuclear fusion by the claimed method. There currently exists no literature demonstrating cold fusion. Additionally, there is no predictability in the art of cold fusion. Identical experiments have been found to produce different results.
- The amount of direction provided by the disclosure would not have enabled one of ordinary skill in the art at the time of the invention to make the claimed invention. Because the specification does not reliably establish that the present invention achieves nuclear fusion, one of ordinary skill in the art would have no way to verify whether replication of the present invention was successful.
- The absence of working examples indicates one of ordinary skill in the art would not have been enabled to make the claimed invention. No cold fusion experiments to date have provided definitive proof that cold fusion is operative.
- One of ordinary skill in the art would have had to conduct undue experimentation to use the claimed invention. For one of ordinary skill in the art to use the claimed invention, one would need to perform the claimed process and achieve nuclear fusion. Based on the foregoing factors, it is unlikely that any amount of experimentation would provide this result.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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Requirement to pay appeal forwarding fee. In order to avoid dismissal of the instant appeal in any application or ex parte reexamination proceeding, 37 CFR 41.45 requires payment of an appeal forwarding fee within the time permitted by 37 CFR 41.45(a), unless appellant had timely paid the fee for filing a brief required by 37 CFR 41.20(b) in effect on March 18, 2013.

Some Criteria for a Power Producing Thermonuclear Reactor

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Communicated by D. W. Fry; MS. received 2nd November 1956

Abstract. Calculations of the power balance in thermonuclear reactors operating under various idealized conditions are given. Two classes of reactor are considered: first, self-sustaining systems in which the charged reaction products are trapped and, secondly, pulsed systems in which all the reaction products escape so that energy must be supplied continuously during the pulse. It is found that not only must the temperature be sufficiently high, but also the reaction must be sustained long enough for a definite fraction of the fuel to be burnt.

§ 1. INTRODUCTION

IT has been widely conjectured that some form of controlled thermonuclear reactor, capable of producing a useful amount of power, will some day be constructed. In this paper the power balance in such a reactor is considered, and some criteria which have to be satisfied in a power producing system are derived.

Some of the difficulties of realizing a controlled fusion reaction have been discussed by Thirring (1955) and Thonemann (1956), and a broad survey of fundamentals has been given by Post (1956). The present treatment differs from that of Thirring in the assumptions about the radiation from a hot gas, and it covers in rather more detail some of the points discussed by Thonemann and Post. The analysis is based on simple assumptions; it is designed to illustrate the essential features of the problem, and is neither rigorous nor complete. The assumptions made are in all cases optimistic, so that the criteria established are certainly necessary, though by no means sufficient, for the successful operation of a thermonuclear reactor.

§ 2. BASIC PRINCIPLES

Of the exoergic reactions involving light nuclei those between the hydrogen isotopes (the so-called D-D and T-D reactions) are by far the most probable at low energies. Of these the T-D reaction has the higher cross section, but since tritium does not occur naturally it is necessary to use a system in which it can be bred. This may be done by capturing the neutrons emitted in the T-D reaction in ${}^6\text{Li}$, which then decays into T and ${}^4\text{He}$.

The reactions of interest are shown in table 1.

Table 1

Reaction	Q (mev)	σ_{\max} (barns)	σ_{\max} energy
${}^2\text{H}(\text{d}, \text{n}){}^3\text{He}$	3.3	0.09	2 mev
${}^2\text{H}(\text{d}, \text{p}){}^3\text{H}$	4.0	0.16	2 mev
${}^2\text{H}(\text{t}, \text{n}){}^4\text{He}$	17.6	5.0	150 kev
${}^6\text{Li}(\text{n}, \alpha){}^3\text{H}$	4.8	$1/v$ law	

The energy released per unit time and volume by thermonuclear reactions in a hot gas is given by

$$P_R = n_1 n_2 \bar{v}\sigma(T)E \quad \dots\dots(1)$$

where n_1 and n_2 are the number densities of the nuclei of the first and second kinds, and $\bar{v}\sigma(T)$ is the product of the relative velocities of the nuclei and the reaction cross section averaged over the Maxwellian velocity distribution corresponding to a temperature T , and E is the energy released by one reaction. If the ions are of the same kind (as in the D-D reaction) $n_1 n_2$ is replaced by $2(n/2)^2 = \frac{1}{2}n^2$. Values of $\bar{v}\sigma(T)$ calculated from published values of the cross sections for the D-D and T-D reactions are given in the companion paper by Thompson (1957).

Energy can be lost from the hot gas in two ways, by radiation and by conduction. At temperatures above about 10^6 degrees hydrogen is completely ionized and radiation occurs principally as bremsstrahlung (free-free transitions). The mean free path of such radiation is large (several g cm⁻²) and consequently in a reactor of controllable size virtually all of it would escape. The Stefan-Boltzmann T^4 law does not hold under these circumstances; the variation of intensity with temperature can only be found by a detailed study of the radiation process. The power radiated per unit volume in hydrogen is given by (Spitzer 1956)

$$P_B = 1.4 \times 10^{-34} n^2 T^{1/2} \text{ watts cm}^{-3}. \quad \dots\dots(2)$$

If the hot gas is in a magnetic field the electrons will move in spiral orbits, and additional radiation due to the acceleration towards the axis of the spiral will occur. This radiation is similar to that obtained from electrons in a betatron, and it may be important in very intense fields. It will, however, be neglected in this paper.

Conduction loss is difficult to treat in a general way, since it depends on the geometry of the system, its density and temperature distribution, and also the wall material. In the analysis which follows it is optimistically assumed that the conduction loss is zero.

It is of interest to see at what temperature the nuclear power release is equal to the radiated power. This may be called the 'critical temperature' and is the hypothetical temperature which would be needed for a self-sustaining system if all the radiation escaped but the reaction products were retained. The critical temperature is about 150 million degrees for the D-D reaction (assuming that the tritium is burnt as soon as it is formed, but that the ³He is not burnt), and 30 million degrees for the T-D reaction.

The critical temperature is a somewhat artificial concept; it does not mean that if a thermonuclear fuel is heated to this temperature a reaction will be set off in the way that a chemical explosion is set off, or that the fuel can be ignited as in a gas jet. This would only be true if the energy of the reaction were deposited close to where it was released, i.e. if the range of the reaction products were short compared with the dimensions of the apparatus. In fact, the range of the particles will almost certainly be large compared with the dimensions of the apparatus if the system is to be of controllable size, so that unless the tracks are somehow coiled up it will be the walls of the apparatus which are heated rather than the gas, and energy must be fed in continuously to sustain the reaction.

Various types of system will now be considered in a general way. No suggestions of how to realize them will be given.

§ 3. SYSTEMS IN WHICH THE REACTION PRODUCTS ARE RETAINED

It is not inconceivable that the charged reaction products could be contained in the hot gas by a suitable combination of electric and magnetic fields, though it seems unlikely that the escape of neutrons can be prevented. The temperature at which such a system would be self-sustaining in the absence of conduction loss can be calculated by equating the radiation loss to the energy carried by the charged disintegration products. This temperature is about 3×10^8 degrees for the D-D reaction, and 5×10^7 degrees for the T-D reaction. In the D-D system it is only just possible in principle to sustain the reaction, since above about 10^8 degrees the reaction rate increases with temperature only slightly faster than the radiation loss. At 10^9 degrees for example a conduction loss equal to the radiation loss is sufficient to quench the reaction.

As an example of the orders of magnitude involved, the slowing down range of the charged reaction products in a gas at 10^8 degrees and 10^4 atmospheres pressure ($n = 3 \times 10^{17}$ nuclei/cm³) is of the order of a kilometre. The range of the neutrons is hundreds of kilometres.

§ 4. SYSTEMS IN WHICH THE REACTION PRODUCTS ESCAPE

An alternative type of system in which the reaction products are not retained in the gas will now be considered. Since some specific proposals are for pulsed systems we shall consider the following idealized cycle: the gas is heated instantaneously to a temperature T , this temperature is maintained for a time t , after which the gas is allowed to cool. Conduction loss is neglected entirely, and it is assumed that the energy used to heat the gas and supply the radiation loss is regained as useful heat.

An important parameter R will now be introduced; this is the ratio of the energy released in the hot gas to the energy supplied. Now the energy released by the reaction appears as heat generated in the walls of the apparatus, and this has to be converted to electrical, mechanical or chemical energy before it can be fed back into the gas. If η is the efficiency with which this can be done, then the condition for a system with a net power gain is

$$\eta(R+1) > 1. \quad \dots\dots(3)$$

The maximum value of η is about $\frac{1}{3}$, so that R must be greater than 2.

For the pulsed cycle described above we have

$$R = \frac{tP_R}{tP_B + 3nkT} = \frac{P_R/3n^2kT}{P_B/3n^2kT + 1/nt} \quad \dots\dots(4)$$

where P_R and P_B are respectively the reaction power and radiated power per unit volume. The $3nkT$ term represents the energy required to heat the gas to a temperature T . Electron binding energies are neglected, but the contribution from electrons is included (this accounts for the factor 3 rather than $\frac{3}{2}$).

Since P_R and P_B are both proportional to n^2 , R is a function of T and nt . In figure 1 curves of R against T for various values of nt are shown for the D-D reaction assuming that the tritium formed is also burnt. (In practice the tritium would have to be collected and fed back into the system with the deuterium.) The line $R=2$ is shown dotted in the figure, and it is seen that for a useful reactor T must exceed 2×10^8 degrees and nt must exceed about 10^{16} . Thus, for a pulse of 1 microsecond duration, n must be greater than 10^{22} ; this corresponds to

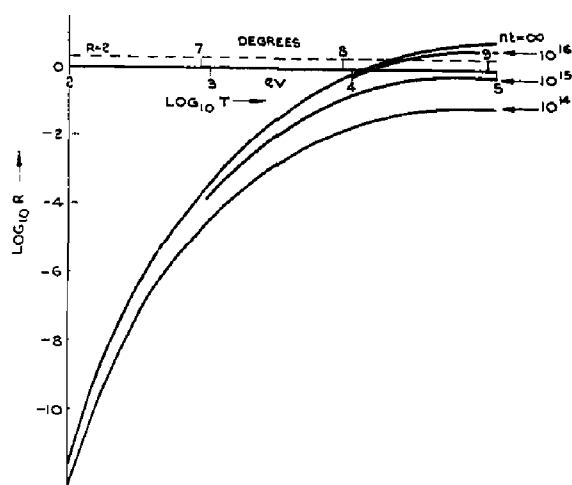


Figure 1. Variation of R with T for various values of nt for D-D reaction.

a pressure of 6×10^8 atmospheres at a temperature of 2×10^8 degrees. Particles move several metres during this time, and the mean free path for momentum transfer is several centimetres even at this high density. These distances are, of course, measured along the track, which may be spiralled or oscillatory.

Figure 2 shows similar curves for the T-D reaction. Conditions are easier, but still severe; nt must exceed 10^{14} , and the minimum temperature is 3×10^7 degrees.

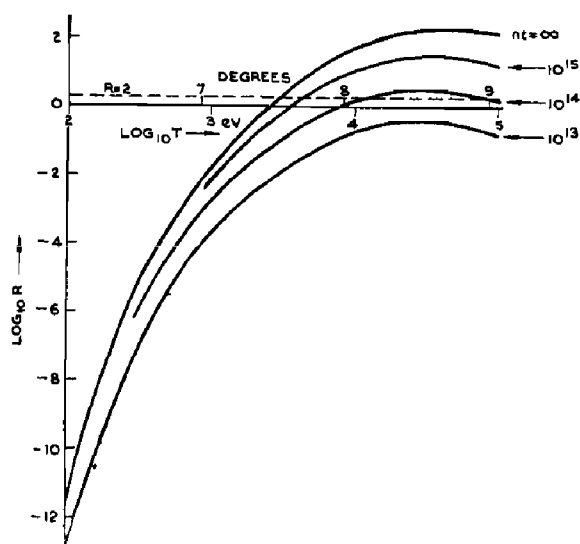


Figure 2. Variation of R with T for various values of nt for T-D reaction.

The curve marked $nt = \infty$ merely shows the ratio of the thermonuclear power release to the radiation loss, and crosses the $\log R = 0$ axis at the critical temperature. The curves are only accurate so long as t is sufficiently short that only a small fraction of the fuel is burnt. The values $nt = 10^{16}$ for a D-D system and 10^{14} for a T-D system both correspond to a burning of about 1% of the fuel.

Although these calculations refer specifically to a system in which the reaction products escape, it may easily be verified that the '1% burn-up' criterion is

almost unaltered in a system in which the reaction products are retained. In any practical system, where conduction loss is present, and where a large circulating power in the system is undesirable, the fraction of fuel burnt would need to be much greater.

§ 5. CONCLUSION

For a successful thermonuclear reactor not only has the temperature to be sufficiently high, but also the reaction has to be sustained for a sufficient time. The reason for this is that the organized energy used to heat the gas is ultimately degraded to the temperature of the walls of the apparatus and, consequently, sufficient thermonuclear energy must be released during each heating cycle to compensate for this degradation.

No claim that the above treatment is complete or applies to all possible types of system is made, but it does give some idea of the order of magnitude of the problems involved.

Systems which depart substantially from the electrically neutral Maxwellian gas assumed here have been carefully considered, but none looks promising. Some reasons for this are discussed by Thonemann (1956).

ACKNOWLEDGMENTS

This paper is an amplified version of the more important topics in A.E.R.E. report GP/R 1807. It owes much to discussions with several colleagues, in particular Mr. R. S. Pease, Dr. W. B. Thompson and Dr. P. C. Thonemann.

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Believable statements of uncertainty and believable science

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Abstract Nearly 50 years ago, two landmark papers appeared that should have cured the problem of ambiguous uncertainty statements in published data. Eisenhart's paper in *Science* called for statistically meaningful numbers, and Currie's *Analytical Chemistry* paper revealed the wide range in common definitions of detection limit. Confusion and worse can result when uncertainties are misinterpreted or ignored. The recent stories of cold fusion, variable radioactive decay, and piezonuclear reactions provide cautionary examples in which prior probability has been neglected. We show examples from our laboratory and others to illustrate the fact that uncertainty depends on both statistical and scientific judgment.

Keywords Data quality · Uncertainty · Traceability

Introduction

Two papers were published in 1968 that clearly set out the terms of discussion for two fundamental concepts in measurement science. Churchill Eisenhart's four-page paper [1] pointed out the several meanings that the literature might be understood to imply by an uncertainty expressed in the shorthand form $a \pm b$. "If no explanation is given, many persons will take $\pm b$ to signify bounds to the inaccuracy of a . Others may assume that b is the 'standard error,' or the 'probable error,' of a , and hence the uncertainty of a is at least $\pm 3b$, or $\pm 4b$, respectively. Still

others may take b to be an indication merely of the imprecision of the individual measurements, that is, to be the 'standard deviation,' or the 'average deviation,' or the 'probable error' of a single observation." As a consequence, far too great a fraction of the data in the scientific literature "cannot be critically evaluated because the minimum of essential information is not present." Eisenhart recommended unambiguous and statistically valid procedures for expressing uncertainty, which should have cleared the air and set the standards for future publications.

Also in 1968, Lloyd Currie's paper [2] applied eight common definitions of detection limit from the literature to a simple measurement example in radiation counting, and showed that the resulting estimates cover nearly three orders of magnitude. He then re-examined from the statistical point of view of hypothesis testing what *detection* and *measurement* should mean in analytical chemistry, rigorously defining three quantities: critical level, detection limit, and determination limit. Currie's formulation led to an American Chemical Society symposium on the topic [3] and has been incorporated in many rules of practice governing measurement procedures, international standards [4], regulations, and software. The culmination of Currie's early work was seen in the adoption of a harmonized international position (ISO-IUPAC) on the nomenclature, concepts, and formulation of detection, decision, and detection limits [5, 6].

In order to foster consistency of data reporting in all of science, in 1993 the International Organization for Standardization (ISO) issued its Guide to the Expression of Uncertainty in Measurement (GUM) [7] and the International Vocabulary of Basic and General Terms in Metrology (VIM) [8]. Directed toward professional metrologists, these publications incorporated some concepts unfamiliar to practicing laboratory workers. Several organizations,

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e.g., NIST [9], Eurachem/CITAC [10], IAEA [11], and BIPM [12], published supplemental interpretations with examples appropriate to their fields. The intent of these standards is to foster the publication of reliable data, quantitatively and unambiguously traceable to the International System of Units (SI).

Data quality in practice

In practice, of course, not all routine measurements require detailed uncertainty evaluation every time: the effort must be proportional to its importance, following the principle of fitness for use. When numbers are to be published and used by others, however, Eisenhart's admonitions apply despite the effort required. "The concepts of traceability are not always well accepted by the analytical chemistry community. There is a benign kind of neglect towards these ideas or even straight hostility" [13]. Part of the reason is that a full ISO-compliant treatment of uncertainties requires differentiation of the measurement equation, which may be difficult. For example, extracting the derivative of the equation used to reduce counting data to standard conditions

$$A_0 = \frac{C\lambda e^{\lambda t} e^{P\delta/\Delta} (e^{\lambda\Delta} - 1)}{(1 - e^{-\lambda\Delta})(1 - e^{-\lambda\tau})\lambda\Delta}$$

with respect to λ is daunting to most people. However, numerical re-calculations of the measurement equation employing finite differences instead of derivatives [10, 14, 15] can quantitatively show the effect upon the uncertainty of the final result due to uncertainties in the parameters. Applied to neutron activation analysis [16–18], this approach clearly shows the relevant uncertainties.

The two classic 1968 papers [1, 2] and the ISO GUM set the standards for clarity in future publications, yet we still see many papers submitted for review and even published with uncertainties given as simply "±" or omitted completely, or with many more digits than are truly significant. As Eisenhart pointed out, these practices have consequences for the users of these papers. As an example from our own work, a newly published half-life for ^{76}As [19] was accepted by the evaluators because of a plausible (but novel and incomplete) description of the uncertainties in the measurement, even though this value conflicted with previous measurements in the literature (notably a set of seven determinations with six different kinds of detectors [20]). This half-life would have led to an inaccurate INAA value for Arsenic Implant in Silicon (SRM 2134) had we used it in our measurements [21]. A redetermination of the half-life [22, 23] in agreement with the previous consensus is slowly driving out the incorrect value from tabulations of nuclear data.

Data quality and good science

Although science is always open to new ideas, a lack of understanding of the real uncertainties in a measurement, in physics as well as statistics, has led to some conspicuously mistaken conclusions. Scientific judgment (prior probability, in Bayesian terms) needs to be applied, especially to unexpected observations, and the null hypothesis that the observation is in error needs to be explicitly tested. Perhaps the best-known recent example is cold fusion [24] where, in the rush to publish, blank experiments were not adequately done and people knowledgeable in nuclear science were not consulted. Early measurements in our laboratory at NIST [25] *without* the Pd/D electrochemical cell showed neutrons (from cosmic rays) and gammas (mostly from ^{214}Bi) in quantitative agreement with Fleischmann and Pons's paper. Other workers were also unable to duplicate the publicized work electrochemically, so that research in low-energy nuclear reactions (LENR) has nearly, but not entirely, stopped.

Since the discovery of radioactivity, more than eighty attempts have been made to influence the rate of radioactive decay. None has had an effect, with the sole exception of decay modes that involve the orbital electrons, the physics of which is well understood [26]. More recently, an unexplained anomaly in the decay curve of ^{54}Mn was observed to be coincident with a strong solar flare, and statistical anomalies in other decay measurements made at Brookhaven National Laboratory and at the Physikalisch-Technische Bundesanstalt (PTB) were found to have annual periodicity [27, 28]. The cause was hypothesized to be related to solar neutrinos affecting the value of the decay constant.

To test this connection, measurements were done in our laboratory at NIST to compare the decay rates of paired intense sources of ^{198}Au with greatly different surface/volume ratios (sphere vs. foil or wire), and thus greatly different internal antineutrino fluxes [29, 30]. The half-lives of the paired sources were found to be indistinguishable, contrary to the prediction of the neutrino hypothesis. Decay rate measurements at Delft in the presence of neutrinos from the HOR reactor were found to be no different when the reactor was shut down [31], casting further doubt on the hypothesis. Other arguments degrade the solar connection [32]; for example, a ^{137}Cs source decayed at the expected rate as the MESSENGER spacecraft traveled from earth to Mercury's orbit at 0.4 AU [33]. Recent measurements at PTB have caused most of the earlier anomalies to disappear as more sources of experimental bias have been revealed and eliminated [34, 35]. Half-life measurement is subject to many sources of bias, not all of which are readily detected [36]. Although there is

decreasing evidence for non-constant radioactive decay rates, the search continues in some laboratories.

The surprising observation that light is emitted from collapsing bubbles produced by ultrasonic agitation of water has led to the hypothesis that the energy of the collapse might be sufficient to cause nuclear fusion, a process called sonofusion. Indeed, both tritium and neutrons were claimed to be detected in deuterated acetone under cavitation [37]. Other laboratories failed to duplicate these measurements, and the pursuit quickly collapsed as a combination of self-deception and fraud was revealed. Inspired by this, another group searched for nuclear transformations in sonicated water, and found increased amounts of uranium and even transuranic nuclides [38].

Subsequently [39] it was claimed that neutrons generated in the ultrasonic probe caused measurable changes in element concentrations. That work was accepted for publication with the editor's comment "This paper has been evaluated by six peers and has been considered to contain questionable results. However, as it reports on results difficult to prove but indisputably important if correct, the editor takes full responsibility for making it public." Other observations led the same group to believe that cavitation increases the rate of alpha decay of ^{228}Th [40]. The physical evidence has been sharply criticized [41], and more reasonable explanations of the observations have been proposed [42].

More recently, piezonuclear transmutations of ^{63}Cu to ^{65}Zn via multiple neutron capture were claimed [43], even though gamma spectrometry showed that the ultrasonic probe itself was no more radioactive after operation than before. The publication of this report resulted in strong criticism [44, 45] from the neutron activation analysis community, with the admonition, echoing others [41, 42], that the reviewers and editors of journals have an important responsibility to see that only verifiable facts and theories appear in the published literature.

Error and bias have many ways to creep into laboratory measurements. Currie (pers. comm., 1990) has pointed out that in a real measurement process " $d.f. < 0$ always; since the number of variables exceeds the number of observations, scientific insight is essential." Anomalous observations may indeed point to new phenomena, but simple explanations are usually most probable. "The first principle is that you must not fool yourself—and you are the easiest person to fool" (R. P. Feynman, 1974 Caltech commencement address).

Summary and conclusions

Science is a communal activity whose practitioners build upon each others' work. To exploit the literature we must understand its limitations, which is possible only if the authors of publications understand the uncertainties in their

measurements and conclusions, and make us, the readers, understand them in the same way.

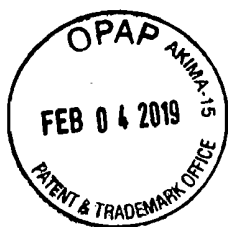
Acknowledgments I have profited from many years of discussions with Lloyd A. Currie.

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PATENT
Customer No. 117724
Attorney Docket No. DE-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)
)
Christopher H. Cooper et. al.) Group Art Unit: 3646
)
Application No.: 13/089,986) Examiner: Davis, Sharon M.
)
Filed: April 19, 2011) Confirmation No.: 1497
)
For: METHOD OF GENERATING)
ENERGY AND ⁴He USING THREE)
DIMENSIONAL NANOSTRUCTURED)
CARBON MATERIALS)

Attention: Mail Stop Appeal Brief-Patents

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

TRANSMITTAL OF APPEAL FEE

Applicants filed an Appeal Brief, with the appropriate extensions of time on
January 8, 2019, with a fee of \$750.00.

Due to an administrative error on the part of the undersigned (inadvertently using
a check from the wrong account) the check was not honored.

A check in the amount of \$750.00 is submitted herewith.

Respectfully submitted,

Dated: January 30, 2019

By: 
Stephen L. Peterson

Enclosure Check 1784 \$750.00

Reg. No. 26325

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first-class mail in an envelope addressed to: Commissioner for Trademarks, P.O. Box 1451, Alexandria, Virginia 22313-1451 on the date shown below:

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Commissioner:

TRANSMITTAL OF APPENDICES FOR APPEAL BRIEF UNDER 37 C.F.R. § 41.37

The Appeal Brief filed for this application included Appendices A-C. The Brief, a Petition for Extension of Time and a check for the appropriate fee was mailed but failed to include Appendices A-C. They are attached hereto.

Respectfully submitted,

Dated: January 8, 2019

By: Stephen L. Peterson
Stephen L. Peterson
Reg. No. 26,325
202 251 9367

Attached: Appendices A-C

CERTIFICATE OF MAILING

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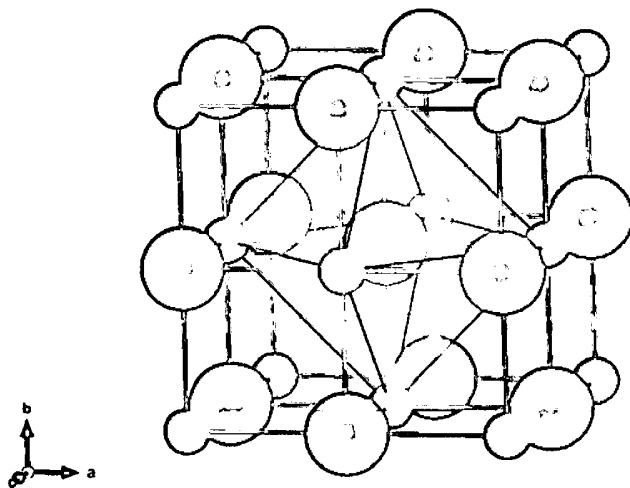
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Appendix A – NaCl Crystalline Structure

Application No.:13/089,986

Attorney Docket No. DE-1

A unit cell representation of sodium chloride is shown in the following figure.



The salient features of its structure are:

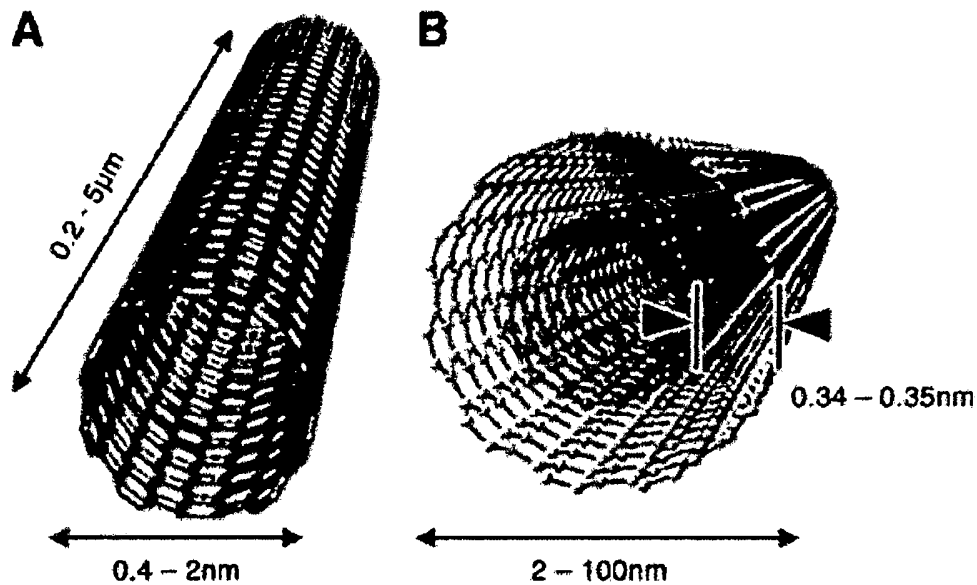
- Chloride ions are *ccp* type of arrangement, *i.e.*, it contains chloride ions at the corners and at the center of each face of the cube.
- Sodium ions are so located that there are six chloride ions around it. This equivalent to saying that sodium ions occupy all the octahedral sites.
- As there is only one octahedral site for every chloride ion, the stoichiometry is 1 : 1.
- For sodium ions to occupy octahedral holes and the arrangement of chloride ions to be close packed the radius ratio, r_{Na^+}/r_{Cl^-} , should be equal to 0.414. The actual radius ratio 0.525 exceeds this limit. To accommodate large sodium ions, the arrangement of chloride ions has to slightly open up.
- It is obvious from the diagram that each chloride ion is surrounded by **six** sodium ions which are disposed towards the corners of a regular octahedron. We may say that cations and anions are present in equivalent positions and the structure has 6 : 6 coordination.
- The structure of sodium chloride consists of eight ions a unit cell, four are Na^+ ions and the other four are Cl^- ions.

In this structure, each corner ion is shared between eight unit cells, each ion a face of the cell by two cells, each ion on a[n] edge by four cells and the ion inside the cell belongs entirely to that unit cell.

Source - <https://minerva.mlib.cnr.it/mod/book/view.php?id=269&chapterid=101>

Appendix B – Carbon Nanotube Crystalline Structures

Application No.:13/089,986
Attorney Docket No. DE-1



A is a single walled CNT

B is a multi-walled CNT (MWCNT)

Source - https://www.researchgate.net/figure/Conceptual-diagram-of-A-single-walled-carbon-nanotube-and-B-multi-walled-carbon_fig1_42588327

Appendix C – The Guo Article

**Application No.:13/089,986
Attorney Docket No. DE-1**

Visible-Light-Induced Water-Splitting in Channels of Carbon Nanotubes

Deng-Zhu Guo,^{*,†} Geng-Min Zhang,[†] Zhao-Xiang Zhang,[†] Zeng-Quan Xue,[†] and Zhen-Nan Gu[‡]*Key Laboratory for Physics and Chemistry of Nanodevices, Department of Electronics, Peking University, Beijing 100871, China, and College of Chemistry and Molecular Engineering, Peking University, Beijing 100871, China**Received: October 17, 2005; In Final Form: December 4, 2005*

The visible-light-induced split of water confined in channels of single-walled carbon nanotubes (SWNTs) was experimentally studied. Arc-discharging synthesized SWNTs were used to adsorb water vapor and then were irradiated in a vacuum by using light from a camera flash. It was found that a great amount of hydrogen-rich gases could be repeatedly produced under several rapid flashes of light, occasionally accompanying evident charge emission phenomena. A quantitative method was developed to estimate the relative amount of gas components on the basis of the data acquired with an ion gauge and a quadrupole mass spectrometer. The results indicated that hydrogen occupied about 80 mol % of the photogenerated gases, with other components such as carbon oxides, helium, methane and trace of ethane, and the total gas yield in one flash (0.1–0.2 J/cm², 8 ms) reached 400–900 ppm of the mass of the SWNTs. Such a yield could be repeatedly obtained in serial flashings until the adsorbed water was depleted, and then, by sufficiently adsorbing water vapor again, the same phenomena could be reproduced.

Introduction

Nanomaterials generally exhibit diverse and unique properties. Recently it has been reported that by exposure to light from a camera flash, single-walled carbon nanotubes (SWNTs)^{1–3} and silicon nanowires⁴ can be ignited and reconstructed in air and polyaniline nanofibers can be welded together to form a smooth and continuous film.⁵ These surprising phenomena have been ascribed to an unprecedented photothermal effect in nanomaterials, in which the absorbed photons generate heat through nonradiative dissipation and/or photochemical reactions. The heat would be confined within individual nanostructures and difficult to be transferred to the neighboring materials and the environment, so that local hot spots of above 1500 °C in nanostructures under flashing irradiation is expected, although the input energy is only a short-pulsed white light.^{1–5} These interesting facts inspired us to think about the possibility of splitting SWNT-confined water under a visible light flash.

Water-containing SWNTs were originally suggested theoretically as a wetting phenomenon by Dujardin and co-workers.⁶ Since then, many theoretical studies on the structure and dynamics of water confined in SWNTs by molecular dynamics (MD) simulations have been reported,^{7–14} and a few experimental observations have also been carried out to investigate its unique properties.¹⁵ Up to now, although some disagreements about the structure of SWNT–water exist among these papers, it is in high agreement that the existing status of nanotube water is very different from that of the bulk one due to the SWNT confinement. Very recently, Kolesnikov and co-workers¹⁵ studied nanotube water by both neutron scattering and MD simulation and revealed anomalously soft dynamics in it. Either

the intramolecular covalent bonds or the intermolecular hydrogen bonds have been verified as considerably different from that of bulk water/ice; especially, the hydrogen bonds among the water chains inside SWNTs are highly softened, so the water molecules have a high mobility in SWNTs. However, the interactions between the entrapped water and the SWNT wall are very strong. The SWNT–water system has been expected to have potential applications in nanofluidic and proton storage devices. In this paper, we will show a new application possibility for such a system.

Now that the nanotube water has a special structure and dynamics different from that of the bulk one and SWNTs have a highly efficient photothermal effect under a flash, one can naturally wonder what would happen when the water-filled SWNTs were irradiated. This question has never been answered until now to our knowledge. Three years ago, for reproduction Ajayan's SWNT ignition experiments,¹ our group occasionally found that by serially exposing SWNT samples in an ultrahigh vacuum (UHV) chamber with the light from a camera flash several times, remarkable hydrogen and other gases could be continually generated. This result has puzzled us for a long time, because there was not any hydrogen source involved in our SWNT sample elaboration, and the adsorption of hydrogen from the ambient air would be very little since hydrogen content in the atmosphere is very low (~0.5 ppm in volume), and moreover, our UHV chamber containing the SWNT sample had been sufficiently heated under a high temperature. To find a reasonable solution, recently we designed a special experimental procedure, carefully analyzed the flash-released gases by using a quadrupole mass spectrometer (QMS), and managed to obtain some quantitative results. We found that the flash-released gases evidently arose from the split of water encapsulated inside SWNT channels and the chemical reactions between them. Moreover, occasional charge emission phenomena accompanying the gas release have also been observed. We suppose that

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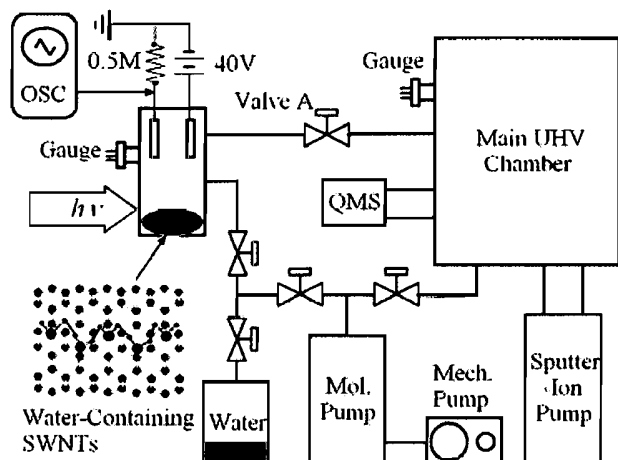


Figure 1. Schematic showing the experimental setup. The gas and charge release from water-containing SWNTs under a visible light flash can be detected by using an ionization gauge and a special circuit, respectively. Then the gases can be sampled and analyzed by using a QMS. The insert is a schematic showing a water-containing SWNT.

our research is of significance both in exploration of new hydrogen energy sources and in fundamental research regarding SWNT–water systems.

Experimental Section

Our experimental setup is schematically shown in Figure 1. A glass tube containing ~10 mg of SWNT raw materials, synthesized by using a direct current (DC) arc-discharge method¹⁶ with Ni–Y particles as the catalyst under a helium pressure of about 500 Pa, was connected through valves to an ultrahigh vacuum (UHV) system and to a vacuum bottle containing distilled water. The sample container (V_s) could be evacuated by using the forestage pumps and the sputter-ion pump through different valves, and its pressure can be measured by using a high-pressure ionization gauge. Two electrodes for charge emission measurement are suspended in the V_s and connected to the ground through 40 V DC batteries and a 0.5 M Ω resistor, respectively. One digital oscilloscope (Tektronix TDS3052) was used to monitor the electrical current passing through the resistor. After sufficient heating (at 180 °C for longer than 24 h) and evacuating, a UHV ($P < 5 \times 10^{-7}$ Pa) was achieved both in the V_s and in the main chamber, to which a homemade quadrupole mass spectrometer (QMS) is attached. Then valve A was closed, and the saturated water vapor (~3500 Pa) from the water bottle was introduced into the V_s and kept for 1 h. Next, the V_s was heated and evacuated again. Subsequently, by stopping the sputter-ion pump and closing valve A, the two rooms were in a pressure-increasing state separately. When the pressures in the two rooms became quasi-stable, the water-containing SWNT sample was exposed to a photographic flash (0.1–0.2 J/cm², ~8 ms). The rapid rise of the total pressure in the V_s was recorded. At the same time, the response of the oscilloscope was also monitored. At last, by slightly opening valve A for gas sampling, the gas components were analyzed by using the QMS. When the gas-releasing properties of the sample were obviously degraded, saturated water vapor was introduced into the V_s again, and the same experiments were repeatedly conducted.

For comparison purposes, we also used ~25 mg of graphite powder (~20 μ m in diameter) containing the same catalyst (Ni–Y particles) as the sample to do the experiments described above.

Quantitative Analysis Methods

After flash irradiation, the total pressure increment in the V_s indicated by the high-pressure ionization gauge, $\Delta P_i(\text{gauge})$, comes from the combination of all of the real partial pressure increments, ΔP_i , as following

$$\Delta P_i(\text{gauge}) = \sum_i \alpha_i \Delta P_i \quad (1)$$

where α_i is the relative ionization coefficient of the i th gas in the gas mixture ($\alpha_{N_2} = 1$).¹⁷ However, when the gas mixture was sampled for QMS analysis, all components will be reflected in the mass spectra as peaks of ion current increments, ΔI_j . Each peak can be factorized into several gas sources

$$\Delta I_j = SGK \sum_k \alpha_k \beta_k^j \Delta P_k \quad (2)$$

where S and G are the ionization sensitivity of N_2 and the multiplier gain of the instrument, respectively. K is the sampling factor, k is the index of the gases that contribute ions to the peak at the atomic mass unit (AMU) j , α_k is the relative ionization coefficient of the k th gas, which is assumed to be the same as that in the ionization gauge, and β_k^j is the relative intensity coefficient at AMU j in the cracking patterns of the k th gas.¹⁷ To eliminate the unknown proportionality constants S , G , and K , we divide the concrete formulas as shown in eq 2 for different AMU peaks by that of AMU 2, because the intensity of the flash-released H_2 is stable relative to other gases with increase in the flash times

$$\frac{\Delta I_j}{\Delta I_2} = \frac{\sum_k \alpha_k \beta_k^j \Delta P_k}{\sum_n \alpha_n \beta_n^2 \Delta P_n} \quad (j \neq 2) \quad (3)$$

where n is the index of the gases that produce ions at AMU 2. Combining eq 3 with eq 1, one can get a set of linear equations regarding the unknown quantities ΔP_i . The number of the ion current peaks in the mass spectrum is usually more than the number of the gas components, so the equation system is generally overdetermined. (The number of unknown quantities is less than the number of equations.) So, a mean-square method was used to obtain the best-fit solution. After the values of ΔP_i are obtained, the molar amount of each flash-released gas, Δv_i , can be calculated as

$$\Delta v_i = \frac{\Delta P_i V_s}{RT} \quad (4)$$

where $R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}$ is the gas constant, T is the temperature in Kelvin (taking $T = 300 \text{ K}$ for room temperature), and V_s is the volume (~200 mL) of the sample container. The molar percentage of the i th gas was defined as

$$\eta_i = \frac{\Delta v_i}{\sum_j \Delta v_j} \quad (5)$$

The mass yield of gases, defined as the ratio of gas masses to

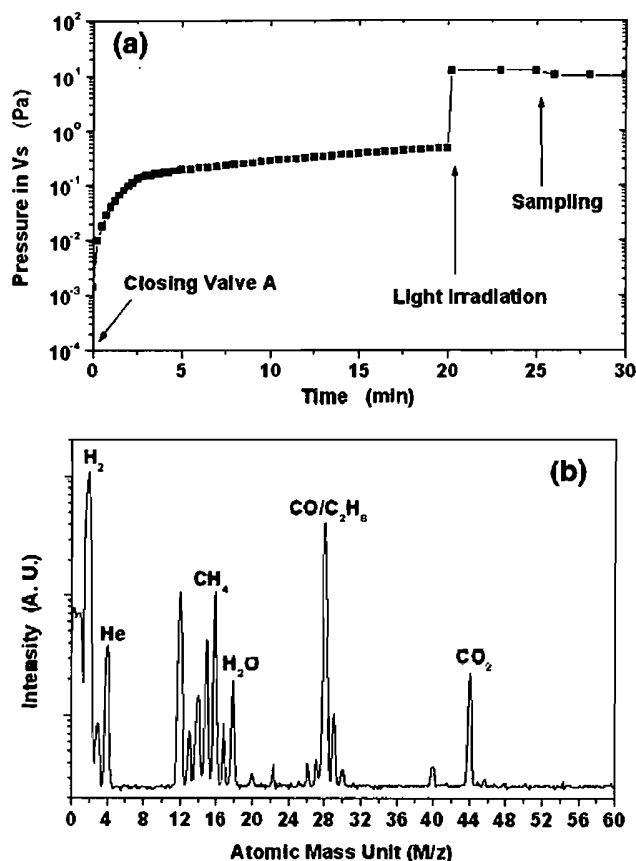


Figure 2. Typical experimental result of gas release. (a) The total pressure in the V_s evolving with time. A step appears when the sample is irradiated. (b) One mass spectrum of the sampled gases. The base spectrum obtained before sampling has been subtracted from the original data. The main components have been labeled above the corresponding peaks.

the mass of SWNTs, m , can be expressed in ppm

$$\epsilon_i(\text{ppm}) = \frac{\Delta V_i M_i}{m} \times 10^6 \quad (6)$$

where M_i is the molar mass of i th gas.

As for the measurements of charge emissions, we directly monitor the electrical potential difference between the two ends of the 0.5 M Ω resistor by using an oscilloscope and then apply Ohm's law to obtain the current passing through it

$$I(\text{nA}) = U/R = 2U \quad (U \text{ in mV}) \quad (7)$$

At last, the charge quantities can be obtained by using a digital integral method.

Results and Discussion

Figure 2 shows a typical experimental result of gas release. As shown in Figure 2a, the total pressure in the V_s approximately stabilized between 10^{-2} to 10^{-1} Pa several minutes after valve A was closed. Then, when the sample was exposed to a flash, it immediately rose to ~ 12 Pa, suggesting that a great amount of gases were generated. The mass spectrum of the sampled gases is shown in Figure 2b, noting that the base spectrum obtained before sampling has been subtracted from the original data. One can see that hydrogen is the main component of the flash-generated gases. Besides H_2 , other components such as He, CH_4 , H_2O , CO, C_2H_6 , and CO_2 can also be found, as

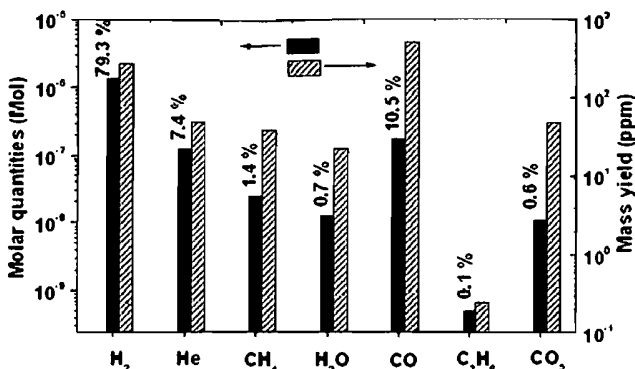


Figure 3. Quantitative estimation of the gas components generated from the water-containing SWNTs in one flash irradiation.

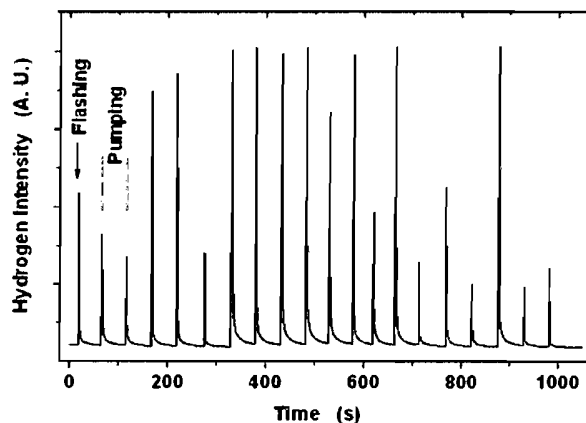


Figure 4. Hydrogen intensity changes with sequent times of flash irradiation, obtained with QMS while the V_s was pumped.

indicated in Figure 2b. The nonlabeled peaks are either attributable to the fragments of these gases or rather insignificant. It should be argued that the presence of N_2 (mainly at AMU 28) in the flash-released gases is nearly impossible. To confirm this, we additionally did a comparison experiment in which dry SWNTs were exposed to dry N_2 instead of H_2O vapor and found that no obvious gas was released under a light flash. We believe that the N_2 adsorbed by the SWNTs in air had been completely desorbed during the heating–pumping process even before the light flash.

The above experimental results were quantitatively calculated, and the result is shown in Figure 3, in which one can see that the production of H_2 in one flash reaches ~ 1.5 μmol , equaling to ~ 300 ppm of the mass of SWNTs and to 79.3 mol % of the total flash-generated gases. CO is the second one, occupying about 10.5% (~ 500 ppm of the mass of SWNTs). All of the other components, He, CH_4 , H_2O , CO_2 , and C_2H_6 , occupy the residual percentage. The total mass yield of all of the gases in one flash reaches about 900 ppm ($\sim 0.09\%$) of the mass of the SWNT sample. Such a yield is considerably high, noting that the time for the gas release is very short (< 1 s).

We also found that when the flash times are increased, the total mass yield was in a range of 400–900 ppm, and the relative quantity of each flash-generated gas could change. However, a similar hydrogen yield could last for more than 10 exposures of the sample to the rapid light flash. The spectrum shown in Figure 4 was obtained with the QMS in “single-ion” mode, namely, only H_2^+ ions were detected versus time, by serially irradiating the sample while valve A was open and the sputter-ion pump was working. Each peak corresponds to one hydrogen release in one flash irradiation, and the period between two

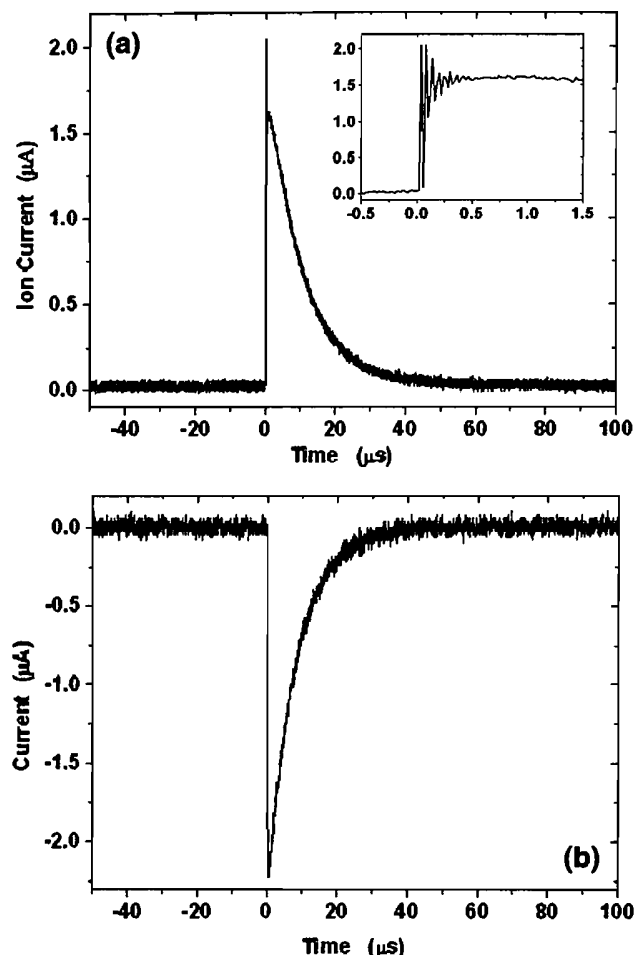


Figure 5. Measurements of charge emission accompanying gas release. (a) A typical result of flash-induced positive current. The insert is an *x*-axis magnification of the measured signal near $t = 0$; the damping oscillation phenomenon is apparent. (b) A typical result of flash-induced negative current.

consecutive peaks corresponds to the pumping time. One can see, during a period of 1000 s, 20 irradiation flashes were carried out, and obvious hydrogen peaks were detected for each time, with a peak intensity difference of a factor of 3–4. If we make an assumption that $\sim 0.75 \mu\text{mol}$ of H_2 has been generated on average during each flash irradiation, then during the total period of 1000 s, $15 \mu\text{mol}$ of H_2 had been released, meaning that the H_2 production rate was $54 \mu\text{mol/h}$, which is at least comparable with the data obtained from the photoelectrochemistry (PEC)-based water-splitting method reported by Zou et al.¹⁸ It should be noted that the PEC method requires sophisticated functional (high conversion efficiency and working stability, long lifespan, and low cost, etc.) materials as the photoelectrode, which is the main technical challenge now.¹⁹

In addition to the gas emission, we also occasionally observed charge emission phenomena. We used the photovoltaic signal of the light of the camera flash as the external trigger of the oscilloscope and monitored the voltage across the $0.5 \text{ M}\Omega$ resistor. A typical result is shown in Figure 5a. At the very beginning of the flash irradiation, a positive current pulse, $2.2 \mu\text{A}$ in peak value and $50 \mu\text{s}$ in bottom width, was generated. The total charge in the pulse can be estimated to be $\sim 2.6 \times 10^{-11} \text{ C}$, corresponding to $\sim 1.6 \times 10^8$ singly charged ions. A damping oscillation with a frequency of about 20 MHz appears within the first $0.5 \mu\text{s}$, and then the positive current could keep nearly constant for several microseconds before exponentially

decreasing, as shown in the insert of Figure 5a. Also, when the polarity of the DC batteries in the measurement was reversed, the polarity of the current pulse could be accordingly reversed, i.e., negative pulses could be obtained. One such example is given in Figure 5b. The above results suggest that generation of plasma could accompany the gas release when the water-containing SWNTs were illuminated by a visible light flash. Here, we have to emphasize that such current pulses could not be always detected in every flash irradiation. They emerged only occasionally, although gases could be definitely generated once the sample was irradiated by a flash. The reason is not clear to us at the present stage.

More importantly, we also found that when the flash-released gases obviously decreased due to the depletion of nanotube water, i.e., no obvious pressure increase in the sample container could be detected after a flash irradiation and no charge emission could be observed for a long time, the gas generation and charge emission ability could be recovered by inputting water vapor into the sample container again. We repeatedly conducted the above experiments for more than 20 times with the same SWNT sample and found no obvious degradation in gas release and charge emission in the end.

The comparative experiments on a micro-graphite-catalyst sample, in contrast, showed a poor outgassing abilities under the same conditions. For such a sample, we found that the gas-release phenomena appeared only for the first few times of rapid light exposure, and the total gas yield is far lower ($<0.01\%$) than that of the SWNTs, and moreover, no charge emission phenomena have been observed during 20 flash exposures. The components of the released gases mainly included H_2 , CO , and CO_2 but no He , H_2O , CH_4 , and C_2H_6 have been detected. It means that most water adsorbed on the powder surfaces has been removed during the heating–pumping process, and the few residual water molecules could also be decomposed to form H_2 and carbon oxides through chemical reactions. But some important reactions in the SWNT cases did not occur in this situation.

At last we will give a tentative discussion on the mechanism of the gas release from water-containing SWNTs under a flash. Here, the SWNTs were used both as the carrier of nanowater and as the photocatalyst. Taking the ultra-photothermal effect of nanomaterials^{1–5} into account, one could imagine that under an optical flash SWNTs and the confined water absorbed photons, disassociating the water molecules and generating O and H atoms. The local pressure in nanotubes would dramatically increase, so a local explosion would occur in the nanotubes, liberating some C atoms. As a result, H_2 and some C–H and C–O compounds as well as H_2O could be detected. We noted that the molar quantity of oxygen in all of the generated gases was very low compared with that of hydrogen. We think that because atomic O is very active, it could preferentially react with the catalyst particles in the SWNT sample (we indeed found some lumps such as ore in the sufficiently flash-irradiated SWNT sample) and react with the hot filaments of tungsten in our QMS and ionization gauge under high temperature. As for He, although it could be attributed to the synthesis process of SWNTs, it really seems strange to us at the present stage and deserves further investigation. The occasionally observed charge emission phenomena mean that some ionization process, such as thermal ionization and photon ionization, could occur accompanying the gas release under special conditions. Since the first ionization energies for the involved atoms and molecules are between 6.217 eV (for Y) and 24.587 eV (for He),²⁰ if thermal ionization has occurred, one can infer that the instant

local temperature within the channels of the SWNTs should be at least 10^4 K. However, photon ionization seems impossible because visible light does not have high energy. Although the concrete ionization process is not clear at the present stage, this observation makes us believe that some local high-energy spots in the water-containing SWNTs would be generated by exposure to a visible light irradiation. That supports the opinion of thermosplitting of water confined within the channels of the SWNTs.

Conclusion

In conclusion, on the basis of the unusual photothermal effects of nanomaterials and the special status of the nanotube-confined water, we proposed a simple way to generate hydrogen-rich gases from water-containing SWNTs by only an optical flash. The flash-released gases were quantitatively analyzed by using an ion gauge and a QMS, which shows that H_2 and CO are the main components in the gas mixture. Totally, the mass of the flash-released gases reaches 900 ppm of the mass of the SWNTs. Meanwhile, sometimes we detected charge emissions accompanying the gas release, which deserves further research.

Acknowledgment. D.-Z. Guo thanks Professors X. Wang and Z.-G. Shi for experimental support. This project was supported by the National Natural Science Foundation of China (Grant Nos. 60231010, 60471008, and 60571003).

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PATENT
Customer No. 117724
Attorney Docket No. DE-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)
)
Christopher H. Cooper et. al.) Group Art Unit: 3646
)
Application No.: 13/089,986) Examiner: Davis, Sharon M.
)
Filed: April 19, 2011) Confirmation No.: 1497
)
For: METHOD OF GENERATING)
ENERGY AND ⁴He USING THREE)
DIMENSIONAL NANOSTRUCTURED)
CARBON MATERIALS)

Attention: Mail Stop Appeal Brief-Patents

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APPEAL BRIEF UNDER 37 C.F.R. § 41.37

Further to the Notice of Appeal filed on June 8, 2018, the period for reply being extended to January 8, 2019 by the accompanying Petition for Extension of Time and payment of the appropriate fees, Appellant submits this brief under 37 C.F.R. § 41.37. Thus, the filing of the present Appeal Brief is timely, and it is submitted herewith.

This Appeal responds to the Final Action dated February 8, 2018 ("Final Rejection") in which the Examiner rejected all pending claims.

Real Party in Interest

The real party in interest is C3L Limited.

Related Appeals, Interferences, and Trials

There are currently no other appeals or interferences, of which Appellant, Appellant's legal representative, or Assignee, are aware that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

Status of Amendments

On June 24, 2014 Applicant filed a Response to an Office Action dated December 24, 2013. In the June 24, 2014 response Applicant amended claims 11, 12, 18, 19, 23, 27, 28, 35, and 40, and canceled claim 38. Applicant also added new claims 42-45. All claim cancellations and amendments were made without prejudice or disclaimer.

On August 10, 2015, Applicant filed a Request for Continued Examination (RCE). In the August 10, 2015 RCE, Applicant amended claims 1-5, 9, 11-13, 16, 17, 19-21, 25, 26, 28-36, 39-41, 44, 45, and cancelled claims 18 and 27. Applicant also added new claims 46-48. All claim cancellations and amendments were made without prejudice or disclaimer. Upon entry of the RCE, claims 1-17, 19-26, 28-36, and 39-48 were pending.

Status of the Claims

Claims 1-17, 19-26, 28-36, and 39-48 are pending in the application. Claims 18, 27 and 37 are canceled. All pending claims (1-17, 19-26, 28-36, and 39-48) are rejected and subject to this Appeal.

Summary of Claimed Subject Matter

Of the appealed claims, claims 1, 19, 28, 39, 43 and 46 are independent. A concise explanation of the subject matter of independent claims on appeal, referring to the specification by paragraph number, is set forth below. Claims 2-17, 20-26, 29-36, and 40-42, 44, 45, 47 and 48 are dependent claims involved in this appeal.

The following summary of the presently claimed subject matter indicates portions of the specification that provide examples of embodiments of elements of the claimed subject matter. It is to be understood that other portions of the specification not cited herein may also provide examples of embodiments of elements of the claimed subject matter. It is also to be understood that the indicated examples are merely examples, and the scope of the claimed subject matter includes alternative embodiments and equivalents thereof. References herein to the specification are thus intended to be exemplary and not limiting.

All of the claims of this application are directed to a method of generating energy by contacting three-dimensional nanostructured carbon material with deuterium to induce the transmutation of the deuterium to ^4He atoms and energy.

Claim 1 is specifically directed to a method of generating ^4He atoms and energy by contacting three-dimensional nanostructured carbon materials with deuterium and transmuting the deuterium to ^4He atoms and energy. Specification at paragraph [005]-[015].

Claim 19 is directed to a method of generating energy, ^4He atoms, or both by providing three-dimensional nanostructured carbon material in a sealable vessel, evacuating the sealable vessel to a pressure below atmospheric pressure, adding

deuterium gas to the vessel to achieve a pressure above atmospheric pressure and heating the vessel to increase the pressure inside the vessel. Specification at paragraph [005]-[015].

Claim 28 is directed to a method of generating radiation by contacting three-dimensional nanostructured carbon material with deuterium and placing the three-dimensional nanostructured carbon material in the deuterium for a time sufficient to generate radiation. Specification at paragraph [005]-[017].

Claim 39 is directed to a method of inducing nuclear transmutation by contacting three-dimensional nanostructured carbon material with deuterium and placing the three-dimensional nanostructured carbon material in deuterium for a time sufficient to transmute the deuterium and generate ^4He atoms and energy. Specification at paragraphs [005]-[017], [079], [080]-[099] and Table 2.

Claim 43 is directed to a method of producing energy by introducing a gas consisting essentially of D_2O to a material consisting essentially of carbon nanotubes, applying pressure to the gas and generating energy and ^4He atoms. Specification at paragraphs [005]-[017], [079], [080], [096]-[099] and Table 2.

Claim 46 is directed to a method of generating energy by contacting three-dimensional nanostructured carbon material with deuterium and transmuting said deuterium to produce ^4He atoms and energy. Specification at paragraphs [005]-[017], [079], [080], [096]-[099] and Table 2.

Argument

The Final Rejection being appealed asserts that the Applicants have not met the statutory criteria defining patentable subject matter. But that is not the actual basis for the Examiner's position. When the evidence supporting the patentability of the present invention is considered on its merits, the invention is operable, it has utility, it is adequately disclosed, and the claimed invention is novel and unobvious.

The Examiner has incorrectly equated the subject matter of the present application to what is termed "cold fusion." And, because what is termed "cold fusion" has been discredited by the mainstream scientific community as being in conflict with current theories of nuclear physics, and, as yet, "cold fusion" has not been shown to be reproducibly operable, the Examiner erroneously asserts that **any** technology producing energy through a low temperature nuclear reaction is "cold fusion," is "contrary to known science" and must be shown to be operable by extraordinary evidence. Then, in a stunning display of inconsistency, cites a reference with no operative examples relevant to the present invention and asserts what was previously asserted to be "contrary to known science" would have been obvious to one skilled in the art.

The Examiner's first error is equating the Pons and Fleischmann "cold fusion" technology with the generic term LENR (Low Energy Nuclear Reaction). The source of that error is self-evident. Before Applicants' discovery there was only one type of LENR that was known - that discovered by Pons and Fleischmann. Thus, the generic term LENR, and "cold fusion" are generally used synonymously. But they are not synonymous. The technology of the Applicants appears to be a low energy nuclear reaction, but it is different in every major respect from known LENR and "cold fusion"

except that both produce energy by some mechanism that is contrary to current scientific knowledge concerning nuclear fusion.

The Examiner attempts to equate the technology of “cold fusion” to the technology of the present invention by stating:

8. The Pons and Fleischmann experiments are directed to what is known in the art as “lattice-enhanced nuclear reactions.” [no citation for this characterization was provided] The experimenters theorized that an interaction between deuterium atoms and a lattice of atoms in a metallic material could provide a mechanism by which the Coulomb barrier between deuterium atoms was overcome, leading to nuclear fusion. [no citation for this characterization was provided] The theory was proven to be false. In the present invention, it is suggested that an interaction between deuterium atoms and the lattice of carbon-based materials can induce nuclear fusion. Accordingly, it appears that the present invention is directed to similar subject matter as the disproven experiments of Pons and Fleischmann.

Final Rej. P. 8 (clarification added)

Such a general description of the “cold fusion” of the Pons and Fleischmann experiments (“an interaction between deuterium atoms and a lattice of atoms”) hides the fundamental differences between “cold fusion” and the present invention. The Defense Analysis Report, DIA-08-0911-003, 13 November 2009 describes the Pons and Fleischmann “cold fusion” technology [and equates it with all LENR] as follows:

LENR involves electrodes immersed in solutions of metal salts such as lithium chloride or lithium sulfate, with heavy water substituted for natural water. Electric current is sent through the experimental apparatus, in most instances producing excess heat.

Id. P. 4

Thus, a key component of Pons and Fleischmann LENR or “cold fusion” is the use of electrodes and electrochemistry to induce an exothermic reaction between deuterium and a metal. Yes, both the present invention and “cold fusion” involve a reaction of deuterium with a “solid,” but uniquely different solids

and by entirely different mechanisms. The compositions of the solids are different, the structures of the solids are different, the present invention does not use electrochemistry nor solid state reactions of metals with deuterium. In addition, the reaction of the present invention is not known to be exothermic. By contrast, when "cold fusion" is operable, it produces extraordinary amounts of heat. Excess heat is the primary means used to determine if Pons and Fleischmann cold fusion has occurred. Defense Analysis Report, DIA-08-0911-003, 13 November 2009. P. 4.

The chart below illustrates the major differences.

Technology	"cold fusion"	the present invention
Fuel	Deuterium	Deuterium
Operative material	Metal compound	Elemental Carbon
Material structure	Metal hydride ¹	Three dimensional CNT ²
Crystalline structure	NaCl (see App. A)	Uniquely tubular (see App B)
Inducement for reaction	Electrical energy	None
Result of the reaction	Heat	Radiation

To equate the two processes, by ignoring the fundamental characteristics of the operative materials and calling two different materials "solids" is to obscure the facts.

There is an additional error. The Examiner equates failure of the Pons and Fleischmann experiments (and those attempting to replicate them) to reproducibly produce an exothermic reaction (thus failing to meet USPTO standards for "operability")

¹ More accurately a "deuteride," the crystallographic analog of a hydride, but having the hydrogen isotope deuterium at the hydrogen site in the metallic compound, the compound has a NaCl structure. Crystallographic Data. 124. Lithium Hydride, LiH; 125. Lithium Deuteride, LiD, Eugene. Staritzky and D. I. Walker, *Analytical Chemistry* **1956** 28 (6), 1055-1055

² CNT is a carbon nanotube, at least one crystalline layer of graphite in the form of a tube. <https://web.pa.msu.edu/cmp/csc/ntproperties/equilibriumstructure.html>

with total failure of the Pons and Fleischmann experiments to show that “cold fusion” can be operable. The Examiner cites *In re Swartz* 232 F.3d 862, (Fed. Cir. 2000) and asserts the Federal Circuit held that “[a] “cold fusion process for producing energy was found to be wholly inoperable.” [emphasis added, citation omitted] The Swartz case holds no such thing.

What that case actually holds is that Swartz could not use the above cited DIA report³ to overcome the presumption of no utility for Swartz’s technology. The reasoning was based on two factors. First, the uncertainty in results surrounding the technology discussed in the DIA report (Pons Fleischmann “cold fusion”) and second Swartz did not “explain how an invention described in any of the relevant [Swartz] patent applications was used in the course of any of the referenced demonstrations or experiments [in the DIA Report].” *Id.* 232 F.3d at 5. (clarification added)

This (non-precedential) opinion **not** does hold that cold fusion is wholly inoperable. Moreover, the present Applicants do not cite the DIA report for the purpose of proving its technology is operable. Applicants cite the DIA report to refute the factual assertion that it is not possible for a nuclear reaction to occur at low temperatures.

It is beyond reasonable challenge that many independent researchers have demonstrated the production of excess heat and the production of transmutation byproducts and nuclear ash in replicating the Pons and Fleischmann experiments. See, Defense Analysis Report, DIA-08-0911-003, 13 November 2009. P. 2-3. This is clear evidence that some type of nuclear reaction can take place at low temperatures. The issue is not - can some type of fusion event ever take place using the Pons and

³ Defense Analysis Report, DIA-08-0911-003, 13 November 2009.

Fleischmann technology – many have independently proven it does. Id. The real issue is that the Pons and Fleischmann reaction does not take place reproducibly.

Applicants cited the DIA report to prove that if current scientific theory indicates that fusion cannot take place at low temperatures, then current scientific theory must be wrong because it conflicts with observable facts.

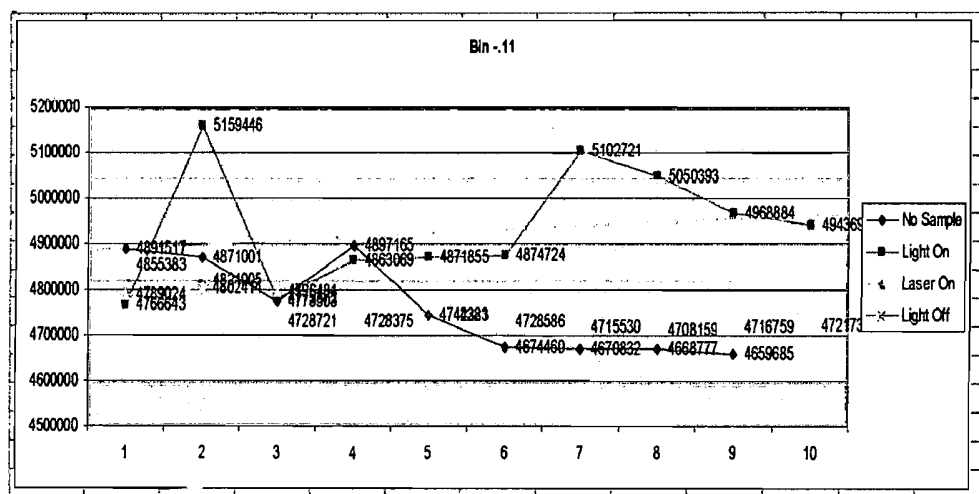
In contrast to the Swartz application, the Applicants have shown, in four different types of experiments that their technology produces energy consistent with some type of low temperature nuclear reaction.

The first is reported in the Declarations of James Loan filed August 24, 2015 (“the August Declaration”) and the second on October 6, 2015 (“the October Declaration”). In the August Declaration Paragraphs 17 through 24 describe work Mr. Loan conducted in 2005 where measurable radiation was detected on a sample that was retained for later work. The sample is 10 milligrams of carbon nanotubes into which was introduced heavy water D₂O as a source of Deuterium. The October Declaration sets out tests done on the same sample from 2005 that was still emitting energy ten years after its creation. Applicants submit that these tests alone demonstrate some type of nuclear reaction is occurring in the combination of carbon nanotubes and Deuterium.

In the Final Rejection the Examiner criticized the data in the August declaration and asserts that “this data clearly has not been subjected to the rigorous examination required by the scientific method.” This assertion is incomprehensible. The data referred to is the actual discovery of the invention where the existence of radiation coming from the sample is being detected. The Examiner further asserts (Final Rej. P. 9) that Applicants should have determined the exact amount and nature of any radiation

produced. That was not possible with the equipment available and the Examiner's hindsight observation is unwarranted. The point of the August Declaration was to describe how the creation of radiation from the combination of carbon nanotubes and deuterium was discovered in 2005, not to identify the radiation or its amount.

The data is set out below and it clearly shows that at some energy levels (that is the abscissa, time is the ordinate) under four different conditions.



The data above is the bin count in a multi-channel analyzer showing some kind of radiation being detected, with and without light excitation. The fact that the detector that was used detected gamma rays, X-rays and neutrons, the fact the sample sizes were small, and the presence of the polypropylene shielding (to allow the neutrons to slow and be more detectable) prevented determining the exact amount and nature of any radiation produced.

The Examiner also totally ignores the data of the October Declaration that shows the 2005 sample is emitting energy ten years after its creation. Instead, the Examiner focuses on data at certain energy levels where the background radiation (measured at one time and place) exceeded that measured (at another time and place) with the

sample present. What the Examiner ignores is that, ten years after production the sample was produced, it is still emitting measurable radiation and at most energy levels the measured radiation (in counts per minute over 10 and 40 minutes) is far in excess of background. Below is a chart from the October Declaration that shows that for most energy levels detected the emitted radiation is above background.

The following is from paragraph 7 of the October Declaration: "In the table on the next page the "Bin Count" reflects the magnitude of the energy produced. The column labeled Sample A is the data in counts per minute when the detector was ~30 centimeters from the sample for 10 minutes." And the data follows:

Bin count, Magnitude	Sample A (counts/min.)	Background (counts/min.)
180	1	0
150	5	2
120	19	11
90	50	38
60	125	128
30	217	243
26	0	4
24	0	3
20	0	3
18	0	3
0	216	202

So what does the data show? That for energy levels corresponding to 180-90 the measured radiation exceeds measured background and that for energy levels 30-0 it does not. That proves radiation is being emitted at certain energy levels. That does not prove that the process is not repeatable or that it is inoperable as asserted by the Examiner. The Examiner then opines that Applicants should have determined the nature of the radiation, the exact amount of radiation and looked for neutrons. The goal

of the work was to demonstrate the existence of measurable radiation ten years after the sample was produced and the data unequivocally proved that.

The Examiner also ignores the plain import of the next set of data in the October Declaration. Again, the Bin Count represents the magnitude of the radiation detected when the detector was ~3 centimeters from Sample A for 40 minutes.

Bin count, Magnitude	Sample A (counts/min.)	Background (counts/min.)
270	1	0
210	1	0
180	7	0
150	38	2
120	34	44
90	500	124

The data clearly shows, that for energy levels corresponding to 270-150 the measured radiation exceeds measured background and that for energy levels 120-90 it does not. The data proves that radiation is being emitted at certain energy levels ten years after the carbon nanotubes and deuterium were combined. The fact that the background is higher at certain energy levels is technically and legally irrelevant.

The goal of this work was not to prove the existence of cold fusion by identifying the nature and amount of the emitted radiation, as suggested by the Examiner in the Final Rejection at P. 9.

In the Final Rejection the Examiner asserted that "substantial empirical proof of operability that has been rigorously evaluated by objective scientists skilled in the art would be require to demonstrate operability." Final Rej. P.8. As noted above, the Pons

and Fleischmann technology is technologically operable and has been proven to be operable by many "objective scientists skilled in the art" but not repeatedly operable.⁴

The second proof that the combination of carbon nanotubes and deuterium produces energy or radiation from a nuclear reaction is the work Applicants had done at Lawrence Livermore National Laboratories (LLNL). Applicants then believed that the production of neutrons would demonstrate there was a nuclear reaction, and that external energy was needed to initiate such a reaction. As a result, electrical stimulation of the samples was used with neutron detectors. As will be discussed below, using neutrons as being determinative of a nuclear reaction later proved to be misguided and energy input was found to be unnecessary.

Contrary to the Examiner's assertion on P. 5 of the Final Rejection, the experiments at LLNL are described in the August Loan Declaration.

The entire LLNL report cannot be submitted to the USPTO to become a public document because of the contract provisions required by LLNL prohibit "publication."

From the cited report:

The Contractor will not publish or disclose any information associated with the work done under this agreement without the express written consent of the Sponsor. The Sponsor will not publish any information associated with the work done under this agreement without the express written consent of the Contractor. Notwithstanding the foregoing, the Sponsor may disclose the content of any report provided to the Sponsor by the Contractor resulting from the work under this Agreement.

The contract does not prohibit disclosure of reports content and it describes that on at least one occasion, when energy was input to the applicant's combination of CNTs and deuterium, measurable neutrons were produced. Specifically, at page 27, it reports that analysis of the ³He proportional counter neutron data revealed a number of events

⁴ The Examiner apparently confuses technological operability with the USPTO standard for operability. They are not the same.

associated with the CNT samples that are above normal background levels. Of these, the CNT sample event of October 13, 2006 at 16:14 provides evidence for a DD fusion source.

From this work, and interface with LLNL technical personnel, Applicants learned that using neutron production as proof of a nuclear reaction was not determinative proof of a nuclear reaction for the following reasons. First, the neutron detectors at LLNL could not discriminate between a cosmic ray and a neutron. Thus, large reactive samples, long reactions times, and simultaneous cosmic ray measurements would be needed. Such research was far too expensive to be funded by the Applicants. In addition, neutrons can also be produced by impinging high energy on some materials, and there are nuclear fusion reactions that do not produce neutrons. Specifically, $D + D \rightarrow {}^4\text{He} + 23.8 \text{ MeV}$.⁵ (Par. [0049] from the present application).

Thus, even when energy is impinged on a CNT/Deuterium mixture and neutrons are produced from Applicants' invention, the existence of some type of nuclear reaction is not unequivocally shown. For those reasons, plus the high cost of conducting research at LLRL, and the reality that to prove Applicants' technology was a nuclear reaction the proof must be absolutely unequivocal, Applicants used two other means of determining the existence of a fusion reaction, the experiments shown in the present application at paragraphs [0059] to [0099].

Tellingly, the Examiner ignores the work set out in the application and has asserted that a peer-reviewed article is necessary to show acceptance of the

⁵ In that equation, D is deuterium, He is Helium and 23.8 MeV is energy measured in electron volts - 1MeV is one million electron volts.

Applicants' process. But when a peer-reviewed article reports results supporting Applicants' position the Examiner, after reading it and criticizing it, asserts it is not of record.

The journal article, "Visible-Light-Induced Water-Splitting in Channels of Carbon Nanotubes," J. Phys. Chem. B, 110, No. 4, (2006)1571-1575), [also referred to as the "Guo" reference] was not cited in an Information Disclosure Statement, but the Examiner has read and considered the content of the Guo reference. (See, Final Rej. P. 12) where the Examiner states: [the] findings of Guo were addressed in detail at paras. 9-13 of the Office Action of 08/01/16." Therefore, it should be considered in this Appeal and is attached as Appendix C.

The invention of the present application creates energy and Helium by the combination of three-dimensional nanostructured carbon material (e.g. carbon nanotubes) and deuterium. In the Guo article the researchers noted the production of energy when water (inherently containing deuterium as heavy water⁶) was combined with carbon nanotubes but not with "micro graphite." . Id. at 1574. Micro graphite (also known as "graphene") is crystalline carbon, but it is planar, i.e. a two-dimensional sheet. Moreover, the results of their gas analysis unequivocally showed transmutation byproducts (helium and tritium) of some type of nuclear reaction. Those authors opined that the water was being split [into its constituent elements] in the carbon nanotubes. "That supports the opinion of thermosplitting of water confined within the channels of the SWNTs." Id. P. 1575. [a SWNT is a single-walled carbon nanotube]

⁶ For about every 5,600 molecules of conventional H₂O there is a molecule of "heavy water" D₂O.

In the Final Rejection at P. 12-13, the Examiner denigrates the import of the Guo paper by stating: "Guo explicitly discloses that the 'non-labeled peaks are either attributable to the fragments of [He, CH₄, H₂O, CO, C₂H₆, CO₂] or 'are rather insignificant.'" They may be "insignificant" to the authors of the paper, they were not looking for or considering the ramifications of the existence of transmutation byproducts, but the existence of Helium (⁴He) is proof of some kind of nuclear reaction. Transmutation of one atomic element to another is a characteristic of a nuclear reaction. The existence of helium in those gases may be considered insignificant to the Examiner, but the existence of transmutation byproducts in this work is significant because it results from the combination of three-dimensional carbon nanotubes (but not planar carbon) and deuterium.

The Examiner focuses on elements at 3 AMU (the unlabeled peak in Fig. 2 of Gou, but never discusses the import of the ⁴He peak at 4AMU that is labeled in that same figure, reproduced below.

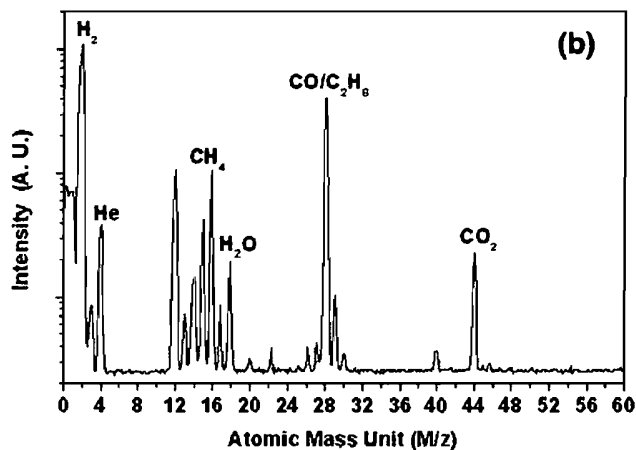


Figure 2. Typical experimental result of gas release. (a) The total pressure in the V_s evolving with time. A step appears when the sample is irradiated. (b) One mass spectrum of the sampled gases. The base spectrum obtained before sampling has been subtracted from the original data. The main components have been labeled above the corresponding peaks.

The Examiner's assertion that the 3 AMU peak is "noise" does not address the fact that the labeled ^4He peak (described by Guo as "a main component") is not and cannot be residual ^4He from the atmosphere⁷ because, as stated above: The base spectrum obtained before sampling has been subtracted from the original data. Id.

Applicants cited and discussed the import of recent article relevant to scientific theory on the interaction of water (and hence deuterium-containing heavy water) and solids such as carbon nanotubes. The Examiner asserted that the articles fail to show a nexus between Applicant's technology and nuclear fusion. Final Rej. P. 12.

Applicants cited two recent articles to show that current technological developments from mainstream science support the fact that water (hence heavy water or deuterium) can be confined in carbon nanotubes. In an article dated April 26, 2016, "New state of water molecule discovered"⁸ the author quotes from research conducted at Oak Ridge National Laboratory:

"At low temperatures, this tunneling water exhibits quantum motion through the separating potential walls, which is forbidden in the classical world," said lead author Alexander Kolesnikov of ORNL's Chemical and Engineering Materials Division. "This means that the oxygen and hydrogen atoms of the water molecule are 'delocalized' and therefore simultaneously present in all six symmetrically equivalent positions in the channel at the same time. It's one of those phenomena that only occur in quantum mechanics and has no parallel in our everyday experience." [emphasis added].

The author of the review goes on to discuss the ramifications of this work at ORNL:

⁷ Air ordinarily contains from 5-7 ppm of Helium (^4He)

⁸ Filed in an Information Disclosure Statement in this application.

The existence of the tunneling state of water shown in ORNL's study should help scientists better describe the thermodynamic properties and behavior of water in highly confined environments such as water diffusion and transport in the channels of cell membranes, in carbon nanotubes and along grain boundaries and at mineral interfaces in a host of geological environments. [emphasis added].

This article is significant for three reasons. First, it was conducted by unimpeachable technical personnel. Second, it supports the fact that water, heavy water and thus deuterium can be confined in carbon nanotubes. And third, it demonstrates the fallacy of the Examiner's assumption that the science with respect to everything, including water and its ability to permeate other molecules, including carbon nanotubes, is static.

If the facts are in conflict with current scientific theory, it is the theory that must be changed to conform with the facts. Discounting indisputable facts because they are in conflict with current theory is scientifically and legally indefensible.

The Final Rejection asserts that the claims of this application are unpatentable under 35 USC 102 in view of U.S. Patent Publ. 2009/0086877 (Hagelstein). Applicants have previously asserted that they do not concede that this publication is "prior art."

It is fundamental that for a cited art document to anticipate a claim, the cited art must provide an enabling disclosure of the claimed subject matter. *MPEP* § 2121.01. The cited cases hold that, "In determining that quantum of prior art disclosure which is necessary to declare an applicant's invention 'not novel' or 'anticipated' within section 102, the stated test is whether a reference contains an 'enabling disclosure'... ." *In re Hoeksema*, 399 F.2d 269, 158 USPQ 596 (CCPA 1968). The mere naming or description of the subject matter is insufficient; rather, the cited art must demonstrate

that the public was in possession of the claimed subject matter before the date of invention. The cited art must describe the claimed subject matter in such detail as to enable one of ordinary skill in the art to make the claimed subject matter without undue experimentation. See MPEP § 2121.01, referring to *Elan Pharm., Inc. v. Mayo Found. For Med. Educ. & Research*, 346 F.3d 1051, 1054, 68 USPQ2d 1373, 1376 (Fed. Cir. 2003)."

Instead of a clear disclosure of the invention of the present application, Hagelstein sets out numerous materials that Hagelstein believed could be excited with applied energy to produce a reaction. Below is a table showing all the "materials 202" that are taught to be operable in the disclosed process. The list has no discernable bounds.

Material 202	Citation
gaseous molecular deuterium (D ₂)	[0312]
liquid deuterium (D ₂)	[0332]
solid deuterium (D ₂)	[0332]
gaseous hydrogen-deuterium (HD)	[0312]
liquid hydrogen-deuterium (HD)	[0332]
solid hydrogen-deuterium (HD)	[0332]
gaseous molecular deuterium (D ₂) and hydrogen-deuterium (HD)	[0312]
liquid deuterium (D ₂) and hydrogen-deuterium (HD)	[0332]
solid deuterium (D ₂) and hydrogen-deuterium (HD)	[0332]
at least one element that has one or more stable isotopes	[0312]
at least one element that has an excess number of neutrons	[0312]
an isotopic variant of a dihydrogen transition metal complex with a substitution by D ₂	[0316]

an isotopic variant of a dihydrogen transition metal complex with a substitution by HD	[0316]
an isotopic variant of a dihydrogen transition metal complex with a substitution by D ₂ and HD	[0316]
a fullerene-based material	[0322]
a semiconductor material	[0327]
an insulator	[0327]
deuterium containing liquid	[0357]
metal hydride	[0308]
metal deuteride	[0309]
metals Pd, Ni, Pt, Rh, Ru, Ti, Nb, V, Ta, W, Hf, Zr, Mo, U, Sc, Mn, Co, Zn, Y, Zr, Cd, Ag, Sn	[0258]
Alloys (of the metals above?)	[0258]
Composites (including the metals above?)	[0258]

In addition to the sheer number of possible materials “202” including gases, liquids, and solids, and the open-ended disclosure of “alloys” and “composites” (leaving undisclosed what alloys and what composites of what materials are to be used) precludes this reference from being a disclosure of the combination of a fullerene-based material and deuterium.

In addition, the purpose of the material 202 is entirely different from the purpose of a three-dimensional nanostructured carbon material as it is used in Applicants’ claimed invention.

According to Hagelstein the purpose of the material 202 is to store D₂, HD (hydrogen and deuterium) or a combination of D₂ and HD and He (helium) interstitially in the metal lattice (“material 202”). Helium is required in the lattice to promote the desired reactions. Hagelstein at [0224]. It should be noted that, as pointed out by the Examiner, the Pons and Fleischmann technology used by Hagelstein is not capable of

being predictably replicated. Thus, the mechanisms proposed by Hagelstein with respect to the function and operation of the material 202 are pure speculation and conjecture that cannot be entirely correct, or the process would produce energy as Hagelstein predicted.

By contrast the three-dimensional nanostructured carbon material of the present is not a storage medium for deuterium and helium, but provides the electronic conditions to induce some type of nuclear reaction. It is mere speculation to locate those electronic conditions at any particular location relative the three-dimensional nanostructured carbon material.

Most significantly, the function of the three-dimensional nanostructured carbon material must be different than the material 202 of Hagelstein because every time the Applicants have combined carbon nanotubes and deuterium in the presence of some type of energy-detecting device measurable energy has been produced.

When Hagelstein et. al. is read in its entirety it is clearly apparent that it is a research paper that has been crudely transformed into a patent application. It is also clear that the application is primarily speculation, theory, and conjecture. From Hagelstein et. al.:

[0124] However, there are new effects that are predicted by the new theory . . . [0222] The basic conjecture here is . . . [0224] Nevertheless, the predictions of the model . . .

It is also clear that the conjectures all relate to the mechanism of the Pons Fleischmann technology that uses metal deuterides excited with external energy to induce an exothermic reaction.

Hagelstein discloses carbon nanotubes (a fullerene-based material) and thousands of additional and unspecified materials only to store or transport deuterium and helium. The entire focus of the work discussed in this obtuse, and theoretical document is impinging energy on deuterium containing materials (primarily metal deuterides) to facilitate a fusion reaction when the stored deuterium is excited by external energy. This reference does not teach or suggest that a nuclear reaction or the production of Helium and energy results from combining deuterium and carbon nanotubes.

While the listed materials 202 includes three-dimensional nanostructured carbon material ("a fullerene-based material"), its inclusion in an exhaustive list of thousands of possible materials to excite to produce a reaction does not provide sufficient guidance to one skilled in the art to make that selection. As such Hagelstein fails to provide an enabling disclosure with respect to the claimed subject matter of the present application.

In paragraph 24 of the Final Rejection the Examiner asserts that Hagelstein "discloses the generation of energy by contacting carbon materials with deuterium." The Examiner then quotes Paragraph [0274] of Hagelstein for support of this assertion. It states:

[0274] In FIG. 17c, at one site 26, molecular deuterium 25 fuses into another helium 37 thereby releasing energy 39 into the lattice structure 31. At the other site 28, the helium 27 dissociate to form a deuteron pair 41 of lower energy within the site 28. Some of the energy release from the molecular transformations is lost to the metal lattice 31 and appears as heat energy.

Fig. 17c is reproduced on the next page.

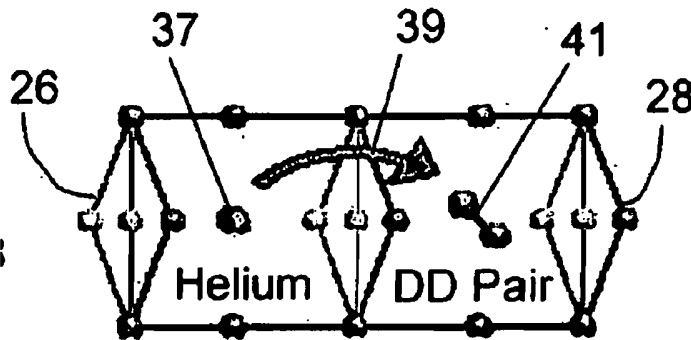


FIG. 17c

The Examiner infers that the “metal lattice 31” is a “fullerene material” such as carbon nanotubes. But Hagelstein explicitly states it is **not**:

[0257] FIG. 17a-17e illustrates energy being created in a **metal deuteride** in accordance with an embodiment of the present invention. In FIG. 17a, deuterium (D_2) 25 and helium (4He) 27 are loaded into the interstitial sites 26, 28 in the atomic lattice of the host metal structure 31. (emphasis added)

The “host metal structure 31” is not a carbon lattice as inferred by the Examiner. The schematic depiction of the lattice in Fig. 17c is not that of a carbon nanotube (See Appendix B), and “a metal deuteride” is one of the explicitly disclosed “materials 202,” disclosed in Paragraph [0302] of Hagelstein.

The disclosure cited by the Examiner is a speculative description of proposed atomic reactions believed to occur in a lattice of a metal deuteride in which helium (4He) has been inserted. One deuterium from the lattice is asserted to fuse with a helium atom at one site in the lattice to release energy and at a different site helium is believed to disassociate to form a deuterium-deuterium pair that also releases energy. Both these postulated events are to be induced by imposing external energy on the helium

containing lattice. Such speculation does not disclose, teach, or suggest that deuterium will react with a carbon nanotube to form ^4He and energy.

Finally with respect to Hagelstein, it is fundamentally inconsistent and inequitable to hold the present Applicants to a rigorous standard of disclosure and then reject their claims using a reference that contains, in a wholly obtuse, speculative, and theoretical discussion, a combination of deuterium and thousands of materials including carbon nanotubes in a manner that would not enable one skilled in the art to practice what is claimed in the present application.

In Paragraph 25 of the Final Rejection the Examiner asserts that the specification is not in compliance with 35USC§112 as failing to provide an adequate written description of the invention and further for failing to provide an enabling disclosure. Such a position is not supported by the facts. The present application has working examples and discloses three different types of tests that confirmed the creation of energy from the combination of carbon nanotubes and deuterium, either as heavy water or deuterium gas. The reaction of the present application has been reported by third parties imbedded in their investigation of gas production from water. See pages 17-20 of this Brief.

Paragraph 26 of the Final Rejection is reproduced below:

26. There is no reputable evidence of record to support the claim that the present invention involves nuclear fusion, nor is there evidence that claims of energy production are valid and reproducible, nor is there evidence that the invention is capable of operating as indicated or capable of providing a useful output.

The examples of this application that show emitted radiation, transmutation byproducts, and emanating light are evidence of some type of nuclear reaction. Whether it is a fusion reaction or any other type of known or unknown nuclear reaction, it has been proved to be nuclear because of the production of energy (for over 10 years from a 10 milligram sample) and transmutation byproducts without energy input. In addition, a peer-reviewed technical article of record supports the fact that combinations of carbon nanotubes and deuterium emit energy and transmutation byproducts (Guo et al Appendix C and pages 17-20 of this Brief). It is the Examiner's burden to show why such evidence is "not reputable" and the Examiners criticisms of the August and October Loan Declaration have been shown to be flawed. See pages 12-15 of this Brief.

Moreover, the technical results set out in the present application at [0059-0099] have not been shown to be inadequate in any respect. The work disclosed in [0059-0080] shows the production of the transmutation byproduct Helium and the work disclosed in [0081-0099] shows the generation of light energy. It is not understood how the Examiner can reasonably assert that there is no evidence that claims of energy production are valid.

The assertions in the last sentence of Paragraph 26, without any technological justification, ignore the working examples in the application and the work reported in the Loan Declarations. In addition, the Examiner's assertion that the production of energy from a reaction between deuterium and carbon nanotubes is not capable of providing a useful output presumes, without any technological support, that the proven energy output is not useful.

In Paragraph 27 of the Final Rejection the Examiner attempts to link the invention of the present application with the Pons Fleischmann technology citing paragraphs [0005-6] and [0057] of the specification. Paragraphs [0005-6] disclose that the present invention produces helium. Paragraph [0057] merely notes that in one apparently successful Pons Fleischmann process done in 2009 helium was produced. It cannot be credibly asserted that if two processes produce the same material the processes are the same. Applicants' process creates helium as a transmutation byproduct but that does not make the processes the same as the Pons Fleischmann technology. The excitation of deuterium containing solids in the presence of helium in an electrochemical process is not the same as reacting three-dimensional carbon nanostructures with deuterium.

After making the erroneous conclusion that the present invention and Pons Fleischmann "cold fusion" are the same technology, the Final Rejection then goes on for 15 paragraphs (28-42) and 8 pages of diatribe criticizing the body of work relating to the electrochemical process of Pons Fleischmann "cold fusion."

Guilt by association is a known error in logic. While it appears to have "credibility" in social media and the press, it has no place in legal reasoning.

As set out above, and on pages 8-10 of this Brief, there is no factual basis for equating the two different processes, and thus the factual assertions in paragraphs 28-42 of the Final Rejection are logically and legally irrelevant.

In Paragraph 44 the Examiner asserts that the claimed invention is "not supported by a specific and substantial asserted utility or a well-established

utility.” This is apparently based on the assertion that the invention of the present application is incapable of producing nuclear fusion. Applicants’ process, by whatever nuclear reaction exists, known or unknown, produces energy without greenhouse gases or harmful byproducts in amounts far in excess of any known chemical reaction. For the Examiner to assert such technology has no utility is ludicrous and appears to be based on the false premise that the present invention shares the disabilities of Pons Fleischmann-type technology, the lack of reproducible results. There is no evidence to support such a position.

The applicants working examples and peer-reviewed research has demonstrated that the confinement of deuterium or water in carbon nanotubes is a fact and energy and nuclear transmutation byproducts are produced by the combination of carbon nanotubes and deuterium.

In Paragraph 45 of the Final Rejection the Examiner alleges that the claimed invention “does not have a specific and substantial asserted utility or a well-established utility.” To the extent that assertion is understood, it has been addressed on the two paragraphs above.

The Examiner, without explanation, then asserts that “one skilled in the art would not know how to use the claimed invention.” To the extent that unsupported assertion is understood, the issue of whether or not one skilled in the art could make and use the invention was addressed in the August Loan Declaration.

Mr. Loan went through each of the “Wands” criteria and showed how it was possible, with the disclosure of the present application, for one of ordinary

skill in the art, without undue experimentation, to make and use the claimed invention. See paragraphs 13, 32, 42, and 46 of the Loan Declaration..

Paragraphs 46-65 and 66-87 of the Final rejection reject the claims of this application under 35USC §§102 and 103, relying on Hagelstein as the primary reference. As is set out on pages 25-26 of this Brief the Examiner's understanding of the disclosure in Hagelstein is fundamentally flawed. Hagelstein totally fails to disclose, teach, suggest that the combination of deuterium and a fullerene (using Hagelstein's terminology) would result in a reaction producing energy and Helium.

As noted on page 21 of this Brief, Hagelstein's speculative description of proposed atomic reactions believed to occur in a lattice of a metal deuteride in which helium (^4He) has been inserted, where a deuterium from the lattice is asserted to fuse with a helium atom at one site in the lattice to release energy and at a different site helium is believed to disassociate to form a deuterium-deuterium pair that also releases energy triggered by imposing external energy on the helium containing lattice simply does not disclose, teach, or suggest that deuterium will react with a carbon nanotube to form ^4He and energy.

Conclusion

The record of this application shows that Applicants have rebutted every factual assertion made by the Examiner with credible evidence, supporting the fact that the claimed subject matter complies with all applicable statutory standards. But by erroneously attempting to equate Pons Fleischmann-type "cold fusion" with the present invention, the Examiner attempted to distort the entire

examination process and use the historic rejection of “cold fusion” by the USPTO and the Federal Circuit as the basis for the rejection of the present invention.

It is absolutely irrelevant to the issues of this application that the Fleischmann and Pons technology is not accepted or cannot be repeated by independent research. As noted above, when third-party research unknowingly combined deuterium (inherently present in ordinary water) with carbon nanotubes their results confirmed what is reported in the present application.

In response to the inquiry of paragraph 66 of the Final Rejection, the subject matter of all of the claims was commonly owned at the time the inventions were made.

Applicants have disclosed and claimed an invention having great technical potential. It is a source of energy that does not create toxic or radioactive byproducts. It produces energy in amounts not possible for a chemical reaction. The invention has been disclosed with four different examples that can be duplicated by technical personnel without undue experimentation.

The major impediment to allowance of this application is not the utility of the invention, the adequacy of the disclosure, or the prior art. It is the history of “cold fusion” and the electrolysis technology of Pons and Fleischmann. Applicants cannot erase that history, nor should the Board ignore it.

But it is self-evident that when one line of research in a technology has not been proven or cannot be reproduced, it does not mean all lines of research in that technology are similarly flawed.

Objective analysis of the facts shows the following:

- 1) The combination of three-dimensional nanostructured carbon material and deuterium produces measurable energy.
- 2) The duration of energy production precludes it being produced by chemical means.
- 3) Peer-reviewed research confirms the production of both energy and nuclear transmutation byproducts when three-dimensional nanostructured carbon material and deuterium are combined.

Applicants have demonstrated the invention is useful, operable, readily practiced without undue experimentation, and nowhere disclosed or suggested in the prior art.

Applicants respectfully request that the application be examined on ITS merits, not in view of the failing of other techniques. When viewed on its merits the application meets all statutory criteria for patentability.

Moreover, it is the mandate of the U.S. Constitution that the patent system "**promote** science and the useful arts" [emphasis added]. The positions set out in the Final Rejection suppress science by asserting that scientific understanding is static and that anything in conflict with known science or having any relationship to controversial technology must be dealt with by changing the statutory standards of patentability.

Reversal of the Final Rejection and allowance of the claims is respectfully requested.

Attached to this Brief is a Claims Appendix and Appendices A-C.

Respectfully submitted,

Dated: January 8, 2019

By: Stephen L. Peterson
Stephen L. Peterson
Reg. No. 26,325
202 251 9367

Attached: Claims Appendix and Appendices A-C

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Trademarks, P.O. Box 1451, Alexandria, Virginia 22313-1451 on the date shown below:

Stephen L. Peterson

(Typed or Printed Name of Person Signing Certificate)

Stephen L. Peterson
(Signature)

Jan 8, 2019
(Date)

Claims Appendix to Appeal Brief Under Rule 41.37(c)(1)(viii)

1. (Previously Presented) A method of generating ^4He atoms and energy, said method comprising:

contacting three dimensional nanostructured carbon material with deuterium; and

transmuting the deuterium to ^4He atoms and energy.
2. (Previously Presented) The method of claim 1; wherein ^4He is generated in an amount of at least ten ^4He atoms per hour per microgram of said three dimensional nanostructured carbon material at 0°C .
3. (Previously Presented) The method of claim 1, wherein said three dimensional nanostructured carbon material comprise multilayer graphite, single walled carbon nanotubes, multiwalled carbon nanotubes, buckyballs, carbon onions, and carbon nanohorns.
4. (Previously Presented) The method of claim 1, wherein said deuterium is in a liquid, gas, plasma, or supercritical phase.
5. (Previously Presented) The method of claim 1, further comprising the removal of from the surface of the three dimensional nanostructured carbon material by heating the three dimensional nanostructured carbon material prior to the contacting step, wherein said heating is performed at conditions sufficient to remove unwanted material from the surface of the three dimensional nanostructured carbon material.
6. (Previously Presented) The method of claim 5, wherein said unwanted materials comprise H_2O , OH , H_2 , atomic hydrogen (protium), polymers, oils, amorphous carbon, O_2 , solvents, acids, and bases.

7. (Originally Filed) The method of claim 5, wherein said conditions comprise a time up to 18 hours and a temperature up to 400 °C.

8. (Originally Filed) The method of claim 7, wherein said conditions comprise a time ranging from 1 to 8 hours and a temperature ranging from 100 to 250 °C.

9. (Previously Presented) The method of claim 1, wherein said three dimensional nanostructured carbon material comprises carbon nanotubes, and said method further comprises heating the carbon nanotubes at a temperature and for a time sufficient to promote absorption of the deuterium into or onto the carbon nanotubes.

10. (Originally Filed) The method of claim 9, wherein the temperature and time sufficient to promote absorption ranges from 30 °C to 300 °C, and from 30 minutes to 8 hours, respectively.

11. (Previously Presented) The method of claim 1, wherein the step of contacting three dimensional nanostructured carbon material with deuterium is performed at or below room temperature.

12. (Previously Presented) The method of claim 11, wherein the step of contacting three dimensional nanostructured carbon material with deuterium is performed at a temperature ranging from 20 °C to -100 °C.

13. (Previously Presented) The method of claim 1, wherein said three dimensional nanostructured carbon material comprise carbon nanotubes that are functionalized and/or doped with nitrogen.

14. (Originally Filed) The method of claim 1, wherein said ^4He atoms have an energy of less than 1 KeV.

15. (Originally Filed) The method of claim 14, wherein said ^4He atoms have an energy of less than 100 eV.

16. (Previously Presented) The method of claim 1, wherein said three dimensional nanostructured carbon material are placed in deuterium for a time ranging from 30 minutes to 48 hours.

17. (Previously Presented) The method of claim 16, wherein said three dimensional nanostructured carbon material are placed in deuterium for a time ranging from 1 to 18 hours.

18. (Cancelled)

19. (Previously Presented) A method of generating energy, ^4He atoms, or both, said method comprising:

providing three dimensional nanostructured carbon material in a sealable vessel;
evacuating the sealable vessel to a pressure below atmospheric pressure;
adding deuterium gas to said vessel to achieve a pressure above atmospheric pressure; and

heating the vessel to increase the pressure inside the vessel.

20. (Previously Presented) The method of claim 19, wherein ^4He is generated in an amount of at least ten ^4He atoms per hour per microgram of said three dimensional nanostructured carbon material at 0°C .

21. (Previously Presented) The method of claim 19, further comprising heating the three dimensional nanostructured carbon material prior to adding deuterium gas.

22. (Originally Filed) The method of claim 21, wherein said heating is performed in a sealed chamber and a temperature to bake-out unwanted materials, said method

further comprising evacuating the sealed container to remove the unwanted materials from the sealed container.

23. (Originally Filed) The method of claim 19, wherein said at least one heating step is performed at temperature ranging from 50°C to 500°C for a time ranging from 20 minutes to 6 hours.

24. (Originally Filed) The method of claim 19, wherein said aging is performed at a temperature ranging from 20 °C to -100 °C.

25. (Previously Presented) The method of claim 19, wherein said radiation comprises x-rays, visible light, infrared, microwaves, radio waves or combinations thereof

26. (Previously Presented) The method of claim 19, wherein said three dimensional nanostructured carbon material are placed in deuterium for a time ranging from 1 to 18 hours.

27. (Cancelled)

28. (Previously Presented) A method of generating radiation, said method comprising:

contacting three dimensional nanostructured carbon material with deuterium; and placing said three dimensional nanostructured carbon material in said deuterium for a time sufficient to generate radiation.

29. (Previously Presented) The method of claim 28, wherein said radiation comprises x-rays, visible light, infrared, microwaves, radio waves or combinations thereof.

30. (Previously Presented) The method of claim 28, wherein said three dimensional nanostructured carbon material comprise, multilayer graphite, single walled carbon nanotubes, multiwalled carbon nanotubes, buckyballs, carbon onions, carbon nanohorns and combinations thereof.

31. (Previously Presented) The method of claim 28, wherein the deuterium is in a liquid, gas, plasma, or supercritical phase.

32. (Previously Presented) The method of claim 28, further comprising the removal of contaminants from the surface of the three dimensional nanostructured carbon material by heating the three dimensional nanostructured carbon material prior to the contacting step, wherein said heating is performed at conditions sufficient to remove unwanted material from the surface of the three dimensional nanostructured carbon material.

33. (Previously Presented) The method of claim 28, wherein said three dimensional nanostructured carbon material comprises carbon nanotubes, and said method further comprises heating the carbon nanotubes prior to aging at a temperature and for a time sufficient to promote absorption of the deuterium into or onto the carbon nanotubes.

34. (Originally Filed) The method of claim 28, wherein said graphene materials comprise carbon nanotubes that are functionalized and/or doped with nitrogen.

35. (Previously Presented) The method of claim 28, wherein said ^4He atoms have an energy of less than 1 KeV.

36. (Previously Presented) The method of claim 35, wherein said ^4He atoms have an energy of less than 100 eV.

37. (Cancelled)

38. (Canceled)

39. (Previously Presented) A method of inducing nuclear transmutation, comprising the steps of:
contacting three dimensional nanostructured carbon material with deuterium; and
placing said three dimensional nanostructured carbon material ~~in said source of~~
deuterium for a time sufficient to transmute said deuterium and generate primarily a plurality of ^4He atoms and energy.

40. (Previously Presented) The method of claim 39, wherein said three dimensional nanostructured carbon material comprises carbon nanotubes.

41. (Previously Presented) The method of claim 39, wherein said three dimensional nanostructured carbon material further include nitrogen.

42. (Originally Filed) The method of claim 39, wherein said deuterium is a gas.

43. (Originally Filed) A method of producing energy, comprising the steps of:
introducing a gas consisting essentially of D_2O to a material consisting essentially of carbon nanotubes;
applying pressure to the gas; and
generating energy and ^4He atoms.

44. (Previously Presented) A method of producing energy, comprising the steps of:

introducing a material consisting essentially of deuterium to three dimensional nanostructured carbon material to form a combination of deuterium and said three dimensional nanostructured carbon material;

applying pressure to the combination; and
generating energy and ^4He atoms.

45. (Previously Presented) The method of claim 44, wherein said three dimensional nanostructured carbon material comprises carbon nanotubes.

46. (Previously Presented) A method of generating energy, comprising:
contacting three dimensional nanostructured carbon material with deuterium; and
transmuting said deuterium to produce a plurality of ^4He atoms and energy.

47. (Previously Presented) The method of claim 46, wherein said three dimensional nanostructured carbon material comprises carbon nanotubes.

48. (Previously Presented) The method of claim 46, wherein said deuterium is a gas.



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PATENT
Customer No. 117724
Attorney Docket No. DE-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)
)
Christopher H. Cooper et. al.) Group Art Unit: 3646
)
Application No.: 13/089,986) Examiner: Davis, Sharon M.
)
Filed: April 19, 2011) Confirmation No.: 1497
)
For: METHOD OF GENERATING)
ENERGY AND ^4He USING THREE)
DIMENSIONAL NANOSTRUCTURED)
CARBON MATERIALS)

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PETITION FOR EXTENSION OF TIME

A Notice of Appeal for this application was filed January 26, 2017. The Brief was due August 8, 2018.

Applicants hereby petition for a five-month extension of time to file the Appeal Brief until January 8, 2019.

A fee of \$750.00 is submitted herewith.

Respectfully submitted,

Dated: January 8, 2019

By: Stephen L. Peterson
Stephen L. Peterson

Enclosure Check 2039 \$750.00

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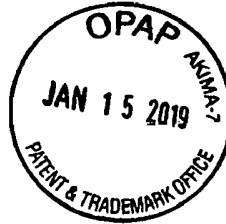
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NOTICE OF APPEAL FROM THE EXAMINER TO THE PATENT TRIAL AND APPEAL BOARD		Docket Number (Optional) DE-0001								
I hereby certify that this correspondence is being facsimile transmitted to the USPTO, EFS-Web transmitted to the USPTO, or deposited with the United States Postal Service with sufficient postage in an envelope addressed to "Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)] on _____. Signature _____ Typed or printed name _____	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2" style="padding: 2px;">In re Application of Cooper et al.</td> </tr> <tr> <td style="width: 50%; padding: 2px;">Application Number 13/089,986</td> <td style="width: 50%; padding: 2px;">Filed April 19, 2011</td> </tr> <tr> <td colspan="2" style="padding: 2px;">For <small>METHOD OF GENERATING ENERGY AND 4He USING THREE-DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS</small></td> </tr> <tr> <td style="padding: 2px;">Art Unit 3646</td> <td style="padding: 2px;">Examiner Sharon M. Davis</td> </tr> </table>		In re Application of Cooper et al.		Application Number 13/089,986	Filed April 19, 2011	For <small>METHOD OF GENERATING ENERGY AND 4He USING THREE-DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS</small>		Art Unit 3646	Examiner Sharon M. Davis
In re Application of Cooper et al.										
Application Number 13/089,986	Filed April 19, 2011									
For <small>METHOD OF GENERATING ENERGY AND 4He USING THREE-DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS</small>										
Art Unit 3646	Examiner Sharon M. Davis									
Applicant hereby appeals to the Patent Trial and Appeal Board from the last decision of the examiner.										
The fee for this Notice of Appeal is (37 CFR 41.20(b)(1))		\$ <u>800.00</u>								
<input type="checkbox"/> Applicant asserts small entity status. See 37 CFR 1.27. Therefore, the fee shown above is reduced by 50%, and the resulting fee is:		\$ _____								
<input checked="" type="checkbox"/> Applicant certifies micro entity status. See 37 CFR 1.29. Therefore, the fee shown above is reduced by 75%, and the resulting fee is: <small>Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.</small>		\$ <u>200.00</u>								
<input type="checkbox"/> A check in the amount of the fee is enclosed.										
<input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.										
<input type="checkbox"/> The Director is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. _____.										
<input checked="" type="checkbox"/> Payment made via EFS-Web.										
<input checked="" type="checkbox"/> A petition for an extension of time under 37 CFR 1.136(a) (PTO/AIA/22 or equivalent) is enclosed. <small>For extensions of time in reexamination proceedings, see 37 CFR 1.550.</small>										
WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.										
I am the										
<input type="checkbox"/> applicant	<input checked="" type="checkbox"/> attorney or agent of record Registration number <u>26,325</u>	<input type="checkbox"/> attorney or agent acting under 37 CFR 1.34 Registration number _____								
Signature <u>/s/ Stephen L. Peterson</u>										
Typed or printed name <u>Stephen L. Peterson</u>										
Telephone Number <u>202 251 9367</u>										
Date <u>June 8, 2018</u>										
NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.										
<input checked="" type="checkbox"/> * Total of <u>2</u> forms are submitted.										

This collection of information is required by 37 CFR 41.20(b)(1) and 41.31. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11, 1.14 and 41.6. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PATENT
Customer No. 117724
Attorney Docket No. DE-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Christopher H. Cooper et. al.

Group Art Unit: 3646

Application No.: 13/089,986

Examiner: Davis, Sharon

Filed: April 19, 2011

Confirmation No.: 1497

For: METHOD OF GENERATING
ENERGY AND ^4He USING THREE
DIMENSIONAL
NANOSTRUCTURED CARBON
MATERIALS [As Amended]

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

PETITION FOR EXTENSION OF TIME

Applicants petition for a one-month extension of time to file a Notice
of Appeal of the Final Rejection dated February 8, 2018. A fee of \$50.00
is submitted herewith.

Respectfully submitted,

Dated: June 8, 2018

By: /s/ Stephen L. Peterson
Stephen L. Peterson
Reg. No. 26325
(202) 251-9367

Electronic Patent Application Fee Transmittal

Application Number:	13089986			
Filing Date:	19-Apr-2011			
Title of Invention:	METHOD OF GENERATING ENERGY AND 4HE USING THREE DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS			
First Named Inventor/Applicant Name:	Christopher H. Cooper			
Filer:	Stephen Leroy Peterson			
Attorney Docket Number:	DE-1			
Filed as Micro Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
NOTICE OF APPEAL	3401	1	200	200
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Extension - 1 month with \$0 paid	3251	1	50	50
Miscellaneous:				
Total in USD (\$)				250

Electronic Acknowledgement Receipt

EFS ID:	32850178
Application Number:	13089986
International Application Number:	
Confirmation Number:	1497
Title of Invention:	METHOD OF GENERATING ENERGY AND 4HE USING THREE DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS
First Named Inventor/Applicant Name:	Christopher H. Cooper
Correspondence Address:	Stephen L. Peterson - PO BOX 319 - CRESTON CA 93432-0319 US - steve @petersonipc.com
Filer:	Stephen Leroy Peterson
Filer Authorized By:	
Attorney Docket Number:	DE-1
Receipt Date:	08-JUN-2018
Filing Date:	19-APR-2011
Time Stamp:	17:14:26
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$250

RAM confirmation Number		061118INTEFSW17171300			
Deposit Account					
Authorized User					
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:					
File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Notice of Appeal Filed	NOAc.pdf	188487	no	2
			c1161a70102d83ca7139de0944a3335c8886017c		
Warnings:					
Information:					
2	Extension of Time	EOTc.pdf	56394	no	1
			ed7f9978708ee7af58ef9bb1371974ba8a9a2c65		
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	32236	no	2
			f6e5d664a3716a75596465a0267141faea3ed2b7		
Warnings:					
Information:					
Total Files Size (in bytes):			277117		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111


If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Search Notes 	Application/Control No. 13/089,986	Applicant(s)/Patent Under Reexamination Cooper et al.
	Examiner SHARON M DAVIS	Art Unit 3646

CPC - Searched*		
Symbol	Date	Examiner
G21B3/00, 002	01/30/2018	SMD

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner
376	100 - as limited by text, see attached EAST Search History	12/9/2013	KEC

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Consulted with S. Burke and M. O'Connor regarding search terms	12/9/2013	KEC
Inventor search in EAST/PALM - See attached EAST Search History	12/9/2013	KEC
NPL search using google scholar with keywords such as "graphene" "hydrogen" "deuterium" "fusion"	12/9/2013	KEC
Refreshed prior search	1/7/2016	SPB
Refreshed prior search	7/25/2016	SPB
reviewed prosecution history, art of record, and new IDS art	01/30/2018	SMD

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

	/SEAN P BURKE/ Examiner.Art Unit 3646
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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/089,986	04/19/2011	Christopher H. Cooper	DE-1	1497

7590 02/08/2018
Stephen L. Peterson
PO BOX 319
CRESTON, CALIFORNIA 93432-0319

EXAMINER

DAVIS, SHARON M

ART UNIT	PAPER NUMBER
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3646

MAIL DATE	DELIVERY MODE
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02/08/2018

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application is being examined under the pre-AIA first to invent provisions.

Status of Claims and Prosecution

2. Claims 1-17, 19-26, 28-36, and 39-48 are pending in this application. A Final Rejection for these claims was mailed on 08/01/16.
3. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 08/26/17 has been entered.
4. No claim amendments were filed with the RCE of 08/26/17.

Request for Interview/Interview Summary

5. Applicant's representative Stephen Peterson placed a call to the Examiner on 12/04/17. A voicemail message was left stating that he was not at the time an attorney of record but that power of attorney documents were to be filed in the application. He further requested an interview to be held before an action on the merits was issued in the RCE. The examiner returned the call and explained that she could not schedule an interview until the power of attorney documents were processed. At the time, the examiner suggested that Applicant's representative wait until he was correctly listed as an attorney of record in the file and then call back to schedule an interview. Applicant's representative did not call to schedule the interview.

6. On Wednesday 01/24/18, Examiner placed a call to Applicant's representative at 202-251-9367. The examiner explained that she was calling to schedule an interview in the application and requested a return phone call to schedule a date and time. No return call was received until Saturday 02/03/17. A voicemail was left stating that Applicant's representative would call on Monday to schedule an interview. On Monday, the Examiner received a phone call from Applicant's representative. The Examiner noted that the application had been at the top of her docket for over 14 days and that an action was due to be completed on it by the end of the week. It was agreed to hold a telephone interview at the time of the phone call.

7. Applicant's representative discussed the nine numbered points of the interview agenda filed 01/06/18. The examiner stated that an interview was unlikely to result in advancement of prosecution because significant objective evidence would be required to overcome the 35 U.S.C. 101/112a rejections of record in the application, and such evidence cannot be introduced verbally. Applicant's representative stated that the Examiner was "close-minded." The Examiner responded that her position is based on the objective examination of cold fusion by the scientific community and is supported by droves of published literature. Examiner suggested that many of these issues had been discussed in previous prosecution and would therefore be better addressed in an appeal due to a lack of progress in prosecution to date. Nonetheless, Applicant's representative insisted on providing a verbal explanation of the nine numbered points of the interview agenda of 01/06/18. The Examiner's response was as follows:

1. The prior art referenced has not be properly been made of record. However, the Examiner finds no support in the article to suggest that a nuclear fusion reaction occurs when deuterium is exposed to carbon nanotubes. A detailed explanation is provided in paragraph 21 below.

2. Similarly, the article "New state of water molecule discovered" provides no evidence of nuclear fusion and has no similarity to the present invention because it studied the interaction of water with a beryllium-containing mineral, not a carbon-based material. See, again, paragraph 21 below.
3. The examiner provided a citation to MPEP 2107.02. The character and amount of evidence needed to support an asserted utility will vary depending on what is claimed (*Ex parte Ferguson*, 117 USPQ 229 (Bd. App. 1957)), and whether the asserted utility appears to contravene established scientific principles and beliefs. *In re Gazave*, 379 F.2d 973, 978, 154 USPQ 92, 96 (CCPA 1967); *In re Chilowsky*, 229 F.2d 457, 462, 108 USPQ 321, 325 (CCPA 1956). A detailed explanation is provided in paragraph 17 below.
4. The Loan affidavit does not contain sufficient information regarding experimental conditions, including control experiments conducted, to demonstrate operability of the device. Specifically, because the claimed invention does not operate by any mechanism that is recognized as valid by the scientific community as a whole, evidence of operability would need to overcome the evidence amassed by the scientific community to date. In order to do so, evidence of operability would need to be subjected to the same rigorous evaluation to which the evidence of inoperability was subjected. A detailed explanation is provided below in paragraph 17.
5. A "cold fusion" process for producing energy was found to be wholly inoperable. *In re Swartz*, 232 F.3d 862, 56 USPQ2d 1703 (Fed. Cir. 2000).
6. The examiner is unaware of such a directive. She explained that this point should be addressed with her supervisor.
7. The evidence is the scientific literature introduced in support of the Examiner's assertion that the present invention is directed to an inoperable cold fusion device (see,

e.g., Office action 01/12/16, paras. 8-20). This basis is provided again below in paragraphs 25-42.

8. The Pons and Fleischmann experiments are directed to what is known in the art as “lattice-enhanced nuclear reactions.” The experimenters theorized that an interaction between deuterium atoms and a lattice of atoms in a metallic material could provide a mechanism by which the Coulomb barrier between deuterium atoms was overcome, leading to nuclear fusion. The theory was proven to be false. In the present invention, it is suggested that an interaction between deuterium atoms and the lattice of carbon-based materials can induce nuclear fusion. Accordingly, it appears that the present invention is directed to similar subject matter as the disproven experiments of Pons and Fleischmann.
9. “Even if a reference discloses an inoperative device, it is prior art for all that it teaches.” *Beckman Instruments v. LKB Produkter AB*, 892 F.2d 1547, 1551, 13 USPQ2d 1301, 1304 (Fed. Cir. 1989). Therefore, “a non-enabling reference may qualify as prior art for the purpose of determining obviousness under 35 U.S.C. 103.” *Symbol Techs. Inc. v. Opticon Inc.*, 935 F.2d 1569, 1578, 19 USPQ2d 1241, 1247 (Fed. Cir. 1991). MPEP § 2121. See paragraphs 23-24 below.
8. Applicant’s representative made reference to experimental data, i.e. a report that was produced by LLNL after testing the present invention, that has not been made of record. The examiner cannot consider such information until it is made of record. Applicant is again invited to provide the relevant portions of this report for the Examiner’s consideration. Relevant information would include experimental setup and parameters, instrumentation and data collection methodology, results and control experiments performed. Applicant’s representative stated that the testing of the present invention was evaluated by an unnamed MIT scientist. This review has not been made of record.

9. No agreement as to patentability was reached during the interview. The examiner noted that an office action would be mailed to Applicant this week.

Information Disclosure Statement

10. The information disclosure statement (IDS) submitted on 08/26/17 was filed after the mailing date of the Final Rejection on 08/01/16. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

11. The examiner notes that the article referred to as "Guo" repeatedly referenced throughout prosecution does not appear to have been made properly of record by its listing on an information disclosure statement.

Response to Arguments

12. Applicant's arguments filed 08/26/17 have been fully considered but they are not persuasive. The arguments center on an allegation that the examiner has failed to provide a full explanation of the 35 U.S.C. 101/112a operability/utility rejections. A detailed explanation follows.

13. The claimed invention is directed to a nuclear fusion method ("method of generating ^4He atoms and energy...comprising...transmuting the deuterium to ^4He atoms and energy"). The present nuclear fusion method is disclosed to occur at temperatures and pressures well below conditions that cause nuclear fusion to occur. Accordingly, the examiner has characterized the present invention as directed to what is known in the art as "cold fusion." Energy production by cold fusion has been theorized for several decades, but the scientific community has repeatedly disproven such claims. Examiner set forth a factual explanation of this in the office actions of 01/12/16 (see paras. 5-20) and 08/01/16 (see paras. 19-35). In short, the scientific literature as a whole suggests that the present invention is wholly inoperable, i.e., that it is incapable of causing any nuclear fusion reactions to occur. Accordingly, the

examiner found that the asserted utility of the present invention is incredible in view of contemporary knowledge.

14. To properly reject a claimed invention under 35 U.S.C. 101, the Office must (A) make a prima facie showing that the claimed invention lacks utility, and (B) provide a sufficient evidentiary basis for factual assumptions relied upon in establishing the prima facie showing. *In re Gaubert*, 524 F.2d 1222, 1224, 187 USPQ 664, 666 (CCPA 1975) "Accordingly, the PTO must do more than merely question operability - it must set forth factual reasons which would lead one skilled in the art to question the objective truth of the statement of operability." If the Office cannot develop a proper prima facie case and provide evidentiary support for a rejection under 35 U.S.C. 101, a rejection on this ground should not be imposed. See, e.g., *In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992) ("[T]he examiner bears the initial burden, on review of the prior art or on any other ground, of presenting a prima facie case of unpatentability. If that burden is met, the burden of coming forward with evidence or argument shifts to the applicant.... If examination at the initial stage does not produce a prima facie case of unpatentability, then without more the applicant is entitled to grant of the patent."). See also *Fregeau v. Mossinghoff*, 776 F.2d 1034, 227 USPQ 848 (Fed. Cir. 1985) (applying prima facie case law to 35 U.S.C. 101); *In re Piasecki*, 745 F.2d 1468, 223 USPQ 785 (Fed. Cir. 1984). MPEP 2107.02(IV).

15. The examiner has provided a proper showing that the claimed invention lacks utility by stating on the record that the present invention is directed to cold fusion (see, e.g., Office action 01/12/16, paras. 6-7). Furthermore, evidentiary basis for this statement was provided (see, e.g., Office action 01/12/16, paras. 8-20). Consequently, the burden of proving operability and utility has shifted to Applicant.

16. Applicant has attempted to meet this burden by filing declarations (08/25/15 and 10/06/15), referencing an experimental study performed by LLNL (in the declaration of 08/25/15; report not made

of record); and various NPL (Guo, which is not of record, and as filed on the IDS of 08/25/15). These submissions are insufficient to demonstrate operability and utility of the present invention, for the reasons set forth previously, and as detailed below (referring to MPEP 2107.02 and 716.01(c)).

17. Regarding the evidence submitted in the declarations, the statements in the declarations regarding the purported testing and demonstration of operability of the present invention are not persuasive. Because the statements are unsupported by empirical data and have not been rigorously evaluated and scrutinized by the scientific community as a whole, they do not shift the balance of the totality of evidence in the record towards patentability. Because the examiner's position is based on established scientific beliefs and principles, evidence of similar weight would have to be made of record to overcome the finding of inoperability and lack of utility. There is no predetermined amount or character of evidence that must be provided by an applicant to support an asserted utility, therapeutic or otherwise. Rather, the character and amount of evidence needed to support an asserted utility will vary depending on what is claimed (*Ex parte Ferguson*, 117 USPQ 229 (Bd. App. 1957)), and whether the asserted utility appears to contravene established scientific principles and beliefs. *In re Gazave*, 379 F.2d 973, 978, 154 USPQ 92, 96 (CCPA 1967); *In re Chilowsky*, 229 F.2d 457, 462, 108 USPQ 321, 325 (CCPA 1956). Because the present invention is disclosed to operate by a mechanism that does not obey the laws of physics as currently understood by the scientific community, substantial empirical proof of operability that has been rigorously evaluated by objective scientists skilled in the art would be required to demonstrate operability. The bar for demonstrating operability is quite high for the present invention because of the large number of similar experiments allegedly demonstrating cold fusion that were subsequently disproven when subjected to more rigorous scrutiny. The Examiner notes that a "cold fusion" process for producing energy was found to be wholly inoperable. *In re Swartz*, 232 F.3d 862, 56 USPQ2d 1703 (Fed. Cir. 2000).

- The first Loan affidavit provides radiation count data purportedly obtained by placing a radiation detector near the present invention. However, the data obtained does not appear to be statistically different from the background radiation also collected. In fact, in many instances, the background radiation is higher than the radiation supposedly emanating from the invention. Furthermore, the detector used in these experiments *does not detect* neutrons, which would be a key signature indicating fusion was occurring. A key factor in disclosing a statistically significant result is collecting data from multiple experiments and consolidating that data together. Such experimentation provides an indication of the *reproducibility* of the results. It is the *reproducibility* issue that has been the downfall of previous cold fusion experiments.
- The second Loan affidavit provides additional “data” purportedly collected from the present invention. However, this data clearly has not been subjected to the rigorous examination required by the scientific method. For example, the chart between paragraphs 21 and 22 has no labels on its axes, so it is impossible to tell what is being displayed. Furthermore, Loan admits “the fact that the detector we used detected gamma rays, X-rays and neutrons, the fact the sample sizes were small, and the presence of polypropylene shielding....prevented us from determining the exact amount and nature of any radiation produced.” It would seem however, that an experiment designed to prove the existence of cold fusion would, in fact, necessarily need to provide an indication of the “exact amount and nature of any radiation produced.” This experimentation, accordingly, seems to be flawed.
- The quotation of a single sentence in what probably is a several-hundred page report produced by LLNL is insufficient evidence of operability. Loan himself admits “the experiments produced mixed results.” Again, the Examiner notes that the downfall of cold fusion experimentation has historically been *reproducibility*. The LLNL report that has not

been made of record in this application allegedly states "Of these [various test results] the CNT sample event of October 25, 2006 at 16:14 provides evidence for a DD fusion source." Accordingly, it appears that *a single experiment among many* provided an indication of fusion. The overall conclusions of the LLNL report have not been made of record. The experimental details have not been made of record. The experimental results have not been made of record. Accordingly, there is no indication that the LLNL report provides a *statistically significant, reproducible* indication of cold fusion.

- It is telling that the present invention is disclosed and claimed to produce energy. However, there is no disclosure whatsoever of any calorimetry experiments that would verify this claim.
- The rejection under 35 U.S.C. 101/112a that the present invention is wholly inoperable and therefor lacking in utility is based on decades of research by multiple teams, dozens of peer-reviewed scientific studies and represents the prevailing view of the scientific community worldwide. As discussed in previous prosecution (and detailed again below), reports of cold fusion have been dismissed as due to experimental error (see paragraphs 28-29 below). The general consensus by those skilled in the art is that there is no reputable evidence to support the claims of excess heat production, or the production of fusion by-products such as neutrons, gamma rays, tritium, or helium. Accordingly, operability of the present invention must be established by a showing of *statistically significant, reproducible* results that can only be caused by the presence of nuclear fusion and cannot be attributed to experimental error. The evidence of record in this application does not contain such a body of evidence. Even if it did, to prove operability, any evidence of cold fusion also be subjected to the rigorous evaluation by the scientific community that previous reports of cold fusion

have undergone. This is because previous reports of cold fusion have been found to be anomalous and not reproducible.

18. Regarding the alleged testing of the present invention in experiments conducted at LLNL, the examiner finds the information submitted to be insufficient for demonstrating operability (as discussed in the foregoing paragraph). The previous examiner has made a request for information to evaluate any such report of experimental evaluation. Applicant has responded by stating that the report is unavailable. However, the standard non-publication clause of a typical government contract report is insufficient to establish that the referenced experimental evidence is not able to be made of record. This clause is directed to publication of the report, and specifically states (with emphasis added), "Sponsor **may disclose the content of any report** provided to the Sponsor by the Contractor resulting from the work under this Agreement."

19. The examiner notes that the request for information was made in this application based on declaration statements that empirical evidence may exist to overcome the Examiner's position that the present invention is inoperable and therefore lacking utility. Applicant's refusal to provide evidence that possibly could shift the determination of patentability in favor of Applicant is perplexing. It would seem that if the inventors possessed information that would prove the present invention is operable, they would be eager to provide this to the Office as well as to publish it in scientific journals to prove to the scientific community that the dismissal of cold fusion is in error.

20. In appropriate situations the Office may require an applicant to substantiate an asserted utility for a claimed invention. See *In re Pottier*, 376 F.2d 328, 330, 153 USPQ 407, 408 (CCPA 1967) ("When the operativeness of any process would be deemed unlikely by one of ordinary skill in the art, it is not improper for the examiner to call for evidence of operativeness."). See also *In re Jolles*, 628 F.2d 1322, 1327, 206 USPQ 885, 890 (CCPA 1980); *In re Citron*, 325 F.2d 248, 139 USPQ 516 (CCPA 1963); *In re Novak*, 306 F.2d 924, 928, 134 USPQ 335, 337 (CCPA 1962). In *In re Citron*, the court held that when an

"alleged utility appears to be incredible in the light of the knowledge of the art, or factually misleading, applicant must establish the asserted utility by acceptable proof." 325 F.2d at 253, 139 USPQ at 520. The court approved of the board's decision which affirmed the rejection under 35 U.S.C. 101 "in view of the art knowledge of the lack of a cure for cancer and the absence of any clinical data to substantiate the allegation." 325 F.2d at 252, 139 USPQ at 519 (emphasis in original). The court thus established a higher burden on the applicant where the statement of use is incredible or misleading. In such a case, the examiner should challenge the use and require sufficient evidence of operativeness. The purpose of this authority is to enable an applicant to cure an otherwise defective factual basis for the operability of an invention. Because this is a curative authority (e.g., evidence is requested to enable an applicant to support an assertion that is inconsistent with the facts of record in the application), Office personnel should indicate not only why the factual record is defective in relation to the assertions of the applicant, but also, where appropriate, what type of evidentiary showing can be provided by the applicant to remedy the problem.

21. Finally, the Examiner respectfully disagrees that the referenced NPL publications provide evidentiary support of the operability of the present invention. The findings of Guo were addressed in detail at paras. 9-13 of the Office action of 08/01/16. The NPL publications of the IDS of 08/26/17 are similarly insufficient in overcoming the totality of evidence presented by the Examiner in support of inoperability. The finding of inoperability and lack of utility of the present invention is based entirely on the fact that the present invention requires that *nuclear fusion* occur. Accordingly, any objective evidence in support of operability must demonstrate that *nuclear fusion occurs in the present invention*. Without such a connection, the evidence fails to meet the nexus requirement (see MPEP 716.01(b)). Guo describes a chemical interaction between water (light water, H₂O) molecules and carbon nanotubes, resulting in the production of hydrogen gas via electrolysis. It contains no support for the production of helium or tritium via nuclear fusion. Guo explicitly discloses "[t]he non-labeled peaks are

either attributable to the fragments of [He, CH₄, H₂O, CO, C₂H₆, and CO₂] *or are rather insignificant.*"

Accordingly, Guo attributes the peak at AU 3 to instrumental noise, rather than to tritium, as the Loan affidavit alleges. Furthermore, the Loan affidavit argues that the peak at AU 3 "can only be made by ³He (Helium 3) or T (tritium ³H). Both of these gases are transmutation byproducts of a nuclear reaction."

Loan ignores the fact that ³He is a naturally occurring isotope as well as the fact that H-D would also have an AU of 3. Accordingly, the non-labeled peak at AU 3 that Guo dismisses as not exceeding the signal-to-noise ratio of its instrumentation is attributable to naturally occurring substances and cannot be taken alone to be statistically significant evidence of nuclear fusion. The Guo article further does not meet the nexus requirement because the present invention is directed to an interaction between deuterium and carbon nanotubes. Moreover, the NPL documents of the IDS of 08/26/17 fail to meet the nexus requirement. The publications describe the discovery of an interesting quantum interaction between water (light water, H₂O) molecules and beryl (beryllium aluminum silicate), resulting in proton delocalization. There is no indication that the interaction produces helium or nuclear fusion. It similarly does not meet the nexus requirement because the present invention is directed to the interaction of deuterium and carbon materials.

22. In summary, the examiner finds that the totality of evidence of operability submitted by Applicant is insufficient to overcome the totality of the evidence provided by the examiner in support of inoperability. Accordingly, the present invention is ineligible for patent protection because it is inoperable and therefore lacks utility. The claim rejections under 35 U.S.C. 101 and 112(a) are therefore maintained.

23. Regarding the claim rejections under 35 U.S.C. 102, Applicant's arguments are unpersuasive. Applicant's arguments seem to be conflating issues of enablement under 35 U.S.C. 112(a) with issues of anticipation under 35 U.S.C. 102. Accordingly, Applicant's argument that "Hagelstein fails to provide an enabling disclosure with respect to the claimed subject matter" is moot. "Even if a reference discloses

an inoperative device, it is prior art for all that it teaches." *Beckman Instruments v. LKB Produkter AB*, 892 F.2d 1547, 1551, 13 USPQ2d 1301, 1304 (Fed. Cir. 1989). Therefore, "a non-enabling reference may qualify as prior art for the purpose of determining obviousness under 35 U.S.C. 103." *Symbol Techs. Inc. v. Opticon Inc.*, 935 F.2d 1569, 1578, 19 USPQ2d 1241, 1247 (Fed. Cir. 1991). MPEP § 2121. Furthermore, Applicant's arguments do not comply with 37 CFR 1.111(c) because they do not clearly point out the patentable novelty which he or she thinks the claims present in view of the state of the art disclosed by the references cited or the objections made. Further, they do not show how the amendments avoid such references or objections.

24. Applicant argues that Hagelstein fails to disclose the generation of energy by contacting carbon materials with deuterium. The examiner disagrees. Paragraph [0274] states (with emphasis added) "molecular deuterium 25 fuses into another helium 37 thereby *releasing energy* into the lattice structure...Some of the *energy release from the molecular transformations* is lost to the metal lattice 31 and appears as heat energy." In one of the embodiments of the invention the material 202 of the metal lattice is carbon-based (see [0322]) and comprises molecular deuterium ([0312]). That Hagelstein fails to explicitly disclose all of the claim elements in a single paragraph or section is moot. A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984). "The use of patents as references is not limited to what the patentees describe as their own inventions or to the problems with which they are concerned. They are part of the literature of the art, relevant for all they contain." *In re Heck*, 699 F.2d 1331, 1332-33, 216 USPQ 1038, 1039 (Fed. Cir. 1983) (quoting *In re Lemelson*, 397 F.2d 1006, 1009, 158 USPQ 275, 277 (CCPA 1968)). A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill in the art, including nonpreferred embodiments. *Merck & Co. v. Biocraft Laboratories*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989). See also *Celeritas*

Technologies Ltd. v. Rockwell International Corp., 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522-23 (Fed. Cir. 1998) (The court held that the prior art anticipated the claims even though it taught away from the claimed invention. "The fact that a modem with a single carrier data signal is shown to be less than optimal does not vitiate the fact that it is disclosed.") Although Hagelstein discloses many examples of materials that can perform its energy production method, disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments. *In re Susi*, 440 F.2d 442, 169 USPQ 423 (CCPA 1971).

Specification

25. The specification is objected to under 35 U.S.C. §112, first paragraph (pre-AIA) or 35 U.S.C. §112(a) as failing to provide an adequate written description of the invention and further for failing to provide an enabling disclosure.

26. There is no reputable evidence of record to support the claim that the present invention involves nuclear fusion, nor is there evidence that claims of energy production are valid and reproducible, nor is there evidence that the invention is capable of operating as indicated or capable of providing a useful output.

27. The invention (see, for example, paras. [0005-6] and [0057] of the specification) is considered as based on the "cold fusion" concept set forth by Fleischmann and Pons.¹ This concept relies on the incorporation of deuterium into a crystal lattice. While Fleischmann and Pons relied on electrolysis of heavy water to incorporate deuterium into the crystal lattice, it was also known that as a variation, the deuterium could be incorporated into the crystal lattice by bringing the crystal into contact with deuterium gas. The present invention incorporates deuterium gas into the molecular structure of

¹ Braaten, "Ridiculously easy test yields claim of energy triumph," The Washington Times, p. A5, March 24, 1989.

carbon-based materials. Thus, it is clear that applicant's invention is just a variation of the cold fusion concept set forth by Fleischmann and Pons. However, as set forth more fully below, this "cold fusion" concept is still no more than just an unproven concept.

Background

28. After Fleischmann and Pons announced their fusion device competing researchers attempted to reproduce their results. The results of these attempts were primarily negative. The few initial positive results were either retracted or later shown to be in error by subsequent experiments.^{2,3} The general consensus by those skilled in the art and working at these various laboratories is that the fusion conclusion made by Fleischmann and Pons was based on experimental error.⁴ The general consensus by those skilled in the art is that there is no reputable evidence to support the claims of excess heat production, or the production of fusion by-products such as neutrons, gamma rays, tritium, or helium.⁵

See also Cooke, pages 4 and 5, which refers to the attempts at Harwell to obtain "cold fusion." Page 5

² Stipp, The Wall Street Journal, page B-4, "Georgia Group Outlines Errors That Led To Withdrawal Of 'Cold Fusion' Claims", April 26, 1989.

³ Browne, "Fusion claim is greeted with scorn by physicists," The New York Times, pp. A1 and A22, vol. CXXXVIII, no. 47,859, May 3, 1989.

⁴ *Id.*, see also Kreysa, et al., Journal of Electroanalytical Chemistry, vol. 266, pages 437-450, "A Critical Analysis Of Electrochemical Nuclear Fusion Experiments", 1989; Hilts, The Washington Post, page A7, "Significant Errors Reported In Utah Fusion Experiments", May 2, 1989; Ohashi, et al., Journal of Nuclear Science and Technology, vol. 26, pages 729-732, "Decoding Of Thermal Data In Fleischmann & Pons Paper", July 1989; Miskelly, et al., Science, vol. 246, no. 4931, pages 793 and 796, "Analysis Of The Published Calorimetric Evidence For Electrochemical Fusion Of Deuterium In Palladium", November 10, 1989; Chapline, "Proceedings of the NATO Advance Study Institute on the "Nuclear Equation of State," pages 1-9, "Cold Confusion," July 1989.

⁵ Cooke, Solid State Theory Section, Solid State Division, ORNL-FTR-3341, pages 2-15, "Report Of Foreign Travel Of J. F. Cooke, Head", 1989; Faller, et al., Journal of Radioanalytical Nuclear Chemistry, Letters, vol. 137, no. 1, pages 9-16, "Investigation Of Cold Fusion In Heavy Water", August 21, 1989; Cribier, et al., "Conventional Sources of Fast Neutrons in 'Cold Fusion' Experiments," Physics Letters B, Vol. 228, No. 1, 7 September 1989; Hajdas, et al., Solid State Communications, vol. 72, no. 4, pages 309-313, "Search For Cold-Fusion Events", 1989; Shani, Solid State Communications, vol. 72, no. 1, pages 53-57, "Evidence For A Background Neutron Enhanced Fusion In Deuterium Absorbed Palladium," 1989; Ziegler, et al., "Electrochemical Experiments in Cold Nuclear Fusion," Physical Review Letters, vol. 62 No. 25, June 19, 1989; Schrieder, et al., B-Condensed Matter, vol. 76, no. 2, pages 141-142, "Search For Cold Nuclear Fusion In Palladium-Deuteride" 1989; AP, "Physicist: Utah Cold-Fusion Gear Doesn't Work," The Washington Post, March 29, 1990.

also indicates that data was also collected in Frascatti-type (i.e. gaseous) experiments. See the last paragraph on page 5:

"After three months of around-the-clock work at a cost of over a half a million dollars, the project was terminated on June 15. This program is believed to be one of the most comprehensive worldwide with as many as 30 cells operating at a time and over 100 different experiments performed. The final result of this monumental effort in the words of the official press release was, in none of these experiments was there any evidence of fusion taking place under electrochemical conditions. It should also be added that there was no evidence of excess heat generated by any of their cells".

29. Note that a complete disclosure must contain enough detail as to enable a person skilled in the art or science to which the invention pertains to make and use the invention as of its filing date.⁶ The present disclosure does not contain the requisite description and detail. There is no adequate description nor enabling disclosure of the parameters of a specific operative embodiment of the invention, including exact composition (including impurities and amounts thereof) of the electrolyte; composition (including impurities and amounts thereof), size, dimensions and porosity of the electrodes (as well as the spacing between the electrodes); the requisite concentration per unit volume of hydrogen isotopes in the cathode; the applied current and voltage, if any; the requisite physical and/or chemical pretreatment of the electrodes; the instrument calibration prior to and during a run, test or experiment; the amount of each electrode to be immersed in the electrolyte; etc. It is noted that the specification appears to set forth some of the parameters, but it does not appear to set forth an example of an operative embodiment that includes specific values for each of the above parameters. Note that such parameters are critical in arriving at an operative cold fusion embodiment. For example, Morrison⁷ shows that electrode spacing is an important parameter. On page 3, Morrison shows that if the electrodes are close enough to each other, hydrogen isotopes and oxygen will recombine. This can

⁶ *In re Glass*, 181 U.S.P.Q. 31 (CCPA 1974).

⁷ Morrison, "Cold Fusion Update No. 8," November 27, 1993.

be misinterpreted as excess heat.⁸ These references demonstrate the critical importance of cell component composition and impurity content and of electrode pretreatment.

30. Claims of the production of excess heat, tritium, and other nuclear reaction products due to a nuclear reaction, are not sufficient to overcome the numerous teachings by skilled artisans that claims of cold fusion are not reproducible. Note that the numerous teachings by skilled artisans show that in this field it is easy to obtain false-positive results. It is not clear from the information set forth in the specification that applicant would be able to show positive results or that the alleged positive results do not fall within the limits of experimental error. For example the Examiner has cited several documents that deal with calorimeter evidence of cold fusion and possible sources of error. The specification does not disclose any particular structure which makes applicants cold fusion system operative where the other systems disclosed failed.

31. When an experimenter relies on the results of a particular test to establish certain facts (such as the production of excess heat) it is incumbent upon the experimenter to show that the alleged results are valid and not the result of errors or misinterpretation of results. This is especially important where the test in question is in a field that the general scientific community considers fraudulent.

Reproducibility

32. Regarding reproducibility, Huizenga⁹ states:

"The foundation of science requires experimental results to be reproducible. Validation is an integral part of the scientific process. Scientists are obligated to write articles in ways that allow observations to be replicated. Instructions should be available to permit a competent and well-equipped scientist to perform the experiment and obtain essentially the same results. Replication in science usually is reserved for experiments of special

⁸ See Jones, "An Assessment of Claims of Excess Heat in Cold Fusion Calorimetry," J. Phys. Chem. B 1998, 102, 3647; Murray, Google Advanced Groups Search. pages 1-11. "Subject: Rothwel: Abstracts: Cain, Case, Iwamura, Ohmori, Silver, Stringham," April 26, 1998; Shanahan, "Comments on 'Thermal behavior of polarized Pd/D electrodes prepared by co-deposition,'" July, 14, 2004; Miles, et al., "Anomalous Effects in Deuterated Systems," Naval Air Warfare Center Weapons Division, September 1996; Carr, "Re: CF claim score (was Re: reciprocal cold fusion proof standards...)," Williams, et al., "Upper bounds on 'cold fusion' in electrolytic cells," Nature vol. 342, p. 375, November 23, 1989.

⁹ Huizenga, "Cold Fusion Labeled 'Fiasco of Century'", Forum for Applied Research and Public Policy, vol. 7, No. 4, 1992, pages 78-83.

importance or experiments that conflict with an accepted body of work. The greater the implication of an experimental result, the more quickly it will be checked by other scientists.

As more and more groups, at major universities and national laboratories were unable to replicate either the claimed excess heat or fusion products, proponents of cold fusion quickly pointed out that the experiment was not done properly: one needed different size palladium cathodes, longer electrolysis times and higher currents, they claimed.

Whenever the inability of qualified scientists to repeat an experiment is met by ad hoc excuses, beware. One important role of a scientific article is to provide directions for others. Scientists establish priorities for their discoveries by publishing a clear and well documented recipe of their experimental procedures. If a scientific article fails to include an adequate recipe which allows a skilled reader to reproduce the experiment, it is a warning that the author's understanding of their work is incomplete.

Cold-fusion proponents introduced new dimensions into the subject of reproducibility in science. Some tried to turn the table on reproducibility by giving irreproducibility a degree of respectability. A second aberration was to assign a different value to experiments attempting replication. Only experiments that obtained some fragmentary evidence for cold fusion were to be taken seriously because it was declared that experiments obtaining negative results required no special skills or expertise. This viewpoint led proponents of cold fusion to invite mainly papers reporting positive results when organizing conferences. Such an aberrant procedure is incompatible with the scientific process and usually is viewed negatively by scientists as well as journalists."

33. "Reproducibility" must go beyond one's own lab. One must produce a set of instructions, a recipe that would enable anyone to produce the same results. If reproducibility only occurs in one's own lab, errors (such as systematic errors) would be suspect.¹⁰ Experimenters who previously found evidence of excess heat could not reproduce their results when better calorimetry equipment was used.¹¹ Reproducibility of alleged cold fusion results is a critical feature in determining if a disclosure adequately teaches other practitioners how to make and use an invention.

34. When one does not get identical results or the results are not reproducible at will, it must be concluded that the alleged positive results are not real but instead, the result of experimental errors, instrumentation errors, or misinterpretation of results.

¹⁰ Little, et al., "Replication of Jean-Louis Naudin's Replication of the Mizuno Experiment."

¹¹ Morrison, *supra* n. 7, at § 2.2, p. 2.

35. It is elementary that identical structures operated in an identical manner must produce identical results. If such structures do not produce identical results, one of two things is implied: First, the structures are not identical. For example, one of the structures has an additional component or some critical feature that is not found in the other structure. Alternatively, the structures may be identical, but the experimenter's instrumentation is producing spurious results leading to the erroneous conclusion that the structures are producing positive results.

36. If it is the former that causes some of these cold fusion systems to produce actual, positive results then this critical feature must be clearly specified so as to enable another experimenter to make the invention. Accordingly, if Applicant's invention is capable of reproducibly producing excess heat or fusion by-products it can only be because of this undisclosed additional critical feature. If this is the case, the Applicant's specification is insufficient and non-enabling for failing to disclose the additional critical feature.

37. It is well known that impurities in the cell container walls can leach out into the electrolyte and be deposited onto the cathode.^{12,13,14} It is well known that metals such as platinum, gold and, palladium are generally found in the same ore, that they can be extracted sequentially, and that they will be contaminated by the other metals present.

38. The presence of these impurities at the cathode could actually lead to the erroneous conclusion that transmutation has occurred. Applicant's disclosure is insufficient and non-enabling does not address the issue of impurities. For additional commentary on the alleged transmutation of isotopes in a

¹² Flanagan, et al., "Hydrogen Absorption by Palladium in Aqueous Solution," Transactions of the Faraday Society, vol. 55 part 8, No. 440, p 1400-1408, 1407.

¹³ Albagli, et al., "Measurement and Analysis of Neutron and Gamma-Ray Emission Rates, Other Fusion Products, and Power in Electrochemical Cells having Pd Cathodes," Journal of Fusion Energy, Vol. 9, No. 2, 1990 pp. 130-148, 144 (col 2.).

¹⁴ See also Williams, *supra* n. 8, at 380 (second column) and 382 (first column).

cold fusion cell, Applicant is referred to Huizenga.¹⁵ Pages 152-156 of the reference¹⁶ recall that experimenters at the Naval Research Laboratory had mistakenly reported the production of particular palladium isotopes by neutron transmutation in cold fusion cells using a technique known as SIMS (secondary ion mass spectroscopy). See page 156,¹⁷ which states:

"The story associated with the palladium isotope anomaly is not nearly so interesting because it was simply due to an erroneous interpretation of data where the experimental mass peaks were misidentified. Contributions from polyatomic species of impurities with masses nearly coincident with those of the palladium isotopes caused the misidentification. In spite of the fact that the palladium isotope anomalies had been discredited for over five months, Bockris submitted a paper on March 26, 1990 [Fusion Technology 1811 (1990)] in which he discussed, along with other cold fusion phenomena, the thermal and 14-MeV-neutron-induced cross sections on palladium isotopes. He used these mistaken isotopic anomalies data to suggest that the cold fusion reaction is a surface or near-surface reaction, and, therefore, to serve as supporting evidence for his model of fusion. Among cold fusion enthusiasts mistakes and erroneous results usually decay with a very long lifetime".

39. It is the Examiners' position that an undue amount of experimentation would be required to produce an operative embodiment of applicant's invention. The Examiner has cited numerous documents showing that experimenters have obtained negative results using various types of cold fusion apparatus, all based on the cold fusion concept set forth by Fleischmann and Pons. These documents show how easily experimental results can be misinterpreted as evidence of cold nuclear fusion.

40. This issue of undue experimentation has been succinctly addressed by Douglas Morrison at the Fourth International Conference on Cold Fusion Technology, (ICCF-4) held Dec. 6-9, 1993 in Hawaii,¹⁸ see pages 6-7 which states:

¹⁵ Huizenga, "Cold Fusion: The Scientific Fiasco of the Century", (selections provided) pp. 152-156, 237, 269, 275, 276, 284, 286.

¹⁶ *Id.*

¹⁷ *Id.*

¹⁸ Morrison, "Review of Progress in Cold Fusion," Dec. 1993 available at <http://newenergytimes.com/v2/archives/DROM/cfu9a.shtml> (last accessed 18 December 2015).

"[T] he previous speaker, Dr. H. Fox, giving he said, a business man's point of view, declared he expected a working Cold Fusion device in TWENTY YEARS.

November 1993. Dr. S. Pons said that by the year 2000 there should be a household power plant - SIX YEARS.

1992. Dr. M. Fleischmann said a 10 to 20 Kilowatt power plant should be operational in ONE YEAR.

July 1989. The Deseret News published an article by Jo-Ann Jacobsen-Wells who interviewed Dr. S. Pons. There is a photograph in colour, of Dr. Pons beside an simple apparatus with two tubes, one for cold water in and one for hot water out. This working unit based on Cold Fusion was described as; " 'It couldn't take care of the family's electrical needs, but it certainly could provide them with hot water year-round' said Pons".

Later in the article it was written "Simply put, in its current state, it could provide boiling water for a cup of tea". Time delay to this working model - ZERO YEARS.

Thus it appears that as time passes, the delay to realisation of a working model increases.

Conclusion

41. The Examiner has cited documents showing how easily experimental data can be misinterpreted in cold fusion systems. The general scientific community does not consider cold fusion systems real, valid or operative. Since Fleischman and Pons' 1989 announcement, there has been a continuing stream of publications demonstrating that virtually none the "cold fusion" claims are valid.¹⁹ The cited references provide clear evidence that no excess heat is generated in such "cold fusion" systems nor is there any evidence of nuclear fusion.

¹⁹ See Ewing, et al., "A sensitive Multi-detector Neutron counter used to monitor "Cold Fusion" Experiments in an Underground Laboratory: Negative Results and Positive Artifacts", IEEE Transactions on Nuclear Science, vol. 37, no. 3, June 1990, pages 1165-1170; Albagli, *supra* n. 13; Balke, et al., "Limits on Neutron Emission from 'Cold Fusion' in Metal Hydride," Physical Review C, Vol. 42, No. 1, July 1990; Huizenga, *supra* n. 9; Huizenga, *supra* n. 15; Huizenga, "New Developments in the Cold Fusion Saga", Abstracts of Papers of the American Chemical Society, vol. 207, March 13, 1994, page 6; Rogers, et al, "Cold Fusion Reaction Products and Their Measurement", Journal of Fusion Energy, vol. 9, no. 4, 1990, pages 483-485.

42. The disclosure must enable a person skilled in the art to practice the invention without having to incorporate element not readily available in the art.²⁰ The Examiner has set forth a reasonable and sufficient basis for challenging the adequacy of the disclosure. The statute requires the application itself to inform, not to direct others to find out for themselves.^{21,22} Accordingly, the specification is inadequate.

Claim Rejections - 35 USC § 101

Claim Rejections - 35 USC § 112

43. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

44. Claims 1-17, 19-26, 28-36, and 39-48 are rejected under 35 U.S.C. 101 because the claimed invention is not supported by either a specific and substantial asserted utility or a well-established utility. The claimed invention is directed to a nuclear fusion method ("method of generating ⁴He atoms and energy...comprising...transmuting the deuterium to ⁴He atoms and energy"). As shown above, such an invention is incapable of producing nuclear fusion reactions resulting in helium and energy output. Accordingly, the claimed invention has no utility.

45. Claims 1-17, 19-26, 28-36, and 39-48 are also rejected under 35 U.S.C. 112(a) or pre-AIA 35 U.S.C. 112, first paragraph. Specifically, because the claimed invention is not supported by either a specific and substantial asserted utility or a well-established utility for the reasons set forth above, one skilled in the art clearly would not know how to use the claimed invention.

²⁰ *In re Hirsch*, 295 F.2d 251 (C.C.P.A. 1961).

²¹ *In re Gardner et al.*, 99 F.2d 767 (C.C.P.A. 1938).

²² *In re Scarbrough*, 182 U.S.P.Q. 298 (C.C.P.A. 1974).

Claim Rejections - 35 USC § 102

46. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

47. For applicant's benefit, the portions of the reference(s) relied upon in the below rejections have been cited to aid in the review of the rejections. While every attempt has been made to be thorough and consistent within the rejection, it is noted that the PRIOR ART MUST BE CONSIDERED IN ITS ENTIRETY, INCLUDING DISCLOSURES THAT TEACH AWAY FROM THE CLAIMS. See MPEP 2141.02 VI.

48. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(a)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale or otherwise available to the public before the effective filing date of the claimed invention.

(a)(2) the claimed invention was described in a patent issued under section 151, or in an application for patent published or deemed published under section 122(b), in which the patent or application, as the case may be, names another inventor and was effectively filed before the effective filing date of the claimed invention.

49. Claims 1, 3-5,13-15, 19, 21, 25, 27-33, 35-40, and 42-48 are rejected under pre-AIA 35 U.S.C. 102(b) as being anticipated by Hagelstein (US PG-Pub. No. 2009/0086877).

50. Regarding claims 1, 28, 39, and 46 Hagelstein teaches a method of generating helium atoms and energy, said method (Paragraph [0153]) comprising: contacting fullerene-based materials (which are a type of three dimensional nanostructured carbon material), with a source of deuterium (Paragraph

[0322]) for a time sufficient to generate a radiation (Paragraph [0153]; helium is alpha radiation) and transmuting the deuterium to helium atoms (Paragraph [0153]) and energy (Paragraph [0274]).

51. Regarding claims 3, 30, 30, 40, and 47, Hagelstein teaches fullerene-based or graphene materials including "cage-like, hollow molecules" of "hexagonal and pentagonal groups of atoms, e.g., those formed from carbon." (Paragraph [0322]). Hagelstein further specifies these materials to include carbon nanotubes and buckyballs. (Paragraph [0322]).

52. Regarding claims 4, 31, 42, and 48 Hagelstein teaches the use of deuterium gas (Paragraph [0325]). Hagelstein additionally teaches the use of a condensed form of deuterium, such as a liquid (Paragraph [0332]). 10. Regarding claims 5 and 32, Hagelstein teaches the decontamination of the surface of a material prior to deuterium loading by a treatment that includes raising the temperature of the material (Paragraph [0267]).

53. Regarding claims 13-15, Hagelstein teaches the method of Claim 1, which would yield the same results claimed by applicant in Claims 13-15. Accordingly, Hagelstein reads on these claims.

54. Regarding claim 19, Hagelstein teaches a method of generating non-ionizing radiation in the form of He-4 atoms (Paragraph [0153]) comprising: providing graphene materials in a sealable vessel (Paragraph [0261]; Fig. 17g). Hagelstein further teaches the evacuation of such a vessel (Paragraph [0353]) and adding deuterium gas to said vessel (Paragraph [0153]). Additionally, Hagelstein performing at least one heating step that further increases pressure inside the vessel (Paragraph [0261]), cooling said vessel (Paragraph [0332]), and placing the graphene materials in said vessel at room temperature or below for a time sufficient to generate non-ionizing radiation, Helium-4 atoms, or both (Paragraph [0100]).

55. Regarding claim 21, Hagelstein teaches heating the graphene materials prior to adding deuterium gas (Paragraph [0396]).

56. Regarding claim 25, Hagelstein teaches the generation of microwaves or radio frequency energy (Paragraph [0346]).

57. Regarding claims 37 and 38, Hagelstein teaches the generation of phonons within graphene material (Paragraph [0068]). Hagelstein further teaches the process generating 23.8 MeV of energy (Paragraph [0276]).

58. Regarding claim 29, Hagelstein teaches the generation of microwaves or radio frequency energy (Paragraph [0346]).

59. Regarding claim 33, Hagelstein teaches heating a fullerene-based material (Paragraphs [0324], [0325]), such as a carbon nanotube (Paragraph [0322]). Hagelstein additionally teaches the method of heating such materials prior to aging at temperature and for a time sufficient to promote absorption of the deuterium into or onto the carbon nanotubes (Paragraph [0326]).

60. Regarding claims 35 and 36, Hagelstein teaches the method of Claim 28, which would yield the same results claimed by applicant in Claims 35 and 36. Accordingly, Hagelstein reads on these claims.

61. Regarding claims 43-45, Hagelstein teaches a method of producing energy (Para. [0274]) comprising: introducing a gas consisting essentially of O₂ (Para. [0326]) to a material consisting essentially of carbon nanotubes (Para. [0326]) at an elevated pressure (Para. [0326]); and generating non-ionizing energy (Para. [0153]) and energy (Para. [0274]).

Claim Rejections - 35 USC § 103

62. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

63. For applicant's benefit, the portions of the reference(s) relied upon in the below rejections have been cited to aid in the review of the rejections. While every attempt has been made to be thorough and consistent within the rejection, it is noted that the PRIOR ART MUST BE CONSIDERED IN ITS ENTIRETY, INCLUDING DISCLOSURES THAT TEACH AWAY FROM THE CLAIMS. See MPEP 2141.02 VI.

64. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

65. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under pre-AIA 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

66. This application currently names joint inventors. In considering patentability of the claims under pre-AIA 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in

order for the examiner to consider the applicability of pre-AIA 35 U.S.C. 103(c) and potential pre-AIA 35 U.S.C. 102(e), (f) or (g) prior art under pre-AIA 35 U.S.C. 103(a).

67. Claims 2, 11, 12, 16, 17, 20, 24, 26 and 43 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hagelstein (US PG-Pub. No. 2009/0086877), in view of case law.

68. Regarding claims 2, 11 and 12, Hagelstein teaches the generation of Helium-4, via contacting deuterium and another material, at low temperature, such as room temperature [0100]. Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. See *In re Aller*, 220 F. 2d 454, 456 (CCPA 1955) (holding a claimed process performed at a temperature between 40 degrees Celsius and 80 degrees Celsius and an acid concentration between 25% and 70% was prima facie obvious over a reference process differing from the claims only in that it was performed at a temperature of 100 degrees Celsius and acid concentration of 10%); *In re Hoeschele*, 406 F.2d 1403 (CCPA 1969) (where the Court determined that claimed elastomeric polyurethanes which fell within the broad scope of the references were held to be unpatentable there over because, among other reasons, there was no evidence of the criticality of the claimed ranges of molecular weight or proportions); M P E P 2144.05.11 .A. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have generated the Helium-4 at room temperature, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art.

69. Regarding claims 16 and 17, Hagelstein teaches fullerene material in the presence of a deuterium source for 8 hours, falling within the ranges of 30 minutes to 48 hours, as claimed in Claim 16, and 1 to 18 hours, as claimed in Claim 17 (Paragraphs [0324], [0325]). This teaching of Hagelstein reads on both Claims 16 and 17, because prior art teaching a value within, overlapping, or touching a claimed range, anticipates if the prior art range does not substantially deviate from the claimed range.

See *Perricone v. Medicis Pharmaceutical Corp.*, 77 USPQ 1321, 1327 (Fed. Cir. 2005) (where anticipation was found despite the fact that prior art range was not identical to claimed ranges).

70. Regarding claim 20, Hagelstein teaches the method of Claim 19, as discussed above. Hagelstein does not teach that the He-4 is generated in an amount of at least ten He-4 atoms per hour per microgram of said graphene materials at 0 degrees Celsius. As set forth in response to Claims 2, 11 and 12, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. See *In re Aller*, 220 F. 2d at 456.

71. Regarding claim 24, Hagelstein teaches the generation of Helium-4 at low temperature, such as room temperature [0100]. As set forth in response to Claims 2, 11 and 12, difference in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. See *In re Aller*, 220 F. 2d 454 at 456.

72. Regarding claim 26, Hagelstein teaches the graphene materials placed in the source of deuterium for 8 hours, falling within the claimed range of 1 -18 hours. For the reasons set forth above in response to Claims 16 and 17, Claim 26 is obvious.

73. Regarding claim 43, Hagelstein does not explicitly mention a gas consisting essentially of D₂O, but does explicitly teach deuterium gas, as discussed above. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have implemented a gas containing a significant amount of deuterium for the predictable purpose of providing contact between elements commonly used in cold fusion research experiments.

74. Regarding claims 6, 9,10 and 22 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hagelstein (US PG-Pub. No. 2009/0086877), in view of Smalley (US PG-Pub. No. 2002/0127171).

75. Regarding claim 6, although Hagelstein teaches the decontamination of the surface of a material, it does not teach the removal of unwanted materials specifically comprising water, hydroxide, hydrogen, protium, polymers, oils, amorphous carbon, oxygen, solvents, acids, bases and combinations thereof. Smalley discloses the purification of carbon nanotubes for the purpose of removing contaminants, such as amorphous carbon (Paragraphs [0034], [0035]). It would have been obvious to one having ordinary skill in the art at the time of the invention to have implemented the method disclosed in Smalley in conjunction with the invention disclosed in Hagelstein for the predictable result of removing impurities from the carbon nanotube material.

77. Regarding claims 9 and 10, Smalley discloses heating carbon nanotubes at 200 degrees Celsius, falling within the claimed range of 30 to 300 degrees Celsius that applicant defines as sufficient to promote absorption of the deuterium into or onto the carbon nanotubes (Paragraph [0035]). Thus, it would have been obvious to one having ordinary skill in the art at the time of the invention to have combined the method of cleaning the nanotubes disclosed in Smalley with the invention of Hagelstein for the predictable result of removing impurities from the carbon nanotube material.

78. Regarding claim 22, Hagelstein does not specifically teach heating the graphene materials in a sealed chamber and at a temperature to bake-out unwanted materials, comprising evacuating the sealed container to remove unwanted materials therefrom; however, Smalley teaches the purification of carbon nanotubes (Paragraphs [0034], [0035]), thereafter evacuating the sealed chamber (Paragraph [0037]). Because Hagelstein teaches cleaning the graphene material and Smalley discloses a method of doing such, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the method of cleaning disclosed by Smalley as the cleaning method of Hagelstein to yield the predictable result of purifying the graphene material.

79. Claims 7, 8 and 23 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hagelstein (US PG-Pub. No. 2009/0086877), in view of Smalley (US PG-Pub. No. 2002/0127171), and further in view of case law.

80. Regarding claims 7 and 8, Smalley discloses the conditions for purification of the carbon nanotubes comprising a temperature of 200 to 500 degrees Celsius and a time from 1 to 5 hours, contemplating a longer time period, in the range of 15 to 20 hours (Paragraph [0035]). The disclosure in Smalley reads on both Claim 7 and Claim 8 of the present application because prior art teaching a range within, overlapping, or touching a claimed range, anticipates if the prior art range does not substantially deviate from the claimed range. See *Perricone v. Medicis Pharmaceutical Corp.*, 77 USPQ 1321, 1327 (Fed. Cir. 2005) (where anticipation was found despite the fact that prior art range was not identical to claimed ranges).

81. Regarding claim 23, Hagelstein does not teach heating the graphene at a temperature ranging from 50-500 degrees Celsius for a time ranging from 20 minutes to 6 hours. Smalley discloses heating carbon nanotubes at a temperature of 200-500 degrees Celsius for 1 to 5 hours (Paragraph [0035]). The disclosure in Smalley reads on Claim 23 because prior art teaching a range within, overlapping, or touching a claimed range, anticipates if the prior art range does not substantially deviate from the claimed range. See *Perricone v. Medicis Pharmaceutical Corp.*, 77 USPQ 1321 at 1327.

82. Claims 13, 34 and 41 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hagelstein (US PG-Pub. No. 2009/0086877), in view of Maldonado et al. (US PG-Pub. No. 2007/0275160).

83. Regarding claim 13, Hagelstein teaches the use of heterofullerenes (Paragraph [0326]), but does not specifically mention doping with Nitrogen; however, Maldonado discloses nitrogen-doped carbon nanostructures (Paragraph [0008]). It would have been obvious to one having ordinary skill in the art at the time of the invention to have implemented the nitrogen-doped carbon nanotube of Maldonado as

the heterofullerene taught by Hagelstein to achieve the same high stability at high pressure taught by Hagelstein (Paragraph [0326]).

84. Regarding claim 34, Hagelstein does not teach carbon nanotubes doped with nitrogen; however Maldonado discloses nitrogen-doped carbon nanostructures, as discussed in response to Claim 13. For the reasons stated in response to Claim 13, Claim 34 is obvious.

85. Regarding claim 41, Hagelstein does not teach grapheme materials including nitrogen; however Maldonado discloses nitrogen-doped carbon nanostructures, as discussed in response to Claim 13. Accordingly, Claim 41 is obvious.

86. Claim 43 is rejected under pre-AIA U.S.C. 103(a) as being unpatentable over Melechko (A.V. Melechko et al., Vertically aligned carbon nanofibers and related structures: Controlled synthesis and directed assembly, J. of App. Phys., 97 P. 1- 37 (2005)).

87. Regarding claim 43, Melechko teaches a method of contacting hydrogen and carbon nanotubes (Abs.) and applying pressure thereto (P. 5). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have combined heavy water and carbon nanotubes under pressure as carbon nanotubes are well-known in the art for their hydrogen storage properties (Abs.).

Conclusion

88. All claims are drawn to the same invention claimed in the application prior to the entry of the submission under 37 CFR 1.114 and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the application prior to entry under 37 CFR 1.114. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action after the filing of a request for continued examination and the submission under 37 CFR 1.114. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

89. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

90. Any inquiry concerning this communication or earlier communications from the examiner should be directed to SHARON M DAVIS whose telephone number is (571)272-6882. The examiner can normally be reached on Monday - Thursday, 7:30 - 6:00 pm EST.

91. Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

92. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

93. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/SHARON M DAVIS/
Examiner, Art Unit 3646

/JACK W KEITH/
Supervisory Patent Examiner, Art Unit 3646

PTO/SB/08b (07-09)

Approved for use through 07/31/2016. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO		Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i>		Application Number	13/089,986
		Filing Date	April 19, 2011
		First Named Inventor	Cooper et al.
		Art Unit	3646
		Examiner Name	Sean Burke
Sheet 1 of 1	Attorney Docket Number	DE-1	

U.S. PATENT DOCUMENTS					
Examiner Initials*	Cite No. ¹	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number-Kind Code ² (if known)			

FOREIGN PATENT DOCUMENTS						
Examiner Initials*	Cite No. ¹	Foreign Patent Document	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T ⁶
		Country Code ³ Number ⁴ Kind Code ⁵ (if known)				

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ²
		New state of water molecule discovered (2016, April 22) retrieved 26 April 2016 from http://phys.org/news/2016-04-state-molecule.html	
		Quantum Tunneling of Water in Beryl: A New State of the Water Molecule, PRL, journals.aps.org/prl/abstract/10.1103/PhysRevLett.116.167802	

/SHARON M DAVIS/

01/30/2018

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	) Group Art Unit: 3646
)
Christopher H. Cooper et. al.	) Examiner: Davis, Sharon M.
)
Application No.: 13/089,986	) Confirmation No.: 1497
)
Filed: April 19, 2011)
)
For: METHOD OF GENERATING)
ENERGY AND ⁴ He USING THREE)
DIMENSIONAL)
NANOSTRUCTURED CARBON)
MATERIALS)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

REQUEST FOR PERSONAL INTERVIEW WITH THE EXAMINER

This application is the result of filing a Request for Continuing Examination (RCE) that included an Information Disclosure Statement, an Application Data Sheet, a Declaration, and a Response to the issues raised by the Examiner in the parent application. Applicants have addressed all the substantive issues raised in the Final Rejection of this application and claims 1-17, 19-26, 28-36, and 39-48 are pending.

REQUEST

Applicants request a personal interview with the Examiner for this application in accordance with MPEP 713.01 and MPEP 713.02. While there has been no first action on the merits of this RCE application, the issues have been fully addressed in the

prosecution of the parent application and a personal interview will, in the opinion of the Applicants, advance the prosecution of this application.

The following issues would be discussed:

1. The content and relevance of “Visible-Light-Induced Water-Splitting in Channels of Carbon Nanotubes,” J. Phys.Chem. B, 110, No. 4, (2006) 1571-1575, previously made of record in this application.

2. The content and relevance of an article dated April 26, 2016, “New state of water molecule discovered” (<http://phys.org/news/201604statemolecule>), previously made of record in this application.

3. The position of the USPTO that the applicants are required to publish their work in a “peer-reviewed, mainstream scientific journal” before it can be considered credible and that such publication is a condition precedent for the technology to be considered to have utility under 35 USC §101.

4. The specific reasons the USPTO asserts that the declarations of Mr. Loan under 37 CFR 1.132, that are of record in this application, are considered “not persuasive” and are not considered “*significant, quantitative demonstration[s]*” that the disclosed invention is “a viable source of energy.” [italics in original].

5. The legal support for the assertion by the Examiner that: “Cold fusion, to date, has not been recognized by the U.S.P.T.O. as a viable source of energy, and absent *significant, quantitative demonstration to refute this position*, no patent application related to this technology can be seriously entertained.” [italics in original].

6. The existence of any directive to the USPTO by another government agency instructing the USPTO how to respond to patent applications directed to what is referred to as “cold fusion,” or “low energy nuclear reactions,” or LENR.

7. Any support for the Examiner’s assertion that production of energy from a reaction between deuterium and carbon nanotubes is not capable of providing a useful output.

8. Any support for the Examiner’s assertion that the “cold fusion” work of Pons and Fleischmann has relevance to the invention of this application.

9. The scope and content U.S. Patent Publ. 2009/0086877 to Hagelstein.

The time and place for the personal interview can be mutually agreed upon between the Examiner and the undersigned.

Applicants do not consent to a non-personal interview because the written prosecution of this application has demonstrated that the issues of patentability for this technology are unique and controversial. Such issues are best addressed where neither the Applicant nor the USPTO can advance positions that are either inflammatory or personal positions not supported by the law and facts.

Participant for the Applicant – Stephen L. Peterson

The sole exhibit will be the report from Lawrence Livermore National Laboratories noted and discussed in the Loan Declarations, but not made of record in accordance with in accordance with 37 CFR 1.105(3).

The arguments to be presented are that the application discloses and claims an operable, useful invention with a description of the invention that is sufficiently complete so that one could make and use the invention without undue experimentation. The

theory of operation of the invention need not be disclosed. That the claimed technology is nowhere disclosed by the references advanced by the USPTO as prior art.

The suggested form (PTOL-413A) is attached hereto. The content of the present Request is intended to be identical in scope to the information in the attached PTOL-413A.

Respectfully submitted,

Dated: January 6, 2017

By: /Stephen L. Peterson/
Reg. No. 26,325

Attached: PTOL-413A

Applicant Initiated Interview Request Form

Application No.: 13/089,986

First Named Applicant: Christophe H. Cooper

Examiner: Sharon M. Davis

Art Unit: 3646

Status of Application: Pending

Tentative Participants:

(1) Stephen L. Peterson

(2) Sharon M. Davis

(3)

(4)

Proposed Date of Interview: To be determined

Proposed Time: to be determined (☒ AM ☐ PM)**Type of Interview Requested:**(1) ☐ Telephonic(2) ☒ Personal(3) ☐ Video ConferenceExhibit To Be Shown or Demonstrated: ☒ YES☐ NO

If yes, provide brief description: Lawrence Livermore Report mentioned in Applicants responses.

Issues To Be Discussed

Issues (Rej., Obj., etc)	Claims/ Fig. #s	Prior Art	Discussed	Agreed	Not Agreed
(1) Rejection	all claims	Hagelstein	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(2) Rejection	all claims	35 USC 101	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(3) Rejection	all claims	35 USC 112	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(4)			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

☒ Continuation Sheet Attached☐ Proposed Amendment or Arguments Attached

Brief Description of Arguments to be Presented: Applicant has specifically set out all the issues subsumed in the issues noted in the form above in the attached separate Request for Interview document.

An interview was conducted on the above-identified application on

NOTE: This form should be completed and filed by applicant in advance of the interview (see MPEP § 713.01). If this form is signed by a registered practitioner not of record, the Office will accept this as an indication that he or she is authorized to conduct an interview on behalf of the principal (37 CFR 1.32(a)(3)) pursuant to 37 CFR 1.34. This is not a power of attorney to any above named practitioner. See the Instruction Sheet for this form, which is incorporated by reference. By signing this form, applicant or practitioner is certifying that he or she has read the Instruction Sheet. After the interview is conducted, applicant is advised to file a statement of the substance of this interview (37 CFR 1.133(b)) as soon as possible. This application will not be delayed from issue because of applicant's failure to submit a written record of this interview.

/s/ Stephen L. Peterson

Applicant/Applicant's Representative Signature

Examiner/SPE Signature

Stephen L. Peterson

Typed/Printed Name of Applicant or Representative

202 251 9367

Applicant's/Applicant's Representative's Telephone Number

26,325

Registration Number, if applicable

This collection of information is required by 37 CFR 1.133. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 24 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Acknowledgement Receipt

EFS ID:	31426724
Application Number:	13089986
International Application Number:	
Confirmation Number:	1497
Title of Invention:	METHOD OF GENERATING ENERGY AND 4HE USING THREE DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS
First Named Inventor/Applicant Name:	Christopher H. Cooper
Correspondence Address:	Stephen L. Peterson - PO BOX 319 - CRESTON CA 93432-0319 US - steve @petersonipc.com
Filer:	Stephen Leroy Peterson
Filer Authorized By:	
Attorney Docket Number:	DE-1
Receipt Date:	06-JAN-2018
Filing Date:	19-APR-2011
Time Stamp:	13:52:18
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
File Listing:	

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Letter Requesting Interview with Examiner	reqforint.pdf	116666	no	4
			de5288c3fc874c5516a2a6b24b7eaeef62f84d7c		

Warnings:

Information:

2	Letter Requesting Interview with Examiner	pto413a.pdf	206988	no	1
			6deab64252fac77cd048c83ff601ba9d3511a8e		

Warnings:

Information:

Total Files Size (in bytes):			323654
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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/089,986	04/19/2011	Christopher H. Cooper	088479.000147

CONFIRMATION NO. 1497

POWER OF ATTORNEY NOTICE



OC000000095901246

29747
GREENBERG TRAURIG (LV)
77 West Wacker Drive, Suite 3100
Intellectual Property Department
Chicago, IL 60601

Date Mailed: 12/06/2017

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 12/04/2017.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/tlulu/



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/089,986	04/19/2011	Christopher H. Cooper	DE-1

Stephen L. Peterson
PO BOX 319
CRESTON, CA 93432-0319

CONFIRMATION NO. 1497
POA ACCEPTANCE LETTER



Date Mailed: 12/06/2017

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 12/04/2017.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/tlulu/

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

POWER OF ATTORNEY OR REVOCATION OF POWER OF ATTORNEY WITH A NEW POWER OF ATTORNEY AND CHANGE OF CORRESPONDENCE ADDRESS	Application Number	13/089,886
	Filing Date	April 19, 2011
	First Named Inventor	Cooper et al.
	Title	METHOD OF GENERATING NON-IONIZING RADIATION
	Art Unit	3646
	Examiner Name	Sharon Davis
	Attorney Docket Number	DE-1

I hereby revoke all previous powers of attorney given in the above-identified application.

☐ A Power of Attorney is submitted herewith.

OR

☐ I hereby appoint Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s) to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

OR

☒ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s) to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

Practitioner(s) Name	Registration Number
Stephen L. Peterson	26,325

Please recognize or change the correspondence address for the above-identified application to:

☐ The address associated with the above-mentioned Customer Number.

OR

☐ The address associated with Customer Number:

OR

☒ Firm or Individual Name **Stephen L. Peterson**

Address **PO BOX 319**

City **CRESTON** State **CA** Zip **93432-0319**

Country **USA**

Telephone _____ Email **slave@petersonipc.com**

I am the:

☐ Applicant/Inventor.

OR

☒ Assignee of record of the entire interest. See 37 CFR 3.71.

Statement under 37 CFR 3.73(b) (Form PTO/SB/96) submitted herewith or filed on _____

SIGNATURE of Applicant or Assignee of Record

Signature	<i>Stephen L. Peterson</i>	Date	December 4, 2017
Name	Stephen L. Peterson	Telephone	202 251 9367
Title and Company	President, C3L LIMITED		

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☒ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: C3L LIMITED

Application No./Patent No.: 13/089,986

Filed/Issue Date: April 19, 2011

Titled: **METHOD OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS**

C3L LIMITED

, a Corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1. ☒ the assignee of the entire right, title, and interest in;
2. ☐ an assignee of less than the entire right, title, and interest in
(The extent (by percentage) of its ownership interest is _____ %); or
3. ☐ the assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made)
the patent application/patent identified above, by virtue of either:

A. ☒ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 043705, Frame 0140, or for which a copy therefore is attached.

OR
B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

2. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

Stephen L. Peterson
Signature

December 4, 2017

Date

Stephen L. Peterson

President

Printed or Typed Name

Title

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Acknowledgement Receipt

EFS ID:	31124060
Application Number:	13089986
International Application Number:	
Confirmation Number:	1497
Title of Invention:	METHOD OF GENERATING ENERGY AND 4HE USING THREE DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS
First Named Inventor/Applicant Name:	Christopher H. Cooper
Customer Number:	29747
Filer:	Stephen Leroy Peterson
Filer Authorized By:	
Attorney Docket Number:	088479.000147
Receipt Date:	04-DEC-2017
Filing Date:	19-APR-2011
Time Stamp:	19:30:34
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	sb81.pdf	1599020	no	1
			835dae14f6afa64cdb62c15b99eb2e21cbca f2ce		

Warnings:

Information:					
2	Assignee showing of ownership per 37 CFR 3.73	sb96.pdf	1469384	no	1
			d16a0d6ba5c9b57045ced6f8cc8fc6abd4814be0		
Warnings:					
Information:					
			Total Files Size (in bytes):	3068404	
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL (Submitted Only via EFS-Web)

Application Number	13/089,986	Filing Date	2011-04-11	Docket Number (if applicable)	DE-1	Art Unit	3646
First Named Inventor	Christopher H. Cooper			Examiner Name	Sean P. Burke		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.

Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

☐ Other _____

☒ Enclosed

☒ Amendment/Reply

☒ Information Disclosure Statement (IDS)

☒ Affidavit(s)/ Declaration(s)

☒ Other

Application Data Sheet (ADS)

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.

☐ The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No _____

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

☐ Applicant Signature

Signature of Registered U.S. Patent Practitioner			
Signature	/Stephen L. Peterson/	Date (YYYY-MM-DD)	2017-08-26
Name	Stephen L. Peterson	Registration Number	26325

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PATENT
Customer No. 117724
Attorney Docket No. DE-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	) Group Art Unit: 3646
)
Christopher H. Cooper et. al.	) Examiner: Burke, Sean P.
)
Application No.: 13/089,986	) Confirmation No.: 1497
)
Filed: April 19, 2011)
)
For: METHOD OF GENERATING)
ENERGY AND ⁴ He USING THREE)
DIMENSIONAL)
NANOSTRUCTURED CARBON)
MATERIALS)

Mailbox RCE

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

SUBMISSION IN SUPPORT OF A REQUEST FOR CONTINUING EXAMINATION

This application was on appeal based on a Notice of Appeal filed January 26, 2017. The Brief was due May 26, 2017. Applicants have filed herewith a Request for Extension of time for five (5) months with the requisite fee. Applicants have filed a Request for Continuing Examination (RCE) along with this Submission. The present Submission addresses the grounds of rejection advanced in the examination of this application.

In addition, Applicants have filed an Information Disclosure Statement citing two references the Examiner refused consider in connection with this application. In the Final Rejection of this application the Examiner also requested a copy of the report of Lawrence

Livermore National Laboratories (LLNL) that was quoted in the Declaration of James Loan filed on 25 August 2015. Applicants have addressed the request in this submission.

By this submission Applicants have addressed all of the substantive issues raised in the Final Rejection of this application. Examination of claims 1-17, 19-26, 28-36, and 39-48 on their merits is respectfully requested.

REMARKS

Response to Assertions in the Final Rejection

Paragraph 5 of the Final Rejection asserts that the Examiner has “fully considered” Applicant’s arguments but they are deemed “not persuasive.” Applicants respectfully disagree, the Examiner’s consideration of the Applicant’s assertions has been anything but “full.” The Examiner has mocked the professional credentials of scientists having positions contrary to the Examiner, failed to explain why factual assertions and scientific evidence provided by Applicants is not persuasive, and inexplicably castigated Applicants for not providing technical information related to an area of fusion technology (the electrochemical technology of Pons and Fleischmann) having no direct relation to the inventions disclose and claimed.

Paragraph 6 of the Final Rejection begins with an expression of disrespect by characterizing Applicant’s invention as a “scheme” and a “purported invention.”

Paragraph 7 of the Final Rejection asserts that it is Applicant’s burden to explain how the Coulombic repulsion forces that ordinarily prevent two like atoms from achieving close proximity are overcome in Applicant’s invention. It is not Applicant’s burden to explain the theory of the operation of the invention, but this issue is addressed by peer-reviewed articles now of record in this application.

As is clearly disclosed in this application, the invention creates energy by the combination of three-dimensional nanostructured carbon material (e.g. carbon nanotubes) and deuterium. Of record in this application is the "peer-reviewed, published" article from a "mainstream scientific journal": "Visible-Light-Induced Water-Splitting in Channels of Carbon Nanotubes," J. Phys.Chem. B, 110, No. 4, (2006)1571-1575. The article reported the production of energy when water (inherently containing deuterium as heavy water) was combined with carbon nanotubes but not with "micro graphite." P. 1574. As depicted in Fig. 2(b), the results of their gas analysis unequivocally showed transmutation byproducts (helium and tritium) of some type of nuclear reaction. Those authors opined that the water was being split [into its constituent elements] in the carbon nanotubes. The authors state: "[t]hat supports the opinion of thermosplitting of water confined within the channels of the SWNTs." Id. P. 1575. [a SWNT is a single-walled carbon nanotube]

In addition, two articles of record not considered by the Examiner, from unimpeachable scientists support the fact that water (hence heavy water or deuterium) can be confined in carbon nanotubes. In an article dated April 26, 2016, "New state of water molecule discovered"¹ the author quotes from research conducted at Oak Ridge National Laboratory:

"At low temperatures, this tunneling water exhibits quantum motion through the separating potential walls, which is forbidden in the classical world," said lead author Alexander Kolesnikov of ORNL's Chemical and Engineering Materials Division. "This means that the oxygen and hydrogen atoms of the water molecule are 'delocalized' and therefore simultaneously present in all six symmetrically equivalent positions in the channel at the same time. It's one of those phenomena

^{1/} <http://phys.org/news/201604statemolecule> (included in the Information Disclosure Statement filed herewith)

that only occur in quantum mechanics and has no parallel in our everyday experience." [emphasis added].

The author of the review goes on to discuss the ramifications of this work at

ORNL:

The existence of the tunneling state of water shown in ORNL's study should help scientists better describe the thermodynamic properties and behavior of water in highly confined environments such as water diffusion and transport in the channels of cell membranes, in carbon nanotubes and along grain boundaries and at mineral interfaces in a host of geological environments. [emphasis added].

This article this supports the fact that water, heavy water and thus deuterium can be confined in carbon nanotubes. While Applicants are not required to set out the atomic level mechanism for their invention, it is believed the electronic environment within a carbon nanotube somehow overcomes what the Examiner has termed the "electroweak forces."

Applicants have previously submitted technical evidence that a combination of deuterium and carbon nanotubes, that were first combined in 2006, are still emitting measurable energy. No chemical reaction is known to spontaneously produce a transmutation byproduct (helium) and energy for ten years. Applicant has demonstrated, in a process that can be practiced without undue experimentation, that some type of fusion reaction has and is taking place.

It is the Examiner's burden to fully consider the evidence that the atoms of deuterium in the carbon nanotubes are fusing. In considering that evidence, the Examiner cannot merely assert that such an event cannot happen because it is contrary to known science. As has been asserted to the Examiner before, science is not static and changes every day. The above cited articles must be considered by the Examiner

and they demonstrate that it is possible to confine atoms of water (and hence deuterium) within carbon nanotubes in ways that defy previously known properties of water.

Paragraph 7 of the Final Rejection asserts that the invention must be a “cold fusion” process because it takes the energy equivalent to 400 billion°K to overcome the Coulombic repulsion. The Examiner ignores the demonstrated fact that some type of nuclear reaction is occurring in the present invention. Logically, either the equivalent of 400 billion°K is achieved on the atomic level within a carbon nanotube or 400 billion°K is not always needed to achieve fusion. What the process of the invention is called and the mechanism by which Coulombic forces are overcome are irrelevant – the invention produces energy and helium in a reaction that has been proven not to be chemical.

But the Examiner has a reason to call the invention “cold fusion.”

Once the applicant's invention is characterized as “cold fusion” the Examiner then feels free to cite multiple articles concluding that “cold fusion” is not possible. That is a semantic ploy - expanding the definition to encompass something you wish discredited and then denigrate the thing included in the expanded definition because it is included. Moreover, guilt by association is a classic logical fault.

In Paragraph 9 of the Final Rejection the Examiner asserts that a cited peer-reviewed article of record (“Visible-Light-Induced Water-Splitting in Channels of Carbon Nanotubes,” J. Phys.Chem. B, 110, No. 4, (2006)1571-1575) is irrelevant because it fails to “demonstrate that the Applicant has undone one of the four fundamental natural forces.” The article does exactly that – it reports that energy and transmutation

byproducts were observed and recorded from the combination of carbon nanotubes and the deuterium naturally present in water.

Paragraph 10 of the Final Rejection asserts that because the Guo article (noted in paragraph 9 above) does not explicitly state that the reaction is "exothermic" that it is irrelevant. The reported reaction produced visible light and that is energy. It produced transmutation byproducts, helium and tritium when carbon nanotubes contacted the deuterium containing water. Perhaps it was also exothermic and produced heat, but the fact heat production was not reported (the researchers were looking for gaseous byproducts, not energy or heat) does not mean that none was produced.

Paragraph 11 of the Final Rejection advances a novel and entirely unsupported position that the applicants are required to publish their work in a "peer-reviewed, mainstream scientific journal." No such requirement exists. Applicants have submitted the declarations of a skilled researcher clearly setting out experimental work that supports the existence of a nuclear reaction that produces energy. The application discloses specific examples of the invention in sufficient detail that they can be reproduced without undue experimentation. No more is necessary to support this application. The Examiner is requested to either withdraw this assertion or provide legal support for it.

Paragraph 12 of the Final Rejection *inter alia* asserts that the Declarant James Loan, in declarations discussing the work done at Lawrence Livermore National Laboratory, admitted the results were "inconclusive." The quoted language of Mr. Loan is no such "admission." The Examiner mistakenly equates variation of the test results and intermittent production of measurable neutrons with being "inconclusive." The

production of an intermittent fusion reaction does not mean the various experiments are valueless or inconclusive. Irrespective of the intermittent detection of neutrons in some experiment (experimental conditions were varied during the work), the LLNL report unequivocally states that a fusion reaction was observed. That one experiment showing a fusion event need not demonstrate continuous neutron production in order to show that the current, orthodox understanding of the conditions needed to induce nuclear fusion is incomplete or incorrect.

The Examiner requested a copy of the LLNL report. Article VII of that report is set out below:

Article VII. PUBLICATION MATTERS

The Contractor will not publish or disclose any information associated with the work done under this agreement without the express written consent of the Sponsor. The Sponsor will not publish any information associated with the work done under this agreement without the express written consent of the Contractor. Notwithstanding the foregoing, the Sponsor may disclose the content of any report provided to the Sponsor by the Contractor resulting from the work under this Agreement.

Applicants ("the Sponsor") have disclosed the relevant content of the LLNL report, as allowed, but are precluded from publishing the report.

The Request for Information has been fully complied with in accordance with 37 CFR 1.105(3) which states: "Any reply to a requirement for information pursuant to this section that states either that the information required to be submitted is unknown to or is not readily available to the party or parties from which it was requested may be accepted as a complete reply."

Paragraph 12 of the Final Rejection is flawed as it mischaracterizes Mr. Loan's assertions and incredibly discredits the work of Guo et al ("Visible-Light-Induced Water-Splitting in Channels of Carbon Nanotubes," J. Phys.Chem. B, 110, No. 4, (2006)1571-1575) by stating that "there is no evidence . . . that those trace elements occurred due

to a fusion reaction . . .” Gou et al were looking for gaseous byproducts from reactions induced by the irradiation of water in contact with single wall carbon nanotubes or “micrographite” with light. To denigrate the finding because the researchers didn’t explicitly confirm a fusion reaction is logically flawed. Had Gou et al been trying to determine the mechanism for the extraneous production of transmutation gases from their experiment perhaps they would have speculated that it was some type of fusion. Their lack of speculation is not evidence that such a reaction did not take place. More likely it took place without their awareness of the reaction. The fact remains, transmutation byproducts and energy were produced when carbon nanotubes (but not planar micrographite) and deuterium in water were combined and irradiated with light.

The Examiner speculates that the transmutation gases could be system impurities. There is no support for such speculation. Such speculation is also in conflict with the goal of the Guo et al research – to look for and identify gases in a reactive system. It is not credible to assert that Guo et al, while trying to identify the composition and amount of gases produced by the induced reaction, would fail to purge their apparatus of impurity gases because that failure would compromise the very results they were seeking. A more logical speculation is that they adequately purged their gas system of impurities and the gases they reported finding were created by the reactions they induced. The fact that they did not characterize the reactions they induced as including “fusion” is legally and factually irrelevant.

Paragraph 14 of the Final Rejection substitutes emphasis for reasoning and simply asserts that the declarations of Mr. Loan are “NOT PERSUASIVE.” If they are

not persuasive then the Examiner is required to state specifically why they are not.

Asserting that his results are in conflict with orthodox science is not sufficient.

Paragraph 15 of the Final Rejection asserts that the §101 rejection will be maintained until Applicant overcomes this rejection by “publishing evidence of his “discovery” in a peer-reviewed, mainstream scientific journal.” The Examiner is respectfully requested to provide support in case law or statute for such a requirement or withdraw this rejection.

Paragraph 16 of the Final Rejection uses reasoning that is flawed on its face. Carbon nanotubes are created in minute quantities in combustion of carbonaceous materials. Deuterium also exists in nature. Using the Examiner’s assumption that once in 13 billion years a carbon nanotube contacted deuterium, what would happen? - it would simply form helium and emit a minute amount of energy and never be perceived. So what? The issue is not whether or not in the 13 billion years of the earths existence have they come in contact and reacted, but would one of ordinary skill in the art combine them to produce energy. If the Examiner is advancing the position that the possibility that two materials that exist in minute quantities must have been combined and that precludes patenting their combination even when the combination has never been perceived, the Examiner is respectfully requested to provide legal support for that position.

In paragraph 16 the Examiner has inherently acknowledged the very fact he will not admit when he states that “. . . no such [fusion] reaction can occur under the present laws of the universe.” [emphasis added] Applicants have shown how the “present laws” concerning water have changed such that the understanding of their

interaction with carbon nanotubes has changed. See the articles cited in applicant's discussion of Paragraph 6 above. Albert Einstein's understanding of "the laws of physics" changed when others discovered quantum physics. Initially, he did not believe it, but he was wrong and facts, not asserted beliefs, changed his mind.

The applicants have proved energy is created with the combination of deuterium and carbon nanotubes and if such demonstrable facts are in conflict with **present** laws of physics then it is those laws that must change to conform to facts. It is scientifically unsupportable to dismiss facts because they do not conform to current understanding.

To state the obvious, that is why the **present** laws of physics or the **present** theory of physics use the word "present" – the laws and theory of physics have changed, they will change again as understanding changes. The "**present** laws" are not immutable.

In a previous action the Examiner stated: "Cold fusion, to date, has not been recognized by the U.S.P.T.O. as a viable source of energy, and absent *significant, quantitative demonstration to refute this position*, no patent application related to this technology can be seriously entertained." [italics in original]. The Examiner is requested to provide a citation to a USPTO document stating that this is the position of the USPTO.

The Examiner is also requested to specifically explain why the examples in the application and the work reported in the Declarations of James Loan are not "*significant, quantitative demonstration[s]*" that the disclosed invention is "a viable source of energy." Again - asserting that these results are in conflict with orthodox science is not sufficient.

Applicant's have anecdotal evidence that the USPTO has been directed by another government agency not to issue applications directed to what is referred to as "cold fusion." It is respectfully requested that any such directive be identified and provided to the applicants. It is fundamentally unfair to reject applicant's applications based on unstated and unidentified policy of the USPTO or any other government agency.

It is not the function of the USPTO to be "Horatio at the bridge" attempting to protect science from technology that is in conflict with the "present" laws of physics, or in conflict with the present understanding of the USPTO or another government agency.

The secondary rejection based on the allegation of no utility is illogical and is unsupported by law or fact.

Paragraph 17 of the Final Rejection asserts that "inoperable inventions are also non-enabled as a matter of law." The assertion is irrelevant because the present application has working examples that prove the invention is operable. The only support for the Examiner's position that the invention is inoperable is his assertion that the invention conflicts with the present orthodox understanding of the conditions necessary for fusion. The examples of the application and the work reported in the Loan Declarations are facts that are in conflict with current theory.

Paragraph 18 of the Final Rejection asserts that the prior art rejections have not been addressed. The previous rejections based on prior art are addressed below.

Paragraph 19 of the Final Rejection asserts that the application fails to provide an adequate written description and fails to provide an enabling disclosure. The rejections are respectfully traversed. Both issues are dealt with in the Declarations of

James Loan, of record in this application. The working examples and the complete description of the invention are sufficient to enable one skilled in the art to practice the invention without undue experimentation.

Paragraph 20 of the Final Rejection is reproduced below:

20. There is no reputable evidence of record to support the claim that the present invention involves nuclear fusion, nor is there evidence that claims of "excess heat" are valid and reproducible, nor is there evidence that the invention is capable of operating as indicated or capable of providing a useful output.

The examples of the application that show emanating radiation, transmutation byproducts, and emanating light are evidence of a fusion reaction. In addition, peer-reviewed technical articles of record support the fact that combinations of carbon nanotubes and deuterium emit energy and transmutation byproducts (Guo et al). It is the Examiner's burden to show why such evidence is "not reputable." Again - asserting that these results are in conflict with orthodox science is not sufficient.

Applicants have not asserted that the reaction of the present application created "excess heat."

The assertions in the last sentence of Paragraph 20, without any technological justification, ignore the working examples in the application and the work reported in the Loan Declarations. Finally, for the Examiner to assert that the production of energy from a reaction between deuterium and carbon nanotubes is not capable of providing a useful output presumes, without any technological support, that the proven energy output is not useful.

Paragraphs 21 through 35 of the Final Rejection are another example of flawed reasoning. The Examiner equates the technology of the present application to the discredited work of Pons and Fleischmann and then spends nine pages denigrating the work of Pons and Fleischman and the electrochemical method of generating "excess heat."

Simply stated the present invention does not involve the use of catalysts or electrochemistry to introduce deuterium to a crystal lattice. Thus, the analogy and the criticism of the Examiner in paragraphs 21-35 is legally irrelevant. The Examiner has again expanded the definition of a concept (cold fusion by introducing deuterium to a lattice) so that it will include something scientifically denigrated (Pons and Fleischmann technology) to support the denigration of the concept (deuterium reacting with carbon nanotubes) improperly included in the expanded definition.

The rejections of Paragraphs 21-35 have no support.

The §101 and §112 Rejections

Paragraphs 1-3 of this section of the Final Rejection assert that the invention has no operable or well-established utility. The working examples of the application, the work described in the Declarations of James Loan prove otherwise. The factual assertions of the Examiner are in conflict with facts of record and thus his conclusions of law are unsupported.

The §102 and §103 Rejections

The Examiner as based the rejection of the claims on the content of U.S. Patent Publ. 2009/0086877 (Hagelstein). Applicants do not concede that this publication is "prior art."

According to MPEP § 2121.01, in order for a cited art document to anticipate a claim, the cited art must provide an enabling disclosure of the claimed subject matter. This section of the MPEP relies on decades old case law which states, in relevant part that, "In determining that quantum of prior art disclosure which is necessary to declare an applicant's invention 'not novel' or 'anticipated' within section 102, the stated test is whether a reference contains an 'enabling disclosure'... ." *In re Hoeksema*, 399 F.2d 269, 158 USPQ 596 (CCPA 1968).

This section of the MPEP goes on to state that the mere naming or description of the subject matter is insufficient; rather, the cited art must demonstrate that the public was in possession of the claimed subject matter before the date of invention. In other words, the cited art must describe the claimed subject matter in such detail as to enable one of ordinary skill in the art to make the claimed subject matter without undue experimentation. See MPEP § 2121.01, referring to *Elan Pharm., Inc. v. Mayo Found. For Med. Educ. & Research*, 346 F.3d 1051, 1054, 68 USPQ2d 1373, 1376 (Fed. Cir. 2003)."

In light of the above, Applicants respectfully submit that Hagelstein fails to provide an enabling disclosure with respect to the claimed subject matter, specifically, with regard to a method of generating energy. As such, Applicants respectfully submit that the pending rejection is improper.

Moreover, it is fundamentally inconsistent to hold applicant to a rigorous standard of disclosure and then reject claims using a reference that contains, in a wholly obtuse and theoretical discussion, an offhand combination of hydrogen and carbon in a manner that

would not enable one skilled in the art to practice what the Examiner asserts was suggested.

In addition, Hagelstein discloses contacting hydrogen/deuterium with carbon nanotubes. Hagelstein does so as a means to facilitate the storage or transport of hydrogen/deuterium, not to induce a reaction between those components. The entire focus of the work discussed in this excessively long, obtuse, and theoretical document is impinging energy on solids (primarily metal deuterides) to facilitate a fusion reaction. This reference does not teach or suggest that fusion or the production of energy or Helium results from the placement of deuterium in contact with carbon nanotubes.

The Examiner cites paragraph [0322] for such a teaching, but it must be read in context with what is being referred to as "the material 202" in paragraph [0312].

[0312] According to an exemplary embodiment, an apparatus 200 shown in block diagram form in FIG. 24 comprises a material 202. Material 202 comprises molecular deuterium (D_2) and/or hydrogen-deuterium (HD), and reactions are stimulated in this material 202. In this regard, the presence of both D_2 and HD in the material 202 is contemplated, but it is also possible be appreciated that primarily either D_2 or HD may be present in the material 202, e.g., if the material is processed and maintained at sufficiently low temperature to thwart transformations between D_2 , HD and H_2 . The presence of H_2 in the material is also generally likely and is not precluded. The apparatus 200 also comprises an excitation source 204 arranged to stimulate the material 202 to generate reactions in the material 202, and a load 206 arranged to remove energy generated by the reactions from the material 202. The apparatus can be configured in practice in a variety of ways, such as shown, for example, in the above-described electrochemical cell example of FIG. 20, the dry cell example of FIG. 21, the flash heating tube example of FIG. 22, and the thermoelectric battery example of FIG. 23. In view of those examples, it will be appreciated that the excitation source 204 and the load 206 may or may not be in direct physical contact with the material 202. Also, materials 85, 99, 88, and 104 referred to in FIGS. 20, 21, 22, and 23, respectively, can correspond to material 202 shown in FIG. 24. In a preferred embodiment, the material 202 can include at least one element that has one or more stable isotopes (i.e., stable forms of the element each having different numbers

of neutrons in the nucleus). In another preferred embodiment, the material 202 can include at least one element that has an excess number of neutrons.

Hagelstein contemplates and discloses that encapsulated deuterium may be used in the disclosed process where energy is impinged on the material 202 from the excitation source 204. Nowhere in Hagelstein is it taught or suggested that contacting deuterium and carbon nanotubes will induce a fusion reaction.

Applicants are not the first to contact these materials, but are the first to establish that a nuclear reaction that produces Helium and energy results from that contact. Nowhere in the cited prior art is there an enabling disclosure of the combinations found in the independent claims of the present application.

In summary, the main reference Hagelstein fails to teach or suggest all the features in the independent claims of this application. The cited references neither teach nor suggest that the combination of deuterium and the forms of carbon called graphene or fullerenes would produce non-ionizing energy or Helium. As a result, no *prima facie* showing of obviousness has been set out and the rejection of the claims under 35 USC 102 and 103 should be withdrawn.

Applicants have previously addressed the specific rejections of the Examiner under Sections 102 and 103, and incorporate those comments here. The Examiner has never dealt with the fundamental issue that Hagelstein:

- 1) Isn't prior art;
- 2) Does not disclose the combination of carbon nanotubes and deuterium creates energy; and

3) and any combination of the prior art fails to teach or suggest all the features in the independent claims of this application

It is respectfully submitted that the claims of this application are supported by the disclosure, the invention is operable, and the cited references do not disclose, teach or suggest the claimed subject matter. The rejections are not supported by the law or the cited references and should be withdrawn.

Conclusion

Applicants have addressed every significant issue raised by the Examiner in the Final Rejection and have materially advanced prosecution. Examination of the claims on the merits is respectfully requested.

Respectfully submitted,

Dated: August 26, 2017

By: /Stephen L. Peterson/
Reg. No. 26,325

Electronic Patent Application Fee Transmittal

Application Number:	13089986			
Filing Date:	19-Apr-2011			
Title of Invention:	METHOD OF GENERATING ENERGY AND 4HE USING THREE DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS			
First Named Inventor/Applicant Name:	Christopher H. Cooper			
Filer:	Stephen Leroy Peterson			
Attorney Docket Number:	088479.000147			
Filed as Micro Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension - 5 months with \$0 paid	3255	1	750	750
Miscellaneous:				
RCE- 2ND AND SUBSEQUENT REQUEST	3820	1	425	425
Total in USD (\$)				1175

Electronic Acknowledgement Receipt

EFS ID:	30192825
Application Number:	13089986
International Application Number:	
Confirmation Number:	1497
Title of Invention:	METHOD OF GENERATING ENERGY AND 4HE USING THREE DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS
First Named Inventor/Applicant Name:	Christopher H. Cooper
Customer Number:	29747
Filer:	Stephen Leroy Peterson
Filer Authorized By:	
Attorney Docket Number:	088479.000147
Receipt Date:	26-AUG-2017
Filing Date:	19-APR-2011
Time Stamp:	22:04:35
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$ 1175
RAM confirmation Number	082817INTEFSW22084400
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	ads26.pdf	128536	no	8
			ba57a394121030173f8136ce77fc33dd6987650b		
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
2	Extension of Time	eot26.pdf	57852	no	2
			fcf4298fb7e08082873320ee1a7587d1a17b11b1		
Warnings:					
Information:					
3	Transmittal Letter	ids26.pdf	68223	no	2
			ad06d65a63a42998beb77d2dcff03661fe45a7a8		
Warnings:					
Information:					
4	Information Disclosure Statement (IDS) Form (SB08)	idsptosb08.pdf	97464	no	1
			9c32eb75af185f4bee3a3d0049caf1a1047ff046		
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
5	Non Patent Literature	ornlarticle.pdf	210663	no	2
			a511bcb4d8f9f813214c0c90845550cdeedf3fe		
Warnings:					
Information:					
6	Non Patent Literature	phrevlet.pdf	774368	no	6
			5d0d7f5a90002ad23904650900df086873904c94		

Warnings:					
Information:					
7	Oath or Declaration filed	loandec.pdf	8733726	no	2
			559b604b47b14207e279eff281c941257e91a82b		
Warnings:					
Information:					
8	Request for Continued Examination (RCE)	rce26.pdf	80665	no	3
			8b3d143e1b3ac15969644fd4bf8347c08dba67d8		
Warnings:					
This is not a USPTO supplied RCE SB30 form.					
Information:					
9	Amendment Submitted/Entered with Filing of CPA/RCE	sub26f.pdf	279857	no	17
			de22cc94edbc8b13ceaa7d0c867ef8114d360082		
Warnings:					
Information:					
10	Fee Worksheet (SB06)	fee-info.pdf	32281	no	2
			ec0e6bdfd744e26332a57a8a9d2208633d48face		
Warnings:					
Information:					
Total Files Size (in bytes):			10463635		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	DE-1
		Application Number	
Title of Invention	METHOD OF GENERATING ENERGY AND 4He USING THREE DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS		
<p>The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.</p> <p>This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.</p>			

Secrecy Order 37 CFR 5.2

<input type="checkbox"/>	Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
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Inventor Information:

Inventor 1					Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	James	F.	Loan		
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
City	Turner Falls	State/Province	MA	Country of Residence	US
Mailing Address of Inventor:					
Address 1	12 Country Club Lane				
Address 2					
City	Turner Falls	State/Province	MA		
Postal Code	01376	Country i	US		
Inventor 2					Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Christopher	H.	Cooper		
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
City	Santa Fe	State/Province	NM	Country of Residence	US
Mailing Address of Inventor:					
Address 1	224 E. Buena Vista St.				
Address 2					
City	Santa Fe	State/Province	NM		
Postal Code	87505	Country i	US		
Inventor 3					Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	William	K.	Cooper		
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					

Application Data Sheet 37 CFR 1.76		Attorney Docket Number		DE-1	
		Application Number			
Title of Invention	METHOD OF GENERATING ENERGY AND 4He USING THREE DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS				
City	Santa Fe	State/Province	NM	Country of Residence	US
Mailing Address of Inventor:					
Address 1		224 E. Buena Vista St.			
Address 2					
City	Santa Fe	State/Province	NM		
Postal Code	87505	Country i	US		
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.					Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).			
<input type="checkbox"/> An Address is being provided for the correspondence information of this application.			
Customer Number	117724		
Email Address	steve@petersonipc.com	Add Email	Remove Email

Application Information:

Title of the Invention	METHOD OF GENERATING ENERGY AND 4He USING THREE DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS		
Attorney Docket Number	DE-1	Small Entity Status Claimed	<input checked="" type="checkbox"/>
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	10	Suggested Figure for Publication (if any)	5

Filing By Reference :

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

<input type="checkbox"/> Request Early Publication (Fee required at time of Request 37 CFR 1.219)
<input type="checkbox"/> Request Not to Publish. I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	DE-1
		Application Number	
Title of Invention	METHOD OF GENERATING ENERGY AND 4He USING THREE DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS		

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	<input checked="" type="radio"/> Customer Number	<input type="radio"/> US Patent Practitioner	<input type="radio"/> Limited Recognition (37 CFR 11.9)
Customer Number	117724		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the application number blank.

Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Claims benefit of provisional	61427140	2010-12-24
Prior Application Status	Abandoned	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation in part of	12898807	2010-10-06
Prior Application Status	Abandoned	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
12898807	Continuation of	12258568	2008-10-27
Prior Application Status	Abandoned	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
12258568	Continuation of	11633524	2006-12-05
Prior Application Status	Abandoned	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
11633524	Claims benefit of provisional	60777577	2006-03-01
Prior Application Status	Abandoned	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Claims benefit of provisional	60741874	2005-12-05

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	DE-1
		Application Number	
Title of Invention	METHOD OF GENERATING ENERGY AND 4He USING THREE DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS		

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)ⁱ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove			
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ⁱ (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

<p>This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.</p> <p><input checked="" type="checkbox"/> NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.</p>

Authorization to Permit Access:

<input type="checkbox"/> Authorization to Permit Access to the Instant Application by the Participating Offices

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	DE-1
		Application Number	
Title of Invention	METHOD OF GENERATING ENERGY AND 4He USING THREE DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS		

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.				
Applicant 1				
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.				
<input type="button" value="Clear"/>				
<input type="radio"/> Assignee	<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Joint Inventor		
<input type="radio"/> Person to whom the inventor is obligated to assign.		<input checked="" type="radio"/> Person who shows sufficient proprietary interest		
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:				
Name of the Deceased or Legally Incapacitated Inventor : <input type="text"/>				
If the Applicant is an Organization check here. <input type="checkbox"/>				
Prefix	Given Name	Middle Name	Family Name	Suffix

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	DE-1
		Application Number	
Title of Invention	METHOD OF GENERATING ENERGY AND 4He USING THREE DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS		

Mailing Address Information For Applicant:			
Address 1		Muptipure International	
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City		State/Province	NV
Country	US	Postal Code	89128
Phone Number		Fax Number	
Email Address		steve@petersonipc.com	
Additional Applicant Data may be generated within this form by selecting the Add button.			

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1			
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.			
If the Assignee or Non-Applicant Assignee is an Organization check here.			<input checked="" type="checkbox"/>
Organization Name			
Mailing Address Information For Assignee including Non-Applicant Assignee:			
Address 1			
Address 2			
City		State/Province	
Country		Postal Code	
Phone Number		Fax Number	
Email Address			
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.			

Signature:

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications.			
Signature	/Stephen L. Peterson/	Date (YYYY-MM-DD)	2017-08-26

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	DE-1		
		Application Number			
Title of Invention	METHOD OF GENERATING ENERGY AND 4He USING THREE DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS				
First Name	Peterson	Last Name	Stephen	Registration Number	26325
Additional Signature may be generated within this form by selecting the Add button.					

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PATENT
Customer No. 117724
Attorney Docket No. DE-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)	
)	
Christopher H. Cooper et. al.	)	Group Art Unit: 3646
)	
Application No.: 13/089,986	)	Examiner: Burke, Sean P.
)	
Filed: April 19, 2011)	
	)	Confirmation No.: 1497
For: METHOD OF GENERATING)	
ENERGY AND ⁴ He USING THREE)	
DIMENSIONAL NANOSTRUCTURED)	
CARBON MATERIALS)	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

PETITION FOR EXTENSION OF TIME

A Notice of Appeal for this application was filed January 26, 2017. The Brief was due March 26, 2015. Applicants petition for a five-month extension of time to file the Appeal Brief until August 28, 2015, August 26, 2017 being a Saturday. A fee of \$750.00 is submitted herewith by the sending of an executed PTO-2038 form by facsimile to 571 273 8300.

Applicants are filing with this Petition a Request for Continuing Examination (RCE) addressing all the substantive rejections asserted in the Final Rejection and advancing the examination of this application.

Respectfully submitted,

Dated: August 26, 2015

By: /Stephen L. Peterson/
Reg. No. 26325

PATENT
Customer No. 117724
Attorney Docket No. DE-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)	
)	
Christopher H. Cooper et. al.)	Group Art Unit: 3646
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Application No.: 13/089,986)	Examiner: Burke, Sean P.
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DIMENSIONAL NANOSTRUCTURED)	
CARBON MATERIALS)	

Mail RCE

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT
UNDER 37 C.F.R. § 1.97(b)

Pursuant to 37 C.F.R. §§ 1.56 and 1.97(b), Applicants bring to the attention of the Examiner the listed documents on the attached listing. This Information Disclosure Statement is being filed concurrently with a Request for Continued Examination.

Applicant respectfully requests that the Examiner consider the listed documents and indicate that they were considered by making appropriate notations on the attached form.

This submission does not represent that a search has been made or that no better art exists and does not constitute an admission that each or all of the listed documents are material or constitute "prior art." If any of the documents are applied as prior art against any claims in the application and Applicants determine that the cited documents do not constitute "prior art" under United States law, Applicants reserve the right to present the relevant facts and law regarding the appropriate status of such documents.

Applicants further reserve the right to take appropriate action to establish the patentability of the disclosed invention over the listed documents, should one or more of the documents be applied against the claims of the present application.

Respectfully submitted,

Dated: August 26, 2017

By: /S/ Stephen L. Peterson
Stephen L. Peterson
Reg. No. 26,325

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**

(Use as many sheets as necessary)

Complete if Known

Application Number	13/089,988
Filing Date	April 19, 2011
First Named Inventor	Cooper et al.
Art Unit	3646
Examiner Name	Sean Burke
Attorney Docket Number	DE-1

Sheet 1 of 1

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No. ¹	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number-Kind Code ² (if known)			

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No. ¹	Foreign Patent Document	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T ⁶
		Country Code ³ -Number ⁴ -Kind Code ⁵ (if known)				

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No. ¹	include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T ²
		New state of water molecule discovered (2016, April 22) retrieved 26 April 2016 from http://phys.org/news/2016-04-state-molecule.html	
		Quantum Tunneling of Water in Beryl. A New State of the Water Molecule, PRL, journals.aps.org/prl/abstract/10.1103/PhysRevLett.116.167802	

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN
APPLICATION DATA SHEET (37 CFR 1.76)**

Title of Invention	METHOD OF GENERATING ENERGY AND 4He USING THREE DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS
<p>As the below named inventor, I hereby declare that:</p> <p>This declaration is directed to: <input type="checkbox"/> The attached application, or <input checked="" type="checkbox"/> United States application or PCT international application number <u>13/089,986</u> filed on <u>April 19, 2011</u></p> <p>The above-identified application was made or authorized to be made by me.</p> <p>I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.</p> <p>I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.</p> <p style="text-align: center;">WARNING:</p> <p>Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.</p>	
LEGAL NAME OF INVENTOR	
Inventor: <u>James Loan</u> Date (Optional): <u>21 Aug 2017</u>	
Signature: <u>James F. Loan</u>	
<p>Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.</p>	

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)		Docket Number (Optional) 088479.000147																														
Application Number 13/089,986	Filed April 19, 2011																															
For Method of Generating Energy and 4HE using Three Dimensional Nanostructured Carbon Materials																																
Art Unit 3646	Examiner Sean P. Burke																															
<p>This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above-identified application.</p> <p>The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;"></th> <th style="width: 15%; text-align: center;"><u>Fee</u></th> <th style="width: 15%; text-align: center;"><u>Small Entity Fee</u></th> <th style="width: 15%; text-align: center;"><u>Micro Entity Fee</u></th> <th style="width: 25%;"></th> </tr> </thead> <tbody> <tr> <td><input type="checkbox"/> One month (37 CFR 1.17(a)(1))</td> <td style="text-align: center;">\$200</td> <td style="text-align: center;">\$100</td> <td style="text-align: center;">\$50</td> <td>\$ _____</td> </tr> <tr> <td><input type="checkbox"/> Two months (37 CFR 1.17(a)(2))</td> <td style="text-align: center;">\$600</td> <td style="text-align: center;">\$300</td> <td style="text-align: center;">\$150</td> <td>\$ _____</td> </tr> <tr> <td><input checked="" type="checkbox"/> Three months (37 CFR 1.17(a)(3))</td> <td style="text-align: center;">\$1,400</td> <td style="text-align: center;">\$700</td> <td style="text-align: center;">\$350</td> <td>\$ <u>700.00</u></td> </tr> <tr> <td><input type="checkbox"/> Four months (37 CFR 1.17(a)(4))</td> <td style="text-align: center;">\$2,200</td> <td style="text-align: center;">\$1,100</td> <td style="text-align: center;">\$550</td> <td>\$ _____</td> </tr> <tr> <td><input type="checkbox"/> Five months (37 CFR 1.17(a)(5))</td> <td style="text-align: center;">\$3,000</td> <td style="text-align: center;">\$1,500</td> <td style="text-align: center;">\$750</td> <td>\$ _____</td> </tr> </tbody> </table> <p><input checked="" type="checkbox"/> Applicant asserts small entity status. See 37 CFR 1.27.</p> <p><input type="checkbox"/> Applicant certifies micro entity status. See 37 CFR 1.29. Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.</p> <p><input type="checkbox"/> A check in the amount of the fee is enclosed.</p> <p><input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input type="checkbox"/> The Director has already been authorized to charge fees in this application to a Deposit Account.</p> <p><input checked="" type="checkbox"/> The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number <u>50-2678</u>.</p> <p><input checked="" type="checkbox"/> Payment made via EFS-Web.</p> <p>WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.</p> <p>I am the</p> <p><input type="checkbox"/> applicant/inventor.</p> <p><input type="checkbox"/> assignee of record of the entire interest. See 37 CFR 3.71. 37 CFR 3.73(b) statement is enclosed (Form PTO/SB/96).</p> <p><input checked="" type="checkbox"/> attorney or agent of record. Registration number <u>67,441</u>.</p> <p><input type="checkbox"/> attorney or agent acting under 37 CFR 1.34. Registration number _____.</p> <p><u>/Todd C. Basile/</u> <u>January 26, 2017</u></p> <p style="text-align: center;">Signature Date</p> <p><u>Todd C. Basile</u> <u>(214) 665-3640</u></p> <p style="text-align: center;">Typed or printed name Telephone Number</p> <p>NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.</p> <p><input type="checkbox"/> * Total of _____ forms are submitted.</p>				<u>Fee</u>	<u>Small Entity Fee</u>	<u>Micro Entity Fee</u>		<input type="checkbox"/> One month (37 CFR 1.17(a)(1))	\$200	\$100	\$50	\$ _____	<input type="checkbox"/> Two months (37 CFR 1.17(a)(2))	\$600	\$300	\$150	\$ _____	<input checked="" type="checkbox"/> Three months (37 CFR 1.17(a)(3))	\$1,400	\$700	\$350	\$ <u>700.00</u>	<input type="checkbox"/> Four months (37 CFR 1.17(a)(4))	\$2,200	\$1,100	\$550	\$ _____	<input type="checkbox"/> Five months (37 CFR 1.17(a)(5))	\$3,000	\$1,500	\$750	\$ _____
	<u>Fee</u>	<u>Small Entity Fee</u>	<u>Micro Entity Fee</u>																													
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4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	13089986			
Filing Date:	19-Apr-2011			
Title of Invention:	METHOD OF GENERATING ENERGY AND 4HE USING THREE DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS			
First Named Inventor/Applicant Name:	Christopher H. Cooper			
Filer:	Todd Basile/Jennifer Baggett			
Attorney Docket Number:	088479.000147			
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
NOTICE OF APPEAL	2401	1	400	400
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Extension - 3 months with \$0 paid	2253	1	700	700
Miscellaneous:				
Total in USD (\$)				1100

Electronic Acknowledgement Receipt

EFS ID:	28174981
Application Number:	13089986
International Application Number:	
Confirmation Number:	1497
Title of Invention:	METHOD OF GENERATING ENERGY AND 4HE USING THREE DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS
First Named Inventor/Applicant Name:	Christopher H. Cooper
Customer Number:	29747
Filer:	Todd Basile/Jennifer Baggett
Filer Authorized By:	Todd Basile
Attorney Docket Number:	088479.000147
Receipt Date:	26-JAN-2017
Filing Date:	19-APR-2011
Time Stamp:	12:44:14
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 1100
RAM confirmation Number	012617INTEFSW00014364502678
Deposit Account	502678
Authorized User	Jennifer Baggett

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.16 (National application filing, search, and examination fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

37 CFR 1.19 (Document supply fees)
 37 CFR 1.20 (Post Issuance fees)
 37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Notice of Appeal Filed	000147NoticeofAppeal.PDF	237974	no	2
			90f5f91db6c85073177c01df57cd2e573733e0c4		
Warnings:					
Information:					
2	Extension of Time	000147EOT.PDF	187365	no	2
			c2082b2d4b11246e6e86ec2025b02291b2f42ebe		
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	32411	no	2
			cc3276a8641c409a7b41ee716a5af6c8bb0b2602		
Warnings:					
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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/089,986	04/19/2011	Christopher H. Cooper	088479.000147	1497

29747 7590 08/01/2016
GREENBERG TRAURIG (LV)
77 West Wacker Drive, Suite 3100
Intellectual Property Department
Chicago, IL 60601

EXAMINER

BURKE, SEAN P

ART UNIT	PAPER NUMBER
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3646

NOTIFICATION DATE	DELIVERY MODE
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08/01/2016

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

gtipmail@gtlaw.com
clairt@gtlaw.com
rupickd@gtlaw.com

<p align="center">Office Action Summary</p>	Application No. 13/089,986	Applicant(s) COOPER ET AL.	
	Examiner SEAN P. BURKE	Art Unit 3646	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 7/12/2016.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

- 5) ☒ Claim(s) 1-17, 19-26, 28-36 and 39-48 is/are pending in the application.
 5a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 6) ☐ Claim(s) ____ is/are allowed.
- 7) ☒ Claim(s) 1-17, 19-26, 28-36 and 39-48 is/are rejected.
- 8) ☐ Claim(s) ____ is/are objected to.
- 9) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

- 10) ☒ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

- a) ☐ All b) ☐ Some** c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 3) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)
Paper No(s)/Mail Date ____. | 4) <input checked="" type="checkbox"/> Other: <u>Detailed Action</u> . |

1. The present application is being examined under the pre-AIA first to invent provisions.

DETAILED ACTION

Requirement for Information under 37 C.F.R. § 1.105

2. The Examiner respectfully requests a full, non-redacted copy of the report produced at Lawrence Livermore National Laboratory that was referenced in Mr. James Loan's 25 August 2015 affidavit.¹ Failure to comply with this request will result in abandonment under 35 C.F.R. §§ 1.105(c) and 1.135.

Information Disclosure Statement

3. Applicant filed non-patent literature on 12 July 2016, but failed to file an information disclosure statement. The reference has not been considered.

Status of Claims

4. Claims 1-17, 19-26, 28-36, 39-48 are under examination. All other claims are cancelled.

Response to Arguments

5. Applicant's arguments filed 12 July 2016 have been fully considered but they are not persuasive. A detailed response follows.
6. The present invention is directed, *inter alia*, to a scheme for fusing deuterium at standard temperatures, including the 0°C. Applicant traverses the prior rejections arguing that the purported invention is not a classical cold fusion device and that there

¹ See Loan Affidavit, n. 2.

exists peer-reviewed, published evidence to demonstrate otherwise. For the many reasons discussed previously, these arguments are not persuasive.

7. First and foremost, the Applicant has the burden to demonstrate how the putative process overcomes Coulomb repulsion. Coulomb repulsion occurs when two like-charged particles are placed near each other. As the charges are move closer to together, the particles are repulsed with greater strength by the electroweak force. The electroweak force is one of the four fundamental forces and cannot be ignored.

8. In order to overcome electroweak repulsion, the particles must have a certain energy sufficient to tunnel through the Coulomb barrier. For deuterium-deuterium fusion, this energy corresponds to approximately 400,000,000 K.² The present invention operates at approximately 273 K. The device is considered to be a "cold fusion" device because it operates at temperatures more than 6 orders of magnitude less than is necessary to initiate fusion.

9. Applicant relies on Guo et al., "Visible-Light-Induced Water Splitting in Channels of Carbon Nanotubes," to support the argument energy is produced when water is combined with nanotubes.³ This argument is a misdirection and also incorrect. None of the prior rejections state that it is impossible to cage water molecules in carbon structures. The claims and specification are objected to because they allege that a physically prohibited nuclear reaction occurs after such a caging. Beyond the affidavit (discussed below), there is nothing in the record to demonstrate that the Applicant has undone one of the four fundamental natural forces.

² See "Coulomb Barrier for Fusion," <http://hyperphysics.phy-astr.gsu.edu/hbase/nucene/coubar.html> (last accessed Jul. 25, 2016).

³ Remarks at 3.

10. It is illustrative that the Applicant believes that the Guo experiment generates energy. Nothing in the reference claims that the reaction is exothermic. Guo's suggestion to employ the process for "hydrogen energy sources" relates to the fact that the process separates water molecules - not that it is initiating nuclear fusion.

11. Regarding the affidavits, the Applicant stipulates that the alleged reaction is not accepted by the mainstream physics community.⁴ The fact remains that the Applicant has failed to publish his results in a peer-reviewed, mainstream scientific journal. If such evidence had been legitimately recorded and vetted by the experts, the Examiner has no doubt that it would have been included in the present application. However, no such evidence exists.

12. The Loan affidavit mentions tests that were performed at Lawrence Livermore National Laboratory. Prior to reviewing the Loan affidavit, the Examiner was unaware that Lawrence Livermore National Laboratory offered this service. The Examiner is eager to review such results, even if Loan himself states that the results of the tests were inconclusive.⁵

13. Additionally, Loan discredits himself in discussing the Guo paper. Specifically, he argues that the presence of peaks at 3 and 4 AMU can only be produced by fusion reactions. While this may be true, there is no evidence in Guo that those trace elements occurred due to a fusion reaction in the experimental setup. Additionally, Guo et al.

⁴ "The fact that conventional physics cannot explain how transmutation byproducts, that can only come from nuclear reactions, are created when carbon nanotubes and deuterium are combined does not mean that the results of Fig. 2(b) do not exist. It may not be a classic 'nuclear fusion' reaction, but clearly some type of nuclear reaction has taken place." Remarks at 6.

⁵ "The experiments produced mixed results. When a high frequency signal was imposed on the system the detectors recorded what appeared to be the production of neutrons from a nuclear reaction, but there was no constant output; the output came in bursts." Loan Affidavit at 10.

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explicitly noted that “[t]he nonlabeled peaks are either attributable to the fragments of [He, CH₄, H₂O, CO, C₂H₆ and CO₂] or are rather insignificant.”⁶ At the very best, the researchers themselves disclaimed any evidence of nuclear fusion. Additionally, the signals could also be due to impurities introduced from the sputter-ion pump.

14. Accordingly, the affidavit remains NOT PERSUASIVE.

15. The Applicant traverses the § 101 rejections, arguing that “A process of creating energy by combining material is patentable subject matter.” This is true under certain conditions, but for the many reasons discussed previously, nuclear fusion is simply not occurring the Applicant’s invention. As noted in prior rejections and again below, the Applicant may overcome this rejection by publishing evidence of his “discovery” in a peer-reviewed, mainstream scientific journal. Until such an endorsement occurs, the utility rejection will remain in place.

16. Applicant traverses the secondary utility rejection, arguing that because carbon nanotubes are produced in minute quantities and deuterium has a small concentration in water, “[t]here is no factual support for the Examiner’s assertion that the combination of materials would be ‘apparent in nature.’”⁷ This is another misdirection. It is sufficient to show that both materials occur in nature. If the reaction occurred without any additional support, as alleged in the independent claim, then it must have occurred at least once in the 13-billion year history of the universe. If it is simply a matter of adding the ingredients, it is plainly a natural process. However, for the reasons discussed

⁶ Guo at 1573.

⁷ Remarks at 8.

above and throughout prosecution, no such reaction can occur under the present laws of the universe. Accordingly, the secondary utility rejections are NOT WITHDRAWN.

17. Applicant traverses the enablement rejections arguing that "[t]he failure of mainstream science to adopt a theory of nuclear physics that would embrace the nuclear reaction taking place is not the same thing as there being no utility for the invention." Inoperable inventions are also non-enabled as a matter of law.⁸ Accordingly, the enablement rejections are NOT WITHDRAWN.

18. Applicant traverses the anticipation and obviousness rejections, arguing that the prior art is non-enabled. This argument fails to address the rejections. The anticipation and obviousness rejections are NOT WITHDRAWN.

Specification

19. The specification is objected to under 35 U.S.C. §112, first paragraph (pre-AIA) or 35 U.S.C. §112(a) as failing to provide an adequate written description of the invention and further for failing to provide an enabling disclosure.

20. There is no reputable evidence of record to support the claim that the present invention involves nuclear fusion, nor is there evidence that claims of "excess heat" are valid and reproducible, nor is there evidence that the invention is capable of operating as indicated or capable of providing a useful output.

⁸ *In re Swartz*, 232 F.3d 862 (2000)("[I]f the claims in an application fail to meet the utility requirement because the invention is inoperative, they also fail to meet the enablement requirement because a person skilled in the art cannot practice the invention.").

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21. The invention (see, for example, ¶ 0057 of the specification) is considered as based on the "cold fusion" concept set forth by Fleischmann and Pons.⁹ This concept relies on the incorporation of deuterium into a crystal lattice. While Fleischmann and Pons relied on electrolysis of heavy water to incorporate deuterium into the crystal lattice, it was also known that as a variation, the deuterium could be incorporated into the crystal lattice by bringing the crystal into contact with deuterium gas. Thus, it is clear that applicant's invention is just a variation of the cold fusion concept set forth by Fleischmann and Pons. However, as set forth more fully below, this "cold fusion" concept is still no more than just an unproven concept.

Background

22. After Fleischmann and Pons announced their fusion device competing researchers attempted to reproduce their results. The results of these attempts were primarily negative. The few initial positive results were either retracted or later shown to be in error by subsequent experiments.^{10,11} The general consensus by those skilled in the art and working at these various laboratories is that the fusion conclusion made by Fleischmann and Pons was based on experimental error.¹² The general consensus by

⁹ Braaten, "Ridiculously easy test yields claim of energy triumph," The Washington Times, p. A5, March 24, 1989.

¹⁰ Stipp, The Wall Street Journal, page B-4, "Georgia Group Outlines Errors That Led To Withdrawal Of 'Cold Fusion' Claims", April 26, 1989.

¹¹ Browne, "Fusion claim is greeted with scorn by physicists," The New York Times, pp. A1 and A22, vol. CXXXVIII, no. 47,859, May 3, 1989.

¹² *Id.*, see also Kreysa, et al., Journal of Electroanalytical Chemistry, vol. 266, pages 437-450, "A Critical Analysis Of Electrochemical Nuclear Fusion Experiments", 1989; Hilts, The Washington Post, page A7, "Significant Errors Reported In Utah Fusion Experiments", May 2, 1989; Ohashi, et al., Journal of Nuclear Science and Technology, vol. 26, pages 729-732, "Decoding Of Thermal Data In Fleischmann & Pons Paper", July 1989; Miskelly, et al., Science, vol. 246, no. 4931, pages 793 and 796, "Analysis Of The Published Calorimetric Evidence For Electrochemical Fusion Of Deuterium In Palladium", November

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those skilled in the art is that there is no reputable evidence to support the claims of excess heat production, or the production of fusion by-products such as neutrons, gamma rays, tritium, or helium.¹³ See also Cooke, pages 4 and 5, which refers to the attempts at Harwell to obtain "cold fusion." Page 5 also indicates that data was also collected in Frascatti-type (i.e. gaseous) experiments. See the last paragraph on page 5:

"After three months of around-the-clock work at a cost of over a half a million dollars, the project was terminated on June 15. This program is believed to be one of the most comprehensive worldwide with as many as 30 cells operating at a time and over 100 different experiments performed. The final result of this monumental effort in the words of the official press release was, in none of these experiments was there any evidence of fusion taking place under electrochemical conditions. It should also be added that there was no evidence of excess heat generated by any of their cells".

23. Note that a complete disclosure must contain enough detail as to enable a person skilled in the art or science to which the invention pertains to make and use the invention as of its filing date.¹⁴ The present disclosure does not contain the requisite description and detail. There is no adequate description nor enabling disclosure of the parameters of a specific operative embodiment of the invention, including exact

10,1989; Chapline, "Proceedings of the NATO Advance Study Institute on the "Nuclear Equation of State," pages 1-9, "Cold Confusion," July 1989.

¹³ Cooke, Solid State Theory Section, Solid State Division, ORNL-FTR--3341, pages 2-15, "Report Of Foreign Travel Of J. F. Cooke, Head", 1989; Faller, et al., Journal of Radioanalytical Nuclear Chemistry, Letters, vol. 137, no. 1, pages 9-16, "Investigation Of Cold Fusion In Heavy Water", August 21, 1989; Cribier, et al., "Conventional Sources of Fast Neutrons in 'Cold Fusion' Experiments," Physics Letters B, Vol. 228, No. 1, 7 September 1989; Hajdas, et al., Solid State Communications, vol. 72, no. 4, pages 309-313, "Search For Cold-Fusion Events", 1989; Shani, Solid State Communications, vol. 72, no. 1, pages 53-57, "Evidence For A Background Neutron Enhanced Fusion In Deuterium Absorbed Palladium," 1989; Ziegler, et al., "Electrochemical Experiments in Cold Nuclear Fusion," Physical Review Letters, vol. 62 No. 25, June 19, 1989; Schrieder, et al., B-Condensed Matter, vol. 76, no. 2, pages 141-142, "Search For Cold Nuclear Fusion In Palladium-Deuteride" 1989; AP, "Physicist: Utah Cold-Fusion Gear Doesn't Work," The Washington Post, March 29, 1990.

¹⁴ *In re Glass*, 181 U.S.P.Q. 31 (CCPA 1974).

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composition (including impurities and amounts thereof) of the electrolyte; composition (including impurities and amounts thereof), size, dimensions and porosity of the electrodes (as well as the spacing between the electrodes); the requisite concentration per unit volume of hydrogen isotopes in the cathode; the applied current and voltage, if any; the requisite physical and/or chemical pretreatment of the electrodes; the instrument calibration prior to and during a run, test or experiment; the amount of each electrode to be immersed in the electrolyte; etc. It is noted that the specification appears to set forth some of the parameters, but it does not appear to set forth an example of an operative embodiment that includes specific values for each of the above parameters. Note that such parameters are critical in arriving at an operative cold fusion embodiment. For example, Morrison¹⁵ shows that electrode spacing is an important parameter. On page 3, Morrison shows that if the electrodes are close enough to each other, hydrogen isotopes and oxygen will recombine. This can be misinterpreted as excess heat.¹⁶ These references demonstrate the critical importance of cell component composition and impurity content and of electrode pretreatment.

24. Claims of the production of excess heat, tritium, and other nuclear reaction products due to a nuclear reaction, are not sufficient to overcome the numerous teachings by skilled artisans that claims of cold fusion are not reproducible. Note that

¹⁵ Morrison, "Cold Fusion Update No. 8," November 27, 1993.

¹⁶ See Jones, "An Assessment of Claims of Excess Heat in Cold Fusion Calorimetry," J. Phys. Chem. B 1998, 102, 3647; Murray, Google Advanced Groups Search. pages 1-11. "Subject: Rothwel: Abstracts: Cain, Case, Iwamura, Ohmori, Silver, Stringham," April 26, 1998; Shanahan, "Comments on 'Thermal behavior of polarized Pd/D electrodes prepared by co-deposition,'" July, 14, 2004; Miles, et al., "Anomalous Effects in Deuterated Systems," Naval Air Warfare Center Weapons Division, September 1996; Carr, "Re: CF claim score (was Re: reciprocal cold fusion proof standards...)," Williams, et al., "Upper bounds on 'cold fusion' in electrolytic cells," Nature vol. 342, p. 375, November 23, 1989.

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the numerous teachings by skilled artisans show that in this field it is easy to obtain false-positive results. It is not clear from the information set forth in the specification that applicant would be able to show positive results or that the alleged positive results do not fall within the limits of experimental error. For example the Examiner has cited several documents that deal with calorimeter evidence of cold fusion and possible sources of error. The specification does not disclose any particular structure which makes applicants cold fusion system operative where the other systems disclosed failed.

25. When an experimenter relies on the results of a particular test to establish certain facts (such as the production of excess heat) it is incumbent upon the experimenter to show that the alleged results are valid and not the result of errors or misinterpretation of results. This is especially important where the test in question is in a field that the general scientific community considers fraudulent.

Reproducibility

Regarding reproducibility, Huizenga¹⁷ states:

"The foundation of science requires experimental results to be reproducible. Validation is an integral part of the scientific process. Scientists are obligated to write articles in ways that allow observations to be replicated. Instructions should be available to permit a competent and well-equipped scientist to perform the experiment and obtain essentially the same results. Replication in science usually is reserved for experiments of special importance or experiments that conflict with an accepted body of work. The greater the implication of an experimental result, the more quickly it will be checked by other scientists.

As more and more groups, at major universities and national laboratories were unable to replicate either the claimed excess heat or

¹⁷ Huizenga, "Cold Fusion Labeled 'Fiasco of Century'", Forum for Applied Research and Public Policy, vol. 7, No. 4, 1992, pages 78-83.

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fusion products, proponents of cold fusion quickly pointed out that the experiment was not done properly: one needed different size palladium cathodes, longer electrolysis times and higher currents, they claimed.

Whenever the inability of qualified scientists to repeat an experiment is met by ad hoc excuses, beware. One important role of a scientific article is to provide directions for others. Scientists establish priorities for their discoveries by publishing a clear and well documented recipe of their experimental procedures. If a scientific article fails to include an adequate recipe which allows a skilled reader to reproduce the experiment, it is a warning that the author's understanding of their work is incomplete.

Cold-fusion proponents introduced new dimensions into the subject of reproducibility in science. Some tried to turn the table on reproducibility by giving irreproducibility a degree of respectability. A second aberration was to assign a different value to experiments attempting replication. Only experiments that obtained some fragmentary evidence for cold fusion were to be taken seriously because it was declared that experiments obtaining negative results required no special skills or expertise. This viewpoint led proponents of cold fusion to invite mainly papers reporting positive results when organizing conferences. Such an aberrant procedure is incompatible with the scientific process and usually is viewed negatively by scientists as well as journalists."

26. "Reproducibility" must go beyond one's own lab. One must produce a set of instructions, a recipe, that would enable anyone to produce the same results. If reproducibility only occurs in one's own lab, errors (such as systematic errors) would be suspect.¹⁸ Experimenters who previously found evidence of excess heat could not reproduce their results when better calorimetry equipment was used.¹⁹ Reproducibility of alleged cold fusion results is a critical feature in determining if a disclosure adequately teaches other practitioners how to make and use an invention.

27. When one does not get identical results or the results are not reproducible at will, it must be concluded that the alleged positive results are not real but instead, the result of experimental errors, instrumentation errors, or misinterpretation of results.

¹⁸ Little, et al., "Replication of Jean-Louis Naudin's Replication of the Mizuno Experiment."

¹⁹ Morrison, *supra* n. 15, at § 2.2, p. 2.

28. It is elementary that identical structures operated in an identical manner must produce identical results. If such structures do not produce identical results, one of two things is implied: First, the structures are not identical. For example, one of the structures has an additional component or some critical feature that is not found in the other structure. Alternatively, the structures may be identical, but the experimenter's instrumentation is producing spurious results leading to the erroneous conclusion that the structures are producing positive results.

29. If it is the former that causes some of these cold fusion systems to produce actual, positive results then this critical feature must be clearly specified so as to enable another experimenter to make the invention. Accordingly, if Applicant's invention is capable of reproducibly producing excess heat or fusion by-products it can only be because of this undisclosed additional critical feature. If this is the case, the Applicant's specification is insufficient and non-enabling for failing to disclose the additional critical feature.

30. It is well known that impurities in the cell container walls can leach out into the electrolyte and be deposited onto the cathode.^{20,21,22} It is well known that metals such as platinum, gold and, palladium are generally found in the same ore, that they can be extracted sequentially, and that they will be contaminated by the other metals present.

²⁰ Flanagan, et al., "Hydrogen Absorption by Palladium in Aqueous Solution," Transactions of the Faraday Society, vol. 55 part 8, No. 440, p 1400-1408, 1407.

²¹ Albagli, et al., "Measurement and Analysis of Neutron and Gamma-Ray Emission Rates, Other Fusion Products, and Power in Electrochemical Cells having Pd Cathodes," Journal of Fusion Energy, Vol. 9, No. 2, 1990 pp. 130-148, 144 (col 2.).

²² See also Williams, *supra* n. 16, at 380 (second column) and 382 (first column).

31. The presence of these impurities at the cathode could actually lead to the erroneous conclusion that transmutation has occurred. Applicant's disclosure is insufficient and non-enabling does not address the issue of impurities. For additional commentary on the alleged transmutation of isotopes in a cold fusion cell, Applicant is referred to Huizenga.²³ Pages 152-156 of the reference²⁴ recall that experimenters at the Naval Research Laboratory had mistakenly reported the production of particular palladium isotopes by neutron transmutation in cold fusion cells using a technique known as SIMS (secondary ion mass spectroscopy). See page 156,²⁵ which states:

"The story associated with the palladium isotope anomaly is not nearly so interesting because it is was simply due to an erroneous interpretation of data where the experimental mass peaks were misidentified. Contributions from polyatomic species of impurities with masses nearly coincident with those of the palladium isotopes caused the misidentification. In spite of the fact that the palladium isotope anomalies had been discredited for over five months, Bockris submitted a paper on March 26, 1990 [Fusion Technology 1811 (1990)] in which he discussed, along with other cold fusion phenomena, the thermal and 14-MeV-neutron-induced cross sections on palladium isotopes. He used these mistaken isotopic anomalies data to suggest that the cold fusion reaction is a surface or near-surface reaction, and, therefore, to serve as supporting evidence for his model of fusion. Among cold fusion enthusiasts mistakes and erroneous results usually decay with a very long lifetime".

32. It is the Examiners' position that an undue amount of experimentation would be required to produce an operative embodiment of applicant's invention. The Examiner has cited numerous documents showing that experimenters have obtained negative results using various types of cold fusion apparatus, all based on the cold fusion

²³ Huizenga, "Cold Fusion: The Scientific Fiasco of the Century", (selections provided) pp. 152-156, 237, 269, 275, 276, 284, 286.

²⁴ *Id.*

²⁵ *Id.*

concept set forth by Fleischmann and Pons. These documents show how easily experimental results can be misinterpreted as evidence of cold nuclear fusion.

33. This issue of undue experimentation has been succinctly addressed by Douglas Morrison at the Fourth International Conference on Cold Fusion Technology, (ICCF-4) held Dec. 6-9, 1993 in Hawaii,²⁶ see pages 6-7 which states:

"[T] he previous speaker, Dr. H. Fox, giving he said, a business man's point of view, declared he expected a working Cold Fusion device in TWENTY YEARS.

November 1993. Dr. S. Pons said that by the year 2000 there should be a household power plant - SIX YEARS.

1992. Dr. M. Fleischmann said a 10 to 20 Kilowatt power plant should be operational in ONE YEAR.

July 1989. The Deseret News published an article by Jo-Ann Jacobsen-Wells who interviewed Dr. S. Pons. There is a photograph in colour, of Dr. Pons beside an simple apparatus with two tubes, one for cold water in and one for hot water out. This working unit based on Cold Fusion was described as; " 'It couldn't take care of the family's electrical needs, but it certainly could provide them with hot water year-round' said Pons".

Later in the article it was written "Simply put, in its current state, it could provide boiling water for a cup of tea". Time delay to this working model - ZERO YEARS.

Thus it appears that as time passes, the delay to realisation of a working model increases.

Conclusion

34. The Examiner has cited documents showing how easily experimental data can be misinterpreted in cold fusion systems. The general scientific community does not consider cold fusion systems real, valid or operative. Since Fleischman and Pons' 1989

²⁶ Morrison, "Review of Progress in Cold Fusion," Dec. 1993 available at <http://newenergytimes.com/v2/archives/DROM/cfu9a.shtml> (last accessed 18 December 2015).

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announcement, there has been a continuing stream of publications demonstrating that virtually none the "cold fusion" claims are valid.²⁷ The cited references provide clear evidence that no excess heat is generated in such "cold fusion" systems nor is there any evidence of nuclear fusion.

35. The disclosure must enable a person skilled in the art to practice the invention without having to incorporate element not readily available in the art.²⁸ The Examiner has set forth a reasonable and sufficient basis for challenging the adequacy of the disclosure. The statute requires the application itself to inform, not to direct others to find out for themselves.^{29,30} Accordingly, the specification is inadequate.

Claim Rejections - 35 USC § 101

Claim Rejections - 35 USC § 112

1. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

2. Claims 1-17, 19-26, 28-36, 39-48 are rejected under 35 U.S.C. 101 because the claimed invention is not supported by either an operative utility or a well-established utility. The reasons for this rejection are the same as the above.

²⁷ See Ewing, et al., "A sensitive Multi-detector Neutron counter used to monitor "Cold Fusion" Experiments in an Underground Laboratory: Negative Results and Positive Artifacts", IEEE Transactions on Nuclear Science, vol. 37, no. 3, June 1990, pages 1165-1170; Albagli, *supra* n. 21; Balke, et al., "Limits on Neutron Emission from 'Cold Fusion' in Metal Hydride," Physical Review C, Vol. 42, No. 1, July 1990; Huizenga, *supra* n. 17; Huizenga, *supra* n. 23; Huizenga, "New Developments in the Cold Fusion Saga", Abstracts of Papers of the American Chemical Society, vol. 207, March 13, 1994, page 6; Rogers, et al, "Cold Fusion Reaction Products and Their Measurement", Journal of Fusion Energy, vol. 9, no. 4, 1990, pages 483-485.

²⁸ *In re Hirsch*, 295 F.2d 251 (C.C.P.A. 1961).

²⁹ *In re Gardner et al.*, 99 F.2d 767 (C.C.P.A. 1938).

³⁰ *In re Scarbrough*, 182 U.S.P.Q. 298 (C.C.P.A. 1974).

Claim 1 is further rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The claim(s) does/do not fall within at least one of the four categories of patent eligible subject matter because the claim only directs exposing deuterium to graphene. Even if there were a credible assertion of operability, such an operation would be apparent in nature as both graphene and deuterium are both naturally occurring.

3. Claims 1-17, 19-26, 28-36, 39-48 are also rejected under 35 U.S.C. 112(a) or pre-AIA 35 U.S.C. 112, first paragraph. Specifically, because the claimed invention is not supported by either an operative asserted utility or a well-established utility for the reasons set forth above, one skilled in the art clearly would not know how to use the claimed invention.

Claim Rejections - 35 USC § 102

4. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

5. The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 3-5, 13-15, 18, 19, 21, 25, 27-33, 35-40, and 42-45 are rejected under pre-AIA 35 U.S.C. 102(b) as being anticipated by Hagelstein (US PG-Pub. No. 2009/0086877).

7. Regarding claims 1, 28, and 39, Hagelstein teaches a method of generating ^4He atoms and energy, said method (Paragraph [0153]) comprising: contacting fullerene-based materials, which read on graphene, with a source of deuterium (Paragraph [0322]) for a time sufficient to generate a plurality of non-ionizing He-4 atoms (Paragraph [0153]) and energy (Paragraph [0274]).

8. Regarding claims 3, 30 and 40, Hagelstein teaches fullerene-based or graphene materials including "cage-like, hollow molecules" of "hexagonal and pentagonal groups of atoms, e.g., those formed from carbon." (Paragraph [0322]). Hagelstein further specifies these materials to include carbon nanotubes and buckyballs. (Paragraph [0322]).

9. Regarding claims 4, 31 and 42, Hagelstein teaches the use of deuterium gas (Paragraph [0325]). Hagelstein additionally teaches the use of a condensed form of deuterium, such as a liquid (Paragraph [0332]).

10. Regarding claims 5 and 32, Hagelstein teaches the decontamination of the surface of a material prior to deuterium loading by a treatment that includes raising the temperature of the material (Paragraph [0267]).

11. Regarding claims 13-15, Hagelstein teaches the method of Claim 1, which would yield the same results claimed by applicant in Claims 13 - 15. Accordingly, Hagelstein reads on these claims.

12. Regarding claim 19, Hagelstein teaches a method of generating non-ionizing radiation in the form of He-4 atoms (Paragraph [0153]) comprising: providing graphene materials in a sealable vessel (Paragraph [0261]; Fig. 17g). Hagelstein further teaches the evacuation of such a vessel (Paragraph [0353]) and adding deuterium gas to said vessel (Paragraph [0153]). Additionally, Hagelstein performing at least one heating step that further increases pressure inside the vessel (Paragraph [0261]), cooling said vessel (Paragraph [0332]), and placing the graphene materials in said vessel at room temperature or below for a time sufficient to generate non-ionizing radiation, Helium-4 atoms, or both (Paragraph [0100]).

13. Regarding claim 21, Hagelstein teaches heating the graphene materials prior to adding deuterium gas (Paragraph [0396]).

14. Regarding claim 25, Hagelstein teaches the generation of microwaves or radio frequency energy (Paragraph [0346]).

15. Regarding claims 37 and 38, Hagelstein teaches the generation of phonons within graphene material (Paragraph [0068]). Hagelstein further teaches the process generating 23.8 MeV of energy (Paragraph [0276]).

16. Regarding claim 29, Hagelstein teaches the generation of microwaves or radio frequency energy (Paragraph [0346]).

17. Regarding claim 33, Hagelstein teaches heating a fullerene-based material (Paragraphs [0324],[0325]), such as a carbon nanotube (Paragraph [0322]). Hagelstein additionally teaches the method of heating such materials prior to aging at a

temperature and for a time sufficient to promote absorption of the deuterium into or onto the carbon nanotubes (Paragraph [0326]).

18. Regarding claims 35 and 36, Hagelstein teaches the method of Claim 28, which would yield the same results claimed by applicant in Claims 35 and 36. Accordingly, Hagelstein reads on these claims.

19. Regarding claims 43-45, Hagelstein teaches a method of producing energy (Para. [0274]) comprising: introducing a gas consisting essentially of O₂ (Para. [0326]) to a material consisting essentially of carbon nanotubes (Para. [0326]) at an elevated pressure (Para. [0326]); and generating non-ionizing energy (Para. [0153]) and energy (Para. [0274]).

Claim Rejections - 35 USC § 103

20. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

21. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

22. Claims 2, 11, 12, 16, 17, 20, 24, 26 and 43 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hagelstein (US PG-Pub. No. 2009/0086877), in view of case law.

23. Regarding claims 2, 11 and 12, Hagelstein teaches the generation of Helium-4, via contacting deuterium and another material, at low temperature, such as room temperature [0100]. Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. See *In re Aller*, 220 F.2d 454, 456 (CCPA 1955) (holding a claimed process performed at a temperature between 40 degrees Celsius and 80 degrees Celsius and an acid concentration between 25% and 70% was prima facie obvious over a reference process differing from the claims only in that it was performed at a temperature of 100 degrees Celsius and acid concentration of 10%); *In re Hoeschele*, 406 F.2d 1403 (CCPA 1969) (where the Court determined that claimed elastomeric polyurethanes which fell within the broad scope of the references were held to be unpatentable there over because, among other reasons, there was no evidence of the criticality of the claimed ranges of molecular weight or proportions); M P E P 2144.05.11.A. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have generated the Helium-4 at room temperature, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. Accordingly, Claim 2 is obvious.

24. Regarding claims 16 and 17, Hagelstein teaches fullerene material in the presence of a deuterium source for 8 hours, falling within the ranges of 30 minutes to 48 hours, as claimed in Claim 16, and 1 to 18 hours, as claimed in Claim 17 (Paragraphs [0324], [0325]). This teaching of Hagelstein reads on both Claims 16 and 17, because

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prior art teaching a value within, overlapping, or touching a claimed range, anticipates if the prior art range does not substantially deviate from the claimed range. See *Perricone v. Medicis Pharmaceutical Corp.*, 77 USPQ 1321, 1327 (Fed. Cir. 2005) (where anticipation was found despite the fact that prior art range was not identical to claimed ranges).

25. Regarding claim 20, Hagelstein teaches the method of Claim 19, as discussed above. Hagelstein does not teach that the He-4 is generated in an amount of at least ten He-4 atoms per hour per microgram of said graphene materials at 0 degrees Celsius. As set forth in response to Claims 2, 11 and 12, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. See *In re Aller*, 220 F. 2d at 456.

26. Regarding claim 24, Hagelstein teaches the generation of Helium-4 at low temperature, such as room temperature [0100]. As set forth in response to Claims 2, 11 and 12, difference in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. See *In re Aller*, 220 F. 2d 454 at 456.

27. Regarding claim 26, Hagelstein teaches the graphene materials placed in the source of deuterium for 8 hours, falling within the claimed range of 1-18 hours. For the reasons set forth above in response to Claims 16 and 17, Claim 26 is obvious.

28. Regarding claim 43, Hagelstein does not explicitly mention a gas consisting essentially of D₂O, but does explicitly teach deuterium gas, as discussed above. It

would have been obvious to one having ordinary skill in the art at the time the invention was made to have implemented a gas containing a significant amount of deuterium for the predictable purpose of providing contact between elements commonly used in cold fusion research experiments.

29. Regarding claims 6, 9, 10 and 22 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hagelstein (US PG-Pub. No. 2009/0086877), in view of Smalley (US PG-Pub. No. 2002/0127171).

30. Regarding claim 6, although Hagelstein teaches the decontamination of the surface of a material, it does not teach the removal of unwanted materials specifically comprising water, hydroxide, hydrogen, protium, polymers, oils, amorphous carbon, oxygen, solvents, acids, bases and combinations thereof. Smalley discloses the purification of carbon nanotubes for the purpose of removing contaminants, such as amorphous carbon (Paragraphs [0034], [0035]). It would have been obvious to one having ordinary skill in the art at the time of the invention to have implemented the method disclosed in Smalley in conjunction with the invention disclosed in Hagelstein for the predictable result of removing impurities from the carbon nanotube material.

31. Regarding claims 9 and 10, Smalley discloses heating carbon nanotubes at 200 degrees Celsius, falling within the claimed range of 30 to 300 degrees Celsius that applicant defines as sufficient to promote absorption of the deuterium into or onto the carbon nanotubes (Paragraph [0035]). Thus, it would have been obvious to one having ordinary skill in the art at the time of the invention to have combined the method of

cleaning the nanotubes disclosed in Smalley with the invention of Hagelstein for the predictable result of removing impurities from the carbon nanotube material.

32. Regarding claim 22, Hagelstein does not specifically teach heating the graphene materials in a sealed chamber and at a temperature to bake-out unwanted materials, comprising evacuating the sealed container to remove unwanted materials therefrom; however, Smalley teaches the purification of carbon nanotubes (Paragraphs [0034], [0035]), thereafter evacuating the sealed chamber (Paragraph [0037]).

33. Because Hagelstein teaches cleaning the graphene material and Smalley discloses a method of doing such, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the method of cleaning disclosed by Smalley as the cleaning method of Hagelstein to yield the predictable result of purifying the graphene material.

34. Claims 7, 8 and 23 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hagelstein (US PG-Pub. No. 2009/0086877), in view of Smalley (US PG-Pub. No. 2002/0127171), and further in view of case law.

35. Regarding claims 7 and 8, Smalley discloses the conditions for purification of the carbon nanotubes comprising a temperature of 200 to 500 degrees Celsius and a time from 1 to 5 hours, contemplating a longer time period, in the range of 15 to 20 hours (Paragraph [0035]). The disclosure in Smalley reads on both Claim 7 and Claim 8 of the present application because prior art teaching a range within, overlapping, or touching a claimed range, anticipates if the prior art range does not substantially deviate from the claimed range. See *Perricone v. Medicis Pharmaceutical Corp.* , 77 USPQ 1321, 1327

(Fed. Cir. 2005) (where anticipation was found despite the fact that prior art range was not identical to claimed ranges).

36. Regarding claim 23, Hagelstein does not teach heating the graphene at a temperature ranging from 50-500 degrees Celsius for a time ranging from 20 minutes to 6 hours. Smalley discloses heating carbon nanotubes at a temperature of 200-500 degrees Celsius for 1 to 5 hours (Paragraph [0035]). The disclosure in Smalley reads on Claim 23 because prior art teaching a range within, overlapping, or touching a claimed range, anticipates if the prior art range does not substantially deviate from the claimed range. See *Perricone v. Medicis Pharmaceutical Corp.*, 77 USPQ 1321 at 1327.

37. Claims 13, 34 and 41 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hagelstein (US PG-Pub. No. 2009/0086877), in view of Maldonado et al. (US PG-Pub. No. 2007/0275160).

38. Regarding claim 13, Hagelstein teaches the use of heterofullerenes (Paragraph [0326]), but does not specifically mention doping with Nitrogen; however, Maldonado discloses nitrogen-doped carbon nanostructures (Paragraph [0008]). It would have been obvious to one having ordinary skill in the art at the time of the invention to have implemented the nitrogen-doped carbon nanotube of Maldonado as the heterofullerene taught by Hagelstein to achieve the same high stability at high pressure taught by Hagelstein (Paragraph [0326]).

39. Regarding claim 34, Hagelstein does not teach carbon nanotubes doped with nitrogen; however Maldonado discloses nitrogen-doped carbon nanostructures, as

discussed in response to Claim 13. For the reasons stated in response to Claim 13, Claim 34 is obvious.

40. Regarding claim 41, Hagelstein does not teach grapheme materials including nitrogen; however Maldonado discloses nitrogen-doped carbon nanostructures, as discussed in response to Claim 13. Accordingly, Claim 41 is obvious.

41. Claim 43 is rejected under pre-AIA U.S.C. 103(a) as being unpatentable over Melechko (A.V. Melechko et al., Vertically aligned carbon nanofibers and related structures: Controlled synthesis and directed assembly, J. of App. Phys., 97 P. 1-37 (2005)).

42. Regarding claim 43, Melechko teaches a method of contacting hydrogen and carbon nanotubes (Abs.) and applying pressure thereto (P. 5). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have combined heavy water and carbon nanotubes under pressure as carbon nanotubes are well-known in the art for their hydrogen storage properties (Abs.).

Conclusion

36. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SEAN P. BURKE whose telephone number is (571)270-5493. The examiner can normally be reached on Monday-Friday, 10:00 AM to 6:30 PM EST.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on (571) 262-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/SEAN P BURKE/
Examiner, Art Unit 3646

Search Notes 	Application/Control No. 13089986	Applicant(s)/Patent Under Reexamination COOPER ET AL.
	Examiner Sean Burke	Art Unit 3646

CPC- SEARCHED		
Symbol	Date	Examiner


CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
376	100 - as limited by text, see attached EAST Search History	12/9/2013	KEC

SEARCH NOTES		
Search Notes	Date	Examiner
Consulted with S. Burke and M. O'Connor regarding search terms	12/9/2013	KEC
Inventor search in EAST/PALM - See attached EAST Search History	12/9/2013	KEC
NPL search using google scholar with keywords such as "graphene" "hydrogen" "deuterium" "fusion"	12/9/2013	KEC
Refreshed prior search	1/7/2016	SPB
Refreshed prior search	7/25/2016	SPB


INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

/SEAN P BURKE/ Examiner.Art Unit 3646	
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<i>Index of Claims</i> 	Application/Control No. 13089986	Applicant(s)/Patent Under Reexamination COOPER ET AL.
	Examiner Sean Burke	Art Unit 4187

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant		<input type="checkbox"/> CPA		<input type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47			
CLAIM		DATE							
Final	Original	11/27/2013	06/30/2014	01/07/2016	07/25/2016				
	1	✓	✓	✓	✓				
	2	✓	✓	✓	✓				
	3	✓	✓	✓	✓				
	4	✓	✓	✓	✓				
	5	✓	✓	✓	✓				
	6	✓	✓	✓	✓				
	7	✓	✓	✓	✓				
	8	✓	✓	✓	✓				
	9	✓	✓	✓	✓				
	10	✓	✓	✓	✓				
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	15	✓	✓	✓	✓				
	16	✓	✓	✓	✓				
	17	✓	✓	✓	✓				
	18	✓	✓	-	-				
	19	✓	✓	✓	✓				
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	27	✓	✓	-	-				
	28	✓	✓	✓	✓				
	29	✓	✓	✓	✓				
	30	✓	✓	✓	✓				
	31	✓	✓	✓	✓				
	32	✓	✓	✓	✓				
	33	✓	✓	✓	✓				
	34	✓	✓	✓	✓				
	35	✓	✓	✓	✓				
	36	✓	✓	✓	✓				

<i>Index of Claims</i> 	Application/Control No. 13089986	Applicant(s)/Patent Under Reexamination COOPER ET AL.
	Examiner Sean Burke	Art Unit 4187

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
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CLAIM		DATE							
Final	Original	11/27/2013	06/30/2014	01/07/2016	07/25/2016				
	37	✓	✓	-	-				
	38	✓	✓	-	-				
	39	✓	✓	✓	✓				
	40	✓	✓	✓	✓				
	41	✓	✓	✓	✓				
	42	✓	✓	✓	✓				
	43		✓	✓	✓				
	44		✓	✓	✓				
	45		✓	✓	✓				
	46			✓	✓				
	47			✓	✓				
	48			✓	✓				

PATENT
Customer No. 117724
Attorney Docket No. DE-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)	
)	
Christopher H. Cooper et. al.	)	Group Art Unit: 3646
)	
Application No.: 13/089,986	)	Examiner: Burke, Sean P.
)	
Filed: April 19, 2011)	
	)	Confirmation No.: 1497
For: METHOD OF GENERATING)	
ENERGY AND ⁴ He USING THREE)	
DIMENSIONAL NANOSTRUCTURED)	
CARBON MATERIALS [As Amended])	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

Response

In response to the Non-final Action of the Examiner dated January 12, 2016,
having a period for response extended to July 12, 2016, by the accompanying Petition
for Extension of Time, Applicants submit the following response.

REMARKS

In the Office Action of January 12, 2016 the Examiner asserted that the “arguments filed 6 October 2015 have been fully considered but they are not persuasive. Examiner reiterates argument made in prior prosecution.”

The Examiner’s assertions are in conflict with the facts, are unsupported by the law, and should be withdrawn.

Applicant’s Affidavits

Tellingly, on August 25 and October 6 2015 Applicants submitted affidavits of a skilled researcher with years of experience in the field of high energy systems - and the Examiner has **never** addressed the substance of those affidavits in spite of the assertion that the “arguments filed 6 October 2015 have been fully considered.” Both affidavits show energy being emitted from the combination of carbon nanotubes and deuterium (heavy water - D_2O) ten years after the combination was made. The Examiner has not even addressed the factual assertions in the affidavits and merely concludes, without reasoning or explanation, that “[t]hey are not persuasive for the many reasons previously discussed.”

These affidavits were filed after the last substantive action by an examiner on the parent application and, thus, have never been “previously discussed” by the present Examiner or any examiner.

These affidavits set out in detail measurements taken by a skilled researcher that could be duplicated by anyone with a modicum of technical skill in experimental science. Those measurements demonstrate that energy is being emitted from samples that cannot be the result of any known chemical reaction. The affidavits also specifically

rebut factual assertions made by the Examiner about science being static and the degree of skill necessary to make and use the present invention.

The Need for Peer-reviewed Support

The Examiner goes on to assert that the “[a]pplicant may overcome the inoperability rejections by demonstrating peer-reviewed, published evidence from a credible source.” Applicants have done just that and current research from unimpeachable scientists support this fact.

The invention creates energy by the combination of three dimensional nanostructured carbon material (e.g. carbon nanotubes) and deuterium. Of record in this application is the “peer-reviewed, published” article “Visible-Light-Induced Water-Splitting in Channels of Carbon Nanotubes,” J. Phys.Chem. B, 110, No. 4, (2006)1571-1575. In that article the researchers noted the production of energy when water (inherently containing deuterium as heavy water) was combined with carbon nanotubes but not with “micro graphite.” P. 1574. Moreover, the results of their gas analysis unequivocally showed transmutation byproducts (helium and tritium) of some type of nuclear reaction. Those authors opined that the water was being split [into its constituent elements] in the carbon nanotubes. “That supports the opinion of thermosplitting of water confined within the channels of the SWNTs.” Id. P. 1575. [a SWNT is a single-walled carbon nanotube]

Moreover, current technological developments from mainstream science support the fact that water (hence heavy water or deuterium) can be confined in carbon

nanotubes. In an article dated April 26, 2016, "New state of water molecule discovered"¹ the author quotes from research conducted at Oak Ridge National Laboratory:

"At low temperatures, this tunneling water exhibits quantum motion through the separating potential walls, which is forbidden in the classical world," said lead author Alexander Kolesnikov of ORNL's Chemical and Engineering Materials Division. "This means that the oxygen and hydrogen atoms of the water molecule are 'delocalized' and therefore simultaneously present in all six symmetrically equivalent positions in the channel at the same time. It's one of those phenomena that only occur in quantum mechanics and has no parallel in our everyday experience." [emphasis added].

The author of the review goes on to discuss the ramifications of this work at ORNL:

The existence of the tunneling state of water shown in ORNL's study should help scientists better describe the thermodynamic properties and behavior of water in highly confined environments such as water diffusion and transport in the channels of cell membranes, in carbon nanotubes and along grain boundaries and at mineral interfaces in a host of geological environments. [emphasis added].

This article is significant for two reasons. First, it supports the fact that water, heavy water and thus deuterium can be confined in carbon nanotubes. Second, it demonstrates the fallacy of the Examiner's previous assertions that science is static and that extraordinary proof is necessary for the present Applicant to show the claimed invention is operable.

Previous assertions of the Examiner have denigrated anyone reporting results that deviate from "known science" Final Rejection, p. 4." Will the Examiner now assert that scientists from Oak Ridge National Laboratory are "pseudo-scientists?" And will

^{1/} <http://phys.org/news/201604statemolecule> (copy attached)

their results be equated to sightings of "Big Foot" as was done in previous Office Actions when the experimental results did not comport with the Examiner's beliefs.

The Strawman of Fleischmann and Pons

Next, in a classic example of guilt by association, the Examiner equates the work of the present applicants to the technology of Fleischmann and Pons and then spends pages of the Office Action supporting the rejection of electrolysis-type "cold fusion." The Examiner cites a number of articles critical of the technology of Fleischmann and Pons, their experimental procedures, and cites articles disputing the existence of that type of fusion. The present application does not use applied electrical current to create energy. If electrical energy is applied to applicant's combination of carbon nanotubes and deuterium (as is reported in Example 2), the output may be impacted, but electrical energy is not needed.

The invention of the present application is not based on electrolysis, does not disclose the use or need for electrolytes, applied currents, electrode spacing, electrode porosity, or the use of calorimetry.

Clearly the Examiner has merely inserted into the record of this application a pre-existing rejection of a Fleischmann and Pons-type of cold fusion application without considering the fundamental differences between the technologies.

It is absolutely irrelevant to the issues of this application that the Fleischmann and Pons technology is not accepted or cannot be repeated by independent research. As noted above, when research did inadvertently combine deuterium (inherently present in ordinary water) with carbon nanotubes they confirmed the results reported in the present application.

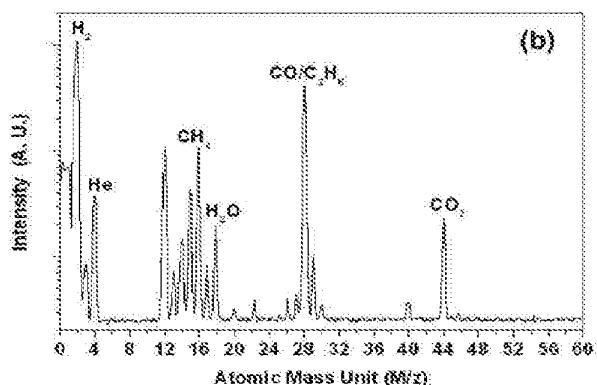
Paragraphs 8-21 of the Examiner's rejection are not directed to the technology of the present application, are not relevant, and should be withdrawn.

The Examiner also makes a statement that is in conflict with the peer-reviewed published research when he asserts (Office Action ¶20, p.11) that Applicants have not shown evidence of a nuclear fusion reaction. In "Visible-Light-Induced Water-Splitting in Channels of Carbon Nanotubes," J. Phys.Chem. B, 110, No. 4. (2006)1571-1575 the text reports the production of helium from the reaction of water and carbon nanotubes.

Besides H₂, other components such as He, CH₄, H₂O, CO, C₂H₆, and CO₂ can also be found, as indicated in Figure 2b.

P. 1573.

As shown on below, Fig. 2(b) also shows the production of both He⁴ (AMU 4) and either tritium or helium³ (AMU 3).



The fact that conventional physics cannot explain how transmutation byproducts, that can only come from nuclear reactions, are created when carbon nanotubes and deuterium are combined does not mean that the results of Fig. 2(b) do not exist. It may not be a classic "nuclear fusion" reaction, but clearly some type of nuclear reaction has taken place.

Moreover, the affidavits of James Loan, that are of record in this application, by measuring energy emanating from combinations of deuterium and carbon nanotubes ten years after the combination, set out unequivocal proof of some type of nuclear reaction. The Examiner has never addressed the facts set out in the Loan affidavits.

The Rejections under 35 USC §101

Using the same flawed analysis and “logic” of the first 24 paragraphs of the Office Action, the Examiner asserts that the claimed invention is “not supported by an operative utility or a well-established utility” for the reasons he set out previously.

The reasons he set out previously in paragraphs 1-23 are not supported in fact because peer-reviewed research has demonstrated: 1) the confinement of deuterium or water in carbon nanotubes is a fact; and 2) energy and nuclear transmutation byproducts are produced by the combination of carbon nanotubes and deuterium. This rejection is not supported and should be withdrawn

The Examiner then asserts that, because “the claim only directs exposing deuterium to graphene it is not one of the four categories of patentable subject matter.” Claim 1 is actually directed to a method of generating ^4He atoms and energy. The steps of the process (and processes are one of the four categories of patentable subject matter) are first, contacting three dimensional nanostructured carbon material with deuterium and transmuting the deuterium to ^4He atoms and energy. A process of creating energy by combining materials is patentable subject matter.

The Examiner then asserts that such an operation would be “apparent in nature because deuterium and graphene are both naturally occurring.” Deuterium is present in nature primarily in minute quantities in ordinary water (~154 PPM). Three dimensional

nanostructured carbon material can occur in nature as a byproduct of combustion in minute quantities, but is primarily a man-made specialty product. There is no factual support for the Examiner's assertion that the combination of these two materials would be "apparent in nature." Nor does the Examiner even attempt to support this assertion or show how that would make such a combination unpatentable.

The rejection of the application under 35 USC §101 should be withdrawn.

The Rejection under 35 USC §112

The Applicants have demonstrated, through the affidavits of James Loan how one of ordinary skill, without undue experimentation, can make and use the claimed invention. The failure of mainstream science to adopt a theory of nuclear physics that would embrace the nuclear reaction taking place is not the same thing as there being no utility for the invention. Applicants clearly teach both a method of generating energy and confirming its generation and both can be accomplished by technical personnel. The law requires no more.

The rejection of the application under 35 USC §112 should be withdrawn.

The Rejection Based on Hagelstein under 35 USC §§102 and 103

In a stunningly inconsistent application of 35 USC §112, the Examiner ignores the facts of record that U.S. Patent Publ. 2009/0086877 to Hagelstein does not disclose the combination of deuterium and three dimensional nanostructured carbon materials with sufficient information to allow one of ordinary skill in the art to make and use the disclosed subject matter, and rejects claims of this application using that disclosure.

Paragraph 52 of the affidavit of James Loan, of record in this application, states the facts succinctly:

While the Hagelstein application mentions CNTs and deuterium, nowhere does it disclose that those two materials, when combined react to produce energy and transmutation byproducts. Moreover, no one of any level of skill in nuclear technology, chemistry, material science, or physics reading the Hagelstein application would be taught how to combine deuterium and CNTs to produce energy.

This reference fails to disclose the claimed invention, and for that reason alone the rejections of paragraphs 25 to 61 should be withdrawn. In addition, the rejections of paragraphs 25 to 61 are based on a reference that fails to meet the criteria of 35 USC §112 and, for that additional reason, these rejections should be withdrawn.

The rejection of Claim 43 over the Melechko reference totally ignores the lack of any incentive to substitute gaseous D₂O for hydrogen. The fact this reference discloses hydrogen storage in carbon nanotubes does not teach or suggest the subject matter of Claim 43.

Conclusion

Applicants have disclosed and claimed an invention having great technical potential. It is a source of energy that does not create toxic or radioactive byproducts. It produces energy in amounts not possible for a chemical reaction. The invention has been disclosed with four different examples that can be duplicated by technical personnel without undue experimentation.

The major impediment to allowance of this application is not the utility of the invention, the adequacy of the disclosure, or the prior art. It is the history of "cold fusion" and the electrolysis technology of Fleischmann and Pons. Applicants cannot erase that history, nor should the Examiner ignore it. But when history shows that one line of research in a technology has not been proven, it does not mean all lines of research in that technology are flawed.

Objective analysis of the facts shows the following:

- 1) The combination of three dimensional nanostructured carbon material and deuterium produces energy.
- 2) The duration of energy production precludes it being produced by chemical means.
- 3) Peer-reviewed research confirms the production of both energy and nuclear transmutation byproducts when three dimensional nanostructured carbon material and deuterium are combined.

Applicants have demonstrated the invention is useful, operable, readily practice without undue experimentation, and nowhere disclosed in the prior art. Applicants respectfully request that the application be examined on ITS merits, not in view of the failing of other techniques. When viewed on its merits the application meets all statutory criteria for patentability.

Withdrawal of all of the grounds of rejection and allowance of the claims is respectfully requested.

Respectfully submitted,

Dated: July 12, 2016

By: /s/ Stephen L. Peterson
Stephen L. Peterson
Reg. No. 26,325
(202) 251-9367

Electronic Patent Application Fee Transmittal

Application Number:	13089986			
Filing Date:	19-Apr-2011			
Title of Invention:	METHOD OF GENERATING ENERGY AND 4HE USING THREE DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS			
First Named Inventor/Applicant Name:	Christopher H. Cooper			
Filer:	Stephen Leroy Peterson			
Attorney Docket Number:	088479.000147			
Filed as Micro Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension - 3 months with \$0 paid	3253	1	350	350
Miscellaneous:				
Total in USD (\$)				350

Electronic Acknowledgement Receipt

EFS ID:	26331495
Application Number:	13089986
International Application Number:	
Confirmation Number:	1497
Title of Invention:	METHOD OF GENERATING ENERGY AND 4HE USING THREE DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS
First Named Inventor/Applicant Name:	Christopher H. Cooper
Customer Number:	29747
Filer:	Stephen Leroy Peterson
Filer Authorized By:	
Attorney Docket Number:	088479.000147
Receipt Date:	12-JUL-2016
Filing Date:	19-APR-2011
Time Stamp:	22:16:59
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$ 350
RAM confirmation Number	6428
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Extension of Time	EOT.pdf	57236	no	1
			c51c5e7f6fad67447ba3f30cca137e2ef1dd776a		
Warnings:					
Information:					
2		finalresp3.pdf	385365	yes	12
			ce20e81f71fb41a94ee5120100e954f3b5ebf8cc		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Amendment/Req. Reconsideration-After Non-Final Reject		1	10	
	Non Patent Literature		11	12	
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30663	no	2
			836975a8274aa62d0338ebcf64c5d2d2ccedd7393		
Warnings:					
Information:					
Total Files Size (in bytes):			473264		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PATENT
Customer No. 117724
Attorney Docket No. DE-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Christopher H. Cooper et. al.

Group Art Unit: 3646

Application No.: 13/089,986

Examiner: Burke, Sean P.

Filed: April 19, 2011

Confirmation No.: 1497

For: METHOD OF GENERATING
ENERGY AND ^4He USING THREE
DIMENSIONAL
NANOSTRUCTURED CARBON
MATERIALS [As Amended]

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

PETITION FOR EXTENSION OF TIME

Applicants petition for a three-month extension of time to file a response to the non-final Office Action of January 12, 2016. A fee of \$350.00 is enclosed.

Respectfully submitted,

Dated: January 12, 2016

By: /s/ Stephen L. Peterson
Stephen L. Peterson
Reg. No. 26325
(202) 251-9367

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 13/089,986	Filing Date 04/19/2011	<input type="checkbox"/> To be Mailed
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ENTITY: ☐ LARGE ☐ SMALL ☒ MICRO

APPLICATION AS FILED – PART I

(Column 1) (Column 2)

FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =	
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

(Column 1) (Column 2) (Column 3)

AMENDMENT	07/12/2016	CLAIMS REMAINING AFTER AMENDMENT	Minus	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))	* 42	Minus	** 44	= 0	x \$20 =	0
	Independent (37 CFR 1.16(h))	* 6	Minus	***6	= 0	x \$105 =	0
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))						
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	0

(Column 1) (Column 2) (Column 3)

AMENDMENT	CLAIMS REMAINING AFTER AMENDMENT	Minus	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))					
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					
						TOTAL ADD'L FEE

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
TAMMY D. MCBETH BROWN

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/089,986	04/19/2011	Christopher H. Cooper	09102.0014-04

CONFIRMATION NO. 1497

POA ACCEPTANCE LETTER



29747
GREENBERG TRAURIG (LV)
77 West Wacker Drive, Suite 3100
Intellectual Property Department
Chicago, IL 60601

Date Mailed: 05/09/2016

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 04/27/2016.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/mmasfaw/



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/089,986	04/19/2011	Christopher H. Cooper	09102.0014-04

CONFIRMATION NO. 1497

IMPROPER CFR REQUEST



OC000000082734575

29747
GREENBERG TRAURIG (LV)
77 West Wacker Drive, Suite 3100
Intellectual Property Department
Chicago, IL 60601

Date Mailed: 05/09/2016

RESPONSE TO REQUEST FOR CORRECTED FILING RECEIPT

Power of Attorney, Claims, Fees, System Limitations, and Miscellaneous

In response to your request for a corrected Filing Receipt, the Office is unable to comply with your request because:

- The correction that was requested cannot be made because the application was filed before the rule became effective.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/mmasfaw/



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/089,986	04/19/2011	Christopher H. Cooper	09102.0014-04

CONFIRMATION NO. 1497

22852
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER
LLP
901 NEW YORK AVENUE, NW
WASHINGTON, DC 20001-4413

POWER OF ATTORNEY NOTICE



OC000000082734428

Date Mailed: 05/09/2016

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 04/27/2016.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/mmasfaw/

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:



Practitioners associated with the Customer Number:

29747

OR



Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:



The address associated with Customer Number:

29747

OR

<input type="checkbox"/> Firm or Individual Name			
Address			
City	State	Zip	
Country			
Telephone	Email		

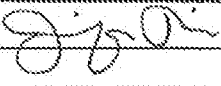
Assignee Name and Address:

MULTIPURE INTERNATIONAL
7251 CATHEDRAL ROCK DRIVE
LAS VEGAS, NV 89128

A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	02-26-2016
Name	JENNIFER RICE	Telephone	702.360.8880
Title	Executive Vice President		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-5199 and select option 2.

STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: MULTIPURE INTERNATIONAL

Application No./Patent No.: 13/089,986

Filed/Issue Date: April 19, 2011

Titled: METHODS OF GENERAING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS

MULTIPURE INTERNATIONAL, a Nevada Corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1. ☒ the assignee of the entire right, title, and interest in;
2. ☐ an assignee of less than the entire right, title, and interest in
(The extent (by percentage) of its ownership interest is _____ %); or
3. ☐ the assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made)

the patent application/patent identified above, by virtue of either:

A. ☒ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 037801, Frame 0715, or for which a copy therefore is attached.

OR

B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

2. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Rob L. Phillips/

April 27, 2016

Signature

Date

ROB L. PHILLIPS

Attorney of Record

Printed or Typed Name

Title

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**



UNITED STATES PATENT AND TRADEMARK OFFICE

UNDER SECRETARY OF COMMERCE FOR INTELLECTUAL PROPERTY AND
DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE

FEBRUARY 24, 2016

PTAS

GREENBERG TRAURIG (LV)
3773 HOWARD HUGHES PARKWAY, SUITE 400N
LAS VEGAS, NV 89169

503705186

UNITED STATES PATENT AND TRADEMARK OFFICE NOTICE OF RECORDATION OF ASSIGNMENT DOCUMENT

THE ENCLOSED DOCUMENT HAS BEEN RECORDED BY THE ASSIGNMENT RECORDATION BRANCH OF THE U.S. PATENT AND TRADEMARK OFFICE. A COMPLETE COPY IS AVAILABLE AT THE ASSIGNMENT SEARCH ROOM ON THE REEL AND FRAME NUMBER REFERENCED BELOW.

PLEASE REVIEW ALL INFORMATION CONTAINED ON THIS NOTICE. THE INFORMATION CONTAINED ON THIS RECORDATION NOTICE REFLECTS THE DATA PRESENT IN THE PATENT AND TRADEMARK ASSIGNMENT SYSTEM. IF YOU SHOULD FIND ANY ERRORS OR HAVE QUESTIONS CONCERNING THIS NOTICE, YOU MAY CONTACT THE ASSIGNMENT RECORDATION BRANCH AT 571-272-3350. PLEASE SEND REQUEST FOR CORRECTION TO: U.S. PATENT AND TRADEMARK OFFICE, MAIL STOP: ASSIGNMENT RECORDATION BRANCH, P.O. BOX 1450, ALEXANDRIA, VA 22313.

RECORDATION DATE: 02/23/2016

REEL/FRAME: 037801/0715
NUMBER OF PAGES: 17

BRIEF: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).

DOCKET NUMBER: 088479.000010

ASSIGNOR:

SELDON TECHNOLOGIES, INC.

DOC DATE: 02/05/2016

ASSIGNEE:

MULTIPURE INTERNATIONAL
7251 CATHEDRAL ROCK DRIVE
LAS VEGAS, NEVADA 89128

APPLICATION NUMBER: 10794056

FILING DATE: 03/08/2004

PATENT NUMBER: 7211320

ISSUE DATE: 05/01/2007

TITLE: PURIFICATION OF FLUIDS WITH NANOMATERIALS

APPLICATION NUMBER: 10859346

FILING DATE: 06/03/2004

PATENT NUMBER: 7682654

ISSUE DATE: 03/23/2010

TITLE: FUSED NANOSTRUCTURE MATERIAL

APPLICATION NUMBER: 10884919

FILING DATE: 07/07/2004

PATENT NUMBER:

ISSUE DATE:

TITLE: CARBON NANOTUBE CONTAINING MATERIALS AND ARTICLES CONTAINING SUCH MATERIALS FOR ALTERING ELECTROMAGNETIC RADIATION

APPLICATION NUMBER: 11111736 FILING DATE: 04/22/2005
PATENT NUMBER: 7419601 ISSUE DATE: 09/02/2008
TITLE: NANOMESH ARTICLE AND METHOD OF USING THE SAME FOR PURIFYING
FLUIDS

APPLICATION NUMBER: 11514184 FILING DATE: 09/01/2006
PATENT NUMBER: ISSUE DATE:
TITLE: LARGE SCALE MANUFACTURING OF NANOSTRUCTURED MATERIAL

APPLICATION NUMBER: 11633524 FILING DATE: 12/05/2006
PATENT NUMBER: ISSUE DATE:
TITLE: METHODS OF GENERATING ENERGETIC PARTICLES USING NANOTUBES AND
ARTICLES THEREOF

APPLICATION NUMBER: 11734858 FILING DATE: 04/13/2007
PATENT NUMBER: 7815806 ISSUE DATE: 10/19/2010
TITLE: PURIFICATION OF FLUIDS WITH CARBON NANOTUBES HAVING ATTACHED
FUNCTIONAL GROUP

APPLICATION NUMBER: 12026868 FILING DATE: 02/06/2008
PATENT NUMBER: 8709374 ISSUE DATE: 04/29/2014
TITLE: METHODS FOR THE PRODUCTION OF ALIGNED CARBON NANOTUBES AND
NANOSTRUCTURED MATERIAL CONTAINING THE SAME

APPLICATION NUMBER: 12118495 FILING DATE: 05/09/2008
PATENT NUMBER: ISSUE DATE:
TITLE: METHODS OF GAS CONFINEMENT WITHIN THE VOIDS OF CRYSTALLINE
MATERIAL AND ARTICLES THEREOF

APPLICATION NUMBER: 12258568 FILING DATE: 10/27/2008
PATENT NUMBER: ISSUE DATE:
TITLE: METHODS OF GENERATING ENERGETIC PARTICLES USING NANOTUBES AND
ARTICLES THEREOF

APPLICATION NUMBER: 12350036 FILING DATE: 01/07/2009
PATENT NUMBER: ISSUE DATE:
TITLE: CARBON NANOTUBE CONTAINING MATERIALS AND ARTICLES CONTAINING
SUCH MATERIALS FOR ALTERING ELECTROMAGNETIC RADIATION

APPLICATION NUMBER: 12615819 FILING DATE: 11/10/2009
PATENT NUMBER: 9126128 ISSUE DATE: 09/08/2015
TITLE: DEVICE INCLUDING CARBON NANOTUBE MATERIAL FOR SEPARATING A
LIQUID EMULSION OF AN ORGANIC LIQUID AND WATER

APPLICATION NUMBER: 12699956 FILING DATE: 02/04/2010
PATENT NUMBER: ISSUE DATE:
TITLE: FUSED NANOSTRUCTURE MATERIAL

APPLICATION NUMBER: 12898807 FILING DATE: 10/06/2010
PATENT NUMBER: ISSUE DATE:
TITLE: METHODS OF GENERATING ENERGETIC PARTICLES USING NANOTUBES AND
ARTICLES THEREOF

APPLICATION NUMBER: 12901066 FILING DATE: 10/08/2010
PATENT NUMBER: ISSUE DATE:
TITLE: CARBON NANOTUBE CONTAINING MATERIALS AND ARTICLES CONTAINING
SUCH MATERIALS FOR ALTERING ELECTROMAGNETIC RADIATION

APPLICATION NUMBER: 13089986 FILING DATE: 04/19/2011
PATENT NUMBER: ISSUE DATE:
TITLE: METHOD OF GENERATING ENERGY AND 4HE USING THREE DIMENSIONAL
NANOSTRUCTURED CARBON MATERIALS

APPLICATION NUMBER: 13591162 FILING DATE: 08/21/2012
PATENT NUMBER: ISSUE DATE:
TITLE: METHODS OF GENERATING ENERGETIC PARTICLES USING NANOTUBES AND
ARTICLES THEREOF

APPLICATION NUMBER: 13775010 FILING DATE: 02/22/2013
PATENT NUMBER: ISSUE DATE:
TITLE: ELECTRODES AND APPLICATIONS

APPLICATION NUMBER: 14049727 FILING DATE: 10/09/2013
PATENT NUMBER: ISSUE DATE:
TITLE: METHODS OF GAS CONFINEMENT WITHIN THE VOIDS OF CRYSTALLINE
MATERIAL AND ARTICLES THEREOF

APPLICATION NUMBER: 14209358 FILING DATE: 03/13/2014
PATENT NUMBER: ISSUE DATE:
TITLE: METHODS FOR THE PRODUCTION OF ALIGNED CARBON NANOTUBES AND
NANOSTRUCTURED MATERIAL CONTAINING THE SAME

APPLICATION NUMBER: 14294666 FILING DATE: 06/03/2014
PATENT NUMBER: ISSUE DATE:
TITLE: LARGE SCALE MANUFACTURING OF NANOSTRUCTURED MATERIAL

APPLICATION NUMBER: 14812410 FILING DATE: 07/29/2015
PATENT NUMBER: ISSUE DATE:
TITLE: CARBON NANOTUBE MATERIAL AND METHOD FOR THE SEPARATION OF
LIQUIDS

APPLICATION NUMBER: 14844393 FILING DATE: 09/03/2015
PATENT NUMBER: ISSUE DATE:
TITLE: METHODS OF GAS CONFINEMENT WITHIN THE VOIDS OF CRYSTALLINE
MATERIAL AND ARTICLES THEREOF

APPLICATION NUMBER: 14844399 FILING DATE: 09/03/2015
PATENT NUMBER: ISSUE DATE:
TITLE: METHODS FOR THE PRODUCTION OF ALIGNED CARBON NANOTUBES AND
NANOSTRUCTURED MATERIAL CONTAINING THE SAME

APPLICATION NUMBER: 14844418 FILING DATE: 09/03/2015
PATENT NUMBER: ISSUE DATE:
TITLE: NANOFIBER YARNS, THREAD, ROPE, CABLES, FABRIC, ARTICLES AND
METHODS OF MAKING THE SAME

APPLICATION NUMBER: 14844430 FILING DATE: 09/03/2015
PATENT NUMBER: ISSUE DATE:
TITLE: DEVICE AND METHOD FOR THE PURIFICATION OF BIOLOGICALLY
CONTAMINATED WATER

APPLICATION NUMBER: 14844433 FILING DATE: 09/03/2015
PATENT NUMBER: ISSUE DATE:
TITLE: PHARMACEUTICAL COMPONENT, DEVICE AND METHOD FOR THE SAME

APPLICATION NUMBER: 60452530 FILING DATE: 03/07/2003
PATENT NUMBER: ISSUE DATE:
TITLE: PURIFICATION OF LIQUIDS WITH NANOMATERIALS

APPLICATION NUMBER: 60468109 FILING DATE: 05/06/2003
PATENT NUMBER: ISSUE DATE:
TITLE: GAS STERILIZATION DEVICE BASED ON NANOTECHNOLOGY

APPLICATION NUMBER: 60474925 FILING DATE: 06/03/2003
PATENT NUMBER: ISSUE DATE:
TITLE: FUSED BUCKYMEMBRANE

APPLICATION NUMBER: 60485117 FILING DATE: 07/08/2003
PATENT NUMBER: ISSUE DATE:
TITLE: EMI SHIELDING WITH CARBON NANOTUBE MESH

APPLICATION NUMBER: 60499375 FILING DATE: 09/03/2003
PATENT NUMBER: ISSUE DATE:
TITLE: CARBON NANOTUBE SUPERSTRUCTURE ARCHITECTURES FOR STERILIZATION
AND FILTRATION

APPLICATION NUMBER: 60712847 FILING DATE: 09/01/2005
PATENT NUMBER: ISSUE DATE:
TITLE: METHODS OF MANUFACTURING NANOSTRUCTURED MATERIAL ARTICLE

APPLICATION NUMBER: 60741874 FILING DATE: 12/05/2005
PATENT NUMBER: ISSUE DATE:
TITLE: METHODS OF ENERGY CONVERSION USING CARBON NANOTUBES AND ARTICLES
THEREOF

APPLICATION NUMBER: 60777577 FILING DATE: 03/01/2006
PATENT NUMBER: ISSUE DATE:
TITLE: METHODS OF ENERGY CONVERSION USING CARBON NANOTUBES AND ARTICLES
THEREOF

APPLICATION NUMBER: 60899868 FILING DATE: 02/07/2007
PATENT NUMBER: ISSUE DATE:
TITLE: METHODS FOR THE PRODUCTION OF ALIGNED CARBON NANOTUBES AND
NANOSTRUCTURED MATERIAL CONTAINING THE SAME

APPLICATION NUMBER: 60924376 FILING DATE: 05/10/2007
PATENT NUMBER: ISSUE DATE:
TITLE: METHODS OF GAS CONFINEMENT WITHIN THE VOIDS OF CRYSTALLINE
MATERIAL AND ARTICLES THEREOF

APPLICATION NUMBER: 61113386 FILING DATE: 11/11/2008
PATENT NUMBER: ISSUE DATE:
TITLE: CARBON NANOTUBE DEVICE AND METHOD FOR THE SEPARATION OF LIQUIDS

APPLICATION NUMBER: 61427140 FILING DATE: 12/24/2010
PATENT NUMBER: ISSUE DATE:
TITLE: METHODS OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4HE
USING GRAPHENE BASED MATERIALS

APPLICATION NUMBER: 61601732 FILING DATE: 02/22/2012
PATENT NUMBER: ISSUE DATE:
TITLE: ELECTRODES AND APPLICATIONS

ASSIGNMENT RECORDATION BRANCH
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United States Patent and Trademark Office

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Electronic Patent Assignment System

Patent Assignment Recordation Form
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[Attachments](#) - [Sign](#)

EPAS v1.0.1
PTO-1595 (Rev. 08/12)
OMB No. 5651-0027 (Exp.
04/30/2015)

Signature

The request must be signed by the filer. The request will not be "signed" in the sense of a traditional paper document. To sign the request, the signer must enter any combination of printable characters that have been adopted to serve the function of a signature, preceded and followed by the forward slash(/) symbol. Acceptable "signatures" could include: /john doe/, /jd/, and /123-4567/.

Sign the request by completing the following fields

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT
CONVEYING PARTY DATA	
Name	Execution Date
SELDON TECHNOLOGIES, INC.	02/05/2016
RECEIVING PARTY DATA	
Name:	MULTIPURE INTERNATIONAL
Street Address:	7251 CATHEDRAL ROCK DRIVE
City:	LAS VEGAS
State/Country:	NEVADA
Postal Code:	89128
PROPERTY NUMBERS Total: 40	
Property Type	Number
Patent Number:	7211320
Patent Number:	7419601
Patent Number:	7682654
Patent Number:	7815806
Patent Number:	8709374

Patent Number:	9126128
Application Number:	10884919
Application Number:	11514184
Application Number:	11633524
Application Number:	12118495
Application Number:	12258568
Application Number:	12350036
Application Number:	12699956
Application Number:	12898807
Application Number:	12901066
Application Number:	13089986
Application Number:	13775010
Application Number:	13591162
Application Number:	14049727
Application Number:	14209358
Application Number:	14294666
Application Number:	14812410
Application Number:	14844393
Application Number:	14844399
Application Number:	14844418
Application Number:	14844430
Application Number:	14844433
Application Number:	60452530
Application Number:	60468109
Application Number:	60474925
Application Number:	60485117
Application Number:	60499375
Application Number:	60712847
Application Number:	60741874
Application Number:	60777577
Application Number:	60899868
Application Number:	60924376
Application Number:	61113386
Application Number:	61427140
Application Number:	61601732

CORRESPONDENCE DATA

Fax Number:	(702)792-9002
Phone:	702-792-3773
Email:	delacruz@gtlaw.com
<i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i>	
Correspondent Name:	GREENBERG TRAURIG (LV)
Address Line 1:	3773 HOWARD HUGHES PARKWAY, SUITE 400N
Address Line 4:	LAS VEGAS, NEVADA 89169

Total Attachments: 14
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source=MultipureAssignment#page13.tif
source=MultipureAssignment#page14.tif

Signature: *	<input type="text" value="/Rob L. Phillips/"/>
Name: *	<input type="text" value="ROB L. PHILLIPS"/>
Date:	<input type="text" value="02/23/2016"/>
<input type="checkbox"/> This document serves as an <u>Oath/Declaration (37 CFR 1.63)</u> .	

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

SUPPLEMENTAL		Attorney Docket Number	038479.000147
Application Data Sheet 37 CFR 1.76		Application Number	
Title of Invention	METHODS OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS		
<p>The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.</p> <p>This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.</p>			

Secrecy Order 37 CFR 5.2

<input type="checkbox"/>	Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
--------------------------	---

Inventor Information:

Inventor 1						Remove	
Legal Name							
Prefix	Given Name		Middle Name		Family Name		Suffix
	Christopher		H.		Cooper		
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service							
City	Windsor		State/Province	VT	Country of Residence	US	
Mailing Address of Inventor:							
Address 1		16 Pine Street					
Address 2							
City	Windsor		State/Province	VT			
Postal Code	05089		Country	US			
Inventor 2						Remove	
Legal Name							
Prefix	Given Name		Middle Name		Family Name		Suffix
	William		K.		Cooper		
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service							
City	Santa Fe		State/Province	NM	Country of Residence	US	
Mailing Address of Inventor:							
Address 1		224 E. Buena Vista					
Address 2							
City	Santa Fe		State/Province	NM			
Postal Code	87505		Country	US			
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.						Add	

Correspondence Information:

<p>Enter either Customer Number or complete the Correspondence Information section below.</p> <p>For further information see 37 CFR 1.33(a).</p>
--

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SUPPLEMENTAL Application Data Sheet 37 CFR 1.76		Attorney Docket Number	088479.000147
		Application Number	
Title of Invention	METHODS OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS		

☐ An Address is being provided for the correspondence information of this application.

Customer Number	29747		
Email Address	GTIPMAIL@GTLAW.COM	<input type="button" value="Add Email"/>	<input type="button" value="Remove Email"/>

Application Information:

Title of the Invention	METHODS OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS		
Attorney Docket Number	088479.000147	Small Entity Status Claimed	<input checked="" type="checkbox"/>
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	9	Suggested Figure for Publication (if any)	

Filing By Reference :

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	<input checked="" type="radio"/> Customer Number	<input type="radio"/> US Patent Practitioner	<input type="radio"/> Limited Recognition (37 CFR 11.9)
Customer Number	29747		

SUPPLEMENTAL Application Data Sheet 37 CFR 1.76		Attorney Docket Number	088479.000147
		Application Number	
Title of Invention	METHODS OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the application number blank.

Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation in part of	12898807	2010-10-06
Prior Application Status	Abandoned	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
12898807	Continuation of	12258568	2008-10-27
Prior Application Status	Abandoned	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
12258568	Continuation of	11633524	2006-12-05
Prior Application Status	Expired	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
11633524	Claims benefit of provisional	60741874	2005-12-05
Prior Application Status	Expired	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
60741874	Claims benefit of provisional	60777577	2006-03-01
Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
60777577	Claims benefit of provisional	61427140	2010-12-24

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)¹ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Application Number	Country ¹	Filing Date (YYYY-MM-DD)	Remove
			Access Code ³ (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the Add button.

SUPPLEMENTAL Application Data Sheet 37 CFR 1.76		Attorney Docket Number	088479.000147
		Application Number	
Title of Invention	METHODS OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS		

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

<p>This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.</p> <p><input type="checkbox"/> NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.</p>
--

Authorization to Permit Access:

<p><input checked="" type="checkbox"/> Authorization to Permit Access to the Instant Application by the Participating Offices</p> <p>If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.</p> <p>In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.</p> <p>In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.</p>
--

Applicant Information:

<p>Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.</p>
--

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SUPPLEMENTAL Application Data Sheet 37 CFR 1.76		Attorney Docket Number	088479.000147
		Application Number	
Title of Invention	METHODS OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS		

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

<input checked="" type="radio"/> Assignee	<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Joint Inventor
<input type="radio"/> Person to whom the inventor is obligated to assign.	<input type="radio"/> Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. ☒

Organization Name MULTIPURE INTERNATIONAL

Mailing Address Information For Applicant:

Address 1	<u>7251 CATHEDRAL ROCK DRIVE</u>		
Address 2			
City	<u>LAS VEGAS</u>	State/Province	<u>NV</u>
Country	<u>US</u>	Postal Code	<u>89128</u>
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

SUPPLEMENTAL Application Data Sheet 37 CFR 1.76		Attorney Docket Number	088479.000147
		Application Number	
Title of Invention	METHODS OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS		

Prefix	Given Name	Middle Name	Family Name	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		State/Province	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Signature	/Rob L. Phillips/		Date (YYYY-MM-DD)	2016-04-27
First Name	ROB	Last Name	PHILLIPS	Registration Number
		40305		

Additional Signature may be generated within this form by selecting the Add button.

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Electronic Acknowledgement Receipt

EFS ID:	25608598
Application Number:	13089986
International Application Number:	
Confirmation Number:	1497
Title of Invention:	METHOD OF GENERATING ENERGY AND 4HE USING THREE DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS
First Named Inventor/Applicant Name:	Christopher H. Cooper
Customer Number:	22852
Filer:	Rob L. Phillips/Carmela de la Cruz
Filer Authorized By:	Rob L. Phillips
Attorney Docket Number:	09102.0014-04
Receipt Date:	27-APR-2016
Filing Date:	19-APR-2011
Time Stamp:	12:15:29
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	088479_000147_PowerofAttorney.pdf	1128010 ce7554325092edc4bf852e730f5385736c249e64	no	9

Warnings:

Information:

2	Application Data Sheet	088479_000147_Supplemental ADS.pdf	1052376 e06ce939e6e43c5b2bf2acd776120d6f8ca0 a202	no	6
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
Total Files Size (in bytes):				2180386	
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/089,986	04/19/2011	Christopher H. Cooper	09102.0014-04	1497
22852	7590	01/12/2016		
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER LLP 901 NEW YORK AVENUE, NW WASHINGTON, DC 20001-4413			EXAMINER BURKE, SEAN P	
			ART UNIT	PAPER NUMBER
			3646	
			NOTIFICATION DATE	DELIVERY MODE
			01/12/2016	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

regional-desk@finnegan.com

Office Action Summary	Application No. 13/089,986	Applicant(s) COOPER ET AL.	
	Examiner SEAN P. BURKE	Art Unit 3646	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10/6/2015.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

- 5) ☒ Claim(s) 1-17, 19-26, 28-36 and 39-48 is/are pending in the application.
5a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 6) ☐ Claim(s) ____ is/are allowed.
- 7) ☒ Claim(s) 1-17, 19-26, 28-36 and 39-48 is/are rejected.
- 8) ☐ Claim(s) ____ is/are objected to.
- 9) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

- 10) ☒ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

- a) ☐ All b) ☐ Some** c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)
Paper No(s)/Mail Date ____.
- 3) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 4) ☒ Other: Detailed Action.

1. The present application is being examined under the pre-AIA first to invent provisions.

DETAILED ACTION

Status of Claims

2. Claims 1-17, 19-26, 28-36, and 39-48 are presently under examination.

Response to Arguments

3. Applicant's arguments filed 6 October 2015 have been fully considered but they are not persuasive. Examiner reiterates the argument made in prior prosecution.

Affidavit

4. Applicant's affidavits, submitted on 25 August 2015 and 6 October 2015 are acknowledged. They are not persuasive for the many reasons previously discussed. Applicant may overcome the inoperability rejections by demonstrating peer-reviewed, published evidence from a credible source. Both the present and prior Examiners have been unable to produce such a reference after an exhaustive search.

Specification

5. The specification is objected to under 35 U.S.C. §112, first paragraph (pre-AIA) or 35 U.S.C. §112(a) as failing to provide an adequate written description of the invention and further for failing to provide an enabling disclosure.
6. There is no reputable evidence of record to support the claim that the present invention involves nuclear fusion, nor is there evidence that claims of "excess heat" are valid and reproducible, nor is there evidence that the invention is capable of operating as indicated or capable of providing a useful output.

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7. The invention (see, for example, ¶ 0057 of the specification) is considered as based on the "cold fusion" concept set forth by Fleischmann and Pons.¹ This concept relies on the incorporation of deuterium into a crystal lattice. While Fleischmann and Pons relied on electrolysis of heavy water to incorporate deuterium into the crystal lattice, it was also known that as a variation, the deuterium could be incorporated into the crystal lattice by bringing the crystal into contact with deuterium gas. Thus, it is clear that applicant's invention is just a variation of the cold fusion concept set forth by Fleischmann and Pons. However, as set forth more fully below, this "cold fusion" concept is still no more than just an unproven concept.

Background

8. After Fleischmann and Pons announced their fusion device competing researchers attempted to reproduce their results. The results of these attempts were primarily negative. The few initial positive results were either retracted or later shown to be in error by subsequent experiments.^{2,3} The general consensus by those skilled in the art and working at these various laboratories is that the fusion conclusion made by Fleischmann and Pons was based on experimental error.⁴ The general consensus by

¹ Braaten, "Ridiculously easy test yields claim of energy triumph," The Washington Times, p. A5, March 24, 1989.

² Stipp, The Wall Street Journal, page B-4, "Georgia Group Outlines Errors That Led To Withdrawal Of 'Cold Fusion' Claims", April 26, 1989.

³ Browne, "Fusion claim is greeted with scorn by physicists," The New York Times, pp. A1 and A22, vol. CXXXVIII, no. 47,859, May 3, 1989.

⁴ *Id.*, see also Kreysa, et al., Journal of Electroanalytical Chemistry, vol. 266, pages 437-450, "A Critical Analysis Of Electrochemical Nuclear Fusion Experiments", 1989; Hilts, The Washington Post, page A7, "Significant Errors Reported In Utah Fusion Experiments", May 2, 1989; Ohashi, et al., Journal of Nuclear Science and Technology, vol. 26, pages 729-732, "Decoding Of Thermal Data In Fleischmann & Pons Paper", July 1989; Miskelly, et al., Science, vol. 246, no. 4931, pages 793 and 796, "Analysis Of The Published Calorimetric Evidence For Electrochemical Fusion Of Deuterium In Palladium", November

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those skilled in the art is that there is no reputable evidence to support the claims of excess heat production, or the production of fusion by-products such as neutrons, gamma rays, tritium, or helium.⁵ See also Cooke, pages 4 and 5, which refers to the attempts at Harwell to obtain "cold fusion." Page 5 also indicates that data was also collected in Frascatti-type (i.e. gaseous) experiments. See the last paragraph on page 5:

"After three months of around-the-clock work at a cost of over a half a million dollars, the project was terminated on June 15. This program is believed to be one of the most comprehensive worldwide with as many as 30 cells operating at a time and over 100 different experiments performed. The final result of this monumental effort in the words of the official press release was, in none of these experiments was there any evidence of fusion taking place under electrochemical conditions. It should also be added that there was no evidence of excess heat generated by any of their cells".

9. Note that a complete disclosure must contain enough detail as to enable a person skilled in the art or science to which the invention pertains to make and use the invention as of its filing date.⁶ The present disclosure does not contain the requisite description and detail. There is no adequate description nor enabling disclosure of the parameters of a specific operative embodiment of the invention, including exact

10,1989; Chapline, "Proceedings of the NATO Advance Study Institute on the "Nuclear Equation of State," pages 1-9, "Cold Confusion," July 1989.

⁵ Cooke, Solid State Theory Section, Solid State Division, ORNL-FTR--3341, pages 2-15, "Report Of Foreign Travel Of J. F. Cooke, Head", 1989; Faller, et al., Journal of Radioanalytical Nuclear Chemistry, Letters, vol. 137, no. 1, pages 9-16, "Investigation Of Cold Fusion In Heavy Water", August 21, 1989; Cribier, et al., "Conventional Sources of Fast Neutrons in 'Cold Fusion' Experiments," Physics Letters B, Vol. 228, No. 1, 7 September 1989; Hajdas, et al., Solid State Communications, vol. 72, no. 4, pages 309-313, "Search For Cold-Fusion Events", 1989; Shani, Solid State Communications, vol. 72, no. 1, pages 53-57, "Evidence For A Background Neutron Enhanced Fusion In Deuterium Absorbed Palladium," 1989; Ziegler, et al., "Electrochemical Experiments in Cold Nuclear Fusion," Physical Review Letters, vol. 62 No. 25, June 19, 1989; Schrieder, et al., B-Condensed Matter, vol. 76, no. 2, pages 141-142, "Search For Cold Nuclear Fusion In Palladium-Deuteride" 1989; AP, "Physicist: Utah Cold-Fusion Gear Doesn't Work," The Washington Post, March 29, 1990.

⁶ *In re Glass*, 181 U.S.P.Q. 31 (CCPA 1974).

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composition (including impurities and amounts thereof) of the electrolyte; composition (including impurities and amounts thereof), size, dimensions and porosity of the electrodes (as well as the spacing between the electrodes); the requisite concentration per unit volume of hydrogen isotopes in the cathode; the applied current and voltage, if any; the requisite physical and/or chemical pretreatment of the electrodes; the instrument calibration prior to and during a run, test or experiment; the amount of each electrode to be immersed in the electrolyte; etc. It is noted that the specification appears to set forth some of the parameters, but it does not appear to set forth an example of an operative embodiment that includes specific values for each of the above parameters. Note that such parameters are critical in arriving at an operative cold fusion embodiment. For example, Morrison⁷ shows that electrode spacing is an important parameter. On page 3, Morrison shows that if the electrodes are close enough to each other, hydrogen isotopes and oxygen will recombine. This can be misinterpreted as excess heat.⁸ These references demonstrate the critical importance of cell component composition and impurity content and of electrode pretreatment.

10. Claims of the production of excess heat, tritium, and other nuclear reaction products due to a nuclear reaction, are not sufficient to overcome the numerous teachings by skilled artisans that claims of cold fusion are not reproducible. Note that

⁷ Morrison, "Cold Fusion Update No. 8," November 27, 1993.

⁸ See Jones, "An Assessment of Claims of Excess Heat in Cold Fusion Calorimetry," J. Phys. Chem. B 1998, 102, 3647; Murray, Google Advanced Groups Search. pages 1-11. "Subject: Rothwel: Abstracts: Cain, Case, Iwamura, Ohmori, Silver, Stringham," April 26, 1998; Shanahan, "Comments on 'Thermal behavior of polarized Pd/D electrodes prepared by co-deposition,'" July, 14, 2004; Miles, et al., "Anomalous Effects in Deuterated Systems," Naval Air Warfare Center Weapons Division, September 1996; Carr, "Re: CF claim score (was Re: reciprocal cold fusion proof standards...)," Williams, et al., "Upper bounds on 'cold fusion' in electrolytic cells," Nature vol. 342, p. 375, November 23, 1989.

the numerous teachings by skilled artisans show that in this field it is easy to obtain false-positive results. It is not clear from the information set forth in the specification that applicant would be able to show positive results or that the alleged positive results do not fall within the limits of experimental error. For example the Examiner has cited several documents that deal with calorimeter evidence of cold fusion and possible sources of error. The specification does not disclose any particular structure which makes applicants cold fusion system operative where the other systems disclosed failed.

11. When an experimenter relies on the results of a particular test to establish certain facts (such as the production of excess heat) it is incumbent upon the experimenter to show that the alleged results are valid and not the result of errors or misinterpretation of results. This is especially important where the test in question is in a field that the general scientific community considers fraudulent.

Reproducibility

Regarding reproducibility, Huizenga⁹ states:

"The foundation of science requires experimental results to be reproducible. Validation is an integral part of the scientific process. Scientists are obligated to write articles in ways that allow observations to be replicated. Instructions should be available to permit a competent and well-equipped scientist to perform the experiment and obtain essentially the same results. Replication in science usually is reserved for experiments of special importance or experiments that conflict with an accepted body of work. The greater the implication of an experimental result, the more quickly it will be checked by other scientists.

As more and more groups, at major universities and national laboratories were unable to replicate either the claimed excess heat or

⁹ Huizenga, "Cold Fusion Labeled 'Fiasco of Century'", Forum for Applied Research and Public Policy, vol. 7, No. 4, 1992, pages 78-83.

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fusion products, proponents of cold fusion quickly pointed out that the experiment was not done properly: one needed different size palladium cathodes, longer electrolysis times and higher currents, they claimed.

Whenever the inability of qualified scientists to repeat an experiment is met by ad hoc excuses, beware. One important role of a scientific article is to provide directions for others. Scientists establish priorities for their discoveries by publishing a clear and well documented recipe of their experimental procedures. If a scientific article fails to include an adequate recipe which allows a skilled reader to reproduce the experiment, it is a warning that the author's understanding of their work is incomplete.

Cold-fusion proponents introduced new dimensions into the subject of reproducibility in science. Some tried to turn the table on reproducibility by giving irreproducibility a degree of respectability. A second aberration was to assign a different value to experiments attempting replication. Only experiments that obtained some fragmentary evidence for cold fusion were to be taken seriously because it was declared that experiments obtaining negative results required no special skills or expertise. This viewpoint led proponents of cold fusion to invite mainly papers reporting positive results when organizing conferences. Such an aberrant procedure is incompatible with the scientific process and usually is viewed negatively by scientists as well as journalists."

12. "Reproducibility" must go beyond one's own lab. One must produce a set of instructions, a recipe, that would enable anyone to produce the same results. If reproducibility only occurs in one's own lab, errors (such as systematic errors) would be suspect.¹⁰ Experimenters who previously found evidence of excess heat could not reproduce their results when better calorimetry equipment was used.¹¹ Reproducibility of alleged cold fusion results is a critical feature in determining if a disclosure adequately teaches other practitioners how to make and use an invention.

13. When one does not get identical results or the results are not reproducible at will, it must be concluded that the alleged positive results are not real but instead, the result of experimental errors, instrumentation errors, or misinterpretation of results.

¹⁰ Little, et al., "Replication of Jean-Louis Naudin's Replication of the Mizuno Experiment."

¹¹ Morrison, *supra* n. 7, at § 2.2, p. 2.

14. It is elementary that identical structures operated in an identical manner must produce identical results. If such structures do not produce identical results, one of two things is implied: First, the structures are not identical. For example, one of the structures has an additional component or some critical feature that is not found in the other structure. Alternatively, the structures may be identical, but the experimenter's instrumentation is producing spurious results leading to the erroneous conclusion that the structures are producing positive results.

15. If it is the former that causes some of these cold fusion systems to produce actual, positive results then this critical feature must be clearly specified so as to enable another experimenter to make the invention. Accordingly, if Applicant's invention is capable of reproducibly producing excess heat or fusion by-products it can only be because of this undisclosed additional critical feature. If this is the case, the Applicant's specification is insufficient and non-enabling for failing to disclose the additional critical feature.

16. It is well known that impurities in the cell container walls can leach out into the electrolyte and be deposited onto the cathode.^{12,13,14} It is well known that metals such as platinum, gold and, palladium are generally found in the same ore, that they can be extracted sequentially, and that they will be contaminated by the other metals present.

¹² Flanagan, et al., "Hydrogen Absorption by Palladium in Aqueous Solution," Transactions of the Faraday Society, vol. 55 part 8, No. 440, p 1400-1408, 1407.

¹³ Albagli, et al., "Measurement and Analysis of Neutron and Gamma-Ray Emission Rates, Other Fusion Products, and Power in Electrochemical Cells having Pd Cathodes," Journal of Fusion Energy, Vol. 9, No. 2, 1990 pp. 130-148, 144 (col 2.).

¹⁴ See also Williams, *supra* n. 8, at 380 (second column) and 382 (first column).

17. The presence of these impurities at the cathode could actually lead to the erroneous conclusion that transmutation has occurred. Applicant's disclosure is insufficient and non-enabling does not address the issue of impurities. For additional commentary on the alleged transmutation of isotopes in a cold fusion cell, Applicant is referred to Huizenga.¹⁵ Pages 152-156 of the reference¹⁶ recall that experimenters at the Naval Research Laboratory had mistakenly reported the production of particular palladium isotopes by neutron transmutation in cold fusion cells using a technique known as SIMS (secondary ion mass spectroscopy). See page 156,¹⁷ which states:

"The story associated with the palladium isotope anomaly is not nearly so interesting because it is was simply due to an erroneous interpretation of data where the experimental mass peaks were misidentified. Contributions from polyatomic species of impurities with masses nearly coincident with those of the palladium isotopes caused the misidentification. In spite of the fact that the palladium isotope anomalies had been discredited for over five months, Bockris submitted a paper on March 26, 1990 [Fusion Technology 1811 (1990)] in which he discussed, along with other cold fusion phenomena, the thermal and 14-MeV-neutron-induced cross sections on palladium isotopes. He used these mistaken isotopic anomalies data to suggest that the cold fusion reaction is a surface or near-surface reaction, and, therefore, to serve as supporting evidence for his model of fusion. Among cold fusion enthusiasts mistakes and erroneous results usually decay with a very long lifetime".

18. It is the Examiners' position that an undue amount of experimentation would be required to produce an operative embodiment of applicant's invention. The Examiner has cited numerous documents showing that experimenters have obtained negative results using various types of cold fusion apparatus, all based on the cold fusion

¹⁵ Huizenga, "Cold Fusion: The Scientific Fiasco of the Century", (selections provided) pp. 152-156, 237, 269, 275, 276, 284, 286.

¹⁶ *Id.*

¹⁷ *Id.*

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concept set forth by Fleischmann and Pons. These documents show how easily experimental results can be misinterpreted as evidence of cold nuclear fusion.

19. This issue of undue experimentation has been succinctly addressed by Douglas Morrison at the Fourth International Conference on Cold Fusion Technology, (ICCF-4) held Dec. 6-9, 1993 in Hawaii,¹⁸ see pages 6-7 which states:

"[T] he previous speaker, Dr. H. Fox, giving he said, a business man's point of view, declared he expected a working Cold Fusion device in TWENTY YEARS.

November 1993. Dr. S. Pons said that by the year 2000 there should be a household power plant - SIX YEARS.

1992. Dr. M. Fleischmann said a 10 to 20 Kilowatt power plant should be operational in ONE YEAR.

July 1989. The Deseret News published an article by Jo-Ann Jacobsen-Wells who interviewed Dr. S. Pons. There is a photograph in colour, of Dr. Pons beside an simple apparatus with two tubes, one for cold water in and one for hot water out. This working unit based on Cold Fusion was described as; " 'It couldn't take care of the family's electrical needs, but it certainly could provide them with hot water year-round' said Pons".

Later in the article it was written "Simply put, in its current state, it could provide boiling water for a cup of tea". Time delay to this working model - ZERO YEARS.

Thus it appears that as time passes, the delay to realisation of a working model increases.

Conclusion

20. The Examiner has cited documents showing how easily experimental data can be misinterpreted in cold fusion systems. The general scientific community does not consider cold fusion systems real, valid or operative. Since Fleischman and Pons' 1989

¹⁸ Morrison, "Review of Progress in Cold Fusion," Dec. 1993 available at <http://newenergytimes.com/v2/archives/DROM/cfu9a.shtml> (last accessed 18 December 2015).

announcement, there has been a continuing stream of publications demonstrating that virtually none the "cold fusion" claims are valid.¹⁹ The cited references provide clear evidence that no excess heat is generated in such "cold fusion" systems nor is there any evidence of nuclear fusion.

21. The disclosure must enable a person skilled in the art to practice the invention without having to incorporate element not readily available in the art.²⁰ The Examiner has set forth a reasonable and sufficient basis for challenging the adequacy of the disclosure. The statute requires the application itself to inform, not to direct others to find out for themselves.^{21,22} Accordingly, the specification is inadequate.

Claim Rejections - 35 USC § 101

Claim Rejections - 35 USC § 112

22. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

23. Claims 1-17, 19-26, 28-36, 39-48 are rejected under 35 U.S.C. 101 because the claimed invention is not supported by either an operative utility or a well-established utility. The reasons for this rejection are the same as the above.

¹⁹ See Ewing, et al., "A sensitive Multi-detector Neutron counter used to monitor "Cold Fusion" Experiments in an Underground Laboratory: Negative Results and Positive Artifacts", IEEE Transactions on Nuclear Science, vol. 37, no. 3, June 1990, pages 1165-1170; Albagli, *supra* n. 13; Balke, et al., "Limits on Neutron Emission from 'Cold Fusion' in Metal Hydride," Physical Review C, Vol. 42, No. 1, July 1990; Huizenga, *supra* n. 9; Huizenga, *supra* n. 15; Huizenga, "New Developments in the Cold Fusion Saga", Abstracts of Papers of the American Chemical Society, vol. 207, March 13, 1994, page 6; Rogers, et al, "Cold Fusion Reaction Products and Their Measurement", Journal of Fusion Energy, vol. 9, no. 4, 1990, pages 483-485.

²⁰ *In re Hirsch*, 295 F.2d 251 (C.C.P.A. 1961).

²¹ *In re Gardner et al.*, 99 F.2d 767 (C.C.P.A. 1938).

²² *In re Scarbrough*, 182 U.S.P.Q. 298 (C.C.P.A. 1974).

Claim 1 is further rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The claim(s) does/do not fall within at least one of the four categories of patent eligible subject matter because the claim only directs exposing deuterium to graphene. Even if there were a credible assertion of operability, such an operation would be apparent in nature as both graphene and deuterium are both naturally occurring.

24. Claims 1-17, 19-26, 28-36, 39-48 are also rejected under 35 U.S.C. 112(a) or pre-AIA 35 U.S.C. 112, first paragraph. Specifically, because the claimed invention is not supported by either an operative asserted utility or a well-established utility for the reasons set forth above, one skilled in the art clearly would not know how to use the claimed invention.

Claim Rejections - 35 USC § 102

25. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

26. The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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27. Claims 1, 3-5, 13-15, 18, 19, 21, 25, 27-33, 35-40, and 42-45 are rejected under pre-AIA 35 U.S.C. 102(b) as being anticipated by Hagelstein (US PG-Pub. No. 2009/0086877).

28. Regarding claims 1, 28, and 39, Hagelstein teaches a method of generating ^4He atoms and energy, said method (Paragraph [0153]) comprising: contacting fullerene-based materials, which read on graphene, with a source of deuterium (Paragraph [0322]) for a time sufficient to generate a plurality of non-ionizing He-4 atoms (Paragraph [0153]) and energy (Paragraph [0274]).

29. Regarding claims 3, 30 and 40, Hagelstein teaches fullerene-based or graphene materials including "cage-like, hollow molecules" of "hexagonal and pentagonal groups of atoms, e.g., those formed from carbon." (Paragraph [0322]). Hagelstein further specifies these materials to include carbon nanotubes and buckyballs. (Paragraph [0322]).

30. Regarding claims 4, 31 and 42, Hagelstein teaches the use of deuterium gas (Paragraph [0325]). Hagelstein additionally teaches the use of a condensed form of deuterium, such as a liquid (Paragraph [0332]).

31. Regarding claims 5 and 32, Hagelstein teaches the decontamination of the surface of a material prior to deuterium loading by a treatment that includes raising the temperature of the material (Paragraph [0267]).

32. Regarding claims 13-15, Hagelstein teaches the method of Claim 1, which would yield the same results claimed by applicant in Claims 13 - 15. Accordingly, Hagelstein reads on these claims.

33. Regarding claim 19, Hagelstein teaches a method of generating non-ionizing radiation in the form of He-4 atoms (Paragraph [0153]) comprising: providing graphene materials in a sealable vessel (Paragraph [0261]; Fig. 17g). Hagelstein further teaches the evacuation of such a vessel (Paragraph [0353]) and adding deuterium gas to said vessel (Paragraph [0153]). Additionally, Hagelstein performing at least one heating step that further increases pressure inside the vessel (Paragraph [0261]), cooling said vessel (Paragraph [0332]), and placing the graphene materials in said vessel at room temperature or below for a time sufficient to generate non-ionizing radiation, Helium-4 atoms, or both (Paragraph [0100]).

34. Regarding claim 21, Hagelstein teaches heating the graphene materials prior to adding deuterium gas (Paragraph [0396]).

35. Regarding claim 25, Hagelstein teaches the generation of microwaves or radio frequency energy (Paragraph [0346]).

36. Regarding claims 37 and 38, Hagelstein teaches the generation of phonons within graphene material (Paragraph [0068]). Hagelstein further teaches the process generating 23.8 MeV of energy (Paragraph [0276]).

37. Regarding claim 29, Hagelstein teaches the generation of microwaves or radio frequency energy (Paragraph [0346]).

38. Regarding claim 33, Hagelstein teaches heating a fullerene-based material (Paragraphs [0324],[0325]), such as a carbon nanotube (Paragraph [0322]). Hagelstein additionally teaches the method of heating such materials prior to aging at a

temperature and for a time sufficient to promote absorption of the deuterium into or onto the carbon nanotubes (Paragraph [0326]).

39. Regarding claims 35 and 36, Hagelstein teaches the method of Claim 28, which would yield the same results claimed by applicant in Claims 35 and 36. Accordingly, Hagelstein reads on these claims.

40. Regarding claims 43-45, Hagelstein teaches a method of producing energy (Para. [0274]) comprising: introducing a gas consisting essentially of O₂ (Para. [0326]) to a material consisting essentially of carbon nanotubes (Para. [0326]) at an elevated pressure (Para. [0326]); and generating non-ionizing energy (Para. [0153]) and energy (Para. [0274]).

Claim Rejections - 35 USC § 103

41. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

42. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

43. Claims 2, 11, 12, 16, 17, 20, 24, 26 and 43 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hagelstein (US PG-Pub. No. 2009/0086877), in view of case law.

44. Regarding claims 2, 11 and 12, Hagelstein teaches the generation of Helium-4, via contacting deuterium and another material, at low temperature, such as room temperature [0100]. Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. See *In re Aller*, 220 F.2d 454, 456 (CCPA 1955) (holding a claimed process performed at a temperature between 40 degrees Celsius and 80 degrees Celsius and an acid concentration between 25% and 70% was prima facie obvious over a reference process differing from the claims only in that it was performed at a temperature of 100 degrees Celsius and acid concentration of 10%); *In re Hoeschele*, 406 F.2d 1403 (CCPA 1969) (where the Court determined that claimed elastomeric polyurethanes which fell within the broad scope of the references were held to be unpatentable there over because, among other reasons, there was no evidence of the criticality of the claimed ranges of molecular weight or proportions); M P E P 2144.05.11.A. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have generated the Helium-4 at room temperature, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. Accordingly, Claim 2 is obvious.

45. Regarding claims 16 and 17, Hagelstein teaches fullerene material in the presence of a deuterium source for 8 hours, falling within the ranges of 30 minutes to 48 hours, as claimed in Claim 16, and 1 to 18 hours, as claimed in Claim 17 (Paragraphs [0324], [0325]). This teaching of Hagelstein reads on both Claims 16 and 17, because

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prior art teaching a value within, overlapping, or touching a claimed range, anticipates if the prior art range does not substantially deviate from the claimed range. See *Perricone v. Medicis Pharmaceutical Corp.*, 77 USPQ 1321, 1327 (Fed. Cir. 2005) (where anticipation was found despite the fact that prior art range was not identical to claimed ranges).

46. Regarding claim 20, Hagelstein teaches the method of Claim 19, as discussed above. Hagelstein does not teach that the He-4 is generated in an amount of at least ten He-4 atoms per hour per microgram of said graphene materials at 0 degrees Celsius. As set forth in response to Claims 2, 11 and 12, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. See *In re Aller*, 220 F. 2d at 456.

47. Regarding claim 24, Hagelstein teaches the generation of Helium-4 at low temperature, such as room temperature [0100]. As set forth in response to Claims 2, 11 and 12, difference in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. See *In re Aller*, 220 F. 2d 454 at 456.

48. Regarding claim 26, Hagelstein teaches the graphene materials placed in the source of deuterium for 8 hours, falling within the claimed range of 1-18 hours. For the reasons set forth above in response to Claims 16 and 17, Claim 26 is obvious.

49. Regarding claim 43, Hagelstein does not explicitly mention a gas consisting essentially of D₂O, but does explicitly teach deuterium gas, as discussed above. It

would have been obvious to one having ordinary skill in the art at the time the invention was made to have implemented a gas containing a significant amount of deuterium for the predictable purpose of providing contact between elements commonly used in cold fusion research experiments.

50. Regarding claims 6, 9, 10 and 22 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hagelstein (US PG-Pub. No. 2009/0086877), in view of Smalley (US PG-Pub. No. 2002/0127171).

51. Regarding claim 6, although Hagelstein teaches the decontamination of the surface of a material, it does not teach the removal of unwanted materials specifically comprising water, hydroxide, hydrogen, protium, polymers, oils, amorphous carbon, oxygen, solvents, acids, bases and combinations thereof. Smalley discloses the purification of carbon nanotubes for the purpose of removing contaminants, such as amorphous carbon (Paragraphs [0034], [0035]). It would have been obvious to one having ordinary skill in the art at the time of the invention to have implemented the method disclosed in Smalley in conjunction with the invention disclosed in Hagelstein for the predictable result of removing impurities from the carbon nanotube material.

52. Regarding claims 9 and 10, Smalley discloses heating carbon nanotubes at 200 degrees Celsius, falling within the claimed range of 30 to 300 degrees Celsius that applicant defines as sufficient to promote absorption of the deuterium into or onto the carbon nanotubes (Paragraph [0035]). Thus, it would have been obvious to one having ordinary skill in the art at the time of the invention to have combined the method of

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cleaning the nanotubes disclosed in Smalley with the invention of Hagelstein for the predictable result of removing impurities from the carbon nanotube material.

53. Regarding claim 22, Hagelstein does not specifically teach heating the graphene materials in a sealed chamber and at a temperature to bake-out unwanted materials, comprising evacuating the sealed container to remove unwanted materials therefrom; however, Smalley teaches the purification of carbon nanotubes (Paragraphs [0034], [0035]), thereafter evacuating the sealed chamber (Paragraph [0037]).

54. Because Hagelstein teaches cleaning the graphene material and Smalley discloses a method of doing such, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the method of cleaning disclosed by Smalley as the cleaning method of Hagelstein to yield the predictable result of purifying the graphene material.

55. Claims 7, 8 and 23 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hagelstein (US PG-Pub. No. 2009/0086877), in view of Smalley (US PG-Pub. No. 2002/0127171), and further in view of case law.

56. Regarding claims 7 and 8, Smalley discloses the conditions for purification of the carbon nanotubes comprising a temperature of 200 to 500 degrees Celsius and a time from 1 to 5 hours, contemplating a longer time period, in the range of 15 to 20 hours (Paragraph [0035]). The disclosure in Smalley reads on both Claim 7 and Claim 8 of the present application because prior art teaching a range within, overlapping, or touching a claimed range, anticipates if the prior art range does not substantially deviate from the claimed range. See *Perricone v. Medicis Pharmaceutical Corp.* , 77 USPQ 1321, 1327

(Fed. Cir. 2005) (where anticipation was found despite the fact that prior art range was not identical to claimed ranges).

57. Regarding claim 23, Hagelstein does not teach heating the graphene at a temperature ranging from 50-500 degrees Celsius for a time ranging from 20 minutes to 6 hours. Smalley discloses heating carbon nanotubes at a temperature of 200-500 degrees Celsius for 1 to 5 hours (Paragraph [0035]). The disclosure in Smalley reads on Claim 23 because prior art teaching a range within, overlapping, or touching a claimed range, anticipates if the prior art range does not substantially deviate from the claimed range. See *Perricone v. Medicis Pharmaceutical Corp.*, 77 USPQ 1321 at 1327.

58. Claims 13, 34 and 41 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hagelstein (US PG-Pub. No. 2009/0086877), in view of Maldonado et al. (US PG-Pub. No. 2007/0275160).

59. Regarding claim 13, Hagelstein teaches the use of heterofullerenes (Paragraph [0326]), but does not specifically mention doping with Nitrogen; however, Maldonado discloses nitrogen-doped carbon nanostructures (Paragraph [0008]). It would have been obvious to one having ordinary skill in the art at the time of the invention to have implemented the nitrogen-doped carbon nanotube of Maldonado as the heterofullerene taught by Hagelstein to achieve the same high stability at high pressure taught by Hagelstein (Paragraph [0326]).

60. Regarding claim 34, Hagelstein does not teach carbon nanotubes doped with nitrogen; however Maldonado discloses nitrogen-doped carbon nanostructures, as

discussed in response to Claim 13. For the reasons stated in response to Claim 13, Claim 34 is obvious.

61. Regarding claim 41, Hagelstein does not teach grapheme materials including nitrogen; however Maldonado discloses nitrogen-doped carbon nanostructures, as discussed in response to Claim 13. Accordingly, Claim 41 is obvious.

62. Claim 43 is rejected under pre-AIA U.S.C. 103(a) as being unpatentable over Melechko (A.V. Melechko et al., Vertically aligned carbon nanofibers and related structures: Controlled synthesis and directed assembly, J. of App. Phys., 97 P. 1-37 (2005)).

63. Regarding claim 43, Melechko teaches a method of contacting hydrogen and carbon nanotubes (Abs.) and applying pressure thereto (P. 5). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have combined heavy water and carbon nanotubes under pressure as carbon nanotubes are well-known in the art for their hydrogen storage properties (Abs.).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SEAN P. BURKE whose telephone number is (571)270-5493. The examiner can normally be reached on Monday-Friday, 10:00 AM to 6:30 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on (571) 262-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 3646

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/SEAN P BURKE/
Examiner, Art Unit 3646

Notice of References Cited	Application/Control No. 13/089,986	Applicant(s)/Patent Under Reexamination COOPER ET AL.	
	Examiner SEAN P. BURKE	Art Unit 3646	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
	A	US-				
	B	US-				
	C	US-				
	D	US-				
	E	US-				
	F	US-				
	G	US-				
	H	US-				
	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				


FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS


*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	Examiner's Appendix on Lattice-Assisted (Cold) Fusion
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

<i>Index of Claims</i> 	Application/Control No. 13089986	Applicant(s)/Patent Under Reexamination COOPER ET AL.
	Examiner Sean Burke	Art Unit 4187


✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant		<input type="checkbox"/> CPA		<input type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47			
CLAIM		DATE							
Final	Original	11/27/2013	06/30/2014	01/07/2016					
	1	✓	✓	✓					
	2	✓	✓	✓					
	3	✓	✓	✓					
	4	✓	✓	✓					
	5	✓	✓	✓					
	6	✓	✓	✓					
	7	✓	✓	✓					
	8	✓	✓	✓					
	9	✓	✓	✓					
	10	✓	✓	✓					
	11	✓	✓	✓					
	12	✓	✓	✓					
	13	✓	✓	✓					
	14	✓	✓	✓					
	15	✓	✓	✓					
	16	✓	✓	✓					
	17	✓	✓	✓					
	18	✓	✓	-					
	19	✓	✓	✓					
	20	✓	✓	✓					
	21	✓	✓	✓					
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	24	✓	✓	✓					
	25	✓	✓	✓					
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	27	✓	✓	-					
	28	✓	✓	✓					
	29	✓	✓	✓					
	30	✓	✓	✓					
	31	✓	✓	✓					
	32	✓	✓	✓					
	33	✓	✓	✓					
	34	✓	✓	✓					
	35	✓	✓	✓					
	36	✓	✓	✓					

<p align="center"><i>Index of Claims</i></p> 	Application/Control No. 13089986	Applicant(s)/Patent Under Reexamination COOPER ET AL.
	Examiner Sean Burke	Art Unit 4187

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
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<input type="checkbox"/> Claims renumbered in the same order as presented by applicant		<input type="checkbox"/> CPA		<input type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47			
CLAIM		DATE							
Final	Original	11/27/2013	06/30/2014	01/07/2016					
	37	✓	✓	-					
	38	✓	✓	-					
	39	✓	✓	✓					
	40	✓	✓	✓					
	41	✓	✓	✓					
	42	✓	✓	✓					
	43		✓	✓					
	44		✓	✓					
	45		✓	✓					
	46			✓					
	47			✓					
	48			✓					

Search Notes 	Application/Control No. 13089986	Applicant(s)/Patent Under Reexamination COOPER ET AL.
	Examiner Sean Burke	Art Unit 3646

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
376	100 - as limited by text, see attached EAST Search History	12/9/2013	KEC

SEARCH NOTES		
Search Notes	Date	Examiner
Consulted with S. Burke and M. O'Connor regarding search terms	12/9/2013	KEC
Inventor search in EAST/PALM - See attached EAST Search History	12/9/2013	KEC
NPL search using google scholar with keywords such as "graphene" "hydrogen" "deuterium" "fusion"	12/9/2013	KEC
Refreshed prior search	1/7/2016	SPB

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

/SEAN P BURKE/ Examiner.Art Unit 3646	
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PATENT
Customer No. 117724
Attorney Docket No. DE-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)	
)	
Christopher H. Cooper et. al.	)	Group Art Unit: 4187
)	
Application No.: 13/089,986	)	Examiner: Kimberly Coghill
)	
Filed: April 19, 2011)	
	)	Confirmation No.: 1497
For: METHOD OF GENERATING)	
ENERGY AND ⁴ He USING THREE)	
DIMENSIONAL)	
NANOSTRUCTURED CARBON)	
MATERIALS [As Amended])	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

TRANSMITTAL OF DECLARATION UNDER 37CFR 1.132

On August 10, 2015 Applicants filed a Request for Continuing Examination (RCE), an appropriate Petition for Extension of Time, and an Amendment. On August 24, 2015 Applicants filed a Declaration of James Loan under 37 CFR 1.132 ("the First Loan Declaration") setting out facts material to the issues raised in the Examiner's rejections of this application.

Filed herewith is a second Declaration of James Loan under 37 CFR 1.132 ("the Second Loan Declaration") setting out additional facts that are material to the Examiner's previous rejections of this application.

REMARKS

In the Final Rejection the Examiner asserted that the claims of this application contain subject matter which is not described in such a way that one of ordinary skill in the art could make and/or use the invention. The Second Loan Declaration makes it clear that proof of a nuclear reaction is well within the ability of one of ordinary skill. Specifically, a commercially available radiation detector was placed in proximity to one of the same samples first made in 2005 and described in Paragraphs 17-24 of the First Loan Declaration. As the results of Paragraphs 7 and 8 of the Second Loan Declaration describe, that sample is still emitting radiation ten years after the CNTs and D₂O were mixed.

If the Examiner maintains the rejection of this application based on the allegation that the examples are not adequate, the Examiner is requested to specifically describe what complexity would prevent one of ordinary skill in the art from mixing CNTs and D₂O and then use a commercially available radiation detector to measure the radiation being emitted from the mixture.

As stated in the Second Loan Declaration “one of ordinary skill could repeat the experiments described in paragraphs 17-24 of the First Loan Declaration and obtain similar results.” Paragraph 9.

The Examiner’s position is circular and unsupported. It is the Examiners position that the examples cannot be adequate because they are in conflict with “known science” and are unsubstantiated. But Applicants do not control what those in science choose to substantiate and what they choose to ignore. Given the treatment of scientists who address low energy nuclear reactions (professional name calling and disrespect) by those

who believe it is unproven, it is understandable why a scientist would not choose to do work to substantiate the work of others in such a controversial field of science. The fact others may choose not to duplicate Applicants work does not prove that Applicants have failed to disclose an operable invention. Recognition of operability is not the same as operability. The former is a state of mind, the latter is demonstrable fact.

Moreover, the Examiner ignores the substantiating work of others having no agenda to prove or disprove “cold fusion” or “low energy nuclear reactions.” It is a fact substantiated by the work reported in “Visible-Light-Induced Water Splitting in Channels of Carbon Nanotubes,” J. Phys. Chem. B, 2006, 110, 1571-75 that energy and transmutation byproducts of ^4He and ^3T are produced when carbon nanotubes (but not graphite) are combined with deuterium. See Fig. 2(b) *id.* This document is of record in this application.

Applicants have demonstrated that the work described in paragraphs 17-24 of the First Loan Declaration is completely described, technically sufficient and would, therefore, allow one skilled in the art to duplicate the examples and practice the invention claimed without undue experimentation, Paragraph 9 of the Second Loan Declaration.

In addition, the Examiner has asserted that the results in the patent application (the examples) are not credible because they “directly contradict accepted science.” Final Rejection, Page 5. The results have been substantiated in the Second Loan Declaration filed herewith. See Paragraphs 6-9 of the Second Loan Declaration.

While such results may not comport with the Examiner’s understanding of nuclear physics, responding to the Second Loan Declaration by calling the Declarant a “pseudoscientist” or equating his work with sightings of “Bigfoot” is unacceptable. If the

substantiated facts contradict modern nuclear science, it is modern nuclear science that must change to comport with observed facts.

Applicants have measured energy (radiation) emanating from a sample ten years after it was prepared. It is the burden of the Examiner to demonstrate why that FACT does not support the existence of a nuclear reaction when carbon nanotubes and deuterium are combined.

Conclusion

Applicants have shown by technically sound examples, in the application itself and with supporting examples in the Loan Declarations, that the invention can be practiced by one of ordinary skill without undue experimentation.

Applicants have shown that some type of nuclear reaction is taking place when deuterium and carbon nanotubes are combined.

The Applicants request that the previously advanced rejections of the application be withdrawn and the application be allowed.

Respectfully submitted,

Dated: October 6, 2015

By: /s/ Stephen L. Peterson
Stephen L. Peterson
Reg. No. 26,325
(805) 365-3012

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)	
)	
Christopher H. Cooper et. al.	)	Group Art Unit: 4187
)	
Application No.: 13/089,986	)	Examiner: Kimberly Coghill
)	
Filed: April 19, 2011)	
	)	Confirmation No.: 1497
For: METHOD OF GENERATING)	
ENERGY AND ⁴ He USING THREE)	
DIMENSIONAL)	
NANOSTRUCTURED CARBON)	
MATERIALS [As Amended])	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

DECLARATION OF JAMES LOAN UNDER 37CFR 1.132

I, James Loan, hereby declare as follows:

1. I am the same James Loan that filed a Declaration under 37 CFR 1.132 in connection with this application on August 23, 2015 ("the August Declaration").
2. In the August Declaration Paragraphs 17 through 24 describe work I personally conducted in 2005 while I was at Seldon.
3. After the work of Paragraphs 17 through 24 was conducted the two samples (mixtures of carbon nanotubes and D₂O) were retained. When I left Seldon on

or about April 2008 I had already moved one of the samples to my personal laboratory.

4. I have been in possession of this sample continuously since 2005 and it is in my possession as of the signing of this Declaration.
5. As noted in Paragraphs 21 through 23 of the August Declaration, radiation was being emitted from the samples when the work described in Paragraphs 17 through 24 of the August Declaration was done. After that work was completed the samples were isolated and shielded because they continued to emit some type of radiation.
6. On September 11, 2015 I obtained a S.E. Inspector USB Geiger Counter Digital Handheld Nuclear Radiation Monitor to determine if the samples of paragraph 5 were still emitting radiation. This detector can detect alpha, beta, gamma, and x-rays but it cannot differentiate between them. It does not detect neutrons.
7. From September 20, 2015 to September 25, 2015 I exposed a sample retained from my work in 2005 (referred to here as Sample A) to the radiation monitor identified in paragraph 6. In the table on the next page the "Bin Count" reflects the magnitude of the energy produced. The column labeled Sample A is the data in counts per minute when the detector was ~30 centimeters from the sample for 10 minutes. The Background measurement was taken before the Sample A run, about 12 feet from Sample A with six feet of intervening brick wall. The data from the September 20-25 run is set out in the table on the next page.

Paragraph 7 continued:

Bin count, Magnitude	Sample A (counts/min.)	Background (counts/min.)
180	1	0
150	5	2
120	19	11
90	50	38
60	125	128
30	217	243
26	0	4
24	0	3
20	0	3
18	0	3
0	216	202

8. On September 25, 2015 I continued to make measurements on Sample A. Again the Bin Count represents the magnitude of the radiation detected. Sample A is the data in counts per minute when the detector was ~3 centimeters from Sample A for 40 minutes. The Background measurement was taken before the Sample A measurement, again about 12 feet from Sample A with six feet of intervening brick wall. The data from the September 25 run is set out below:

Bin count, Magnitude	Sample A (counts/min.)	Background (counts/min.)
270	1	0
210	1	0
180	7	0
150	38	2
120	34	44
90	500	124

9. The work described above involved merely placing a commercially available radiation detector in proximity to a sample (made in 2005) and recording

measurements. The sample was made (in 2005) by merely mixing D₂O with carbon nanotubes (CNTs). It is my opinion that the work could be repeated by anyone of ordinary skill in any technical field and the similar results obtained without undue experimentation. By “similar results” I mean that radiation would be detected, not that the data would be the same.

10. Based on the work described in Paragraphs 17 through 24 of the August Declaration, the work described in Paragraphs 6 through 8 above, and my background and experience in this technology, it is my conclusion that the examples in the present application could be repeated by anyone of ordinary skill in any technical field and that similar results be obtained without undue experimentation.

11. Based on the work described in Paragraphs 17 through 24 of the August Declaration, the work described in Paragraphs 6 through 8 above, and my background and experience in this technology, it is my conclusion that, because the samples prepared in 2005 are still emitting radiation above measured background radiation ten years after their preparation, there is clear evidence that some type of nuclear reaction takes place when D₂O and CNTs are combined.

12. I have read the Examiner’s assertion that the results in the patent application are “unsubstantiated by and contradictory toward modern nuclear science.”

13. Based on the **substantiated** facts that:

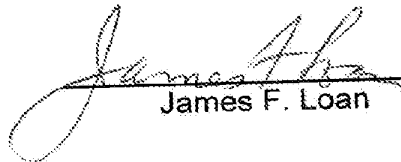
- a) Four different types of tests set out in the August Declaration show evidence of a nuclear reaction; and

b) One of the samples referred to in Paragraphs 17 through 24 (Sample A) of the August Declaration is still emitting measurable radiation above background **ten years after their preparation**, as shown in the data of Paragraphs 7 and 8 of this Second Loan Declaration, the existence of some kind of nuclear reaction in the samples has been "substantiated."

14. If the data from such measurements is "contrary toward nuclear science," as the Examiner alleged, then nuclear science must change to explain this clear proof of a nuclear reaction.

15. I declare under penalty of perjury that the foregoing is true and correct. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true. I further declare that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of title 18 of the United States Code.

Dated: October 2, 2015


James F. Loan

Electronic Acknowledgement Receipt

EFS ID:	23706320
Application Number:	13089986
International Application Number:	
Confirmation Number:	1497
Title of Invention:	METHOD OF GENERATING ENERGY AND 4HE USING THREE DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS
First Named Inventor/Applicant Name:	Christopher H. Cooper
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1	Miscellaneous Incoming Letter	transloandec2.pdf	90487 66d0cccd23ad16a03259e06238a63cdf9e596606ef	no	4

Warnings:

Information:

2	Affidavit-traversing rejectns or objectns rule 132	loan132dec2.pdf	946539 db69ca3928dd0d04bc091d8a5ed55f1ee19 aca7c	no	5
Warnings:					
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PATENT
Customer No. 117724
Attorney Docket No. DE-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)	
)	
Christopher H. Cooper et. al.	)	Group Art Unit: 4187
)	
Application No.: 13/089,986	)	Examiner: Kimberly Coghill
)	
Filed: April 19, 2011)	
	)	Confirmation No.: 1497
For: METHOD OF GENERATING)	
ENERGY AND ⁴ He USING THREE)	
DIMENSIONAL)	
NANOSTRUCTURED CARBON)	
MATERIALS [As Amended])	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

TRANSMITTAL OF DECLARATION UNDER 37CFR 1.132

On August 10, 2015 Applicants filed a Request for Extension of time for five (5) months with the requisite fee, a Request for Continuing Examination (RCE), and an Amendment. Filed herewith is the Declaration of James Loan under 37 CFR 1.132. It sets out facts related to the development of the technology of this application that are material to the consideration of the issues raised in the Examiner's rejections of this application.

REMARKS

The Examiner asserted that the claims of this application contain subject matter which is not described in such a way that one of ordinary skill in the art could make and/or use the invention. The Declaration filed herewith (referred to as “the Loan Declaration”), after setting out the relevant background of the declarant, specifically addresses that issue in Paragraphs 12 and 13. In addition, the technical work described in Paragraphs 17 through 24 demonstrates that one with basic skills in chemistry, could practice the invention and obtain meaningful results.

The Examiner also dismissed the examples in the application as “two, fairly minimal ‘examples’ [to *prove* the mastery of ‘cold fusion’] . . . ” [italics in original]. The Examiner’s comment about “cold fusion” aside, the Loan Declaration addresses this issue concerning Example 1 in Paragraphs 32 through 41 and concludes: “one of ordinary skill in the use of vacuum systems, the properties of the various pumps used in the system, and state of the art detectors could repeat the experiments and obtains similar results.” Para. 32. He addresses that same issue with respect to Example 2 in Paragraph 42 and concludes: “one skilled in the use of state of the art CCD detectors could repeat the experiments and obtains similar results.” Para. 42.

The Examiner has not specifically identified any technical issue in the Examples that could prevent one skilled in the art from repeating the work of Examples 1 and 2. Instead the Examiner cites sources asserting the concept of “cold fusion” is outside the bounds of accepted science. Applicants have rebutted that assertion with specific evidence showing nuclear transmutation and the production of energy from the combination of CNTs and D₂O. That is sufficient to overcome this rejection because

“evidence will be sufficient if, considered as a whole, it leads a person of ordinary skill in the art to conclude that the asserted utility is more likely than not true.” M.P.E.P.

2164.07. General skepticism about new technology is not evidence.

The Loan Declaration also discloses two more specific examples of the claimed invention, one a set of experiments by the Declarant (see Para. 17-24) where radiation was detected when CNTs were mixed with D₂O. In addition, Applicants had Lawrence Livermore National Laboratories (LLNL) conduct research to determine if neutrons could be issuing from a mixture of CNTs and D₂O. The LLNL work is described in Paragraphs 25-29 of the Loan Declaration. In the final report prepared by LLNL personnel it states: “Of these, the CNT sample event of October 25, 2006 at 16:14 **provides evidence for a DD fusion source.**” (LLNL final Report P. 27, emphasis added). Applicants have demonstrated (as opposed to merely stating) that the technology disclosed is operable and that the described effect of producing energy from the combination of CNTs and deuterium is more likely than not true. The general skepticism of those physicists who believe “cold fusion” is not possible is not evidence that can outweigh specific, well conducted tests **showing** transmutation, neutron generation, and the production of energy from the combination of CNTs and D₂O.

In the Final Rejection the Examiner denigrated the substance of a U.S. Government report (DIA-08-0911-003) dated November 13, 2009, and the competence of the researchers whose work is reported therein referring to them as “scientists” and quoted an article where those working in the area of LENR are referred to as “psuedoscientists.” Final Rejection at P. 6.

The Declarant for the enclosed Declaration, James Loan, is by any measure a scientist. Dr. Lasilla, who conducted the work of Example 1 in the present application is a scientist, the Chinese authors of the cited journal article of record^{1/} showing transmutation byproducts when water with deuterium is mixed with CNTs are scientists, and those at LLNL that conducted the work were scientists. If the Examiner continues to discount the reported work of these researchers, other than by innuendo, then the Examiner should identify the shortcomings of these researchers that prevent their work from being credible. The Examiner's denigration of those finding evidence of nuclear transmutation reactions using the technology of this application as "pseudoscientists" has no basis in fact.

Actual scientists have open minds and know that current knowledge can and will be supplanted by new discoveries.

It is not the function of the Examiner to denigrate new technology and those who discover it and equate such discoveries to sightings of "Bigfoot" (Final Rejection at P. 4) or science fiction concepts like "a working teleportation system," (Final Rejection at P. 4) but to objectively assess the description of the technology and determine if it meets statutory criteria.

The Declarant has also considered the "Wands Criteria," as modified by the Examiner, and shown how they are flawed. Loan Declaration Para. 45-51.

The Declarant has read U.S. Patent Publ. 2009/0086877 (Hagelstein). He is familiar with the technology disclosed in that application and states: "no one of any level

^{1/} "Visible-Light-Induced Water-Splitting in Channels of Carbon Nanotubes," *J. Phys.Chem. B*, 110, 1571-1575.

of skill in nuclear technology, chemistry, material science, or physics reading the Hagelstein application would be taught how to combine deuterium and CNTs to produce energy.” Loan Declaration Para. 52.

Conclusion

Applicants have disclosed an operable invention with detailed, technically sound examples. Those examples show nuclear transmutation and the generation of energy and such an effect has been independently supported. The work at LLNL and the conclusion of the scientists at LLNL that “. . . the CNT sample event of October 25, 2006 at 16:14 provides evidence for a DD fusion source.” (LLNL Final Report P. 27) provides the “significant, quantitative demonstration” the Examiner asserts is necessary to refute the USPTO position that this technology is not a “viable source of energy.”

Having met every issue the Examiner set out in the Final Rejection with credible facts and irrefutable technical proof, the Applicants request reconsideration of the present application on its merits.

Respectfully submitted,

Dated: August 24, 2015

By: /s/ Stephen L. Peterson
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PATENT
Customer No. 117724
Attorney Docket No. DE-1

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MATERIALS [As Amended])	

Commissioner for Patents
P.O. Box 1450
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Commissioner:

DECLARATION OF JAMES LOAN UNDER 37CFR 1.132

I, James Loan, hereby declare as follows:

1. I am a veteran of the United States Army and a combat veteran of three tours in Vietnam. I served in B Company, 3/503rd Infantry, 173rd Airborne Brigade. I was wounded in combat and was cycled back to the United States to the 82nd Airborne Division. I remained there until 1973, until I was appointed as a technical Instructor to the Massachusetts Institute of Technology (MIT) Army ROTC detachment. While an instructor I took four years of undergraduate courses at MIT, mainly physics, calculus, chemistry. In 1977, no longer able to perform as an Infantryman due to service related injuries I was honorably

discharged from the Army as an E-6. I was accepted at Harvard for their class of 1981.

2. I placed out of most undergraduate courses due to my course work at MIT and I studied chemistry and physics, mostly at the graduate level. I worked directly with Edward M. Purcell, who shared the 1952 Nobel Prize for Physics for his independent discovery of nuclear magnetic resonance in liquids and in solids.
3. I largely worked in the Radical Gas Phase Kinetics group at Harvard. We made balloon packages for in-situ gas phase kinetics experiments in the stratosphere. In connection with that work we made stratosphere-emulating ground systems that were wholly dependent on enormous vacuum systems rated at 9000 cubic meters/hour. This work culminated with working on a set of four 48 inch diameter high-vacuum diffusion pumps designed to create a vacuum that would let helium atoms (^3He and ^4He) self-cluster. As such, I am familiar with helium chemistry. That work was also my introduction to "residual gas analyzers" ("RGAs"). I received an AB in Chemistry from Harvard in 1981.
4. About six months prior to graduation, I was hired by Northrop Corporation to work on the guidance system for what was then the MX missile. This involved the synthesis of a specific fluid compound for the gyroscope, and the design and implementation of new vacuum processes, and their control in manufacturing, often using custom-made RGA's. I was involved in the nuclear shock tube testing of the functioning gyroscope and IMU, and ended up with a

- well-grounded and working knowledge of neutron capture, gamma radiation measurement and effects, and their mitigation for the guidance system.
5. Northrop encouraged (and funded) off site technical work for some of its employees. Given my vacuum and RGA backgrounds, and the fact that I developed a very high energy nitrogen laser that was used as a pump for dye cell lasers, I was for years involved with the various phases of development of the laser system, and largely the vacuum systems for the various experimental lasers known as Shiva and Shiva Nova. Those lasers evolved to those used in the National Ignition Facility currently in operation at Lawrence Livermore National Laboratories (LLNL), the only operational nuclear fusion system in the United States. Through this work I became familiar with the physics of conventional nuclear fusion.
 6. I have used, developed, designed, and sometimes invented vacuum systems, components, sensors, and RGA's. I have implemented processes, and used RGA's as process monitors and controllers a number of projects. I have used x-ray, gamma, and neutron detectors in the testing and development of the MX, later Peacekeeper missile, and some use of same in the development of the B2.
 7. After my work at Northrop I worked in the semiconductor process equipment and controls industry solving vacuum and process monitoring problems. I have worked on an electron beam chain scission system, x-ray sensors development, ion implanters, and the development of vacuum systems that would work 24/7.

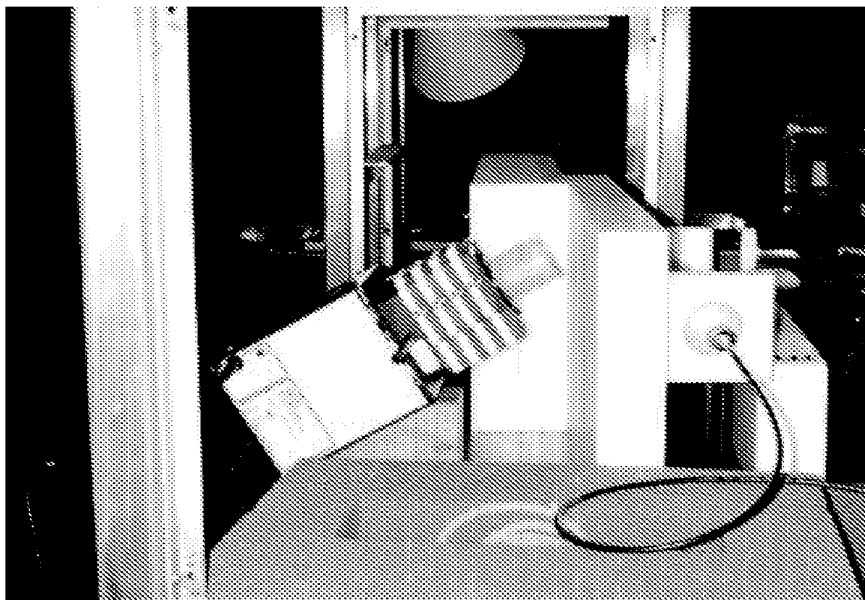
8. From there I went to work for Sony, where we designed, developed and fielded several of the largest continuous in-line vacuum coating systems in the world.
9. From there, I went to MKS instruments manufacturing, designing and developing vacuum gauging, process controllers, and RGA's used as both analytical devices and process control systems for semiconductor equipment processes.
10. I then started my own company, manufacturing vacuum process control systems and inventing the parts that didn't exist. The purpose of establishing my own company was to develop it, sell it and use the proceeds to fund development of my interests in fusion research. A purchaser was located and the sale of the company was to occur at 9 AM September 11, 2001 in Tower One of the World Trade Center. It didn't happen.
11. After taking some time to consider my options, I volunteered to help Seldon (once the owner of this Application) developing and designing processes and controls associated with producing filters using carbon nanotubes (CNTs). I worked first for no salary, just to help, and later I began working there full time. I was invited to be a partner in the company and had the title of Director of Technology. I continued to work on processes for manufacturing CNT-containing filters, but I also had the opportunity to do work out of the field of filtration.
12. I have read the specification and claims of this application. I understand that the examiner in the USPTO has asserted that the claims of this application

- contain subject matter which is not described in the specification in such a way that one of ordinary skill in the art could make and/or use the invention.
13. I have experience in the technology of this application and the examples are clear and detailed. As such, one of ordinary skill in high vacuum systems, the pumps used in such systems, and the detectors used could duplicate the results without undue experimentation. By “undue experimentation” I mean that there is sufficient technical information in the examples that one of ordinary skill in this technology could readily duplicate the results without having to solve any major technical issues.
14. As noted above I was the Director of Technology at Seldon when the technology of this application was developed. I conducted the first set of experiments that lead up to the invention of this application. But before the experiments are described, some background in carbon chemistry is necessary.
15. Carbon nanotubes (“CNTs”) have a unique structure, a diameter of about 1 nanometer (1/10,000,000 of a centimeter) and have been fabricated with length-to-diameter ratios up to 132,000,000:1. The structure of a “single-walled” CNT (SWCNT) can be conceptualized by wrapping a one-atom-thick layer of graphite called graphene into a seamless cylinder. Multiwall carbon nanotubes (“MWCNTs”) are also known and simply have multiple concentric layers of carbon in the form of tubes. In this Declaration I use the term “CNT” or “CNTs” to refer to both single walled and multiwall carbon nanotubes. Because CNTs have dimensions at the molecular level the interaction of

- CNTs with other materials is not predictable. In addition, at those dimensions, concepts like pressure and temperature are not entirely understood.
16. Because of the electronic environment created by CNTs (as a result of the electrical charges of the nucleus and electrons of the carbon atoms (and bonds between these concentric layers in the case of MWCNT's) and the interaction with other atoms and parts of atoms (electrons, protons, neutrons etc.) We wondered if deuterium¹ could be sufficiently confined inside a CNT such that some sort of nuclear or fusion reaction could take place.
17. I conducted two similar experiments to preliminarily determine if there was any reaction when D₂O and CNTs were combined. Because there was the possibility of a fusion reaction of unknown strength, the sample sizes were very small, and extensive shielding surrounded the experimental apparatus.
18. In the first experiment D₂O ("heavy water") was added to a very small amount (on the order of 10 milligrams) of a single batch of MWCNT's in two separate glass beakers. Positioned under each beaker was a piece of X-ray film. After allowing exposure overnight, both films were developed and showed X-ray and possibly neutron exposure. Both beakers with D₂O and the small amount of the MWCNT's were bubbling at room temperature, a condition we had noted with plain H₂O, but with the D₂O it appeared to be happening to a greater degree.

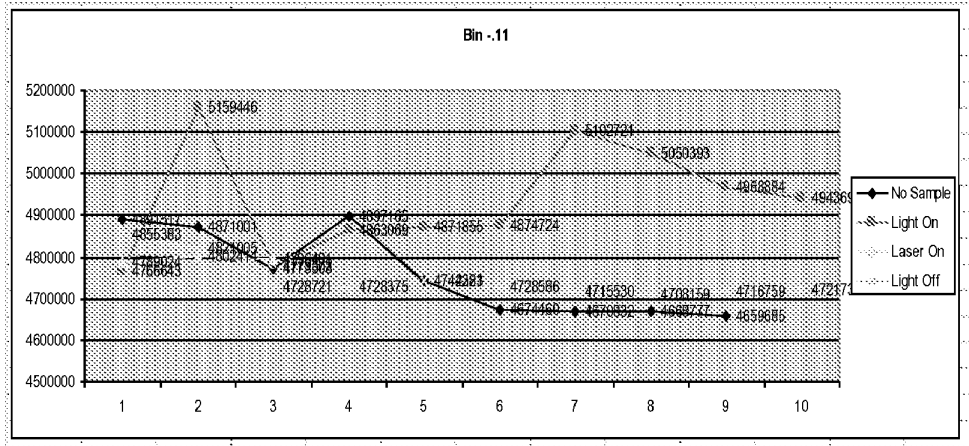
1 . Deuterium is an isotope of hydrogen. Deuterium has a nucleus of one proton and one neutron, around which orbits a single electron. Hydrogen has a single proton as the nucleus and a single orbiting electron. When deuterium is in a water molecule rather than hydrogen the molecule is called "heavy water" or D₂O.

19. In the second experiment we added another 10 ml of the same heavy water to the same beakers containing D_2O and MWCNT's from the first experiment and the beakers were inclined and rotated. In some of the experiments light from various sources was impinged on the D_2O/CNT mixture. A detector capable of detecting gamma rays and X-ray's, and a separate neutron detector monitored the output from the apparatus.
20. The apparatus that was used is shown in the photograph below.



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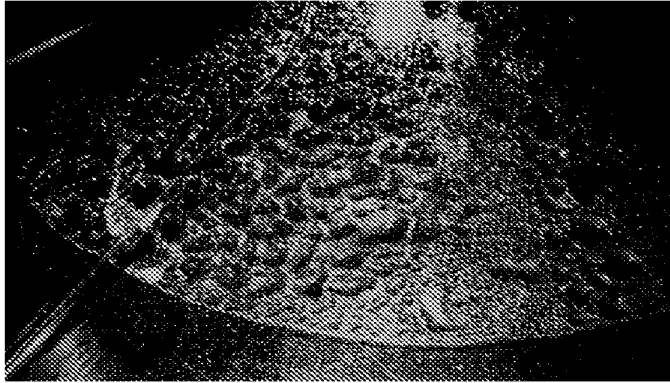
21. Irradiation of the beaker with visible light as it rotated produced measureable radiation that was captured by the detectors used and the results are depicted below.



22. The data above is the bin count in a multi-channel analyzer showing some kind of radiation being detected. The fact that the detector we used detected gamma rays, X-rays and neutrons, the fact the sample sizes were small, and the presence of the polypropylene shielding (to allow the neutrons to slow and be more detectable) prevented us from determining the exact amount and nature of any radiation produced.

23. In addition, we had shielded the operator from the apparatus with clear plastic containers of water. The picture on the next page shows the bubbles

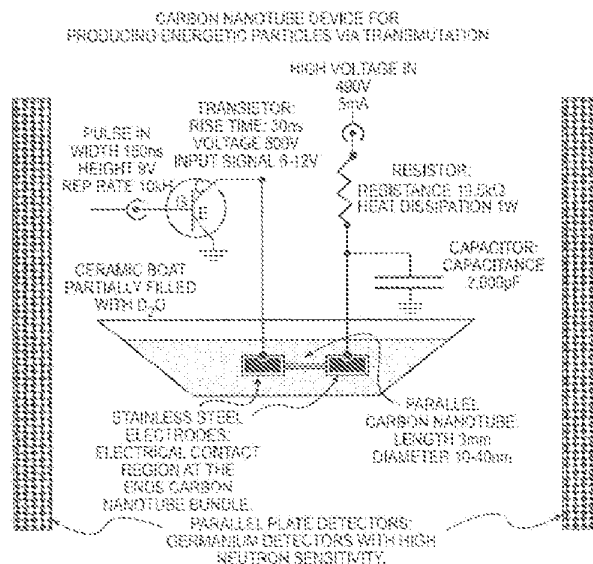
and steam produced in the shielding water after a significant energy burst.



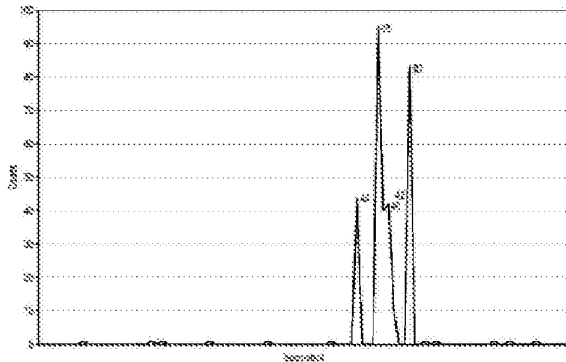
24. From this work it was determined that it was possible to generate radiation by combining deuterium in the form of “heavy water” and CNTs. Because we had limited experience with nuclear systems, and systems generating radiation, it was decided that further research should be conducted at a facility having such experience.
25. We then contracted with Lawrence Livermore National Laboratories (LLNL) to conduct further experiments. Again, a mixture of liquid D_2O and CNTs was subjected to various energy inputs to induce a fusion reaction. In this work an electrical signal was impinged on the system in an effort to induce a reaction. State of the art neutron detectors (some proprietary to LLNL) were used to determine if such a reaction took place. The neutron detectors were designed for the detection of a high neutron flux.
26. Because our funds were limited we could not do extensive, systematic research to determine how the system reacted to differing energy input. The goal of the research was primarily to determine if the reaction was producing

neutrons. We believed that if neutrons were produced it would be an unequivocal indication that some type of nuclear reaction took place.

27. I travelled to LLNL and saw the experiments being done. They were done by technically qualified LLNL personnel with technical input from me and, one of the co-inventors of this application, Christopher Cooper. A schematic representation of one experiment is set out below:



28. The experiments produced mixed results. When a high frequency signal was imposed on the system the detectors recorded what appeared to be the production of neutrons from a nuclear reaction, but there was no constant output; the output came in bursts. The figure on the next page shows counts from the neutron detectors versus time:



29. From this research we learned:

- 1) The system we were using (with electronic stimulation of a mixture of liquid heavy water and CNTs) “**provided evidence of a DD fusion source.**”²
- 2) That cosmic rays could also be responsible for some of the events being detected.
- 3) That using neutrons as the metric to determine if a nuclear reaction was taking place was not determinative when the reaction being tested does not produce neutrons in large numbers or continuously.
- 4) The use of small sample sizes (for safety reasons – we did not know how much energy per unit of D₂O or CNTs would be produced) made measurements difficult.
- 5) The use of liquid rather than gaseous D₂O (again for safety reasons) limited the rate of the reaction because a disassociation of the D₂O was needed before there could be a D-D reaction.

2. A quotation from the LLNL final report. P. 27 (emphasis added).

30. It was decided to continue the research but make two major changes. First, instead of liquid heavy water, gaseous D₂O would be used. We felt that the use of mobile gas molecules would increase the probability of the D₂O either entering a CNT or interacting with its surface. Second, instead of trying to detect neutrons the system would be designed to detect helium gas, an unequivocal byproduct of nuclear fusion.
31. This work was done in the laboratories of David Lassila of Bend Oregon. It is my understanding that he has a PhD with an expertise in the area of vacuum systems and the reaction of hydrogen with solid materials, specifically metal hydrides. I participated in the review of the basic experimental design, the selection of the equipment to be used in the experiment, and provided many of the vacuum sensors and components from my own personal supplies.
32. I have read the description of that work in this patent application found in Paragraphs [0059] – [0078]. In my judgment, one of ordinary skill in the use of vacuum systems, the properties of the various pumps used in the system, and state of the art detectors could repeat the experiments and obtains similar results.
33. The basic approach of the experiments was to evacuate all gases from a high vacuum system, connect a tube containing gaseous D₂O and CNTs, pump any gases in the system using pumps with intrinsic gas type differentiating characteristics through a detector that in effect detects gases by their atomic weight.³ By monitoring the output of the detector the

3. In fact, it differentiates gases by ionizing them and then detecting their charge to mass ratios.

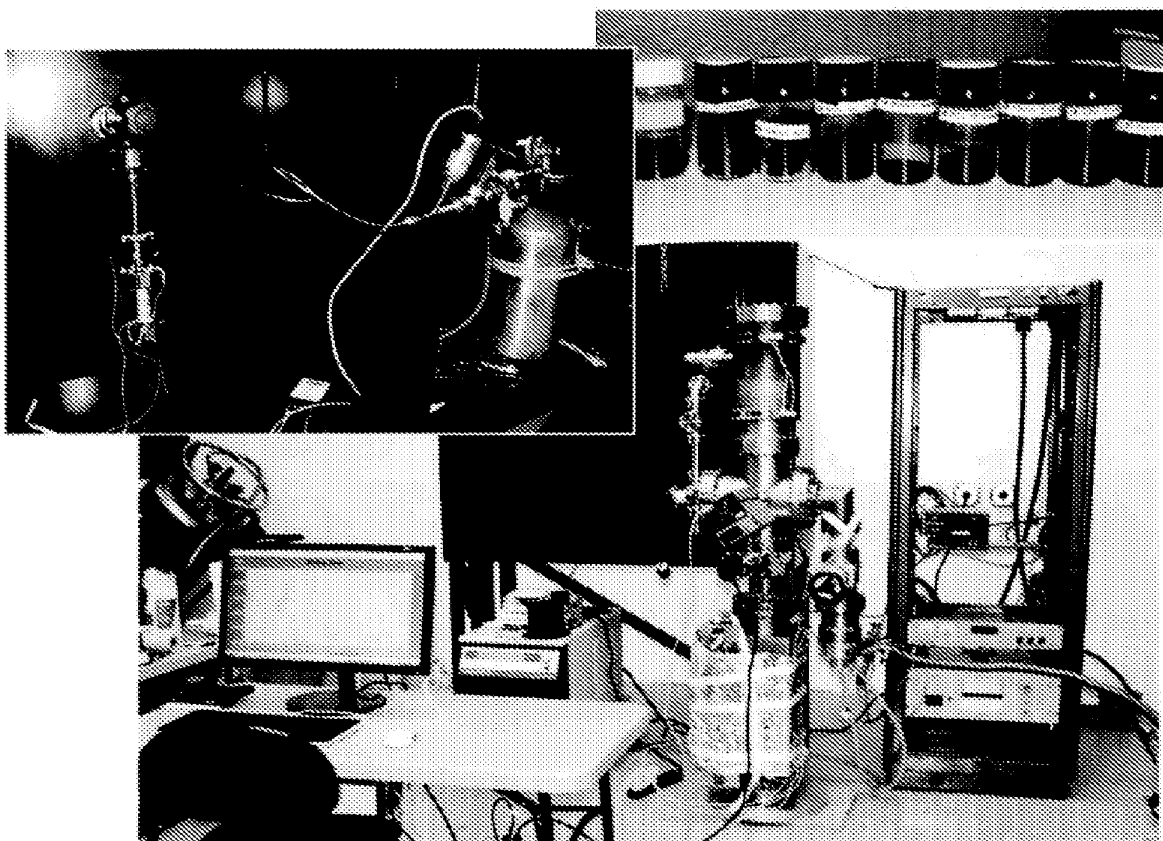
composition of any gases produced by the combination of D₂O and CNTs was determined.

34. I am very familiar with the type of detector used in this work and, while the RGA detector we used not have the resolution to distinguish between ⁴He and ²D because they have molecular weights very close to one another (approximately 4.002602 vs. 4.027106 AMU, respectively), we used differentiating gas type specific pumping in our experiment to detect the presence of ⁴He in the post-reaction gases.
35. There were four different vacuum pumps that had different but complementary pumping characteristics. One pump was water vapor specific. One pump pumped all gases approximately equally well; one pump was only effective with reactive gases (like D₂O and D, H₂O and H, DO, DHO, HO and O); and one pump was primarily effective with inert gases. The system was designed so that only gases that were inert were exposed to the RGA detector. Stated another way, any reactive gases would have been removed from the system by the titanium sublimation pump before the gases were exposed to the RGA detector. ²D is reactive, while ⁴He is an inert gas and is therefore non-reactive. The gas with 4 AMU in the post-reaction gases detected by the RGA detector could not reasonably be ²D because any ²D in those gases would have been previously removed. The only element having a mass near 4 AMU that is inert is ⁴He. Thus, I am confident that the system that was used, as it is described in this patent application had an extremely

high expectation of only ^4He as a reaction by product of combining gaseous D_2O and CNTs.

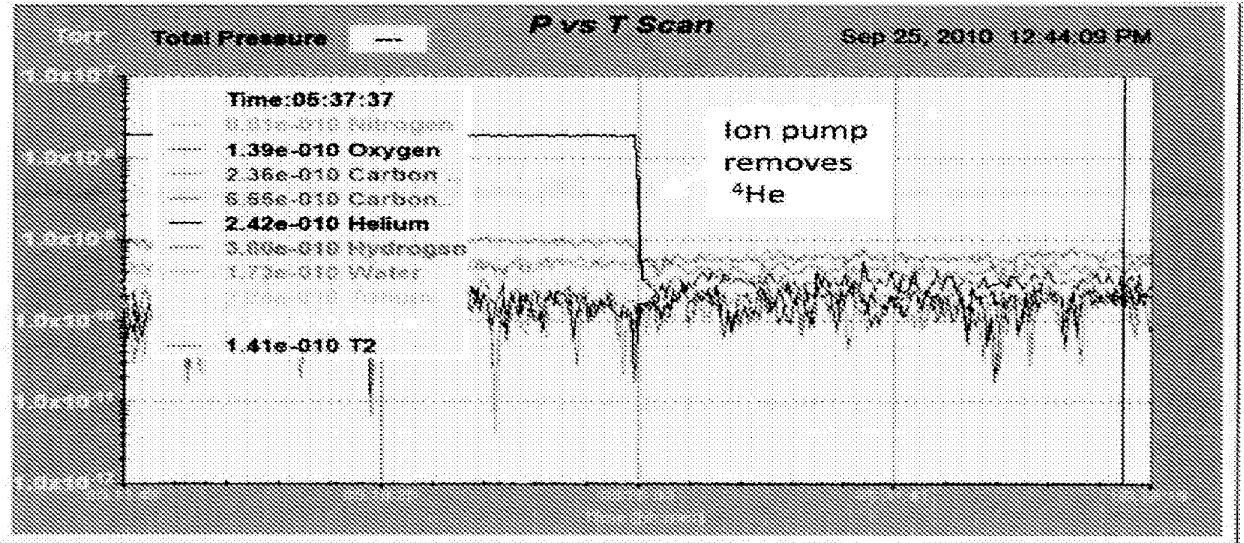
36. The photographs below depict the experimental apparatus that was used.

The portion shown in the upper left is behind the black wall in the picture on the lower right. The CNT sample vials are on the upper right.



37. The four vacuum pumps first evacuated the entire system of all gases, reactive and inert. Next the combination of D_2O and CNTs was introduced to the system and the pumps were again used to remove any gases generated in the system. The composition of the gases that were produced was determined using conventional RGA detectors on the output of the pumps.

38. Below is a graph showing the composition of the gases before and after the ion pump that removes helium is applied. The combination of D₂O and CNTs produced 203 ppm of helium.



39. I have seen a report of another experiment where 325 ppm of helium was produced using the same experimental technique.
40. There is approximately 5 ppm of residual helium in the atmosphere.
41. Because the transmutation of elements is not possible without a nuclear reaction, this body of work demonstrates that some type of nuclear reaction has taken place.
42. I am also generally familiar with the experiments described in Paragraphs [0081] to [0099] of the present application where gaseous D₂O and CNTs were combined in tubes having a quartz "window." A CCD detector counted pulses of emitted light indicating that energy was being emitted when D₂O gas was combined with CNTs. There is nothing complex or difficult in measuring light output with a CCD and counting the pulses. In my judgment, one skilled

in the use of state of the art CCD detectors could repeat the experiments and obtains similar results.

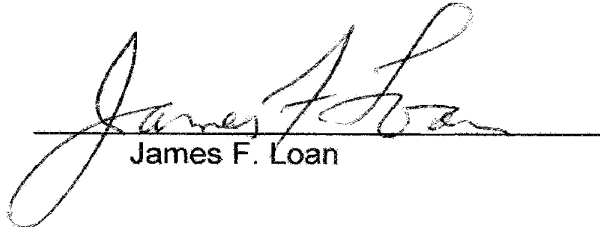
43. I have read the paper entitled "Visible-Light-Induced Water-Splitting in Channels of Carbon Nanotubes," *J. Phys.Chem. B*, 110, 1571-1575. I have concluded that, because of the inherent presence of D₂O in ordinary water the reported combination of D₂O and SWNTs produced some type of nuclear reaction that gave of the pulses of light that they observed. I am further convinced of that fact by the Mass Spectrometer spectrum in Figure 2(b) of that paper. It shows the production of gases with atomic masses of 3 and 4. The peaks at 3 AMU can only be made by ³He (Helium 3) or T (tritium ³H). Both of those gases are transmutation byproducts of a nuclear reaction. The peak at 4 AMU could be ⁴He or ²D. If it is ⁴He it is a transmutation byproducts of a nuclear reaction but if it is ²D it could be residual D found in ordinary water. The fact that unexplained energy production was also reported supports the formation of ⁴He.
44. Based on my background and experience in this technology it is my conclusion that the work described in Examples 1 and 2 of this application provides credible experimental evidence and a quantitative and rigorous demonstration that some type of nuclear reaction takes place when D₂O and CNTs are combined. This conclusion is based on the reported results in the above noted paper, our work at Seldon, the work at LLNL ("Of these, the CNT sample event of October 25, 2006 at 16:14 provides evidence for a DD fusion source." LLNL final Report P. 27), and the work of Dr. Lassila.

45. I have read the Examiner's assertion that the disclosure in this application is inadequate and the Examiner's interpretation of what are referred to as the "Wands criteria in an attempt to support a position that the disclosure is "inadequate." The Examiner asserts the results in the patent application are "unsubstantiated by and contradictory toward modern nuclear science."
46. At the outset it is clear (primarily from the "explanation" of criteria a. and b.) that the Examiner considers science and technology to be static. That is simply not the case and the current state of science and technology is the result of constant change. "Modern nuclear science" changes every day.
47. The Examiner comments on the state of the art (criteria c.) by saying: "effects claimed by applicants have not been observed in prior experiments of patentable merit." The "effects claimed" have been observed in the experiments conducted by myself, those reported in the application, and the work at LLNL. Moreover, the effect can be observed in the data of "Visible-Light-Induced Water-Splitting in Channels of Carbon Nanotubes," *J. Phys.Chem. B*, 110, 1571-1575.
48. What the Examiner means by "of patentable merit" in the quote in paragraph 46. is unclear to me.
49. It seems to me that the Wands criteria concerning "level of ordinary skill" (criteria d.) refers to the technology used to practice the claimed invention. That can be readily accomplished by mixing CNTs and D₂O. After this application demonstrates what happens when such a mixture is made it is not understood, what "skill" is needed to practice the invention.

50. The Examiner's expression of incredulity in the discussion of criteria e., g., and h., is clearly contradicted by the production of transmutation byproducts and energy demonstrated in the work set out above and in the application itself. Moreover, the Examiner's assertion is in conflict with the scientists at LLNL, who stated in the final report: ("Of these [referring to the test results], the CNT sample event of October 25, 2006 at 16:14 provides evidence for a DD fusion source." LLNL Final Report *id.*)
51. The Examiner's position that the applicant's assertions of energy production are "unsubstantiated" in criteria f. is in conflict with the demonstration of the production of transmutation byproducts and energy in the work set out above and in the examples in the application itself and the quoted portion of the LLNL Final Report *id.*
52. I have read the assertion by the Examiner that U.S. Patent Publ. 2009/0086877 (Hagelstein) discloses the invention of this application. I have also read the Hagelstein application. I am familiar with the technology disclosed in the Hagelstein application. While the Hagelstein application mentions CNTs and deuterium, nowhere does it disclose that those two materials, when combined react to produce energy and transmutation byproducts. Moreover, no one of any level of skill in nuclear technology, chemistry, material science, or physics reading the Hagelstein application would be taught how to combine deuterium and CNTs to produce energy.
53. I declare under penalty of perjury that the foregoing is true and correct. I further declare that all statements made herein of my own knowledge are true

and that all statements made on information and belief are believed to be true. I further declare that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of title 18 of the United States Code.

Dated: August 21, 2015



James F. Loan

Electronic Acknowledgement Receipt

EFS ID:	23310372
Application Number:	13089986
International Application Number:	
Confirmation Number:	1497
Title of Invention:	METHOD OF GENERATING ENERGY AND 4HE USING THREE DIMENSIONAL NANOSTRUCTURED CARBON MATERIALS
First Named Inventor/Applicant Name:	Christopher H. Cooper
Customer Number:	22852
Filer:	Stephen Leroy Peterson
Filer Authorized By:	
Attorney Docket Number:	09102.0014-04
Receipt Date:	25-AUG-2015
Filing Date:	19-APR-2011
Time Stamp:	19:24:49
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Supplemental Response or Supplemental Amendment	finaltransloandecv1.pdf	101225 7c24c8cbb19d81c2fa299dbd19c525f19efc04ff	no	5

Warnings:

Information:

2	Affidavit-traversing rejectns or objectns rule 132	loan132decfinalv2.pdf	2312696	no	19
			5169195fdb81586436b80290e43a575ea2059af6		
Warnings:					
Information:					
Total Files Size (in bytes):				2413921	
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL (Submitted Only via EFS-Web)

Application Number	13/089,986	Filing Date	2011-04-11	Docket Number (if applicable)	DE-1	Art Unit	4187
First Named Inventor	Christopher H. Cooper			Examiner Name	Kimberly Coghill		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.

Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

☐ Other _____

☒ Enclosed

☒ Amendment/Reply

☐ Information Disclosure Statement (IDS)

☐ Affidavit(s)/ Declaration(s)

☐ Other _____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____.
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.

☐ The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No _____

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

☐ Applicant Signature

Signature of Registered U.S. Patent Practitioner			
Signature	/Stephen L. Peterson/	Date (YYYY-MM-DD)	2015-08-10
Name	Stephen L. Peterson	Registration Number	26325

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	13089986			
Filing Date:	19-Apr-2011			
Title of Invention:	METHODS OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS			
First Named Inventor/Applicant Name:	Christopher H. Cooper			
Filer:	Stephen Leroy Peterson			
Attorney Docket Number:	09102.0014-04			
Filed as Micro Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension - 5 months with \$0 paid	3255	1	750	750
Miscellaneous:				
RCE - 1st Request	3801	1	300	300
Total in USD (\$)				1050

Electronic Acknowledgement Receipt

EFS ID:	23157923
Application Number:	13089986
International Application Number:	
Confirmation Number:	1497
Title of Invention:	METHODS OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS
First Named Inventor/Applicant Name:	Christopher H. Cooper
Customer Number:	22852
Filer:	Stephen Leroy Peterson
Filer Authorized By:	
Attorney Docket Number:	09102.0014-04
Receipt Date:	10-AUG-2015
Filing Date:	19-APR-2011
Time Stamp:	11:10:37
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$ 1050
RAM confirmation Number	8855
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Extension of Time	EOTsignedv1.pdf	44316	no	1
			12ef740c88df155e16fa8308619217bbd369c61f		
Warnings:					
Information:					
2	Amendment Submitted/Entered with Filing of CPA/RCE	RCEamend.pdf	331838	no	30
			058a56480a124f46305b4e49fa6bd80826f8d64e		
Warnings:					
Information:					
3	Request for Continued Examination (RCE)	sb0030e.pdf	697582	no	3
			4643ab3ea4c64158fa474a777cf51d5ac14b2170		
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	32357	no	2
			953642d5208a060b725e0039bce2fc81f4e71d5		
Warnings:					
Information:					
Total Files Size (in bytes):			1106093		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)	
)	
Christopher Cooper et al.	)	Group Art Unit: 4187
)	
Application No.: 13/089,986	)	Examiner: Kimberley E. Coghill
)	
Filed: April 19, 2011)	
	)	Confirmation No.: 1497
For: METHOD OF GENERATING)	
ENERGY AND ^4He USING THREE)	
DIMENSIONAL NANOSTRUCTURED)	
CARBON MATERIALS [As Amended])	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

PETITION FOR EXTENSION OF TIME

A Notice of Appeal for this application was filed January 10, 2015. The Brief was due March 10, 2015. Applicants petition for a five-month extension of time to file the Appeal Brief until August 10, 2015. A fee of \$750.00 is submitted herewith by the sending of an executed PTO-2038 form by facsimile to 571 273 8300.

Applicants are filing with this Petition a Request for Continuing Examination (RCE) addressing all the substantive rejections asserted in the Final Rejection and advancing the examination of this application.

Respectfully submitted,

Dated: August 10, 2015

By: /s/ Stephen L. Peterson
Reg. No. 26325

PATENT
Customer No. 117724
Attorney Docket No. DE-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)	
)	
Christopher H. Cooper et. al.	)	Group Art Unit: 4187
)	
Application No.: 13/089,986	)	Examiner: Kimberly Coghill
)	
Filed: April 19, 2011)	
	)	Confirmation No.: 1497
For: METHOD OF GENERATING)	
ENERGY AND ⁴ He USING THREE)	
DIMENSIONAL)	
NANOSTRUCTURED CARBON)	
MATERIALS [As Amended])	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

AMENDMENT IN SUPPORT OF A REQUEST FOR CONTINUING EXAMINATION

This application was on appeal based on a Notice of Appeal filed January 10, 2015. The Brief was due April 10, 2015. Applicants have filed herewith a Request for Extension of time for five (5) months with the requisite fee. Applicants have filed a Request for Continuing Examination (RCE) along this Amendment. The Amendment resolves and renders moot several grounds of rejection advanced in the examination of this application.

Prior to examination amend the application as follows:

In the specification:

Amend the title of the application to read:

METHOD OF GENERATING ENERGY AND ^4He USING THREE DIMENSIONAL
NANOSTRUCTURED CARBON MATERIALS

In the Claims:

1. [Currently Amended] A method of generating ~~non-ionizing~~ ^4He atoms and energy, said method comprising:
contacting ~~graphene materials~~ three dimensional nanostructured carbon material
with ~~a source of~~ deuterium; and
~~placing said graphene materials in said source of deuterium for a time sufficient~~
transmuting the deuterium to generate a plurality of non-ionizing ^4He atoms and energy.
2. [Currently Amended] The method of claim 1, wherein ^4He is generated in
an amount of at least ten ~~non-ionizing~~ ^4He atoms per hour per microgram of said
~~graphene materials~~ three dimensional nanostructured carbon material at 0°C .
3. [Currently Amended] The method of claim 1, wherein said ~~graphene~~ three dimensional nanostructured carbon material ~~materials~~ comprise ~~monolayer graphite,~~
multilayer graphite, single walled carbon nanotubes, multiwalled carbon nanotubes,
buckyballs, carbon onions, and carbon nanohorns ~~and combinations thereof.~~
4. [Currently Amended] The method of claim 1, wherein ~~the source of~~ [said]
deuterium is in a liquid, gas, plasma, or supercritical phase.
5. [Currently Amended] The method of claim 1, further comprising the
removal of ~~contaminates~~ contaminants from the surface of the ~~graphene materials~~ three dimensional nanostructured carbon material by heating the ~~graphene materials~~ three dimensional nanostructured carbon material prior to the contacting step, wherein said
heating is performed at conditions sufficient to remove unwanted material from the
surface of the ~~graphene materials~~ three dimensional nanostructured carbon material.

6. [Currently Amended] The method of claim 5, wherein said unwanted materials comprise H₂O, OH, H₂, atomic hydrogen (protium), polymers, oils, amorphous carbon, O₂, solvents, acids, and bases, ~~and combinations thereof~~.

7. [Originally Filed] The method of claim 5, wherein said conditions comprise a time up to 18 hours and a temperature up to 400 °C.

8. [Originally Filed] The method of claim 7, wherein said conditions comprise a time ranging from 1 to 8 hours and a temperature ranging from 100 to 250 °C.

9. [Currently Amended] The method of claim 1, wherein said ~~graphene-~~
~~materials~~ three dimensional nanostructured carbon material comprises carbon nanotubes, and said method further comprises heating the carbon nanotubes ~~prior to-~~
~~aging~~ at a temperature and for a time sufficient to promote absorption of the deuterium into or onto the carbon nanotubes.

10. [Originally Filed] The method of claim 9, wherein the temperature and time sufficient to promote absorption ranges from 30 °C to 300 °C, and from 30 minutes to 8 hours, respectively.

11 [Currently Amended] The method of claim 1, wherein the step of contacting ~~graphene materials~~ three dimensional nanostructured carbon material with a ~~source of~~ deuterium is performed at or below room temperature.

12. [Currently Amended] The method of claim 11, wherein the step of contacting ~~graphene materials~~ three dimensional nanostructured carbon material with a ~~source of~~ deuterium is performed at a temperature ranging from 20 °C to -100 °C.

13. [Currently Amended] The method of claim 1, wherein said ~~graphene-~~
~~materials~~ three dimensional nanostructured carbon material comprise carbon nanotubes
that are functionalized and/or doped with nitrogen.

14. [Originally Filed] The method of claim 1, wherein said ~~non-ionizing~~ ^4He
atoms have an energy of less than 1 KeV.

15. [Originally Filed] The method of claim 14, wherein said ~~non-ionizing~~ ^4He
atoms have an energy of less than 100 eV.

16. [Currently Amended] The method of claim 1, wherein said ~~graphene-~~
~~materials~~ three dimensional nanostructured carbon material are placed in ~~the source of~~
deuterium for a time ranging from 30 minutes to 48 hours.

17. [Currently Amended] The method of claim 16, wherein said ~~graphene-~~
~~materials~~ three dimensional nanostructured carbon material are placed in ~~the source of~~
deuterium for a time ranging from 1 to 18 hours.

18. [Cancelled]

19. [Currently Amended] A method of generating ~~non-ionizing radiation, non-~~
~~ionizing~~ energy, ^4He atoms, or both, said method comprising:

providing ~~graphene materials~~ three dimensional nanostructured carbon material
in a sealable vessel;

evacuating the sealable vessel to a pressure below atmospheric pressure;

adding deuterium gas to said vessel to achieve a pressure above atmospheric
pressure; and

heating the vessel to increase the pressure inside the vessel.

20. [Currently Amended] The method of claim 19, wherein ^4He is generated in an amount of at least ten ^4He atoms per hour per microgram of said ~~graphene materials~~ three dimensional nanostructured carbon material at 0°C.

21. [Currently Amended] The method of claim 19, further comprising heating the ~~graphene materials~~ three dimensional nanostructured carbon material prior to adding deuterium gas.

22. [Originally Filed] The method of claim 21, wherein said heating is performed in a sealed chamber and a temperature to bake-out unwanted materials, said method further comprising evacuating the sealed container to remove the unwanted materials from the sealed container.

23. [Originally Filed] The method of claim 19, wherein said at least one heating step is performed at temperature ranging from 50°C to 500°C for a time ranging from 20 minutes to 6 hours.

24. [Originally Filed] The method of claim 19, wherein said aging is performed at a temperature ranging from 20 °C to -100 °C.

25. [Currently Amended] The method of claim 19, wherein said ~~non-ionizing~~ radiation comprises x-rays, visible light, infrared, microwaves, radio waves or combinations thereof

26. [Currently Amended] The method of claim 19, wherein said ~~graphene materials~~ [three dimensional nanostructured carbon material] are placed in the ~~source~~ of deuterium for a time ranging from 1 to 18 hours.

27. [Cancelled]

28. [Currently Amended] A method of generating ~~non-ionizing~~ radiation, said method comprising:

contacting ~~graphene materials~~ [three dimensional nanostructured carbon material] with a ~~source of~~ deuterium; and

placing said ~~graphene materials~~ three dimensional nanostructured carbon material in said ~~source of~~ deuterium for a time sufficient to generate ~~non-ionizing~~ radiation.

29. [Currently Amended] The method of claim 28, wherein said ~~non-ionizing~~ radiation comprises x-rays, visible light, infrared, microwaves, radio waves or combinations thereof.

30. [Currently Amended] The method of claim 28, wherein said ~~graphene materials~~ three dimensional nanostructured carbon material comprise ~~monolayer-graphite~~, multilayer graphite, single walled carbon nanotubes, multiwalled carbon nanotubes, buckyballs, carbon onions, carbon nanohorns and combinations thereof.

31. [Currently Amended] The method of claim 28, wherein the ~~source of~~ deuterium is in a liquid, gas, plasma, or supercritical phase.

32. [Currently Amended] The method of claim 28, further comprising the removal of ~~contaminates~~ contaminants from the surface of the ~~graphene materials~~ three dimensional nanostructured carbon material by heating the ~~graphene materials~~ three dimensional nanostructured carbon material prior to the contacting step, wherein said heating is performed at conditions sufficient to remove unwanted material from the surface of the ~~graphene materials~~ three dimensional nanostructured carbon material.

33. [Currently Amended] The method of claim 28, wherein said ~~graphene-~~
~~materials~~ three dimensional nanostructured carbon material comprises carbon
nanotubes, and said method further comprises heating the carbon nanotubes prior to
aging at a temperature and for a time sufficient to promote absorption of the deuterium
into or onto the carbon nanotubes.

34. [Originally Filed] The method of claim 28, wherein said graphene materials
comprise carbon nanotubes that are functionalized and/or doped with nitrogen.

35. [Currently Amended] The method of claim 28, wherein said ~~non-ionizing-~~
~~radiation~~ ^4He atoms have an energy of less than 1 KeV.

36. [Currently Amended] The method of claim 35, wherein said ~~non-ionizing~~
 ^4He atoms have an energy of less than 100 eV.

37. [Cancelled]

38. [Canceled]

39. [Currently Amended] A method of inducing ~~local~~ nuclear fusion-
transmutation, comprising the steps of:

contacting ~~graphene materials~~ three dimensional nanostructured carbon material
with deuterium; and

placing said ~~graphene materials~~ three dimensional nanostructured carbon
material in ~~said source of~~ deuterium for a time sufficient to transmute said deuterium
and generate primarily a plurality of ^4He atoms and energy.

40. [Currently Amended] The method of claim 39, wherein said ~~graphene-~~
~~materials~~ three dimensional nanostructured carbon material comprises carbon
nanotubes.

41. [Currently Amended] The method of claim 39, wherein said ~~graphene materials~~ three dimensional nanostructured carbon material further include nitrogen.
42. [Originally Filed] The method of claim 39, wherein said deuterium is a gas.
43. [Originally Filed] A method of producing energy, comprising the steps of:
introducing a gas consisting essentially of D₂O to a material consisting essentially of carbon nanotubes;
applying pressure to the gas; and
generating ~~non-ionizing~~ energy and ⁴He atoms.
44. [Currently Amended] A method of producing energy, comprising the steps of:
introducing a material consisting essentially of deuterium to ~~graphene~~ three dimensional nanostructured carbon material to form a combination of deuterium and ~~graphene~~ said three dimensional nanostructured carbon material;
applying pressure to the combination; and
generating ~~non-ionizing~~ energy and ⁴He atoms.
45. [Currently Amended] The method of claim 44, wherein ~~the graphene~~ said three dimensional nanostructured carbon material comprises carbon nanotubes.
46. [New] A method of generating energy, comprising:
contacting three dimensional nanostructured carbon material with deuterium; and
transmuting said deuterium to produce a plurality of ⁴He atoms and energy.
47. [New] The method of claim 46, wherein said three dimensional nanostructured carbon material comprises carbon nanotubes.
48. [New] The method of claim 46, wherein said deuterium is a gas.

REMARKS

By this amendment, and in the following remarks, applicants have addressed all of the substantive issues raised in the Final Rejection of this application. Examination of claims 1-17, 19-26, 28-36, and 39-48 on their merits is respectfully requested.

Priority

The Examiner asserted on Page 2 of the Final Rejection that “the prior filed applications [list omitted] fail to provide adequate support or enablement [citations omitted] for the terms ‘graphene’ and ‘*local* nuclear fusion’ . . .” [italics in original]

Applicants do not concede that the Examiner’s position has merit, but to advance prosecution of this application they have amended all of the claims of the application to eliminate those terms. The elimination of those terms from the claims impacts the Examiner’s position with respect to the priority of the amended claims. Thus, to be consistent, the Examiner’s application of the prior art must take into account the content of the amended claims in light of their relationship to the priority documents.

Adequate Disclosure

In the Final Rejection the Examiner asserted that the claims contain subject matter which is not described in the specification in such a way that one of ordinary skill in the art could make and/or use the invention. After equating the claimed invention to “a working teleporting system” the Examiner also asserted, without any support in case law or logic, that “at the heart of the scientific method is this truth: **extraordinary claims require extraordinary evidence.** [emphasis in original]

The quote speaks volumes of the position of the Examiner. The Examiner apparently believes that science is static and any deviation from what was known before

is “extraordinary” and therefore must be proved with “extraordinary evidence.” And when Applicants discloses two rigorous and completely described examples of the combination of carbon nanotubes and deuterium producing nuclear byproducts by transmutation and light energy without any external input of energy, the Examiner dismisses **without substantive comment** the examples as “two, fairly minimal ‘examples’ to *prove* the mastery of ‘cold fusion’ . . . ” [italics in original]

There is no requirement in the law that applicants prove the mastery of anything. They must just describe the invention in such a way that one skilled in that technology can practice the invention without undue experimentation. Applicants have done just that. And, in spite of the Examiner having the burden to **specifically** set out any shortcomings of applicant’s examples, the Examiner has not done so. In what specific way are the examples “minimal?” In what specific way do they fall “severely short?” The Examiner has not stated anything other than general skepticism when the law requires specificity. Nuclear transmutation under conditions in conflict with current nuclear physics has been demonstrated by the applicants and many others. Whether it is some form of fusion is merely semantics.

Moreover, the Examiner has provided no legal precedent for the assertion that “extraordinary claims require extraordinary evidence.”

The Examiner has mistakenly taken the position that applicants have the burden to prove the existence of “cold fusion.” There is no basis in law for such a position. The Examiner has set up a “straw man” and then denigrates the disclosure of this application because applicant has not addressed that issue.

When applicants address the substance of the real issue – whether nuclear transmutation reactions can occur under non-typical conditions the Examiner denigrates the substance of a U.S. Government report (DIA-08-0911-003) dated November 13, 2009, and the competence of the researchers whose work is reported therein. The DIA report (of record in this application) states, after reviewing numerous then current (2009) technical papers that disclose non-typical nuclear reactions, on page 3: **“This body of research has produced evidence that local nuclear reactions may be occurring under conditions not previously believed to be possible.”** (emphasis in the original).

Apparently the Defense Intelligence Agency is prepared to consider that physics is not static and nuclear reactions may be taking place without regard for current orthodox views of physicists. The DIA’s position is based on the **FACT** the transmutation of elements and the generation of heat beyond what a chemical reaction could produce has been reported by numerous scientists¹ demonstrated to those who wrote the DIA report and the numerous researchers whose work is reported in the DIA report, that current theories in physics may not be static. Denigration by name calling may be alive and well in the media and in social networks, but not in logic or in law.

Again the Examiner fails to address the substance of the DIA report by equating the work cited in the DIA report to alleged sightings of “Bigfoot.” Final Rejection at P. 4-5. Such analogies are offensive, illogical, and have no place in legal arguments. Guilt by association is routinely used in the media and in social networks, but it has no place in logic or in law.

¹ Referred to by the Examiner as “scientists” because the Examiner apparently has knowledge that the researchers are not real scientists.

Moreover the Examiner's reliance on *In re Mitchel R. Swartz*, 232 F.3d 862 (Fed.Cir. 2000) is misplaced for at least two reasons. First, the state of the art regarding low energy nuclear reactions is not the same as when Swartz filed his application in 1991. Since that date numerous investigators (many are cited in the 2009 DIA report noted above) have proved there are nuclear reactions occurring under conditions not consistent with current theories of nuclear physics. See page 2 of the DIA report where it states: "Scientists worldwide have been reporting anomalous excess heat production, as well as evidence of nuclear particles and transmutation [of elements]." (citations omitted, clarification added). The Examiner does not address that **FACT** aside from denigrating those who advance it.

Second, in *Swartz* the court stated:

Regarding the enablement requirement, the PTO found that the written description in Mr. Swartz's application contains no disclosure of any operative embodiment. Thus, in order to practice the claimed invention, a person of ordinary skill in the art would have had to rely on the art known at the filing date, September 19, 1991. For reasons similar to those forming the basis for his finding that Mr. Swartz had not submitted evidence of operability, the examiner found that Mr. Swartz had not submitted evidence that the concept of the invention could have been practiced by a person skilled in the art at the time of the invention without undue experimentation.

232 Fed.Cir. at 862.

In the present application there are working examples that disclose in detail several embodiments of the claimed invention. In Example 1 (the Gas Phase Experiment, Paragraphs [0050] to [0080] of the present application) two detailed working examples are disclosed. In one 325 ppm of ^4He was produced, 203 ppm in the other. The background residual ^4He concentration in air is about 5 ppm. The results are

unequivocal - the process produced helium (^4He), a transmutation byproduct of the fusion reaction of deuterium.

In Example 2 (Paragraphs [0081] to [0099] of the present application) energy in the form of light was detected. Those are the disclosure of two operable embodiments, one showing nuclear transmutation of deuterium to helium, the second showing emission of photons – both without input of external energy.

The Examiner's unspecific criticisms of the experiments have no factual support. The experiments of Example 1 were conducted by an experienced PhD having peer reviewed publications dealing with the diffusion of hydrogen in solids. He is a retired research scientist from Lawrence Livermore National Laboratory. The experimental procedure is disclosed in detail and great care was taken to insure that the composition of the gases produced by the experiment were not the result of contamination or experimental error. The experimental procedures were reviewed by a nationally known expert in experimental design and the procedures set out in Example 1 were found to be experimentally sound. The Examiner's unspecific, unwarranted, and conclusory dismissal of the experimental work in the present application is totally unsupported by the facts.

There are a number of metrics that can be used to confirm a nuclear reaction, production of heat over that available from chemical reactions, the production of energy or particles characteristic of a nuclear reaction (e.g. gamma rays or neutrons), or transmutation of elements. Heat measurements are not unequivocal, especially if external energy is put into the system, radiation detectors are energy specific and neutron detectors are prone to also detect background cosmic rays. By contrast, the

creation of transmutation byproducts is unequivocal. It is not possible to produce helium or tritium from chemical reactions.

Applicants have demonstrated (and others have confirmed) that the combination of carbon nanotubes and deuterium produces transmutation byproducts.

The Examples

If the Examiner has asserted that “There is no quantitative and rigorous demonstration to indicate that the ‘Examples’ are based on credible experimental evidence.” It is the burden of the Examiner to show the alleged deficiencies in the procedures set out in the Examples. General expressions of incredulity are not sufficient logically or legally.

Applicants have demonstrated in actual examples (that are described in sufficient detail that one of ordinary skill in the art could readily duplicate) that energy and transmutation byproducts are produced when deuterium and carbon nanotubes are combined. Applicants have met their burden of demonstrating the operability of the claimed process and this ground of rejection has no basis in law or fact.

As noted above, applicants do not have the burden to prove cold fusion, but only to describe their invention in such terms that it can be made and used by others.

Applicants have also shown the existence of such low energy nuclear reactions in the literature. A journal article entitled “Visible-Light-Induced Water-Splitting in Channels of Carbon Nanotubes,” *J. Phys.Chem. B*, 110, 1571-1575 is of record in this application.

In that paper the researchers were investigating the creation of gases by impinging energy on water in the presence of carbon nanotubes and, alternatively,

graphite. They were puzzled by the production of energy when carbon nanotubes were used, when no such production occurred using graphite. Moreover, when carbon nanotubes were used Helium was produced. See Page 1574, second full paragraph and Fig. 2(b).

While this research investigated gas production from water, for every 6500 atoms of hydrogen in ordinary water there is also one atom of deuterium (~154 PPM). Thus, the irradiation of water, with its traces of deuterium, in the presence of single walled carbon nanotubes (SWCNTs) resulted in the production of Helium. See the Helium peak at 4 AMU (atomic mass units) in the mass spectrum of the gas produced, as shown in the mass spectrometer readings in Figure 2(b) and the discussion in the text. As noted above, when other forms of carbon were used (micro-graphite) no Helium was produced. Other transmutation products appear to have been produced. In Figure 2(b) there is also a peak at 3 AMU in the mass spectrum of the gas produced. Such a peak can only be made by ^3He (Helium 3) or T (tritium ^3H), and both are transmutation byproducts of a nuclear reaction.

The Examiner in the Final Rejection stated “the article does not amount to a defense of the operability of cold fusion.” Page 6. The Examiner cannot have it both ways. If a researcher advances a discovery as proof of cold fusion, that work is not credible because the researcher had “an agenda” or the researchers are “pseudoscientists.” But if the research is silent on the issue of cold fusion and “merely” supports its existence, it is denigrated as not supporting cold fusion. The article was not submitted as a defense of cold fusion. Nor is it applicant’s burden to defend cold fusion.

The article was cited as proof that nuclear transmutation can occur when deuterium and carbon nanotubes are combined. That is a result that is not suggested or allowed for by conventional nuclear physics, yet the Mass Spectrometer in the article (Fig. 2b) detected helium and tritium. The Examiner asserts that the article is irrelevant because it does not mention fusion or an equivalent. It is relevant because it clearly disclosed the production of transmutation byproducts of deuterium, caused by the combination of carbon nanotubes and D₂O inherently present in water.

Applicants have met their burden of demonstrating that nuclear transmutation reactions are occurring when deuterium and carbon nanotubes are combined. If the Examiner persists with this ground of rejection it is incumbent on the Examiner to show why the examples in the present application do not demonstrate a nuclear transmutation reaction is occurring when deuterium and carbon nanotubes are combined. In addition, it the Examiner's burden to substantively address why "Visible-Light-Induced Water-Splitting in Channels of Carbon Nanotubes," *J. Phys.Chem. B*, 110, 1571-1575 does not support the applicant's assertion that nuclear transmutation can occur when carbon nanotubes and deuterium are combined.

The Examiner's application of the *Wands* criteria, is flawed because the modified criteria are based on an incorrect assumption that the method set out in this application is contrary to known science and therefore the criteria in *Wands* must be adjusted to apply a higher burden to the applicant. The Examiner has cited no support for the factual assertions that are set out in the Examiner's modification of the application of the *Wands* criteria.

Applicants do not care, nor should the Examiner, if the current hypotheses of nuclear physics have to change to accommodate demonstrable facts. The hypotheses of nuclear physics have changed before. They will change again, especially when unequivocal facts are in conflict with current theories of nuclear physics. The facts unequivocally demonstrate that when carbon nanotubes contact deuterium nuclear transmutation reactions. It is the hypotheses of nuclear physics that must change in light of the facts, not that the facts cannot be the credible because they do not fit conventional theories of nuclear physics or “known science.”

The most telling portion of the Final Rejection is on Page 5 where it states: “Cold fusion, to date, has not been recognized by the U.S.P.T.O. as a viable source of energy, and absent *significant, quantitative demonstration to refute this position*, no patent application related to this technology can be seriously entertained.” [italics in original] Such a position is in conflict with the very purpose of the U.S. patent system. It is the responsibility of the USPTO to “seriously entertain” the legal and technical issues before it. To dismiss facts (and to reiterate nuclear transmutation by non-typical nuclear reactions is a fact) because the USPTO believes that such facts are inconsistent with current scientific thought is imperious and legally unsupportable. Current theories of nuclear physics are no more immutable truths than was blood-letting when it was the current state of the art in medical practice.

It is an irrefutable fact that, in the work described in the examples of this application, in the work cited in the DIA report, and in the work described in “Visible-Light-Induced Water-Splitting in Channels of Carbon Nanotubes,” *J. Phys.Chem. B*, 110, 1571-1575 nuclear transmutation and the production of energy occurred. If

orthodox nuclear physicists and the USPTO have to change their position based on such a fact so be it. But to reject the application because it does not prove “cold fusion” is illogical and not legally supportable.

Alleged Steps Missing in the Process

The Examiner has asserted that significant external energy input is necessary to practice the method. Tellingly the Examiner’s technical assertion is required in order to conform with existing theories of nuclear physics. But Example 1 of this application proves that input of external energy is not needed to practice the invention. The Examiner’s position is in conflict with demonstrated facts.

Claim Terminology

The Examiner objected to the language of claims 3 and 6. Applicants have addressed the issue by amendment and the objection is moot.

Anticipation

The Examiner rejected various claims of this application under 35 USC 102 based on the disclosure of U.S. Patent Publ. 2009/0086877 (Hagelstein). Applicants do not concede that this publication is “prior art” and have amended the claims to eliminate the claim terminology that the Examiner asserted prevented the application from having an earlier effective filing date. As such, the Examiner must consider the amended claims and their relationship to the filing date of Hagelstein in any further examination.

Two facts should be noted before the disclosure of Hagelstein is discussed in detail. First, according to MPEP § 2121.01, in order for a cited art document to anticipate a claim, the cited art must provide an enabling disclosure of the claimed subject matter. This section of the MPEP relies on decades old case law which states, in relevant part

that, "In determining that quantum of prior art disclosure which is necessary to declare an applicant's invention 'not novel' or 'anticipated' within section 102, the stated test is whether a reference contains an 'enabling disclosure'... ." *In re Hoeksema*, 399 F.2d 269, 158 USPQ 596 (CCPA 1968).

This section of the MPEP goes on to state that the mere naming or description of the subject matter is insufficient; rather, the cited art must demonstrate that the public was in possession of the claimed subject matter before the date of invention. In other words, the cited art must describe the claimed subject matter in such detail as to enable one of ordinary skill in the art to make the claimed subject matter without undue experimentation. See MPEP § 2121.01, referring to *Elan Pharm., Inc. v. Mayo Found. For Med. Educ. & Research*, 346 F.3d 1051, 1054, 68 USPQ2d 1373, 1376 (Fed. Cir. 2003)."

In light of the above, Applicants respectfully submit that Hagelstein fails to provide an enabling disclosure with respect to the claimed subject matter, specifically, with regard to a method of generating energy or ^4He atoms.

It is fundamentally inconsistent to hold applicant to a rigorous standard of disclosure and then reject claims using a reference that contains, in a wholly obtuse and theoretical discussion, an offhand combination of deuterium and carbon in a manner that would not enable one skilled in the art to practice what the Examiner asserts was suggested.

Second, while Hagelstein discloses contacting deuterium with carbon nanotubes Hagelstein does so as a means to facilitate the storage or transport of deuterium, not to induce a reaction between those components. The entire focus of the work discussed in

this excessively long, obtuse, and theoretical document is impinging energy on solids (primarily metal deuterides) to facilitate a fusion reaction. This reference does not teach or suggest that fusion or the production of Helium results from the placement of deuterium in contact with carbon nanotubes.

The Examiner cites paragraph [0322] for such a teaching, but it must be read in context with what is being referred to as “the material 204” in paragraph [0312].

[0312] According to an exemplary embodiment, an apparatus 200 shown in block diagram form in FIG. 24 comprises a material 202. Material 202 comprises molecular deuterium (D_2) and/or hydrogen-deuterium (HD), and reactions are stimulated in this material 202. In this regard, the presence of both D_2 and HD in the material 202 is contemplated, but it is also possible be appreciated that primarily either D_2 or HD may be present in the material 202, e.g., if the material is processed and maintained at sufficiently low temperature to thwart transformations between D_2 , HD and H_2 . The presence of H_2 in the material is also generally likely and is not precluded. The apparatus 200 also comprises an excitation source 204 arranged to stimulate the material 202 to generate reactions in the material 202, and a load 206 arranged to remove energy generated by the reactions from the material 202. The apparatus can be configured in practice in a variety of ways, such as shown, for example, in the above-described electrochemical cell example of FIG. 20, the dry cell example of FIG. 21, the flash heating tube example of FIG. 22, and the thermoelectric battery example of FIG. 23. In view of those examples, it will be appreciated that the excitation source 204 and the load 206 may or may not be in direct physical contact with the material 202. Also, materials 85, 99, 88, and 104 referred to in FIGS. 20, 21, 22, and 23, respectively, can correspond to material 202 shown in FIG. 24. In a preferred embodiment, the material 202 can include at least one element that has one or more stable isotopes (i.e., stable forms of the element each having different numbers of neutrons in the nucleus). In another preferred embodiment, the material 202 can include at least one element that has an excess number of neutrons.

Hagelstein contemplates and discloses that encapsulated deuterium may be used in the disclosed process where energy is impinged on the material 202 from the excitation source 204. Nowhere in Hagelstein is it taught or suggested that contacting

deuterium and three dimensional nanostructured carbon materials such as carbon nanotubes will induce a fusion reaction.

Applicants are not the first to contact these materials, but are the first to establish that a nuclear reaction that produces Helium and energy results from that contact. Nowhere in the cited prior art is there an enabling disclosure of the combinations found in the independent claims of the present application.

Nowhere in Hagelstein does it disclose contacting a gaseous source of deuterium and three dimensional nanostructured carbon materials such as carbon nanotubes and pressurizing the gas will result in the production of energy and Helium.

Specifically, independent claim 1 is not anticipated because the cited reference does not disclose the production of Helium resulting from the combination of three dimensional nanostructured carbon material and deuterium as is set out in claim 1. Nor does the cited reference disclose placing the three dimensional nanostructured carbon material in the source of deuterium for a time sufficient to generate a plurality of ^4He atoms. The claims dependent on claim 1 are also novel for that reason.

Independent claim 19 is not anticipated because the cited reference does not disclose the production of Helium resulting from the combination of three dimensional nanostructured carbon material and deuterium as is set out in claim 19. Nor does the cited reference disclose heating a vessel to increase the pressure in the vessel. The claims dependent on claim 19 are novel for that reason as well.

Independent claim 28 is not anticipated because the cited reference does not disclose the generation of radiation from the combination of three dimensional nanostructured carbon material and deuterium as is set out in claim 28. Nor does the

cited reference disclose placing the graphene materials in the source of deuterium for a time sufficient to generate radiation. The claims dependent on claim 28 are also novel for that reason.

Independent claim 39 is not anticipated because the cited reference does not disclose inducing nuclear fusion from the combination of three dimensional nanostructured carbon material and deuterium as is set out in claim 39. The claims dependent on claim 39 are also novel for that reason.

Independent claim 43 is not anticipated because the cited reference does not disclose a process of producing energy by applying pressure to a combination of a gas of D₂O and carbon nanotubes and generating energy and ⁴He atoms. The claims dependent on claim 43 are also novel for that reason.

Independent claim 43 is not anticipated because the cited reference does not disclose a method of generating energy by contacting three dimensional nanostructured carbon material with deuterium and transmuting the deuterium to produce a plurality of ⁴He atoms and energy. The claims dependent on claim 43 are also novel for that reason.

In summary, the cited reference does not disclose that fusion or the production of energy or helium results from the combination of deuterium and three dimensional nanostructured carbon material such as carbon nanotubes. As such, a rejection of the claims, based on Hagelstein, is not supported by the disclosure in that reference.

None of the independent claims of this application were rejected as being obvious. Applicants have, in the preceding section noted claim features not found in the cited reference. Applicants assert that such differences also demonstrate the claims are

unobvious because there is no teaching or suggestion in Haglestein that the combination of deuterium and the forms of carbon claimed would produce energy or helium.

Obviousness

The Examiner has rejected claims 2, 11, 12 16, 17, 20, 24, and 26 under pre-AIA 35 USC. 103(a) over Haglestein. All of these claims are dependent on claim 1 and nowhere in Haglestein does it disclose, teach or suggest that the combination of a three dimensional nanostructured carbon material and deuterium would result in the production of helium or generate a plurality of non-ionizing ^4He atoms, all set out in claim 1. Because the content of claim 1 is not taught or suggested in the cited reference, it and all the claims dependent thereon should be allowed because the cited reference does not support the rejection.

The Examiner rejected claims 6, 7, 8, 9, 10, 22, 23 alleging that the combination of Haglestein and US Patent Publ. 2002/0127171 to Smalley would render this claim obvious. Yet the Examiner gives no explanation why one skilled in the art would combine the teachings of these two references.

In order to satisfy the initial burden of establishing a *prima facie* case of obviousness, the Examiner first must show that the prior art references teach or suggest all the claim limitations. See *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). See also M.P.E.P. § 2143. The Examiner also must show that there is some suggestion or motivation, either in the references or in the knowledge generally available to one of ordinary skill in the art, to modify or combine the references. See *In re Rouffet*, 149 F.3d 1350, 47 USPQ2d 1453 (Fed. Cir. 1998).

The Supreme Court, in the *KSR* decision, recognized that a showing of “teaching, suggestion, or motivation” could provide helpful insight in determining whether the claimed subject matter is obvious under Section 103(a). *KSR*, 127 S. Ct. at 1741. In addition, the Supreme Court mandates that “[t]o facilitate review, this analysis [of whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue] should be made explicit.” *Id.* (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (“[R]jections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”)).

No such reason to combine the reference was advanced and the Examiner failed to establish a *prima facie* case of obviousness for these claims.

Similarly the Examiner rejected claims 13, 34, and 41 alleging their subject matter is obvious in view of the combination of Haglestein and US Patent Publ. 2007/0275160 to Maldonado et al. Again the Examiner gives no explanation why one skilled in the art would combine the teachings of these two references. As such the Examiner failed to establish a *prima facie* case of obviousness for these claims.

In summary, the main reference Haglestein fails to teach or suggest all the features in the independent claims of this application. The cited references neither teach nor suggest that the combination of deuterium and the forms of carbon claimed would produce energy or helium. As a result, no *prima facie* showing of obviousness has been set out and the rejection of the claims under 35 USC 103 is contrary to the law.

In *Randall Manufacturing v. Rea*, 733 F.3d 1355, 1362 (Fed. Cir. 2013) the Board's obviousness analysis violated these basic demands when it narrowly focused on the four prior art references cited by the Examiner, ignored the additional record evidence that was cited to demonstrate the knowledge and perspective of one of ordinary skill in the art, and failed to account for critical background information. "As *KSR* established, the knowledge of such an artisan is part of the store of public knowledge that must be consulted when considering whether a claimed invention would have been obvious." *Id.* The Federal Circuit further held that the most reliable evidence for the background knowledge of one of ordinary skill in the art is prior art in the area. *Id.*

In *Par Pharmaceutical*, the Federal Circuit emphasized that "the concept of inherency must be limited when applied to obviousness, and is present only when the limitation at issue is the 'natural result' of the combination of prior art elements." *Par Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1195 (Fed. Cir. 2014). The Examiner provided no evidence to establish that Applicant's property was a "natural result" of the combination of the prior art.

In *Par Pharmaceuticals*, the Federal Circuit cautioned that the Office must "meet a high standard in order to rely on inherency to establish the existence of a claim limitation in the prior art in an obviousness analysis—the limitation at issue necessarily must be present, or the natural result of the combination of elements explicitly disclosed by the prior art." 773 F.3d at 1195-96. Here, however, the Examiner has provided no evidence that the unexpected results of the claimed invention is necessarily and inevitably present in the teachings of the prior art, or the natural result of those teachings.

As the Court of Customs and Patent Appeals explained, when evidence is submitted to rebut an alleged *prima facie* case of obviousness:

[T]he decision-maker must start over. Though the burden of going forward to rebut the [alleged] *prima facie* remains with the applicant, the question of whether that burden has been successfully carried requires that the entire path to decision be retraced. An earlier decision should not, as it was here, be considered as set in concrete, and applicant's rebuttal evidence then be evaluated only on its knockdown ability. Analytical fixation on an earlier decision can tend to provide that decision with an undeservedly broadened umbrella effect. *Prima facie* obviousness is a legal conclusion, not a fact. Facts established by rebuttal evidence must be evaluated along with the facts on which the earlier conclusion was reached, not against the conclusion itself. Though the tribunal must begin anew, a final finding of obviousness may of course be reached, but such finding will rest upon evaluation of all facts in evidence, uninfluenced by an earlier conclusion reached by an earlier board upon a different record.

In re Rinehart, 531 F.2d 1048, 1052 (CCPA 1976). Thus, the Examiner's treatment of Applicant's evidence of secondary considerations was improper. For at least these reasons alone, the Examiner has not set forth a reasonable basis for maintaining the obviousness rejection.

In *Par Pharmaceutical*, at least two other major players in the field had attempted to solve that need using various approaches, each of which failed to produce a viable product. It was not until the Applicant invented the claimed proteins that a viable solution to a long-felt need was achieved. This is probative evidence of non-obviousness that should be afforded significant weight by the Office, according to binding precedent of the Supreme Court and the Federal Circuit.

Because of the significant commercial potential of an operable process of producing energy by a nuclear reaction at relatively low temperatures (whether it is

termed cold fusion, fusion, LENR, nuclear transmutation, or local nuclear fusion) there has been a longstanding pursuit of a workable process. As the above cited DIA report states:

If nuclear reactions in LENR experiments are real and controllable, DIA assesses that whoever produces the first commercialized LENR power source could revolutionize energy production and storage for the future. The potential applications of this phenomenon, if commercialized, are unlimited.

P. 6

In the face of such potential and the long-felt need, and because the applicants have demonstrated to any unbiased observer an operable process for producing nuclear transmutation products and energy, it is unreasonable to assert that the unexpected results of the claimed invention are necessarily and inevitably present in the teachings of the prior art, or the natural result of those teachings.

Because the Examiner has failed to provide any reasonable basis for maintaining any of the rejections in view of the above amendments and evidence that the claimed invention satisfies a long-felt need that was unsolved by those in the art, these claims should be allowed.

Conclusion

It is not the burden of the present applicants to prove the existence of cold fusion. It is not their burden to justify the re-writing of accepted nuclear physics. Applicants must only disclose an operable invention with sufficient clarity such that one skilled in the technology can, without undue experimentation, make and use the invention disclosed and claimed. Applicants have done just that with detailed, technically sound examples showing nuclear transmutation and the generation of energy and they have done it multiple times.

By contrast the Examiner sets out an arbitrary rule that “Cold fusion, to date, has not been recognized by the U.S.P.T.O. as a viable source of energy, and absent significant, quantitative demonstration to refute this position, no patent application related to this technology can be seriously entertained.” Then the Examiner fails to seriously consider the “significant, quantitative demonstration” (the examples of the invention in the application) concluding without explanation “[t]here is no credible record to indicate the “Examples”² (pp. 14+) are based on rigorous, credible experimental evidence. Further, findings of applicant *directly contradict accepted science*.” (P. 5 Final Rejection, italics in original)

Until the Examiner specifies the alleged technical flaws in the Examples in this application the USPTO is ignoring a “significant, quantitative demonstration” of an operable process for transmuting deuterium into helium while producing energy. In other words it is not following its own rule. And the Examiner attempts to avoid the USPTO own “rule” by merely stating the Examples *directly contradict accepted science*.” If the Examples set out procedures that are technically sound and the results contradict accepted science, what is “accepted” must change in light of the facts.

Rejection of this application has no basis in law or fact.

Applicants have addressed every significant issue raised by the Examiner in the Final Rejection, have amended the claims to render moot several rejections in the Final Rejection, and have materially advanced prosecution. Examination of the amended and new claims on the merits is respectfully requested.

² Again the Examiner uses quote marks to infer the “Examples” in this application are not really examples, just as the “scientists” in the DIA report on not real scientists.

Application No.:13/089,986
Attorney Docket No.:DE-1

Respectfully submitted,

Dated: August 10, 2015

By: /s/ Stephen L. Peterson

Stephen L. Peterson

Reg. No. 26,325

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Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 13/089,986	Filing Date 04/19/2011	<input type="checkbox"/> To be Mailed
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ENTITY: ☐ LARGE ☐ SMALL ☒ MICRO

APPLICATION AS FILED – PART I

(Column 1) (Column 2)

FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(j))	minus 20 =	*	X \$ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =	
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

(Column 1) (Column 2) (Column 3)

AMENDMENT	08/10/2015	CLAIMS REMAINING AFTER AMENDMENT	Minus	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))	* 42	Minus	** 44	= 0	x \$20 =	0
	Independent (37 CFR 1.16(h))	* 6	Minus	***6	= 0	x \$105 =	0
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))						
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	0

(Column 1) (Column 2) (Column 3)

AMENDMENT	CLAIMS REMAINING AFTER AMENDMENT	Minus	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))					
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					
						TOTAL ADD'L FEE

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/MARY HOLMES/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

CERTIFICATION OF MICRO ENTITY STATUS (GROSS INCOME BASIS)					
Application Number or Control Number (if applicable): 13/089,986			Patent Number (if applicable):		
First Named Inventor: Christopher H.Cooper			Title of Invention: METHOD OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS		
The applicant hereby certifies the following—					
<p>(1) SMALL ENTITY REQUIREMENT – The applicant qualifies as a small entity as defined in 37 CFR 1.27.</p> <p>(2) APPLICATION FILING LIMIT – Neither the applicant nor the inventor nor a joint inventor has been named as the inventor or a joint inventor on more than four previously filed U.S. patent applications, excluding provisional applications and international applications under the Patent Cooperation Treaty (PCT) for which the basic national fee under 37 CFR 1.492(a) was not paid, and also excluding patent applications for which the applicant has assigned all ownership rights, or is obligated to assign all ownership rights, as a result of the applicant's previous employment.</p> <p>(3) GROSS INCOME LIMIT ON APPLICANTS AND INVENTORS – Neither the applicant nor the inventor nor a joint inventor, in the calendar year preceding the calendar year in which the applicable fee is being paid, had a gross income, as defined in section 61(a) of the Internal Revenue Code of 1986 (26 U.S.C. 61(a)), exceeding the "Maximum Qualifying Gross Income" reported on the USPTO Web site at http://www.uspto.gov/patents/law/micro_entity.jsp which is equal to three times the median household income for that preceding calendar year, as most recently reported by the Bureau of the Census.</p> <p>(4) GROSS INCOME LIMIT ON PARTIES WITH AN "OWNERSHIP INTEREST" – Neither the applicant nor the inventor nor a joint inventor has assigned, granted, or conveyed, nor is under an obligation by contract or law to assign, grant, or convey, a license or other ownership interest in the application concerned to an entity that, in the calendar year preceding the calendar year in which the applicable fee is being paid, had a gross income, as defined in section 61(a) of the Internal Revenue Code of 1986, exceeding the "Maximum Qualifying Gross Income" reported on the USPTO Web site at http://www.uspto.gov/patents/law/micro_entity.jsp which is equal to three times the median household income for that preceding calendar year, as most recently reported by the Bureau of the Census.</p>					
SIGNATURE by an <u>authorized party</u> set forth in 37 CFR 1.33(b)					
Signature		/s/ Stephen L. Peterson			
Name		Stephen L. Peterson			
Date		January 10, 2015	Telephone	805 365 3012	Registration No. 26,325
<input type="checkbox"/>		There is more than one inventor and I am one of the inventors who are jointly identified as the applicant. The required additional certification form(s) signed by the other joint inventor(s) are included with this form.			

**NOTICE OF APPEAL FROM THE EXAMINER TO
THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Docket Number (Optional)

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)]

on _____

Signature _____

Typed or printed
name _____

In re Application of
Christopher H. Cooper

Application Number
13/089,986

Filed
April 19, 2011

For METHOD OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS 

Art Unit
1497

Examiner
Cognill, Kimberly E.

Applicant hereby **appeals** to the Board of Patent Appeals and Interferences from the last decision of the examiner.

The fee for this Notice of Appeal is (37 CFR 41.20(b)(1)) \$ 200.00

☐ Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee shown above is reduced by half, and the resulting fee is: \$ _____

☐ A check in the amount of the fee is enclosed.

☒ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☐ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. _____.

☒ A petition for an extension of time under 37 CFR 1.136(a) (PTO/SB/22) is enclosed.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant/inventor.

s/s Stephen L. Peterson

Signature

☐ assignee of record of the entire interest.
See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed.
(Form PTO/SB/96)

Stephen L. Peterson

Typed or printed name

☒ attorney or agent of record.
Registration number 26,325

805 365 3012

Telephone number

☐ attorney or agent acting under 37 CFR 1.34.
Registration number if acting under 37 CFR 1.34. _____

January 10, 2015

Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☐ *Total of _____ forms are submitted.

This collection of information is required by 37 CFR 41.31. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11, 1.14 and 41.6. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Patent Application Fee Transmittal

Application Number:	13089986			
Filing Date:	19-Apr-2011			
Title of Invention:	METHODS OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS			
First Named Inventor/Applicant Name:	Christopher H. Cooper			
Filer:	Stephen Leroy Peterson			
Attorney Docket Number:	09102.0014-04			
Filed as Micro Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
NOTICE OF APPEAL	3401	1	200	200
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Extension - 3 months with \$0 paid	3253	1	350	350
Miscellaneous:				
Total in USD (\$)				550

Electronic Acknowledgement Receipt

EFS ID:	21176668
Application Number:	13089986
International Application Number:	
Confirmation Number:	1497
Title of Invention:	METHODS OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS
First Named Inventor/Applicant Name:	Christopher H. Cooper
Customer Number:	22852
Filer:	Stephen Leroy Peterson
Filer Authorized By:	
Attorney Docket Number:	09102.0014-04
Receipt Date:	10-JAN-2015
Filing Date:	19-APR-2011
Time Stamp:	15:02:51
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$ 550
RAM confirmation Number	6618
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Extension of Time	EOTsigned.pdf	42981	no	1
			ed1674ab0c275c1fc24a6c078dd0e6632ab84428		
Warnings:					
Information:					
2	Certification of Micro Entity (Gross Income Basis)	sb0015microsigned.pdf	82111	no	1
			6a838482ee6ea606df83df4db5ce8e50bfcf5718		
Warnings:					
Information:					
3	Notice of Appeal Filed	notofappeal.pdf	106644	no	1
			167ffd6f452929a48d11ea3cd3da7c8c4d96a9bb		
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	32156	no	2
			71182b3687a8ba9194c499d53b203aba8029bb20		
Warnings:					
Information:					
Total Files Size (in bytes):			263892		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)	
)	
Christopher Cooper et al.	)	Group Art Unit: 4187
)	
Application No.: 13/089,986	)	Examiner: Kimberley E. Coghill
)	
Filed: April 19, 2011)	
	)	Confirmation No.: 1497
For: METHOD OF GENERATING NON-)	
IONIZING RADIATION OR NON-)	
IONIZING ⁴ He USING GRAPHENE)	
BASED MATERIALS)	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

PETITION FOR EXTENSION OF TIME

Applicants petition for a three-month extension of time to file a reply to the final Office Action of July 11, 2014. A fee of \$350.00 is enclosed.

Please grant any additional extensions of time required to enter the attached reply.

Respectfully submitted,

Dated: January 10, 2015

By: /s/ Stephen L. Peterson



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/089,986	04/19/2011	Christopher H. Cooper	09102.0014-04	1497
22852	7590	07/11/2014	EXAMINER	
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER LLP 901 NEW YORK AVENUE, NW WASHINGTON, DC 20001-4413			COGHILL, KIMBERLY E	
			ART UNIT	PAPER NUMBER
			3646	
			MAIL DATE	DELIVERY MODE
			07/11/2014	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 13/089,986	Applicant(s) COOPER ET AL.	
	Examiner KIMBERLY E. COGHILL	Art Unit 3646	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on 24 June 2014.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.

3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☒ Claim(s) 1-45 is/are pending in the application.
5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☒ Claim(s) 1-45 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10) ☐ The specification is objected to by the Examiner.

11) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a) ☐ All b) ☐ Some** c) ☐ None of the:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)
Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.

4) ☐ Other: _____.

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DETAILED ACTION***Notice of Pre-AIA or AIA Status***

1. The present application is being examined under the pre-AIA first to invent provisions.

Response to Arguments

2. Applicant's arguments, *see* Remarks P. 10-11, filed 24 June 2014, with respect to the statement of priority, have been fully considered, but they are not persuasive for the reasons set forth below.

3. In regard to Applicant's arguments with respect to Examiner's assessment of the proper priority to assign to the term "graphene," such arguments have been fully considered, but are unpersuasive.

Examiner maintains that the prior filed applications (Application No. 60/741,874, 60/777,577, 11/633,524, 12/258,568, and 12/898,807) fail to provide adequate support or enablement in the manner provided by 35 U.S.C. 112(a) or pre-AIA 35 U.S.C. 112, first paragraph for the terms "graphene" and "*local* nuclear fusion" in Applicant's 19 April 2011 Application (hereinafter, "Application"). Thus, Claims 1-42 were given the proper benefit of priority from the date of application 61/427,140: 24 December 2010. Applicant appears to misunderstand the purpose of the statement of priority: it is not a rejection, but simply a clarification of the *proper* priority date awarded to the claims of the Application. The language of Examiner's 24 December 2013 Office Action (hereinafter, "the First Action") acknowledges Applicant's claim for benefit to a prior application. And, while a continuation-in-part application may include matter not disclosed in the prior-filed application, as set forth in MPEP 201.08, only the claims of the continuation-in-part application that are disclosed in the manner provided by 35 U.S.C. 112(a) or pre-AIA 35 U.S.C. 112, first paragraph in the prior-filed application are entitled to the benefit of the filing date of the prior-filed application. While Examiner appreciates Applicant's tutorial on the make-up of carbon nanotubes, Examiner remains unconvinced that the prior-filed applications listed above contain sufficient support for the "graphene" of the claims. In short, while the prior-filed applications would be enabling for "graphene forming carbon nanotubes and other forms of carbon specifically disclosed in the prior applications on which priority is based," they fail to reasonably provide enablement for "graphene materials". The specifications of the prior-filed applications, with the exception of provisional application no. 61/427,140, do not enable any person skilled in the art to which it pertains, or with which it is most

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nearly connected, to the invention commensurate in scope with these claims. Accordingly, the term "graphene" as used in independent Claims 1, 19, 28, and 44, exceeds the scope of enablement of the aforementioned prior-filed applications and is entitled only to the priority date of provisional application no. 61/427,140 of 24 December 2010.

4. In regard to Applicant's arguments with respect to Examiner's assessment of the proper priority to assign to the term "*local* nuclear fusion," such arguments have been fully considered, but are unpersuasive. Again, Applicant appears to misunderstand the nature of the statement of priority. No objection was made to the term "local nuclear fusion." Rather, an assessment of priority was presented to clarify the record for Applicant's benefit. Additionally, Applicant's argument that "local nuclear fusion" appears to be based upon Applicant's equating of the term "local nuclear fusion" with "cold fusion" and "low energy nuclear fusion." Applicant's specification *explicitly defines* the term "local nuclear fusion" to be "a distinct, localized, transient fusion event as opposed to a self-sustaining, high energy, nuclear reaction event." *Application*, Para. [0038]. And, while Applicant now defines the term to be the equivalent of "low energy nuclear fusion" and "cold fusion," Examiner cannot locate either of these terms within the prior-filed specifications. Further, Applicant comments that the use of the term "local nuclear fusion" is a veiled attempt at obtaining a patent for "cold fusion," implemented with the intent of not "invit[ing] a rejection based on the lack of technical support for a fusion reaction." Applicant does not establish a proper chain of priority for the use of this term and fails to demonstrate that the term "local nuclear fusion" is disclosed by some, equally obscure, equivalent term in a prior-filed application.

5. Applicant's arguments, *see* Remarks P. 11, filed 24 June 2014, with respect to the informalities within the amended claims, have been fully considered and are persuasive.

6. Applicant's arguments, *see* Remarks P. 11-16, filed 24 June 2014, with respect to the rejections under 112(a) for failure to comply with the enablement requirement and the rejections under 101 for lack of operability, have been fully considered, but are not persuasive, as set forth below.

7. First, Applicant's arguments under the heading "Alleged Lack of Disclosure," which appear to be directed at Examiner's rejection under 35 U.S.C. 112(a) or 35 U.S.C. 112 (pre-AIA), first paragraph, of Claims 1-42 as failing to comply with the enablement requirement, rely largely on the basis that

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Examiner's position in the First Action relies upon "outdated technical references." Applicant alleges that "[l]ater research in the area [of cold fusion] refutes the position of [] Examiner" and cites a 2009 U.S. government report (hereinafter "2009 Government Report"), dated November 13, 2009, that states "[recent research] has produced evidence that local nuclear reaction may be taking place under conditions not previously believed to be possible." U.S. Government Report (DIA-08-0911-003), 13 Nov. 2009, P. 3. In that same Report, the following statement is found: "DIA assesses with high confidence that if LENR can produce nuclear-origin energy at room temperatures, this disruptive technology could revolutionize energy production and storage [...]" (emphasis added). It is entirely unclear how these two statements, and the Government Report as a whole, amount to proof of "cold fusion." Of course, *if* cold fusion were to actually occur it *would* be revolutionary. If a working teleportation system were to be invented, it too, would be quite revolutionary. But, at the heart of the scientific method is this truth: **extraordinary claims require extraordinary evidence.** And, Applicant's offering of two, fairly minimal, "examples" to *prove* the mastery of "cold fusion" falls severely short of extraordinary proof of the existence of such highly controversial claims.

8. Second, Applicant asserts that Examiner's reliance on *In re Mitchel R. Swartz*, 232 F.3d 862 (Fed. Cir. 2000) is misplaced for at least two reasons: (1) the state of the art regarding low energy nuclear reactions is not the same as when Swartz filed his application in 1991; and, (2) the Swartz application, according to the Court, did not contain a disclosure of any operative embodiment. To support the first rationale, Examiner states that "numerous investigators [...] have proved there are local nuclear reactions," citing the 2009 Government Report referenced above as evidence of this claim; however, the statement quoted by Applicant, that "[s]cientists worldwide have been reporting anomalous excess heat production, as well as evidence of nuclear particles and transmutation [of elements]," is not "proof" of "cold fusion." Rather, the Government Report mentions *reports* of anomalous excess heat production, by "scientists." Unsubstantiated reports hardly amount to proof, particularly when said reports are of extraordinary findings that, *if true*, would amount to a revolutionary discovery. To illustrate this point, Applicant is invited to consider the following analogy: there are *numerous* "reports" of Bigfoot sightings each year in the United States alone, and entire television programs and organizations dedicated to the

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search for the mysterious creature, but such "evidence" of the existence of Bigfoot, has yet to unequivocally *prove* the reality of such a creature. Geographic Database of Bigfoot/Sasquatch Sightings & Reports, The Bigfoot Field Researchers Organization, *available at* www.bfro.net/GDP; Finding Bigfoot, Animal Planet: Surprisingly Human, *available at* www.animalplanet.com/tv-shows/finding-bigfoot; North America Bigfoot Search, *available at* www.nabigfootsearch.com/home.html. In regard to Applicant's second rationale, the presence of "working" examples within Applicant's specification, as noted in Examiner's First Action, "Applicants provide little direction as to how their invention actually operates. Applicants claim energy and He-4 detection was observed from contacting nanotubes with deuterium. There is no credible record to indicate the "Examples" (pp. 14+) are based on rigorous, credible experimental evidence. Further, findings of applicant *directly contradict accepted science*" (First Action, Para. 12). Examiner cites *In re Swartz* because it accurately expresses the view that the U.S.P.T.O. takes on "cold fusion" patent applications. The state of the prior art in regard to low energy nuclear fusion is spotty and unreliable, at best. Cold fusion, to date, has not been recognized by the U.S.P.T.O. as a viable source of energy, and absent *significant, qualitative demonstration to refute this position*, no patent application related to such technology can be seriously entertained (First Action, Para. 11).

9. Applicant goes on to reiterate the findings of the Examples of the Specification, stating that Examiner's "unspecific, unwarranted, and conclusory dismissal of the experimental work is totally unsupported by the facts" as well as setting forth Applicant's educational background. Examiner respectfully disagrees with Applicant's assessment of her First Action and, in light of the laws of physics as they are currently understood and accepted by the scientific community, cannot, in good faith, accept Applicant's educational background and commendable work experience as unequivocal proof of the accuracy of his experiments. Examiner has met her initial burden of challenging a patent applicant's presumptively correct assertion of utility by showing that one of ordinary skill in the art would reasonably doubt the asserted utility of Applicant's invention. *In re Swartz*, at 864. The U.S.P.T.O. may establish a reason to doubt an invention's asserted utility when the written description "suggest[s] an inherently unbelievable undertaking or involve[s] implausible scientific principles." *In re Brana*, 51 F.3d 1560, 1566 (Fed. Cir. 1995). Examiner points Applicant to her First Action, P. 5-9 for a detailed discussion of the

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basis of her finding of inoperability. Regarding the additional literature submitted by Applicant entitled "Visible-Light-Induced Water-Splitting in Channels of Carbon Nanotubes," Examiner finds that the article does not amount to a defense of the operability of cold fusion. In fact, the term "fusion," or an equivalent thereof, is not mentioned within the cited reference. Accordingly, such literature is not persuasive to support Applicant's arguments that the claimed invention is operable and enabled.

10. Third, Applicants exaggeration of the findings within the 2009 Government Report is unpersuasive. As discussed above, that report does *not* amount to a statement of acceptance or proof of the existence of "cold fusion." In regard to the reported "paradigm-shifting [cold fusion] results," the 2009 Government Report cites to various International Conferences on Cold Fusion, LENR seminars, and fringe science websites (see citation numbers: 1-3, 8-11, 20-22, 24, 25, 27-29, 31, 39, 41, 47, and 48, P. 6-8). Such sources have a very obvious agenda, and the mere citation of these sources indicates that those preparing the 2009 Government Report had a significant amount of trouble attaining reported results from sources widely recognized as reliable across the scientific community. As critical review is at the heart of scientific progress, the appropriate response to such criticism "should not be to misconstrue the criticism and then ignore it." The repeated use of this tactic is, in the opinion of Kirk Shanahan, PhD (Physical Chemistry, U. Cal-Berkeley), "the *clearest sign* that [cold fusion] researchers are in fact pseudoscientists, pantomiming the behavior of good scientists." K. Shanahan., Unlikely Cold Fusion, Letters, Chemical & Engineering News, Vol. 90, Iss. 28, P. 3-4 (9 July 2012), *available at* www.cen.acs.org/articles/90/i28/Unlikely-Cold-Fusion.html.

11. Fourth, Applicant's dismissal of Examiner's application of the *Wands* factors to the present application is unpersuasive. Applicant asserts that "the current hypotheses of nuclear physics have to change to accommodate facts" because, in Applicant's opinion, the facts of the present application "unequivocally demonstrate that when carbon nanotubes contact deuterium nuclear reactions occur because transmutation of elements results from the combination." It is inconceivable how Applicant can believe that the very *laws* of physics should be *rewritten* based upon the presentation of a couple of experiments and a few incredible claims. To date, cold fusion experiments have been largely *irreproducible* and, by and large, subject to a severe lack of critical review. K. Shanahan, Comments on

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"A new look at low-energy nuclear reaction research," J. Environ. Monit., Vol. 12, P. 1756-1764, 1762 (2010), *available at* pubs.rsc.org/En/content/articlepdf/2010/em/c001299h.

12. Further, numerous criticisms of cold fusion research must be addressed prior to even a *consideration* of rewriting the laws of modern physics. For instance, it is necessary that cold fusion researchers set forth: (1) a clear explanation of why the calibration constant shift (CCS) does not account for apparent excess heat events resulting from cold fusion experiments; (2) a proven lack of contamination within such experiments; and, (3) proof of consistent and reproducible results of such experiments. *Id.* These three criticisms listed are by no means an exhaustive list of the problems facing the questionable science that is cold fusion. And, Applicants have failed to thoroughly address these, as well as numerous other issues, in a manner that warrants the findings of the present Application to amount to "unequivocal facts." Accordingly, Examiner maintains her rejection of Claims 1-42 under 35 U.S.C. 112(a) or 35 U.S.C. 112 (pre-AIA), first paragraph, as well as 35 U.S.C. 101.

13. Applicants arguments, *see* Remarks P. 16-17, filed 24 June 2014, with respect to the rejections under 112(b) for indefiniteness, have been fully considered, and are addressed, in detail, below.

14. In light of the thorough explanation above, as well as the reasoning set forth in Examiner's First Action, it is unclear how the method could be practiced without the inclusion of a step for inputting energy. Accordingly, Applicant's arguments in this respect are unpersuasive.

15. Applicant's definition of the word "plurality" is accepted. Accordingly, the rejections based upon the use of that term are withdrawn.

16. In regard to Claims 3 and 6, the use of the word "and" implies that *all* elements of Claim 3 or *all* elements of Claim 6 comprise either the "graphene materials" (Cl. 3) or "unwanted materials" (Cl. 6). As stated in the First Action, it is unclear how "combinations" of the elements could comprise the specified materials if all elements listed are already included within the materials. Based upon the specification and claim language, Examiner was, and remains, under the impression that the elements of Claims 3 and 6 are intended to comprise Markush groups. Such an interpretation is consistent with the specification; however, Applicant now argues against an interpretation of Claims 3 and 6 that is consistent with the specification. Accordingly, Examiner maintains her rejection under 112(b) of Claims 3 and 6, as well as

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Claim 30 (for similar reasons). If Applicant insists on the interpretation cited in Applicant's 24 June 2014 Remarks, a 112(a) rejection is necessitated for lack of enablement within the specification, as there is no indication within the specification and it is not conceivable how one embodiment of the present invention could include all elements mentioned as well as a "combination thereof."

17. Applicant's arguments, *see* Remarks P. 17-22, filed 24 June 2014, with respect to the rejections of Claims 1, 3-5, 13-15, 18, 19, 21, 25, 27-33, 35-40 and 42 under 102(b) as anticipated by Hagelstein (US PG-Pub. No. 2009/0086877), have been fully considered, but are not persuasive, as set forth below.

18. First, Hagelstein is prior art under 102(b) for Claims 1-42, because such claims are only entitled to priority as of the filing date of provisional application 61/427,140: 24 December 2010, as discussed above.

19. Second, Applicant argues (a) that Hagelstein does not provide an enabling disclosure of the claimed subject matter; and, (b) Hagelstein fails to acknowledge the fusion reaction resulting from the cited experiments. These arguments are unfounded and inconsistent for two reasons. First, Hagelstein provides numerous "examples," "models," and alleged "results" of the experiments contained therein (All Figs., Tables 1-3). The fact that Applicant challenges Hagelstein's possession of his "invention" at the time the Hagelstein patent application was filed is curious, given that Hagelstein contains each and every element of the many of Applicant's claims and discusses such in arguably much more detail than Applicant. Second, as Applicant challenges the validity of the Hagelstein patent application as prior art by claiming it is not enabling, Applicant apparently overlooks the fact that Hagelstein is one of the very sources upon which Applicant basis his assertion that cold fusion is a reality. *See* 2009 Government Report, P. 3; Cited reference no. 41, 44). If, as Applicant alleges, Hagelstein failed to show possession of his invention as of the date of PG-Pub. No. 2009/0086877, filed prior to the date of the references that Applicant cites to support operability of the present invention, then Applicant's arguments as to the operability of the claimed invention are *significantly weakened*. Accordingly, Applicant's argument (a), is unpersuasive.

20. It is unclear how Applicant arrived at the interpretation of Hagelstein as failing to disclose fusion results from the placement of deuterium in contact with carbon nanotubes. The point of Applicant's

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citation of Para. [0312] is unclear. Examiner cited Para. [0322] in her First Action, which states "fullerene materials can be processed to incorporate D₂ and/or HD prior to incorporation in a solid or liquid." This citation explicitly discloses the placement of deuterium in contact with "graphene materials." Additionally, Hagelstein indicates that such contact ultimately results in "heat energy" (Para. [0274]). Thus, Applicant's arguments with respect to argument (b), are unpersuasive.

21. Applicant's additional arguments regarding the 102(b) rejections of the specified claims fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references. Accordingly, these arguments are unpersuasive.

22. Applicant's discussion of Claims 43-45 under the 102(b) argument subsection will not be discussed, as these claims are newly added. Any rejections to these claims will be addressed in the following subsections of this Office Action.

23. Applicant's arguments, *see* Remarks P. 22-23, filed 24 June 2014, with respect to the rejections of Claims 2, 11, 12, 16, 17, 20, 24 and 26 under 103(a) as unpatentable over Hagelstein (US PG-Pub. No. 2009/0086877), have been fully considered, but are not persuasive, as set forth below.

24. In response to applicant's argument that there is no teaching, suggestion, or motivation to combine the references, the examiner recognizes that obviousness may be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. *See In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988), *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992), and *KSR International Co. v. Teleflex, Inc.*, 550 U.S. 398, 82 USPQ2d 1385 (2007). In this case, the obviousness of each claim rejected under 103(a) was clearly indicated within the 103(a) rejections section of the First Action and is reiterated below. The obviousness rejections rely upon case law, clearly addressed in response to the individual claims.

25. In response to Applicant's allegations of Examiner inaccurately citing to Para. [0100] of Hagelstein to show the generation of He-4, such an allegation is the result of a misreading of Examiner's

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original rejections. Examiner cited to Para. [0100] to establish a temperature, not the generation of He-4. The generation of He-4 is discussed in regard to the rejection of the independent claims from which the temperature-specific claims depend.

26. Applicant's asserts that Hagelstein fails to teach the encapsulation of deuterium within a fullerene material, but rather teaches the encapsulation of hydrogen-2 therein. As deuterium is *synonymous* with hydrogen-2, such an assertion is absolutely nonsensical.

27. Applicant's arguments, see Remarks P. 23-25, filed 24 June 2014, with respect to the rejections of Claims 6, 9, 10 and 22 under 103(a) as unpatentable over Hagelstein (US PG-Pub. No. 2009/0086877), in view of Smalley (US PG-Pub. No. 2002/0127171) and the rejections of Claims 7, 8 and 23 as being unpatentable over Hagelstein, in view of Smalley (US PG-Pub. No. 2002/0127171) have been fully considered, but are not persuasive, as set forth below.

28. In regard to Applicant's unsubstantiated assertion that Examiner fails to establish a *prima facie* case of obviousness, stating that Examiner failed to provide a rationale for combining the cited references, is unfounded in fact, as each and every obviousness rejection set forth in the First Action contains an explanation, consistent with the *KSR* decision. Applicant's characterization of Examiner's rejections in this manner is wholly inaccurate and is, accordingly, unpersuasive.

Priority

29. Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, or 365(c) is acknowledged. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 119(e) as follows:

The later-filed application must be an application for a patent for an invention which is also disclosed in the prior application (the parent or original nonprovisional application or provisional application). The disclosure of the invention in the parent application and in the later-filed application must be sufficient to comply with the requirements of 35 U.S.C. 112(a) or the first paragraph of pre-AIA 35 U.S.C. 112, except for the best mode requirement. See *Transco Products, Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994)

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The disclosures of the prior-filed applications, Application No. 60/741,874, 60/777,577, 11/633,524, 12/258,568, 12/898,807 fail to provide adequate support or enablement in the manner provided by 35 U.S.C. 112(a) or pre-AIA 35 U.S.C. 112, first paragraph for one or more claims of this application. Independent Claims 1, 19, 28 and 39 all contain new matter in the form of “graphene” (claims 1, 19, and 28), “*local* nuclear fusion” (Claim 39). Thus, all claims in the present application will only be given the benefit of the priority date of application 61/427,140 of 24 December 2010.

Claim Rejections - 35 USC § 112

30. The following is a quotation of 35 U.S.C. 112(a):

(a) IN GENERAL.—The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor or joint inventor of carrying out the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), first paragraph:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

31. Claims 1-45 are rejected under 35 U.S.C. 112(a) or 35 U.S.C. 112 (pre-AIA), first paragraph, as failing to comply with the enablement requirement. The claims contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

32. There are many factors recognized by the MPEP that are to be considered when determining whether there is insufficient evidence to support a determination that a disclosure satisfies the enablement requirement, including, but not limited to: (1) the breadth of the claims; (2) the nature of the invention; (3) the state of the prior art; (4) the level of one of ordinary skill; (5) the level of predictability in the art; (6) the amount of direction provided by the inventor; (7) the existence of working examples; and (8) the quantity of experimentation needed to make or use the invention based on the content of the disclosure. *In re Wands*, 858 F. 2d 731, 737 (Fed. Cir. 1988); MPEP 2164.01(a).

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33. It may be possible to generate energetic particles by contacting nanotubes with hydrogen isotopes in the presence of very high power density activation energy. It may further be possible to transmute matter by exposing such matter to the energetic particles produced according to the disclosed method, but the energy necessary for the activation of hydrogen isotopes is much higher than that released from said nuclear transmission. Hydrogen isotope localization by nanotubes (and electron shielding) is similar to hydrogen isotope localization in other molecules and cannot increase the probability of nuclear transmutation (nuclear fusion) significantly, as demonstrated in recent experiments. See F. Raiola et al., *Electron Shielding in $d(d,p)t$ for Deuterided metals and the Periodic Table*, Physics Letters B., 547 (3-4), pp. 193-99 (2002). Further, for a D-T reaction to *break even* - thereby producing as much energy as it consumed - it is necessary that the temperature be in the order of 100×10^6 K. See Knief, *Nuclear Engineering*, Hemisphere Pub. Co., pp. 636, 641 (1992). The electron shielding decreases a threshold energy for D-D fusion very little and does not permit net energy production with a low activation energy.

34. Until now, net energy production from the transmutation of solid hydrogen isotopes were only activated by a "hydrogen" fusion explosion.

35. The nature of the invention rests on certain basic concepts, including the following:

- a. [005] there is disclosed a method of generating non-ionizing radiation, non-ionizing He-4 atoms, or a combination thereof, comprising contacting graphene materials with a source of deuterium; and placing the graphene materials in the source of deuterium for a time sufficient to generate non-ionizing radiation, non-ionizing He-4 atoms
- b. [0015] there is disclosed a method of generating non-ionizing radiation, non-ionizing He-4 atoms, or both, comprising: providing graphene materials in a sealable vessel; evacuating the vessel to a pressure below atmospheric pressure; adding deuterium gas to the vessel to achieve a pressure above atmospheric pressure; performing at least one heating step that further increases pressure inside the vessel; cooling the vessel; and keeping the graphene materials in the vessel at room temperature or below for a time sufficient to generate non-ionizing radiation, non-ionizing He-4 atoms, or both.

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c. [0017] there is disclosed a method of inducing local nuclear fusion, comprising the steps of: contacting graphene materials with deuterium; and placing graphene materials in the deuterium for a time sufficient to generate primarily a plurality of He-4 atoms and energy.

36. The nature of the invention thus turns on the issue of converting D2 to He-4 by contacting graphene material with deuterium. Applicants' theory rests upon some of the following assumptions, such as: that low energy nuclear reactions resulting in the production of He-4 and energy are already known to occur (Paragraph [0057]) and "[t]here is a growing consensus that the reaction rate given in $[D + D \rightarrow 4He + 23.8 \text{ MeV}]$ is much greater than that of [other D+D reactions]," an assertion that is not substantiated by any concrete evidence or experimentation (Paragraph [0057]). Yet, there is a large body of published evidence refuting the existence or even possible existence of the empirical evidence upon which this theory is based. Any efforts to set forth a convincing conception of the physical processes at work cannot assume the very facts that must be proven.

37. Further, the state of the prior art in regard to low energy nuclear fusion is spotty and unreliable, at best. Cold fusion, to date, has not been recognized by the U.S.P.T.O. as a viable source of energy, and absent significant, qualitative demonstration to refute this position, no patent application related to such technology can be seriously entertained. See *In re Mitchel R. Swartz*, 232 F.3d 862 (Fed. Cir. 2000).

38. Applicants provide little direction as to how their invention actually operates. Applicants claim energy and He-4 detection was observed from contacting nanotubes with deuterium. There is no credible record to indicate the "Examples" (pp. 14+) are based on rigorous, credible experimental evidence. Further, findings of applicant directly contradict accepted science. Slight He-4 detection is not enough to prove net energy production. Further, the He-4 yield measurements are not convincing, because no extensive analysis of possible contaminations and systematic error is presented by applicant; neither are control experiments presented, in which "helium production" is measured in an environment of elevated He-4.

39. There is no quantitative and rigorous demonstration to indicate that the "Examples" (pp. 14+) are based on credible experimental evidence. Additionally, Applicants' disclosure does not contain reputable evidence that is sufficient to support any allegations or claims that the invention produces "nuclear

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fusion." Slight He-4 detection is not enough to prove net energy production. Further, the He-4 yield measurements are not convincing, because no extensive analysis of possible contaminations and systematic error is presented by applicant. Neither are control experiments presented, in which "helium production" is measured in an environment of elevated He-4.

40. Conclusions of the DOE 2004 Report of the Review of Low Energy Nuclear Reactions are summarized by the following:

Reviewers expert in nuclear physics noted that the cold fusion mechanism put forward by proponents is not in accord with presently accepted knowledge of D + D fusion. Specifically, D+D fusion is accompanied by the production of protons, neutrons, tritons, He-3, He-4 and high energy gamma rays, all in well known proportions. The fusion channel resulting in He-4 and high energy gamma rays occurs approximately only once for every 10^7 D+D fusion reactions. These characteristic proportions for the production of the fusion products are found for every energy of the incident deuteron measured so far, down to the lowest that has been measured.

The review document and oral presentations made the argument that the branching ratios are different at low energies and that in cold fusion, He-4 fusion channel is predominant. According to the review document, no high energy gamma rays appear to accompany the He-4, as is observed in D-D fusion reactions. Instead, the approximately 24 MeV in energy resulting from D-D fusion was purported to appear as heat in the material lattice. To explain these unusual characteristics, the reviewers were presented with a theoretical framework that purported to describe how collective energy from the material lattice couples to a deuteron pair to induce fusion, how the only fusion reaction channel that occurs would be the production of He-4, and how all the energy is coupled back into the material in the form of heat instead of high energy gamma-rays. The reviewers raised serious concerns regarding the assumptions postulated in the proposed theoretical model for the explanation for He-4 production. *Report of the Review of Low Energy Nuclear Reactions*, 2004, available at [web.archive.org/web/20080226210800/http://www.science.doe.gov/Sub/Newsroom/News_Releases/DOE-SC/2004/low_energy/CF_Final_120104.pdf](http://www.science.doe.gov/Sub/Newsroom/News_Releases/DOE-SC/2004/low_energy/CF_Final_120104.pdf) (Page 4, Charge Element 2: Determine whether the evidence is sufficiently conclusive to demonstrate that such nuclear reactions occur).

41. The amount of guidance or direction necessary to enable an invention is inversely related to the amount of knowledge in the state of the art, as well as to the predictability of the art. *In re Fisher*, 427 F.2d 833,839 (CCPA 1970); MPEP 2164.03. The art of the present invention, transmuting of matter and energy generation by contacting said matter with a nanotube structure and exposing said nanotube structure to activation energy) is so new that it cannot be considered to have a body of knowledge associated with it, much less predictability of results. Applicant has provided data that is based upon questionable science. Therefore, such data is also questionable until such a time that applicant

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rigorously proves that the applied concepts are plausible and the data is statistically sound. Since applicant has not established the operability of the presently claimed invention, it is considered that the invention is lacking in utility. Given the state of the art as discussed herein, it would be unreasonable to expect one skilled in the art to be able to make and use the claimed invention without undue experimentation.

42. Simply stating the concepts the inventor espouses are correct is not sufficient substantiating evidence. Sufficient substantiating evidence may be based on widely accepted scientific concepts (e.g., quantum nuclear physics), a working model, or a supporting opinion in a widely respected and peer-reviewed publication (existing credible publications do not support optimistic Applicants' assumptions).

43. Examiner has set forth a reasonable and sufficient basis for challenging the adequacy of the disclosure. The statute requires the applicant to inform, not to direct others to find out for themselves. Given the state of the art as discussed herein, it is unreasonable to expect one skilled in the art to be able to make and use the claimed invention without undue experimentation.

44. The claimed invention as a whole must be useful and accomplish a practical application. That is, it must produce a "useful, concrete and tangible result." *State Street Bank & Trust Co. v. Signature Financial Grp.*, 149 F.3d 1368, 1373-4 (Fed. Cir. 1998). The purpose of this requirement is to limit patent protection to inventions that possess a certain level of "real world" value, as opposed to subject matter that represents nothing more than an idea or concept or subject matter that is simply a starting point for future investigation or research. *Brenner v. Manson*, 383 U.S. 519, 528 (1966).

45. Reviewing the *Wands* factors, examiner summarizes the above elaborated explanation as to why applicants' invention fails to satisfy the enablement requirement:

- a. The breadth of the claims: *Applicants present broad claims, alleging to satisfy a need for a new alternative source of energy generation, by contacting nanotubes with hydrogen isotopes, unsubstantiated by and contradictory towards modern nuclear science.*
- b. The nature of the invention: *The nature of the invention revolves around the viability of cold fusion as a source for clean energy; as disclosed, such involves a very drastic change in hypothesis of modern nuclear physics.*

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- c. The state of the prior art: *effects claimed by applicants have not been observed in prior experiments of patentable merit.*
- d. The level of one of ordinary skill: *it is impossible to ascertain the level of one of ordinary skill, because technology, as acknowledged by applicants, is purported to be a new "alternative source of energy."*
- e. The level of predictability in the art: *The possibility for nuclear transmutation and net energy generation by contacting nanotubes with hydrogen isotopes is likely impossible.*
- f. The amount of direction provided by the inventor: *Applicants provide insufficient evidence and bases findings upon assumptions not confirmed in independent experiments: applicants fail to indicate the activation energy required for the experiment and provides unsubstantiated assumptions as the bases for their assumptions.*
- g. The existence of working examples: *Examples exist, but realization of non-ionizing He-4 detection during activation of nanotubes contacted with deuterium is incredible and does not have independent confirmation.*
- h. The quantity of experimentation needed to make or use the invention based upon the content of the disclosure: *Such is necessary as such results have never before been attained.*

20. Claim 43 is rejected under 35 U.S.C. 112(a) or 35 U.S.C. 112 (pre-AIA), first paragraph, as failing to comply with the written description requirement. The claim contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor or a joint inventor, or for pre-AIA the inventor(s), at the time the application was filed, had possession of the claimed invention. Neither the present Specification, nor any priority documents, disclose the step of introducing D₂O gas to carbon nanotubes nor the step of applying pressure to said gas.

21. The following is a quotation of 35 U.S.C. 112(b):
(b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:

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The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

22. Claims 1-45 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention. It is evident that a certain amount of energy is at least required for practicing the method, yet none is so claim (or provided elsewhere in the application).

23. Claims 1, 19, 28, 39, 43 and 44 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: applying activation energy to the deuterium.

24. Claims 2-18, 20-27, 29-38, 40-42 and 45 are rejected under this subsection for their dependency from independent Claims 1, 19, 28 and 39 and 44.

25. Claims 3, 6 and 30 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being incomplete for omitting essential steps, because they depend from claims which omit such essential steps, as well as for the indefiniteness as discussed below.

26. In regard to Claim 3, applicants state that graphene materials comprise: "monolayer graphite, multilayer graphite [...] and combinations thereof." It is unclear how combinations thereof could exist if the graphene materials comprise all the carbon structures claimed. For the purpose of examination, the "and" of Claim 3 will be interpreted as an "or."

27. In regard to Claim 6, for similar reasons as stated above in response to Claim 3, the "and" will be interpreted as "or" for the purpose of examination.

28. In regard to Claim 30, for similar reasons as stated above in response to Claim 3, the "and" will be interpreted as "or" for the purpose of examination.

Claim Rejections - 35 USC § 101

29. 35 U.S.C. 101 reads as follows:

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Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

30. Claims 1-45 are rejected under 35 U.S.C. 101 because the disclosed invention is inoperative and therefore lacks utility.

31. The examiner has the initial burden of challenging an asserted utility. Once the examiner has provided evidence showing that one of ordinary skill in the art would reasonably doubt the asserted utility of the invention, the burden shifts to the applicant to provide rebuttal evidence. See MPEP 2164.07(I.B).

32. Invention of the present application lacks utility because it is inoperable. In the specification, applicant suggests "[0002] [d]isclosed herein are methods of generating non-ionizing radiation or non-ionizing 4He by contacting deuterium with a graphene material, such as carbon nanotubes" to satisfy the "need to generate new sources of energy not based on fossil fuels" (Paragraph [0003]). Such a suggestion relies on phenomena that are not proven and/or are contrary to modern nuclear physics. Additionally, even if it were possible to practice the invention, the applicant has not described the method used to implement it in sufficient detail as to enable a skilled artisan to make and use the invention without undue experimentation.

33. Applicant's statement of asserted utility that the claimed invention provides an "alternative source of energy to alleviate our society's current dependence without further impact to the environment or to living organisms associated with nuclear waste or ionizing radiation" ([Paragraph [004]) cannot operate as disclosed because the claimed "contacting graphene with a source of deuterium" cannot enhance the efficiency of nuclear transmission significantly to provide for the release of net nuclear energy.

34. It is well established that where, as here, the utility of the claimed invention is based upon allegations that border on the incredible, or allegations that would not readily be accepted by a substantial portion of the scientific community, sufficient authenticating evidence of operability must be submitted by applicant. See *In re Houghton*, 167 U.S.P.Q. 687 (CCPA 1970); *Puharich v. Brenner*, 162 U.S.P.Q. 136 (CA DC 1969). The art of the present invention (a method of successfully generating 24 MeV of energy and He-4 from the D+D without the presence of ionizing radiation) is so new that it cannot be considered to have a body of knowledge associated with it, nor predictability of results. Applicants' statement of

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asserted utility of an "alternative source of energy" (Paragraph [0004]) is inoperable because the claimed "contacting graphene" with a "deuterium source" cannot enhance an energy efficiency of nuclear transmutation significantly up to possible release of net nuclear energy.

Claim Rejections - 35 USC § 102

35. **Applicant should note that while the method as claimed is anticipated by the prior art, the utility as asserted in the specification is not enabled in or by the reference.**

36. The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

37. Claims 1, 3-5, 13-15, 18, 19, 21, 25, 27-33, 35-40, and 42-45 are rejected under pre-AIA 35 U.S.C. 102(b) as being anticipated by Hagelstein (US PG-Pub. No. 2009/0086877).

38. In regard to Claims 1, 28, and 39, Hagelstein teaches a method of generating non-ionizing radiation in the form of He-4 atoms (Paragraph [0153]) comprising: contacting fullerene-based materials, which read on graphene, with a source of deuterium (Paragraph [0322]) for a time sufficient to generate a plurality of non-ionizing He-4 atoms (Paragraph [0153]) and energy (Paragraph [0274]).

39. In regard to Claims 3, 30 and 40, Hagelstein teaches fullerene-based or graphene materials including "cage-like, hollow molecules" of "hexagonal and pentagonal groups of atoms, e.g., those formed from carbon." (Paragraph [0322]). Hagelstein further specifies these materials to include carbon nanotubes and buckyballs. (Paragraph [0322]).

40. In regard to Claims 4, 31 and 42, Hagelstein teaches the use of deuterium gas (Paragraph [0325]). Hagelstein additionally teaches the use of a condensed form of deuterium, such as a liquid (Paragraph [0332]).

41. In regard to Claims 5 and 32, Hagelstein teaches the decontamination of the surface of a material prior to deuterium loading by a treatment that includes raising the temperature of the material (Paragraph [0267]).

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42. In regard to Claims 13-15, Hagelstein teaches the method of Claim 1, which would yield the same results claimed by applicant in Claims 13 - 15. Accordingly, Hagelstein reads on these claims.

43. In regard to Claim 18, Hagelstein teaches the generation of phonons within graphene material (Paragraph [0068]). Hagelstein further teaches the process generating 23.8 MeV of energy (Paragraph [0276]).

44. In regard to Claim 19, Hagelstein teaches a method of generating non-ionizing radiation in the form of He-4 atoms (Paragraph [0153]) comprising: providing graphene materials in a sealable vessel (Paragraph [0261]; Fig. 17g). Hagelstein further teaches the evacuation of such a vessel (Paragraph [0353]) and adding deuterium gas to said vessel (Paragraph [0153]). Additionally, Hagelstein performing at least one heating step that further increases pressure inside the vessel (Paragraph [0261]), cooling said vessel (Paragraph [0332]), and placing the graphene materials in said vessel at room temperature or below for a time sufficient to generate non-ionizing radiation, Helium-4 atoms, or both (Paragraph [0100]).

45. In regard to Claim 21, Hagelstein teaches heating the graphene materials prior to adding deuterium gas (Paragraph [0396]).

46. In regard to Claim 25, Hagelstein teaches the generation of microwaves or radio frequency energy (Paragraph [0346]).

47. In regard to Claims 27, 37 and 38, Hagelstein teaches the generation of phonons within graphene material (Paragraph [0068]). Hagelstein further teaches the process generating 23.8 MeV of energy (Paragraph [0276]).

48. In regard to Claim 29, Hagelstein teaches the generation of microwaves or radio frequency energy (Paragraph [0346]).

49. In regard to Claim 33, Hagelstein teaches heating a fullerene-based material (Paragraphs [0324],[0325]), such as a carbon nanotube (Paragraph [0322]). Hagelstein additionally teaches the method of heating such materials prior to aging at a temperature and for a time sufficient to promote absorption of the deuterium into or onto the carbon nanotubes (Paragraph [0326]).

50. In regard to Claims 35 and 36, Hagelstein teaches the method of Claim 28, which would yield the same results claimed by applicant in Claims 35 and 36. Accordingly, Hagelstein reads on these claims.

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51. In regard to Claims 43-45, Hagelstein teaches a method of producing energy (Para. [0274]) comprising: introducing a gas consisting essentially of D₂ (Para. [0326]) to a material consisting essentially of carbon nanotubes (Para. [0326]) at an elevated pressure (Para. [0326]); and generating non-ionizing energy (Para. [0153]) and energy (Para. [0274]).

Claim Rejections - 35 USC § 103

52. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

53. Claims 2, 11, 12, 16, 17, 20, 24, 26 and 43 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hagelstein (US PG-Pub. No. 2009/0086877), in view of case law.

54. In regard to Claims 2, 11 and 12, Hagelstein teaches the generation of Helium-4, via contacting deuterium and another material, at low temperature, such as room temperature [0100]. Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. See *In re Aller*, 220 F. 2d 454, 456 (CCPA 1955) (holding a claimed process performed at a temperature between 40 degrees Celsius and 80 degrees Celsius and an acid concentration between 25% and 70% was *prima facie* obvious over a reference process differing from the claims only in that it was performed at a temperature of 100 degrees Celsius and acid concentration of 10%); *In re Hoeschele*, 406 F.2d 1403 (CCPA 1969) (where the Court determined that claimed elastomeric polyurethanes which fell within the broad scope of the references were held to be unpatentable there over because, among other reasons, there was no evidence of the criticality of the claimed ranges of molecular weight or proportions); MPEP 2144.05.II.A. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have generated the Helium-4 at room temperature, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. Accordingly, Claim 2 is obvious.

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55. In regard to Claims 16 and 17, Hagelstein teaches fullerene material in the presence of a deuterium source for 8 hours, falling within the ranges of 30 minutes to 48 hours, as claimed in Claim 16, and 1 to 18 hours, as claimed in Claim 17 (Paragraphs [0324], [0325]). This teaching of Hagelstein reads on both Claims 16 and 17, because prior art teaching a value within, overlapping, or touching a claimed range, anticipates if the prior art range does not substantially deviate from the claimed range. See *Perricone v. Medicis Pharmaceutical Corp.*, 77 USPQ 1321, 1327 (Fed. Cir. 2005) (where anticipation was found despite the fact that prior art range was not identical to claimed ranges).

56. In regard to Claim 20, Hagelstein teaches the method of Claim 19, as discussed above. Hagelstein does not teach that the He-4 is generated in an amount of at least ten He-4 atoms per hour per microgram of said graphene materials at 0 degrees Celsius. As set forth in response to Claims 2, 11 and 12, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. See *In re Aller*, 220 F. 2d at 456.

57. In regard to Claim 24, Hagelstein teaches the generation of Helium-4 at low temperature, such as room temperature [0100]. As set forth in response to Claims 2, 11 and 12, difference in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. See *In re Aller*, 220 F. 2d 454 at 456.

58. In regard to Claim 26, Hagelstein teaches the graphene materials placed in the source of deuterium for 8 hours, falling within the claimed range of 1-18 hours. For the reasons set forth above in response to Claims 16 and 17, Claim 26 is obvious.

59. In regard to Claim 43, Hagelstein does not explicitly mention a gas consisting essentially of D₂O, but does explicitly teach deuterium gas, as discussed above. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have implemented a gas containing a significant amount of deuterium for the predictable purpose of providing contact between elements commonly used in cold fusion research experiments.

60. Claims 6, 9, 10 and 22 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hagelstein (US PG-Pub. No. 2009/0086877), in view of Smalley (US PG-Pub. No. 2002/0127171).

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61. In regard to Claim 6, although Hagelstein teaches the decontamination of the surface of a material, it does not teach the removal of unwanted materials specifically comprising water, hydroxide, hydrogen, protium, polymers, oils, amorphous carbon, oxygen, solvents, acids, bases and combinations thereof. Smalley discloses the purification of carbon nanotubes for the purpose of removing contaminants, such as amorphous carbon (Paragraphs [0034], [0035]). It would have been obvious to one having ordinary skill in the art at the time of the invention to have implemented the method disclosed in Smalley in conjunction with the invention disclosed in Hagelstein for the predictable result of removing impurities from the carbon nanotube material.

62. In regard to Claims 9 and 10, Smalley discloses heating carbon nanotubes at 200 degrees Celsius, falling within the claimed range of 30 to 300 degrees Celsius that applicant defines as sufficient to promote absorption of the deuterium into or onto the carbon nanotubes (Paragraph [0035]). Thus, it would have been obvious to one having ordinary skill in the art at the time of the invention to have combined the method of cleaning the nanotubes disclosed in Smalley with the invention of Hagelstein for the predictable result of removing impurities from the carbon nanotube material.

63. In regard to Claim 22, Hagelstein does not specifically teach heating the graphene materials in a sealed chamber and at a temperature to bake-out unwanted materials, comprising evacuating the sealed container to remove unwanted materials therefrom; however, Smalley teaches the purification of carbon nanotubes (Paragraphs [0034], [0035]), thereafter evacuating the sealed chamber (Paragraph [0037]). Because Hagelstein teaches cleaning the graphene material and Smalley discloses a method of doing such, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the method of cleaning disclosed by Smalley as the cleaning method of Hagelstein to yield the predictable result of purifying the graphene material.

64. Claims 7, 8 and 23 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hagelstein (US PG-Pub. No. 2009/0086877), in view of Smalley (US PG-Pub. No. 2002/0127171), and further in view of case law.

65. In regard to Claims 7 and 8, Smalley discloses the conditions for purification of the carbon nanotubes comprising a temperature of 200 to 500 degrees Celsius and a time from 1 to 5 hours,

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contemplating a longer time period, in the range of 15 to 20 hours (Paragraph [0035]). The disclosure in Smalley reads on both Claim 7 and Claim 8 of the present application because prior art teaching a range within, overlapping, or touching a claimed range, anticipates if the prior art range does not substantially deviate from the claimed range. *See Perricone v. Medicis Pharmaceutical Corp.*, 77 USPQ 1321, 1327 (Fed. Cir. 2005) (where anticipation was found despite the fact that prior art range was not identical to claimed ranges).

66. In regard to Claim 23, Hagelstein does not teach heating the graphene at a temperature ranging from 50-500 degrees Celsius for a time ranging from 20 minutes to 6 hours. Smalley discloses heating carbon nanotubes at a temperature of 200-500 degrees Celsius for 1 to 5 hours (Paragraph [0035]). The disclosure in Smalley reads on Claim 23 because prior art teaching a range within, overlapping, or touching a claimed range, anticipates if the prior art range does not substantially deviate from the claimed range. *See Perricone v. Medicis Pharmaceutical Corp.*, 77 USPQ 1321 at 1327.

67. Claims 13, 34 and 41 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hagelstein (US PG-Pub. No. 2009/0086877), in view of Maldonado et al. (US PG-Pub. No. 2007/0275160).

68. In regard to Claim 13, Hagelstein teaches the use of heterofullerenes (Paragraph [0326]), but does not specifically mention doping with Nitrogen; however, Maldonado discloses nitrogen-doped carbon nanostructures (Paragraph [0008]). It would have been obvious to one having ordinary skill in the art at the time of the invention to have implemented the nitrogen-doped carbon nanotube of Maldonado as the heterofullerene taught by Hagelstein to achieve the same high stability at high pressure taught by Hagelstein (Paragraph [0326]).

69. In regard to Claim 34, Hagelstein does not teach carbon nanotubes doped with nitrogen; however, Moldanado discloses nitrogen-doped carbon nanostructures, as discussed in response to Claim 13. For the reasons stated in response to Claim 13, Claim 34 is obvious.

70. In regard to Claim 41, Hagelstein does not teach grapheme materials including nitrogen; however, Moldanado discloses nitrogen-doped carbon nanostructures, as discussed in response to Claim 13. Accordingly, Claim 41 is obvious.

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71. Claim 43 is rejected under pre-AIA U.S.C. 103(a) as being unpatentable over Melechko (A.V. Melechko et al., Vertically aligned carbon nanofibers and related structures: Controlled synthesis and directed assembly, J. of App. Phys., 97 P. 1-37 (2005)).

72. In regard to Claim 43, Melechko teaches a method of contacting hydrogen and carbon nanotubes (Abs.) and applying pressure thereto (P. 5). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have combined heavy water and carbon nanotubes under pressure as carbon nanotubes are well-known in the art for their hydrogen storage properties (Abs.).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KIMBERLY E. COGHILL whose telephone number is (571)272-6424. The examiner can normally be reached on Monday-Friday; 8 a.m. - 5 p.m. Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack W. Keith can be reached on (571) 272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kimberly E. Coghill/
Examiner, Art Unit 3646

/JACK W KEITH/
Supervisory Patent Examiner, Art Unit 3646

Notice of References Cited	Application/Control No. 13/089,986		Applicant(s)/Patent Under Reexamination COOPER ET AL.	
	Examiner KIMBERLY E. COGHILL		Art Unit 3646	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-			
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			


FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS


*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	Melechko, et al., Vertically aligned carbon nanofibers and related structures: controlled synthesis and directed assembly, J. of App. Phys., No. 97, P. 1-39 (2005)
	V	K. Shanahan, Comments on "A new look at low-energy nuclear reaction research," J. Environ. Monit., Vol. 12, P. 1756-1764, 1762 (2010), available at pubs.rsc.org/En/content/articlepdf/2010/em/c001299h .
	W	K. Shanahan., Unlikely Cold Fusion, Letters, Chemical & Engineering News, Vol. 90, Iss. 28, P. 3-4 (9 July 2012), available at www.cen.acs.org/articles/90/i28/Unlikely-Cold-Fusion.html .
	X	Geographic Database of Bigfoot/Sasquatch Sightings & Reports, The Bigfoot Field Researchers Organization, available at www.bfro.net/GDP

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

<i>Index of Claims</i> 	Application/Control No. 13089986	Applicant(s)/Patent Under Reexamination COOPER ET AL.
	Examiner KIMBERLY E. COGHILL	Art Unit 4187

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant				<input type="checkbox"/> CPA		<input type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47	
CLAIM		DATE							
Final	Original	11/27/2013	06/30/2014						
	1	✓	✓						
	2	✓	✓						
	3	✓	✓						
	4	✓	✓						
	5	✓	✓						
	6	✓	✓						
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	30	✓	✓						
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	32	✓	✓						
	33	✓	✓						
	34	✓	✓						
	35	✓	✓						
	36	✓	✓						

<p><i>Index of Claims</i></p> 	Application/Control No. 13089986	Applicant(s)/Patent Under Reexamination COOPER ET AL.
	Examiner KIMBERLY E. COGHILL	Art Unit 4187

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant				<input type="checkbox"/> CPA		<input type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47	
CLAIM		DATE							
Final	Original	11/27/2013	06/30/2014						
	37	✓	✓						
	38	✓	✓						
	39	✓	✓						
	40	✓	✓						
	41	✓	✓						
	42	✓	✓						
	43		✓						
	44		✓						
	45		✓						

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)	
)	
Christopher H. Cooper et. al.	)	Group Art Unit: 4187
)	
Application No.: 13/089,986	)	Examiner: Kimberly Coghill
)	
Filed: April 19, 2011)	
	)	Confirmation No.: 1497
For: METHOD OF GENERATING NON-)	
IONIZING RADIATION OR NON-)	
IONIZING ⁴ He USING GRAPHENE)	
BASED MATERIALS)	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Madam:

AMENDMENT AND RESPONSE

In response to the Action dated December 24, 2013, the period for response having been extended to June 24, 2014 by the accompanying Petition for Extension of Time, Applicants amend this application as follows:

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 9 of this paper.

Amend the Claims as Follows:

1. [Original] A method of generating non-ionizing ^4He atoms, said method comprising:

 contacting graphene materials with a source of deuterium; and

 placing said graphene materials in said source of deuterium for a time sufficient to generate a plurality of non-ionizing ^4He atoms.
2. [Original] The method of claim 1, wherein ^4He is generated in an amount of at least ten non-ionizing ^4He atoms per hour per microgram of said graphene materials at 0°C .
- 3 [Original] The method of claim 1, wherein said graphene materials comprise monolayer graphite, multilayer graphite, single walled carbon nanotubes, multiwalled carbon nanotubes, buckyballs, carbon onions, carbon nanohorns and combinations thereof.
4. [Original] The method of claim 1, wherein the source of deuterium is in a liquid, gas, plasma, or supercritical phase.
5. [Original] The method of claim 1, further comprising the removal of contaminants from the surface of the graphene materials by heating the graphene materials prior to the contacting step, wherein said heating is performed at conditions sufficient to remove unwanted material from the surface of the graphene materials.
6. [Original] The method of claim 5, wherein said unwanted materials comprise H_2O , OH , H_2 , atomic hydrogen (protium), polymers, oils, amorphous carbon, O_2 , solvents, acids, bases, and combinations thereof.

7. [Original] The method of claim 5, wherein said conditions comprise a time up to 18 hours and a temperature up to 400 °C.

8. [Original] The method of claim 7, wherein said conditions comprise a time ranging from 1 to 8 hours and a temperature ranging from 100 to 250 °C.

9. [Original] The method of claim 1, wherein said graphene material comprises carbon nanotubes, and said method further comprises heating the carbon nanotubes prior to aging at a temperature and for a time sufficient to promote absorption of the deuterium into or onto the carbon nanotubes.

10. [Original] The method of claim 9, wherein the temperature and time sufficient to promote absorption ranges from 30 °C to 300 °C, and from 30 minutes to 8 hours, respectively.

11. [Currently Amended] The method of claim 1, wherein ~~said aging~~ the step of contacting graphene materials with a source of deuterium is performed at or below room temperature.

12. [Currently Amended] The method of claim 11, wherein ~~said aging~~ the step of contacting graphene materials with a source of deuterium is performed at a temperature ranging from 20 °C to -100 °C.

13. [Original] The method of claim 1, wherein said graphene materials comprise carbon nanotubes that are functionalized and/or doped with nitrogen.

14. [Original] The method of claim 1, wherein said non-ionizing ⁴He atoms have an energy of less than 1 KeV.

15. [Original] The method of claim 14, wherein said non-ionizing ⁴He atoms have an energy of less than 100 eV.

16. [Original] The method of claim 1, wherein said graphene materials are placed in the source of deuterium for a time ranging from 30 minutes to 48 hours.

17. [Original] The method of claim 16, wherein said graphene materials are placed in the source of deuterium for a time ranging from 1 to 18 hours.

18. [Currently Amended] The method of ~~any one of~~ claim 1, which comprises generating non-ionizing ^4He and non-ionizing radiation chosen from electromagnetic radiation, phonons or energetic electrons within the graphene material or a combination thereof, wherein said non-ionizing ^4He and non-ionizing radiation has an energy totaling 23.8 MeV.

19. [Currently Amended] A method of generating non-ionizing radiation, non-ionizing ^4He atoms, or both, said method comprising:

providing graphene materials in a sealable vessel;
evacuating the sealable vessel to a pressure below atmospheric pressure;
adding deuterium gas to said vessel to achieve a pressure above atmospheric pressure; and
~~performing at least one heating step that further increases~~ heating the vessel to
increase the pressure inside the vessel;
~~—cooling said vessel; and~~
~~—placing said graphene materials in said vessel at room temperature or below for~~
~~a time sufficient to generate non-ionizing radiation, non-ionizing ^4He atoms, or both.~~

20. [Original] The method of claim 19, wherein ^4He is generated in an amount of at least ten ^4He atoms per hour per microgram of said graphene materials at 0°C .

21. [Original] The method of claim 19, further comprising heating the graphene materials prior to adding deuterium gas.

22. [Original] The method of claim 21, wherein said heating is performed in a sealed chamber and a temperature to bake-out unwanted materials, said method further comprising evacuating the sealed container to remove the unwanted materials from the sealed container.

[22] 23. [Currently Amended] The method of claim 19, wherein said at least one heating step is performed at temperature ranging from 50 °C to 500 °C for a time ranging from 20 minutes to 6 hours.

24. [Original] The method of claim 19, wherein said aging is performed at a temperature ranging from 20 °C to -100 °C.

25. [Original] The method of claim 19, wherein said non-ionizing radiation comprises x-rays, visible light, infrared, microwaves, radio waves or combinations thereof.

26. [Original] The method of claim 19, wherein said graphene materials are placed in the source of deuterium for a time ranging from 1 to 18 hours.

27. [Currently Amended] The method of ~~any one of~~ claim 19, which comprises generating non-ionizing ^4He and non-ionizing radiation chosen from electromagnetic radiation, phonons or energetic electrons within the graphene material or a combination thereof, wherein said non-ionizing ^4He and non-ionizing radiation has an energy totaling 23.8 MeV.

28. [Currently Amended] A method of generating non-ionizing radiation, said method comprising:

contacting graphene materials with a source of deuterium; and
~~aging~~ placing said graphene materials in said source of deuterium for a time
sufficient to generate non-ionizing radiation.

29. [Original] The method of claim 28, wherein said non-ionizing radiation
comprises x-rays, visible light, infrared, microwaves, radio waves or combinations
thereof.

30. [Original] The method of claim 28, wherein said graphene materials
comprise monolayer graphite, multilayer graphite, single walled carbon nanotubes,
multiwalled carbon nanotubes, buckyballs, carbon onions, carbon nanohorns and
combinations thereof.

31. [Original] The method of claim 28, wherein the source of deuterium is
in a liquid, gas, plasma, or supercritical phase.

32. [Original] The method of claim 28, further comprising the removal of
contaminates from the surface of the graphene materials by heating the graphene
materials prior to the contacting step, wherein said heating is performed at conditions
sufficient to remove unwanted material from the surface of the graphene materials.

33. [Original] The method of claim 28, wherein said graphene material
comprises carbon nanotubes, and said method further comprises heating the carbon
nanotubes prior to aging at a temperature and for a time sufficient to promote
absorption of the deuterium into or onto the carbon nanotubes.

34. [Original] The method of claim 28, wherein said graphene materials
comprise carbon nanotubes that are functionalized and/or doped with nitrogen.

35. [Currently Amended] The method of claim 28, wherein said non-ionizing ~~radiation~~ radiation ^4He atoms have an energy of less than 1 KeV.

36. [Original] The method of claim 35, wherein said non-ionizing ^4He atoms have an energy of less than 100 eV.

37. [Original] The method of claim 28, which comprises generating non-ionizing ^4He and non-ionizing radiation chosen from electromagnetic radiation, phonons or energetic electrons within the graphene material or a combination thereof, wherein said non-ionizing ^4He and non-ionizing radiation has an energy totaling 23.8 MeV.

38. [Canceled]

39. [Original] A method of inducing local nuclear fusion, comprising the steps of:

contacting graphene materials with deuterium; and

placing said graphene materials in said source of deuterium for a time sufficient to generate primarily a plurality of ^4He atoms and energy.

40. [Currently Amended] The method of claim 39, wherein said graphene comprises carbon nanotubes.

41. [Original] The method of claim 39, wherein said graphene materials further include nitrogen.

42. [Original] The method of claim 39, wherein said deuterium is a gas.

43.[New] A method of producing energy, comprising the steps of:
introducing a gas consisting essentially of D₂O to a material consisting essentially
of carbon nanotubes;
applying pressure to the gas; and
generating non-ionizing energy and ⁴He atoms.

44.[New] A method of producing energy, comprising the steps of:
introducing a material consisting essentially of deuterium to graphene to form a
combination of deuterium and graphene;
applying pressure to the combination; and
generating non-ionizing energy and ⁴He atoms.

45.[New] The method of claim 44, wherein the graphene comprises carbon
nanotubes.

REMARKS

I. Introduction

Claims 1-37 and 39-45 are pending. Claims 11, 12, 18, 19, 23, 27, 28, 35 and 40 have been amended to correct informalities. For example, claims 11 and 12 have been amended to better align the language in these independent claims and claim 1. Thus, support for these amendments can be found in claim 1. Claims 18 and 27 have been amended to remove typographical errors. Claim 19 has been amended to remove an optional cooling step. Claim 23 has been amended to correct a typographical error in its numbering. Claim 28 has been amended to make the language consistent with the other claim language by replacing “aging” with “contacting.” Support for this amendment can be found in claim 1. Claims 35 and 40 have been amended to correct typographical errors.

Claim 38, which is a duplicate of claim 37, has been cancelled without prejudice or disclaimer.

New claims 43-45 are added. These claims recite a method of producing energy that requires introducing a gas consisting essentially of D₂O to a material consisting essentially of carbon nanotubes, and applying pressure to a gas consisting essentially of D₂O. These new claims are supported by original claim 19, paragraph [0068] of the specification, and the procedure described in the specification starting at paragraph [0082]. Thus, new matter has not been added.

Claims 1-37 and 39-45 are under examination.

II. Priority

In the Office Action dated December 24, 2013 (“Office Action”), the Examiner asserted that the prior filed applications on which the present application claims priority do not support the subject matter of the present application. Specifically, the Examiner stated that the claims containing “graphene” constitute “new matter.” The rejection is traversed. One skilled in the art would recognize that the term graphene is nothing more than the generic term for the form of carbon that makes up carbon nanotubes and other forms of carbon specifically disclosed in the prior applications on which priority is based. The structure of a single walled carbon nanotube is nothing more than a one-atom-thick layer of graphite called graphene wrapped into a seamless cylinder. Graphene is not new matter and this rejection should be withdrawn.

III. New Matter

The Examiner also asserted that “local nuclear fusion” is new matter that is not supported by the prior filed applications on which the present application claims priority. Those applications specifically disclose nuclear events associated with a fusion reaction, specifically, transmutation of elements, production of neutrons, and the production of energy. Today that process is what is termed “Low Energy Nuclear Reactions,” also known as “cold fusion.” Such reactions are now recognized to be taking place, but when the applications on which priority is based for the present application were written “cold fusion” was highly controversial. To explicitly disclose and claim fusion in 2005 was to invite a rejection based on the lack of technical support for a fusion reaction. Whatever the reaction is called, “cold fusion,” “low energy nuclear

reactions,” the claimed subject matter of this application creates energy, it does so by transmuting elements, and it does it locally.

This objection to the specification is respectfully traversed. The present claims are supported by the applications on which priority is based whatever word is used to characterize the reactions.

IV. Informalities

The Examiner objected to the numbering of the claims. The claim numbers have been corrected. Applicants have also amended several of the claims to address informalities.

V. Alleged Lack of Disclosure

The Examiner rejects claims 1-42 asserting that the claims contain subject matter which is not described in the specification in such a way that one of ordinary skill in the art could make and/or use the invention.

The Examiner bases this position on various outdated technical references. Later research in the area refutes the position of the Examiner. Attached hereto is a U.S. Government report (DIA-08-0911-003) dated November 13, 2009 that states, after reviewing numerous then current technical papers that disclose nuclear reactions, on page 3: **“This body of research has produced evidence that local nuclear reaction may be taking place under conditions not previously believed to be possible.”** (emphasis in the original).

Moreover the Examiner’s reliance on *In re Mitchel R. Swartz*, 232 F.3d 862 (Fed.Cir. 2000) is misplaced for at least two reasons. First, the state of the art regarding

low energy nuclear reactions is not the same as when Swartz filed his application in 1991. Since that date, numerous investigators (many cited in the DIA report noted above) have proved there are local nuclear reactions. See page 2 of the DIA report where it states: "Scientists worldwide have been reporting anomalous excess heat production, as well as evidence of nuclear particles and transmutation [of elements]." (citations omitted, clarification added).

Second, in *Swartz* the court stated:

Regarding the enablement requirement, the PTO found that the written description in Mr. Swartz's application contains no disclosure of any operative embodiment. Thus, in order to practice the claimed invention, a person of ordinary skill in the art would have had to rely on the art known at the filing date, September 19, 1991. For reasons similar to those forming the basis for his finding that Mr. Swartz had not submitted evidence of operability, the examiner found that Mr. Swartz had not submitted evidence that the concept of the invention could have been practiced by a person skilled in the art at the time of the invention without undue experimentation.

232 Fed.Cir. at 864.

Unlike Swartz, in the present application there are working examples that disclose in detail several embodiments of the claimed invention. For example, in Example 1 (the Gas Phase Experiment, Paragraphs [0050] to [0080] of the present application) a detailed working example is disclosed. The results are unequivocal. The process produced Helium, a transmutation byproduct of the fusion reaction.

In Example 2 (Paragraphs [0081] to [0099] of the present application) energy in the form of light was detected.

Examples 1 and 2 are the disclosure of two operable embodiments.

The Examiner's criticisms of the experiments in paragraphs 12 and 13 of the Action have no basis in fact. The experiments of Example 1 were conducted by an experienced PhD having peer reviewed publications dealing with the diffusion of hydrogen in solids who is a retired research scientist from Lawrence Livermore National Laboratory. The experimental procedure is disclosed in detail and great care was taken to insure that the composition of the gases produced by the experiment were not the result of contamination or experimental error. The experimental procedures were reviewed by a nationally known expert in experimental design and the procedures set out in Example 1 were found to be experimentally sound. The Examiner's unspecific, unwarranted, and conclusory dismissal of the experimental work is totally unsupported by the facts.

There are a number of metrics that can be used to confirm a nuclear reaction. These include the production of heat above that theoretically available from chemical reactants/ reactions, the production of energy or particles characteristic of a nuclear reaction (e.g. gamma rays or neutrons), or transmutation of elements. Heat measurements are not unequivocal, especially if energy is put into the system. Radiation detectors are energy specific and neutron detectors are prone to also detect background cosmic rays. By contrast, the creation of transmutation byproducts is unequivocal. It is not possible to produce helium or tritium from chemical reactions.

Applicants have demonstrated (and others have confirmed) that the combination of carbon nanotubes and deuterium produces transmutation byproducts.

If the Examiner maintains that "There is no quantitative and rigorous demonstration to indicate that the 'Examples' (pp14+) are based on credible

experimental evidence” then it is the burden of the Examiner to show the alleged deficiencies of the work set out in the Examples.

Applicants have demonstrated in actual examples (that are described in sufficient detail that one of ordinary skill in the art could readily duplicate) that energy and transmutation byproducts are produced when deuterium and carbon nanotubes are combined. Applicants have met their burden of demonstrating the operability of the claimed process and this ground of rejection should be withdrawn.

There is further proof of the existence of such low energy nuclear reactions in the literature. Attached is a copy of “Visible-Light-Induced Water-Splitting in Channels of Carbon Nanotubes,” *J. Phys.Chem. B*, 110, 1571-1575. In that paper, the researchers were investigating the creation of gases by impinging energy on water in the presence of carbon nanotubes and, alternatively, graphite. They were puzzled by the production of energy when carbon nanotubes were used, when no such production occurred using graphite. Moreover, when carbon nanotubes were used Helium was produced. See Page 1574, second full paragraph and Fig. 2(b).

While this research investigated gas production from water, for every 6500 atoms of hydrogen in ordinary water there is also one atom of deuterium (~154 PPM). Thus, the irradiation of water, with its traces of deuterium, in the presence of single walled carbon nanotubes (SWCNTs) resulted in the production of Helium. See the Helium peak at 4 AMU (atomic mass units) in the mass spectrum of the gas produced, as shown in the mass spectrometer readings in Figure 2(b) and the related discussion in the text. As noted above, when other forms of carbon were used (micro-graphite) no Helium was produced. Note that other transmutation products appear to have been

produced. In Figure 2(b) there is also a peak at 3 AMU in the mass spectrum of the gas produced. Such a peak can only be made by He^3 (Helium 3) or T (tritium/ ^3H), and both are byproducts of a fusion reaction.

Applicants have met their burden of demonstrating that low energy nuclear reactions are occurring when deuterium and carbon nanotubes are combined. If the Examiner persists with this ground of rejection it is incumbent on the Examiner to show why the examples in the present application do not demonstrate a low energy nuclear reaction is occurring when deuterium and carbon nanotubes are combined.

The Examiner's position set out in paragraph 14 is simply out of date and incorrect. See the DIA report attached.

Similarly the assertion in paragraph 15, that the data is based on "questionable" science begs the question, questionable to whom? Certainly the DIA report and the experts that wrote it do not consider the science "questionable." Other researchers may not have discovered a method of making low energy nuclear reactions predictable and stable but the science is clear – transmutation does not occur without nuclear reactions and there is no one asserting that nuclear fission is taking place.

Paragraphs 16 through 19, and especially the application of the *Wands* criteria, are similarly flawed because they are based on an incorrect assumption that the method set out in this application is contrary to known science. The Examiner has cited no support for the factual assertions that are set out in the application of the *Wands*.

Applicants do not care, nor should the Examiner, if the current hypotheses of nuclear physics have to change to accommodate facts. The hypotheses of nuclear physics have changed before. They will change again, especially when unequivocal

facts are in conflict with current theories of nuclear physics. The facts unequivocally demonstrate that when carbon nanotubes contact deuterium nuclear reactions occur because transmutation of elements results from the combination. It is the hypotheses of nuclear physics that must change in light of the facts, and not as the Examiner asserts that the facts cannot be the credible because they do not fit conventional theories of nuclear physics or "known science." "Visible-Light-Induced Water-Splitting in Channels of Carbon Nanotubes," *J. Phys.Chem. B*, 110, 1571-1575 provides the independent confirmation that the Examiner asserts is necessary for the Example to be credible.

VI. Alleged Missing Steps and Language Issues

The Examiner has rejected Claims 1-42 asserting that applying activation energy is necessary for practicing the method, and this step is omitted from the claims. No support for that technical assertion is given and Example 1 proves that input of external energy is not needed to practice the invention. The Examiner should either provide support for the assertion that external energy is needed or withdraw this rejection.

The Examiner rejected claims 1, 19, 28 and 39 asserting that essential steps are omitted. The Examiner must either support the assertion that providing external energy is necessary, or withdraw the rejection. Example 1 demonstrates to operability of the invention without external input of energy. The rejection of the claims dependent on claims 1, 19, 28 and 39 for the alleged lack of necessary steps is not supported by the facts and should be withdrawn.

The Examiner's comment with respect to the meaning of "plurality" in claim 1 is not understood. "Plurality" is used in Claim 1 in its ordinary meaning – more than one.

Its inclusion in Claim 1 is not critical and the claim clearly covers the invention with or without the word “plurality.”

The Examiner’s comments on claim 3 are not understood. Graphene is a known material but it can have different morphologies. Those different morphologies are set out in Claim 3 and the claim allows for the different morphologies to be mixed. The common meaning of the word “and” was intended and it is not indefinite or objectionable.

Similarly, the use of “and” in claim 6 is neither indefinite nor objectionable.

VII. Operability

The Examiner’s rejection of claims 1-42 based on an allegation that the invention is inoperable is not supported by the facts. The examples in the application, the provided DIA report, the references cited in the DIA report, and “Visible-Light-Induced Water-Splitting in Channels of Carbon Nanotubes,” *J. Phys.Chem. B*, 110, 1571-1575 all demonstrate that the invention is operable. Applicants have supplied authenticating evidence of operability as required by the Examiner. This rejection has no basis in fact and should be withdrawn.

VIII. Anticipation

The Examiner rejects various claims of this application under 35 U.S.C. §102 based on the disclosure of U.S. Patent Publ. 2009/0086877 (Hagelstein). Applicants do not concede that this publication is “prior art.”

Two facts should be noted before the disclosure of Hagelstein is discussed in detail. First, according to MPEP § 2121.01, in order for a cited art document to anticipate a

claim, the cited art must provide an enabling disclosure of the claimed subject matter. This section of the MPEP relies on decades old case law which states, in relevant part that, "In determining that quantum of prior art disclosure which is necessary to declare an applicant's invention 'not novel' or 'anticipated' within section 102, the stated test is whether a reference contains an 'enabling disclosure'... ." *In re Hoeksema*, 399 F.2d 269, 158 USPQ 596 (CCPA 1968).

This section of the MPEP goes on to state that the mere naming or description of the subject matter is insufficient; rather, the cited art must demonstrate that the public was in possession of the claimed subject matter before the date of invention. In other words, the cited art must describe the claimed subject matter in such detail as to enable one of ordinary skill in the art to make the claimed subject matter without undue experimentation. See MPEP § 2121.01, referring to *Elan Pharm., Inc. v. Mayo Found. For Med. Educ. & Research*, 346 F.3d 1051, 1054, 68 USPQ2d 1373, 1376 (Fed. Cir. 2003)."

In light of the above, Applicants respectfully submit that Hagelstein fails to provide an enabling disclosure with respect to the claimed subject matter, specifically, with regard to a method of generating non-ionizing energy or ^4He atoms. As such, Applicants respectfully submit that the pending rejection is improper and request that the rejection be withdrawn.

It is fundamentally inconsistent to hold applicant to a rigorous standard of disclosure and then reject claims using a reference that contains, in a wholly obtuse and theoretical discussion, an offhand combination of deuterium and carbon in a manner

that would not enable one skilled in the art to practice what the Examiner asserts was suggested.

Second, while Hagelstein discloses contacting deuterium with carbon nanotubes Hagelstein does so as a means to facilitate the storage or transport of deuterium, not to induce a reaction between those components. The entire focus of the work discussed in this excessively long, obtuse, and theoretical document is impinging energy on solids (primarily metal deuterides) to facilitate a fusion reaction. This reference does not teach or suggest that fusion or the production of Helium results from the placement of deuterium in contact with carbon nanotubes.

The Examiner cites paragraph [0322] for such a teaching, but it must be read in context with what is being referred to as “the material 204” in paragraph [0312].

[0312] According to an exemplary embodiment, an apparatus 200 shown in block diagram form in FIG. 24 comprises a material 202. Material 202 comprises molecular deuterium (D_2) and/or hydrogen-deuterium (HD), and reactions are stimulated in this material 202. In this regard, the presence of both D_2 and HD in the material 202 is contemplated, but it is also possible be appreciated that primarily either D_2 or HD may be present in the material 202, e.g., if the material is processed and maintained at sufficiently low temperature to thwart transformations between D_2 , HD and H_2 . The presence of H_2 in the material is also generally likely and is not precluded. The apparatus 200 also comprises an excitation source 204 arranged to stimulate the material 202 to generate reactions in the material 202, and a load 206 arranged to remove energy generated by the reactions from the material 202. The apparatus can be configured in practice in a variety of ways, such as shown, for example, in the above-described electrochemical cell example of FIG. 20, the dry cell example of FIG. 21, the flash heating tube example of FIG. 22, and the thermoelectric battery example of FIG. 23. In view of those examples, it will be appreciated that the excitation source 204 and the load 206 may or may not be in direct physical contact with the material 202. Also, materials 85, 99, 88, and 104 referred to in FIGS. 20, 21, 22, and 23, respectively, can correspond to material 202 shown in FIG. 24. In a preferred embodiment, the material 202 can include at least one element that has one or more stable

isotopes (i.e., stable forms of the element each having different numbers of neutrons in the nucleus). In another preferred embodiment, the material 202 can include at least one element that has an excess number of neutrons.

Hagelstein contemplates and discloses that encapsulated deuterium may be used in the disclosed process where energy is impinged on the material 202 from the excitation source 204. Nowhere in Hagelstein is it taught or suggested that contacting deuterium and graphenes such as carbon nanotubes will induce a fusion reaction. Therefore, nowhere in the cited prior art is there an enabling disclosure of the combinations found in the independent claims of the present application.

Applicants have added two new independent claims and one dependent claim. While the cited prior art does not anticipate the as-filed independent claims, new claims 43 - 45 more clearly distinguish the invention from the cited reference. Nowhere in Hagelstein does it disclose that contacting a gaseous source of deuterium and graphene, such as carbon nanotubes, and pressurizing the gas will result in the production of energy and Helium.

The Examiner's rejection of claims 1-42 under 35 USC 102 is not supported by controlling law or the content of the cited reference and should be withdrawn. Specifically, independent claim 1 is not anticipated because the cited reference does not disclose the production of Helium resulting from the combination of a graphene material and deuterium as is set out in claim 1. Nor does the cited reference disclose placing the graphene materials in the source of deuterium for a time sufficient to generate a plurality of non-ionizing ^4He atoms. The claims dependent on claim 1 are also novel for that reason.

Independent claim 19 is not anticipated because the cited reference does not disclose the production of Helium resulting from the combination of a graphene material and deuterium as is set out in claim 19. Nor does the cited reference disclose heating a vessel to increase the pressure in the vessel. The claims dependent on claim 19 are novel for that reason as well.

Independent claim 28 is not anticipated because the cited reference does not disclose the generation of non-ionizing radiation from the combination of a graphene material and deuterium as is set out in claim 28. Nor does the cited reference disclose placing the graphene materials in the source of deuterium for a time sufficient to generate non-ionizing radiation. The claims dependent on claim 28 are also novel for that reason.

Independent claim 39 is not anticipated because the cited reference does not disclose inducing local nuclear fusion from the combination of a graphene material and deuterium as is set out in claim 39. Nor does the cited reference disclose placing the graphene materials in the source of deuterium for a time sufficient to generate ^4He atoms and energy. The claims dependent on claim 39 are also novel for that reason.

New independent claims 43 - 44 clearly distinguish over the cited reference and should be allowed.

Claim 43 is directed to a process of producing energy by applying pressure to a combination of a gas of D_2O and carbon nanotubes and generating non-ionizing energy and ^4He atoms. No such steps are disclosed in the cited reference.

Claim 44 is directed to a process of producing energy by applying pressure to a combination of deuterium and graphene and generating non-ionizing energy and ^4He

atoms. No such steps are disclosed in the cited reference. New claim 45 is allowable for the same reason.

In summary, the cited reference does not disclose that fusion or the production of energy or Helium results from the combination of deuterium and graphene, fullerenes, or carbon nanotubes. As such, a rejection of the claims, based on Hagelstein, is not supported by the disclosure in that reference. The rejection of the claims under 35 USC 102 should be withdrawn.

IX. Obviousness

None of the independent claims of this application were rejected as being obvious. Applicants have, in the preceding section noted claim features not found in the cited reference. Applicants assert that such differences also demonstrate the claims are unobvious because there is no teaching or suggestion in Haglestein that the combination of deuterium and the forms of carbon called graphene or fullerenes would produce non-ionizing energy or Helium.

The Examiner has rejected claims 2, 11, 12 16, 17, 20, 24, and 26 under pre-AIA 35 U.S.C. §103(a) over Haglestein. All of these claims are dependent on claim 1 and nowhere in Haglestein does it disclose, teach or suggest that the combination of a graphene material and deuterium would result in the production of Helium or generate a plurality of non-ionizing ^4He atoms, all set out in claim 1. As the content of claim 1 is not taught or suggested in the cited reference, it and all claims dependent thereon, should be allowed.

The Examiner has asserted that Haglestein teaches the generation of Helium 4 in paragraph [0100]. That paragraph discusses the use of temperature to control the rate of reaction in a solid system, but does not even mention Helium. The cited reference does not support the rejection and should be withdrawn.

The Examiner asserts that Haglestein teaches fullerene material in the presence of deuterium for 8 hours. But the cited portion of Haglestein teaches no such thing. It discloses the encapsulation of Hydrogen, not Deuterium, in a fullerene structure. "Murata et al. reported the insertion of H₂ into such an open-cage structure by exposing a powder made of the open-cage fullerene to 800 atmospheres of H₂ at 200 degrees C in an autoclave for 8 hours, at also at lower pressures of 560 atmospheres, and 180 atmospheres with lower yields." The cited reference does not support the rejection and should be withdrawn.

The Examiner asserts that Haglestein teaches the generation of Helium at low temperatures in paragraph [0100]. As noted above, paragraph [0100] discusses the use of temperature to control the rate of reaction in a solid system, but does not even mention Helium. The cited reference does not support the rejection and should be withdrawn.

The rejection of claims 2, 11, 12 16, 17, 20, 24, and 26 is not supported by the cited reference and should be withdrawn.

The Examiner has rejected claims 6, 7, 8, 9, 10, 22, 23 alleging that the combination of Haglestein and US Patent Publication No. 2002/0127171 to Smalley would render this claim obvious. Yet the Examiner gives no explanation why one skilled in the art would combine the teachings of these two references.

In order to satisfy the initial burden of establishing a *prima facie* case of obviousness, the Examiner first must show that the prior art references teach or suggest all the claim limitations. *See In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). *See also* M.P.E.P. § 2143. The Examiner also must show that there is some suggestion or motivation, either in the references or in the knowledge generally available to one of ordinary skill in the art, to modify or combine the references. *See In re Rouffet*, 149 F.3d 1350, 47 USPQ2d 1453 (Fed. Cir. 1998).

The Supreme Court, in the *KSR* decision, recognized that a showing of “teaching, suggestion, or motivation” could provide helpful insight in determining whether the claimed subject matter is obvious under Section 103(a). *KSR*, 127 S. Ct. at 1741. In addition, the Supreme Court mandates that “[t]o facilitate review, this analysis [of whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue] should be made explicit.” *Id.* (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (“[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”)).

No such reason to combine the reference was advanced and the Examiner has failed to establish a *prima facie* case of obviousness for these claims.

Similarly the Examiner has rejected claims 13, 34, and 41 alleging their subject matter is obvious in view of the combination of Haglestein and US Patent Publication No. 2007/0275160 to Maldonado et al. Again the Examiner gives no explanation why

one skilled in the art would combine the teachings of these two references. As such the Examiner has failed to establish a *prima facie* case of obviousness for these claims.

In summary, the main reference Haglestein fails to teach or suggest all the features in the independent claims of this application. The cited references neither teach nor suggest that the combination of deuterium and the forms of carbon called graphene or fullerenes would produce non-ionizing energy or Helium. As a result, no *prima facie* showing of obviousness has been set out and the rejection of the claims under 35 U.S.C. §103 should be withdrawn.

It is respectfully submitted that the claims of this application are supported by the disclosure, the invention is operable, and the cited references do not disclose, teach or suggest the claimed subject matter. The rejections are not supported by the law or the cited references and should be withdrawn.

X. Conclusion

Applicants believe that the present application is in condition for allowance. Favorable reconsideration of the application is respectfully requested. The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 18-1579. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing or a credit card payment form being

unsigned, providing incorrect information resulting in a rejected credit card transaction, or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 18-1579. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicants hereby petition for such extension under 37 C.F.R. §1.136 and authorize payment of any such extensions fees to Deposit Account No. 18-1579.

Respectfully submitted,

/Louis Troilo/

By _____

Date: June 24, 2014

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Customer Number: 22208
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Attorney for Applicants
Registration No. 45,284

Encls. 1. DIA Report (DIA-08-0911-003)
 2. "Visible-Light-Induced Water-Splitting in Channels of Carbon Nanotubes," *J. Phys.Chem. B*, 110, 1571-1575.

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)		Docket Number (Optional) 4140-001CIP
Application Number 13/089,986	Filed April 19, 2011	
For METHOD OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS		
Art Unit 4187	Examiner Kimberly Coghill	

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above-identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

	<u>Fee</u>	<u>Small Entity Fee</u>	<u>Micro Entity Fee</u>	
<input type="checkbox"/> One month (37 CFR 1.17(a)(1))	\$200	\$100	\$50	\$ _____
<input type="checkbox"/> Two months (37 CFR 1.17(a)(2))	\$600	\$300	\$150	\$ _____
<input checked="" type="checkbox"/> Three months (37 CFR 1.17(a)(3))	\$1,400	\$700	\$350	\$ 700.00
<input type="checkbox"/> Four months (37 CFR 1.17(a)(4))	\$2,200	\$1,100	\$550	\$ _____
<input type="checkbox"/> Five months (37 CFR 1.17(a)(5))	\$3,000	\$1,500	\$750	\$ _____

☒ Applicant asserts small entity status. See 37 CFR 1.27.
☐ Applicant certifies micro entity status. See 37 CFR 1.29.
 Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.
☐ A check in the amount of the fee is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☐ The Director has already been authorized to charge fees in this application to a Deposit Account.
☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to
 Deposit Account Number 181579.
☐ Payment made via EFS-Web.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant/inventor.
☐ assignee of record of the entire interest. See 37 CFR 3.71. 37 CFR 3.73(b) statement is enclosed (Form PTO/SB/96).
☐ attorney or agent of record. Registration number _____.
☒ attorney or agent acting under 37 CFR 1.34. Registration number 45,284.

/Louis Troilo/

Signature

Louis Troilo

Typed or printed name

June 24, 2014

Date

703-391-2900

Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

☐ * Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public, which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	13089986			
Filing Date:	19-Apr-2011			
Title of Invention:	METHODS OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS			
First Named Inventor/Applicant Name:	Christopher H. Cooper			
Filer:	Louis M. Troilo/Linda Kenah			
Attorney Docket Number:	09102.0014-04			
Filed as Small Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Claims in excess of 20	2202	2	40	80
Independent Claims in Excess of 3	2201	2	210	420
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Extension - 3 months with \$0 paid	2253	1	700	700
Miscellaneous:				
Total in USD (\$)				1200

Electronic Acknowledgement Receipt

EFS ID:	19395742
Application Number:	13089986
International Application Number:	
Confirmation Number:	1497
Title of Invention:	METHODS OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS
First Named Inventor/Applicant Name:	Christopher H. Cooper
Customer Number:	22852
Filer:	Louis M. Troilo/Linda Kenah
Filer Authorized By:	Louis M. Troilo
Attorney Docket Number:	09102.0014-04
Receipt Date:	24-JUN-2014
Filing Date:	19-APR-2011
Time Stamp:	15:32:45
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$ 1200
RAM confirmation Number	2110
Deposit Account	181579
Authorized User	HANSEN, ROBERT M.

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		4140_001CIP_Response.pdf	115827	yes	26
			d1c474a8ae8934b49b2c8d7a28015cd5fe50e6d7		
	Multipart Description/PDF files in .zip description				
	Document Description	Start	End		
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1		
	Claims	2	8		
	Applicant Arguments/Remarks Made in an Amendment	9	26		
Warnings:					
Information:					
2	Non Patent Literature	DIA_Report.pdf	1491549	no	8
			df3d974faab64f5c42cd4517e2132145a3057d30		
Warnings:					
Information:					
3	Non Patent Literature	Guo_J_Phys_Chem.pdf	581260	no	5
			03907a8eae5feb05fcb96a425d29d3c2eb572838		
Warnings:					
Information:					
4	Extension of Time	Extension_of_Time.pdf	187271	no	2
			e9e0f4165cef0f8fc78e4feb2a4bcceec31ce366		
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	33682	no	2
			85ceded9459afdc2f0325471bbb62a7975bc5509		
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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 13/089,986	Filing Date 04/19/2011	<input type="checkbox"/> To be Mailed
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ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

(Column 1) (Column 2)

FOR	NUMBER FILED	NUMBER EXTRA		RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		X \$ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		X \$ =	
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED – PART II

(Column 1) (Column 2) (Column 3)

	06/24/2014	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE (\$)	ADDITIONAL FEE (\$)
AMENDMENT	Total (37 CFR 1.16(i))	* 44	Minus	** 42	= 2		x \$40 =	80
	Independent (37 CFR 1.16(h))	* 6	Minus	***4	= 2		x \$210 =	420
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))							
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	500

(Column 1) (Column 2) (Column 3)

		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE (\$)	ADDITIONAL FEE (\$)
AMENDMENT	Total (37 CFR 1.16(i))	*	Minus	**	=		X \$ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		X \$ =	
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))							
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
 ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
 *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/SHAREILL COLES/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/089,986	04/19/2011	Christopher H. Cooper	09102.0014-04	1497

22852 7590 12/24/2013
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER
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WASHINGTON, DC 20001-4413

EXAMINER

COGHILL, KIMBERLY E

ART UNIT	PAPER NUMBER
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4187

MAIL DATE	DELIVERY MODE
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12/24/2013

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 13/089,986	Applicant(s) COOPER ET AL.	
	Examiner KIMBERLY E. COGHILL	Art Unit 4187	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on 7/07/2011.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5) ☒ Claim(s) 1-42 is/are pending in the application.
5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☒ Claim(s) 1-42 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10) ☐ The specification is objected to by the Examiner.

11) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a) ☐ All b) ☐ Some c) ☐ None of the:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application is being examined under the pre-AIA first to invent provisions.

Priority

2. Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, or 365(c) is acknowledged. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 119(e) as follows:

The later-filed application must be an application for a patent for an invention which is also disclosed in the prior application (the parent or original nonprovisional application or provisional application). The disclosure of the invention in the parent application and in the later-filed application must be sufficient to comply with the requirements of 35 U.S.C. 112(a) or the first paragraph of pre-AIA 35 U.S.C. 112, except for the best mode requirement. See *Transco Products, Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994)

The disclosures of the prior-filed applications, Application No. 60/741,874, 60/777,577, 11/633,524, 12/258,568, 12/898,807 fail to provide adequate support or enablement in the manner provided by 35 U.S.C. 112(a) or pre-AIA 35 U.S.C. 112, first paragraph for one or more claims of this application. Independent Claims 1, 19, 28 and 39 all contain new matter in the form of "graphene" (claims 1, 19, and 28) and "local nuclear fusion" (Claim 39). Thus, all claims in the present application will only be given the benefit of the priority date of application 61/427,140 of 24 December 2010.

Claim Objections

3. The numbering of claims is not in accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not). Claim 22 used twice within this application and no Claim 23 is present. Appropriate correction is required. For the purpose of examination, the second Claim 22 will be interpreted as Claim 23.

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Claim Rejections - 35 USC § 112

4. The following is a quotation of 35 U.S.C. 112(a):

(a) IN GENERAL.—The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor or joint inventor of carrying out the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), first paragraph:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1-42 are rejected under 35 U.S.C. 112(a) or 35 U.S.C. 112 (pre-AIA), first paragraph, as failing to comply with the enablement requirement. The claims contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

6. There are many factors recognized by the MPEP that are to be considered when determining whether there is insufficient evidence to support a determination that a disclosure satisfies the enablement requirement, including, but not limited to: (1) the breadth of the claims; (2) the nature of the invention; (3) the state of the prior art; (4) the level of one of ordinary skill; (5) the level of predictability in the art; (6) the amount of direction provided by the inventor; (7) the existence of working examples; and (8) the quantity of experimentation needed to make or use the invention based on the content of the disclosure. *In re Wands*, 858 F. 2d 731, 737 (Fed. Cir. 1988); MPEP 2164.01(a).

7. It may be possible to generate energetic particles by contacting nanotubes with hydrogen isotopes in the presence of very high power density activation energy. It may further be possible to transmute matter by exposing such matter to the energetic particles produced according to the disclosed method, but the energy necessary for the activation of hydrogen isotopes is much higher than that released from said nuclear transmission. Hydrogen isotope localization by nanotubes (and electron shielding) is similar to hydrogen isotope localization in other molecules and cannot increase the probability of nuclear transmutation (nuclear fusion) significantly, as demonstrated in recent experiments.

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See F. Raiola et al., *Electron Shielding in d(d,p)t for Deuterided metals and the Periodic Table*, Physics Letters B., 547 (3-4), pp. 193-99 (2002). Further, for a D-T reaction to *break even* - thereby producing as much energy as it consumed - it is necessary that the temperature be in the order of 100×10^6 K. See Knief, *Nuclear Engineering*, Hemisphere Pub. Co., pp. 636, 641 (1992). The electron shielding decreases a threshold energy for D-D fusion very little and does not permit net energy production with a low activation energy.

8. Until now, net energy production from the transmutation of solid hydrogen isotopes were only activated by a "hydrogen" fusion explosion.
9. The nature of the invention rests on certain basic concepts, including the following:
 - a. [005] there is disclosed a method of generating non-ionizing radiation, non-ionizing He-4 atoms, or a combination thereof, comprising contacting graphene materials with a source of deuterium; and placing the graphene materials in the source of deuterium for a time sufficient to generate non-ionizing radiation, non-ionizing He-4 atoms
 - b. [0015] there is disclosed a method of generating non-ionizing radiation, non-ionizing He-4 atoms, or both, comprising: providing graphene materials in a sealable vessel; evacuating the vessel to a pressure below atmospheric pressure; adding deuterium gas to the vessel to achieve a pressure above atmospheric pressure; performing at least one heating step that further increases pressure inside the vessel; cooling the vessel; and keeping the graphene materials in the vessel at room temperature or below for a time sufficient to generate non-ionizing radiation, non-ionizing He-4 atoms, or both.
 - c. [0017] there is disclosed a method of inducing local nuclear fusion, comprising the steps of: contacting graphene materials with deuterium; and placing graphene materials in the deuterium for a time sufficient to generate primarily a plurality of He-4 atoms and energy.
10. The nature of the invention thus turns on the issue of converting D₂ to He-4 by contacting graphene material with deuterium. Applicants' theory rests upon some of the following assumptions, such as: that low energy nuclear reactions resulting in the production of He-4 and energy are already known to occur (Paragraph [0057]) and "[t]here is a growing consensus that the reaction rate given in $[D + D \rightarrow$

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4He + 23.8 MeV] is much greater than that of [other D+D reactions],” an assertion that is not substantiated by any concrete evidence or experimentation (Paragraph [0057]). Yet, there is a large body of published evidence refuting the existence or even possible existence of the empirical evidence upon which this theory is based. Any efforts to set forth a convincing conception of the physical processes at work cannot assume the very facts that must be proven.

11. Further, the state of the prior art in regard to low energy nuclear fusion is spotty and unreliable, at best. Cold fusion, to date, has not been recognized by the U.S.P.T.O. as a viable source of energy, and absent significant, qualitative demonstration to refute this position, no patent application related to such technology can be seriously entertained. See *In re Mitchel R. Swartz*, 232 F.3d 862 (Fed. Cir. 2000).

12. Applicants provide little direction as to how their invention actually operates. Applicants claim energy and He-4 detection was observed from contacting nanotubes with deuterium. There is no credible record to indicate the "Examples" (pp. 14+) are based on rigorous, credible experimental evidence. Further, findings of applicant directly contradict accepted science. Slight He-4 detection is not enough to prove net energy production. Further, the He-4 yield measurements are not convincing, because no extensive analysis of possible contaminations and systematic error is presented by applicant; neither are control experiments presented, in which "helium production" is measured in an environment of elevated He-4.

13. There is no quantitative and rigorous demonstration to indicate that the "Examples" (pp. 14+) are based on credible experimental evidence. Additionally, Applicants' disclosure does not contain reputable evidence that is sufficient to support any allegations or claims that the invention produces "nuclear fusion." Slight He-4 detection is not enough to prove net energy production. Further, the He-4 yield measurements are not convincing, because no extensive analysis of possible contaminations and systematic error is presented by applicant. Neither are control experiments presented, in which "helium production" is measured in an environment of elevated He-4.

14. Conclusions of the DOE 2004 Report of the Review of Low Energy Nuclear Reactions are summarized by the following:

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Reviewers expert in nuclear physics noted that the cold fusion mechanism put forward by proponents is not in accord with presently accepted knowledge of D + D fusion. Specifically, D+D fusion is accompanied by the production of protons, neutrons, tritons, He-3, He-4 and high energy gamma rays, all in well known proportions. The fusion channel resulting in He-4 and high energy gamma rays occurs approximately only once for every 10^7 D+D fusion reactions. These characteristic proportions for the production of the fusion products are found for every energy of the incident deuteron measured so far, down to the lowest that has been measured.

The review document and oral presentations made the argument that the branching ratios are different at low energies and that in cold fusion, He-4 fusion channel is predominant. According to the review document, no high energy gamma rays appear to accompany the He-4, as is observed in D-D fusion reactions. Instead, the approximately 24 MeV in energy resulting from D-D fusion was purported to appear as heat in the material lattice. To explain these unusual characteristics, the reviewers were presented with a theoretical framework that purported to describe how collective energy from the material lattice couples to a deuteron pair to induce fusion, how the only fusion reaction channel that occurs would be the production of He-4, and how all the energy is coupled back into the material in the form of heat instead of high energy gamma-rays. The reviewers raised serious concerns regarding the assumptions postulated in the proposed theoretical model for the explanation for He-4 production. *Report of the Review of Low Energy Nuclear Reactions*, 2004, available at web.archive.org/web/20080226210800/http://www.science.doe.gov/Sub/Newsroom/News_Releases/DOE-SC/2004/low_energy/CF_Final_120104.pdf (Page 4, Charge Element 2: Determine whether the evidence is sufficiently conclusive to demonstrate that such nuclear reactions occur).

15. The amount of guidance or direction necessary to enable an invention is inversely related to the amount of knowledge in the state of the art, as well as to the predictability of the art. *In re Fisher*, 427 F.2d 833,839 (CCPA 1970); MPEP 2164.03. The art of the present invention, transmuting of matter and energy generation by contacting said matter with a nanotube structure and exposing said nanotube structure to activation energy) is so new that it cannot be considered to have a body of knowledge associated with it, much less predictability of results. Applicant has provided data that is based upon questionable science. Therefore, such data is also questionable until such a time that applicant rigorously proves that the applied concepts are plausible and the data is statistically sound. Since applicant has not established the operability of the presently claimed invention, it is considered that the invention is lacking in utility. Given the state of the art as discussed herein, it would be unreasonable to expect one skilled in the art to be able to make and use the claimed invention without undue experimentation.

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16. Simply stating the concepts the inventor espouses are correct is not sufficient substantiating evidence. Sufficient substantiating evidence may be based on widely accepted scientific concepts (e.g., quantum nuclear physics), a working model, or a supporting opinion in a widely respected and peer-reviewed publication (existing credible publications do not support optimistic Applicants' assumptions).

17. Examiner has set forth a reasonable and sufficient basis for challenging the adequacy of the disclosure. The statute requires the applicant to inform, not to direct others to find out for themselves. Given the state of the art as discussed herein, it is unreasonable to expect on skilled in the art to be able to make and use the claimed invention without undue experimentation.

18. The claimed invention as a whole must be useful and accomplish a practical application. That is, it must produce a "useful, concrete and tangible result." *State Street Bank & Trust Co. v. Signature Financial Grp.*, 149 F.3d 1368, 1373-4 (Fed. Cir. 1998). The purpose of this requirement is to limit patent protection to inventions that possess a certain level of "real world" value, as opposed to subject matter that represents nothing more than an idea or concept or subject matter that is simply a starting point for future investigation or research. *Brenner v. Manson*, 383 U.S. 519, 528 (1966).

19. Reviewing the *Wands* factors, examiner summarizes the above elaborated explanation as to why applicants' invention fails to satisfy the enablement requirement:

a. The breadth of the claims: *Applicants present broad claims, alleging to satisfy a need for a new alternative source of energy generation, by contacting nanotubes with hydrogen isotopes, unsubstantiated by and contradictory towards modern nuclear science.*

b. The nature of the invention: *The nature of the invention revolves around the viability of cold fusion as a source for clean energy; as disclosed, such involves a very drastic change in hypothesis of modern nuclear physics.*

c. The state of the prior art: *effects claimed by applicants have not been observed in prior experiments of patentable merit.*

d. The level of one of ordinary skill: *it is impossible to ascertain the level of one of ordinary skill, because technology, as acknowledged by applicants, is purported to be a new "alternative source of energy."*

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- e. The level of predictability in the art: *The possibility for nuclear transmutation and net energy generation by contacting nanotubes with hydrogen isotopes is likely impossible.*
- f. The amount of direction provided by the inventor: *Applicants provide insufficient evidence and bases findings upon assumptions not confirmed in independent experiments: applicants fail to indicate the activation energy required for the experiment and provides unsubstantiated assumptions as the bases for their assumptions.*
- g. The existence of working examples: *Examples exist, but realization of non-ionizing He-4 detection during activation of nanotubes contacted with deuterium is incredible and does not have independent confirmation.*
- h. The quantity of experimentation needed to make or use the invention based upon the content of the disclosure: *Such is necessary as such results have never before been attained.*

20. The following is a quotation of 35 U.S.C. 112(b):
(b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

21. Claims 1-42 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention. It is evident that a certain amount of energy is at least required for practicing the method, yet none is so claim (or provided elsewhere in the application).

22. Claims 1, 19, 28 and 39 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: applying activation energy to the deuterium.

23. Claims 2-18, 20-27, 29-38, and 40-42 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being incomplete for omitting essential steps, because they depend from claims which omit such essential steps.

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24. In regard to Claim 1, "plurality" is not defined. For the purpose of examination, "plurality" will be interpreted to include any He-4 atoms.

25. Claims 2-18 are indefinite because they depend from indefinite Claim 1.

26. In regard to Claim 3, applicants state that graphene materials comprise: "monolayer graphite, multilayer graphite [...] and combinations thereof." It is unclear how combinations thereof could exist if the graphene materials comprise all the carbon structures claimed. For the purpose of examination, the "and" of Claim 3 will be interpreted as an "or."

27. In regard to Claim 6, for similar reasons as stated above in response to Claim 3, the "and" will be interpreted as "or" for the purpose of examination.

28. In regard to Claim 30, for similar reasons as stated above in response to Claim 3, the "and" will be interpreted as "or" for the purpose of examination.

Claim Rejections - 35 USC § 101

29. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

30. Claims 1-42 are rejected under 35 U.S.C. 101 because the disclosed invention is inoperative and therefore lacks utility.

31. The examiner has the initial burden of challenging an asserted utility. Once the examiner has provided evidence showing that one of ordinary skill in the art would reasonably doubt the asserted utility of the invention, the burden shifts to the applicant to provide rebuttal evidence. See MPEP 2164.07(I.B).

32. Invention of the present application lacks utility because it is inoperable. In the specification, applicant suggests "[0002] [d]isclosed herein are methods of generating non-ionizing radiation or non-ionizing ⁴He by contacting deuterium with a graphene material, such as carbon nanotubes" to satisfy the "need to generate new sources of energy not based on fossil fuels" (Paragraph [0003]). Such a suggestion relies on phenomena that are not proven and/or are contrary to modern nuclear physics. Additionally, even if it were possible to practice the invention, the applicant has not described the method

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used to implement it in sufficient detail as to enable a skilled artisan to make and use the invention without undue experimentation.

33. Applicant's statement of asserted utility that the claimed invention provides an "alternative source of energy to alleviate our society's current dependence without further impact to the environment or to living organisms associated with nuclear waste or ionizing radiation" ([Paragraph [004]) cannot operate as disclosed because the claimed "contacting graphene with a source of deuterium" cannot enhance the efficiency of nuclear transmission significantly to provide for the release of net nuclear energy.

34. It is well established that where, as here, the utility of the claimed invention is based upon allegations that border on the incredible, or allegations that would not readily be accepted by a substantial portion of the scientific community, sufficient authenticating evidence of operability must be submitted by applicant. See *In re Houghton*, 167 U.S.P.Q. 687 (CCPA 1970); *Puharich v. Brenner*, 162 U.S.P.Q. 136 (CA DC 1969). The art of the present invention (a method of successfully generating 24 MeV of energy and He-4 from the D+D without the presence of ionizing radiation) is so new that it cannot be considered to have a body of knowledge associated with it, nor predictability of results. Applicants' statement of asserted utility of an "alternative source of energy" (Paragraph [0004]) is inoperable because the claimed "contacting graphene" with a "deuterium source" cannot enhance an energy efficiency of nuclear transmutation significantly up to possible release of net nuclear energy.

Claim Rejections - 35 USC § 102

35. **Applicant should note that while the method as claimed is anticipated by the prior art, the utility as asserted in the specification is not enabled in or by the reference.**

36. The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under

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the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

37. Claims 1, 3-5, 13-15, 18, 19, 21, 25, 27-33, 35-40, and 42 are rejected under pre-AIA 35 U.S.C. 102(b) as being anticipated by Hagelstein (US PG-Pub. No. 2009/0086877).

38. In regard to Claims 1, 28, and 39, Hagelstein teaches a method of generating non-ionizing radiation in the form of He-4 atoms (Paragraph [0153]) comprising: contacting fullerene-based materials, which read on graphene, with a source of deuterium (Paragraph [0322]) for a time sufficient to generate a plurality of non-ionizing He-4 atoms (Paragraph [0153]) and energy (Paragraph [0274]).

39. In regard to Claims 3, 30 and 40, Hagelstein teaches fullerene-based or graphene materials including "cage-like, hollow molecules" of "hexagonal and pentagonal groups of atoms, e.g., those formed from carbon." (Paragraph [0322]). Hagelstein further specifies these materials to include carbon nanotubes and buckyballs. (Paragraph [0322]).

40. In regard to Claims 4, 31 and 42, Hagelstein teaches the use of deuterium gas (Paragraph [0325]). Hagelstein additionally teaches the use of a condensed form of deuterium, such as a liquid (Paragraph [0332]).

41. In regard to Claims 5 and 32, Hagelstein teaches the decontamination of the surface of a material prior to deuterium loading by a treatment that includes raising the temperature of the material (Paragraph [0267]).

42. In regard to Claims 13-15, Hagelstein teaches the method of Claim 1, which would yield the same results claimed by applicant in Claims 13 - 15. Accordingly, Hagelstein reads on these claims.

43. In regard to Claim 18, Hagelstein teaches the generation of phonons within graphene material (Paragraph [0068]). Hagelstein further teaches the process generating 23.8 MeV of energy (Paragraph [0276]).

44. In regard to Claim 19, Hagelstein teaches a method of generating non-ionizing radiation in the form of He-4 atoms (Paragraph [0153]) comprising: providing graphene materials in a sealable vessel (Paragraph [0261]; Fig. 17g). Hagelstein further teaches the evacuation of such a vessel (Paragraph [0353]) and adding deuterium gas to said vessel (Paragraph [0153]). Additionally, Hagelstein performing

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at least one heating step that further increases pressure inside the vessel (Paragraph [0261]), cooling said vessel (Paragraph [0332]), and placing the graphene materials in said vessel at room temperature or below for a time sufficient to generate non-ionizing radiation, Helium-4 atoms, or both (Paragraph [0100]).

45. In regard to Claim 21, Hagelstein teaches heating the graphene materials prior to adding deuterium gas (Paragraph [0396]).

46. In regard to Claim 25, Hagelstein teaches the generation of microwaves or radio frequency energy (Paragraph [0346]).

47. In regard to Claims 27, 37 and 38, Hagelstein teaches the generation of phonons within graphene material (Paragraph [0068]). Hagelstein further teaches the process generating 23.8 MeV of energy (Paragraph [0276]).

48. In regard to Claim 29, Hagelstein teaches the generation of microwaves or radio frequency energy (Paragraph [0346]).

49. In regard to Claim 33, Hagelstein teaches heating a fullerene-based material (Paragraphs [0324],[0325]), such as a carbon nanotube (Paragraph [0322]). Hagelstein additionally teaches the method of heating such materials prior to aging at a temperature and for a time sufficient to promote absorption of the deuterium into or onto the carbon nanotubes (Paragraph [0326]).

50. In regard to Claims 35 and 36, Hagelstein teaches the method of Claim 28, which would yield the same results claimed by applicant in Claims 35 and 36. Accordingly, Hagelstein reads on these claims.

Claim Rejections - 35 USC § 103

51. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

52. Claims 2, 11, 12, 16, 17, 20, 24 and 26 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hagelstein (US PG-Pub. No. 2009/0086877), in view of case law.

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53. In regard to Claims 2, 11 and 12, Hagelstein teaches the generation of Helium-4 at low temperature, such as room temperature [0100]. Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. See *In re Aller*, 220 F. 2d 454, 456 (CCPA 1955) (holding a claimed process performed at a temperature between 40 degrees Celsius and 80 degrees Celsius and an acid concentration between 25% and 70% was *prima facie* obvious over a reference process differing from the claims only in that it was performed at a temperature of 100 degrees Celsius and acid concentration of 10%); *In re Hoeschele*, 406 F.2d 1403 (CCPA 1969) (where the Court determined that claimed elastomeric polyurethanes which fell within the broad scope of the references were held to be unpatentable there over because, among other reasons, there was no evidence of the criticality of the claimed ranges of molecular weight or proportions); MPEP 2144.05.II.A. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have generated the Helium-4 at room temperature, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. Accordingly, Claim 2 is obvious.

54. In regard to Claims 16 and 17, Hagelstein teaches fullerene material in the presence of a deuterium source for 8 hours, falling within the ranges of 30 minutes to 48 hours, as claimed in Claim 16, and 1 to 18 hours, as claimed in Claim 17 (Paragraphs [0324], [0325]). This teaching of Hagelstein reads on both Claims 16 and 17, because prior art teaching a value within, overlapping, or touching a claimed range, anticipates if the prior art range does not substantially deviate from the claimed range. See *Perricone v. Medicis Pharmaceutical Corp.*, 77 USPQ 1321, 1327 (Fed. Cir. 2005) (where anticipation was found despite the fact that prior art range was not identical to claimed ranges).

55. In regard to Claim 20, Hagelstein teaches the method of Claim 19, as discussed above. Hagelstein does not teach that the He-4 is generated in an amount of at least ten He-4 atoms per hour per microgram of said graphene materials at 0 degrees Celsius. As set forth in response to Claims 2, 11 and 12, differences in concentration or temperature will not support the patentability of subject matter

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encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. See *In re Aller*, 220 F. 2d at 456.

56. In regard to Claim 24, Hagelstein teaches the generation of Helium-4 at low temperature, such as room temperature [0100]. As set forth in response to Claims 2, 11 and 12, difference in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. See *In re Aller*, 220 F. 2d 454 at 456.

57. In regard to Claim 26, Hagelstein teaches the graphene materials placed in the source of deuterium for 8 hours, falling within the claimed range of 1-18 hours. For the reasons set forth above in response to Claims 16 and 17, Claim 26 is obvious.

58. Claims 6, 9, 10 and 22 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hagelstein (US PG-Pub. No. 2009/0086877), in view of Smalley (US PG-Pub. No. 2002/0127171).

59. In regard to Claim 6, although Hagelstein teaches the decontamination of the surface of a material, it does not teach the removal of unwanted materials specifically comprising water, hydroxide, hydrogen, protium, polymers, oils, amorphous carbon, oxygen, solvents, acids, bases and combinations thereof. Smalley discloses the purification of carbon nanotubes for the purpose of removing contaminants, such as amorphous carbon (Paragraphs [0034], [0035]). It would have been obvious to one having ordinary skill in the art at the time of the invention to have implemented the method disclosed in Smalley in conjunction with the invention disclosed in Hagelstein for the predictable result of removing impurities from the carbon nanotube material.

60. In regard to Claims 9 and 10, Smalley discloses heating carbon nanotubes at 200 degrees Celsius, falling within the claimed range of 30 to 300 degrees Celsius that applicant defines as sufficient to promote absorption of the deuterium into or onto the carbon nanotubes (Paragraph [0035]). Thus, it would have been obvious to one having ordinary skill in the art at the time of the invention to have combined the method of cleaning the nanotubes disclosed in Smalley with the invention of Hagelstein for the predictable result of removing impurities from the carbon nanotube material.

61. In regard to Claim 22, Hagelstein does not specifically teach heating the graphene materials in a sealed chamber and at a temperature to bake-out unwanted materials, comprising evacuating the sealed

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container to remove unwanted materials therefrom; however, Smalley teaches the purification of carbon nanotubes (Paragraphs [0034], [0035]), thereafter evacuating the sealed chamber (Paragraph [0037]). Because Hagelstein teaches cleaning the graphene material and Smalley discloses a method of doing such, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the method of cleaning disclosed by Smalley as the cleaning method of Hagelstein to yield the predictable result of purifying the graphene material.

62. Claims 7, 8 and 23 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hagelstein (US PG-Pub. No. 2009/0086877), in view of Smalley (US PG-Pub. No. 2002/0127171), and further in view of case law.

63. In regard to Claims 7 and 8, Smalley discloses the conditions for purification of the carbon nanotubes comprising a temperature of 200 to 500 degrees Celsius and a time from 1 to 5 hours, contemplating a longer time period, in the range of 15 to 20 hours (Paragraph [0035]). The disclosure in Smalley reads on both Claim 7 and Claim 8 of the present application because prior art teaching a range within, overlapping, or touching a claimed range, anticipates if the prior art range does not substantially deviate from the claimed range. *See Perricone v. Medicis Pharmaceutical Corp.*, 77 USPQ 1321, 1327 (Fed. Cir. 2005) (where anticipation was found despite the fact that prior art range was not identical to claimed ranges).

64. In regard to Claim 23, Hagelstein does not teach heating the graphene at a temperature ranging from 50-500 degrees Celsius for a time ranging from 20 minutes to 6 hours. Smalley discloses heating carbon nanotubes at a temperature of 200-500 degrees Celsius for 1 to 5 hours (Paragraph [0035]). The disclosure in Smalley reads on Claim 23 because prior art teaching a range within, overlapping, or touching a claimed range, anticipates if the prior art range does not substantially deviate from the claimed range. *See Perricone v. Medicis Pharmaceutical Corp.*, 77 USPQ 1321 at 1327.

65. Claims 13, 34 and 41 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hagelstein (US PG-Pub. No. 2009/0086877), in view of Maldonado et al. (US PG-Pub. No. 2007/0275160).

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66. In regard to Claim 13, Hagelstein teaches the use of heterofullerenes (Paragraph [0326]), but does not specifically mention doping with Nitrogen; however, Maldonado discloses nitrogen-doped carbon nanostructures (Paragraph [0008]). It would have been obvious to one having ordinary skill in the art at the time of the invention to have implemented the nitrogen-doped carbon nanotube of Maldonado as the heterofullerene taught by Hagelstein to achieve the same high stability at high pressure taught by Hagelstein (Paragraph [0326]).

67. In regard to Claim 34, Hagelstein does not teach carbon nanotubes doped with nitrogen; however, Moldanado discloses nitrogen-doped carbon nanostructures, as discussed in response to Claim 13. For the reasons stated in response to Claim 13, Claim 34 is obvious.

68. In regard to Claim 41, Hagelstein does not teach grapheme materials including nitrogen; however, Moldanado discloses nitrogen-doped carbon nanostructures, as discussed in response to Claim 13. Accordingly, Claim 41 is obvious.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KIMBERLY E. COGHILL whose telephone number is (571)272-6424. The examiner can normally be reached on Monday-Friday; 8 a.m. - 5 p.m. Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Hodge can be reached on (571) 272-2097. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/Kimberly E. Coghill/
Examiner, Art Unit 4187

/ROBERT HODGE/
Supervisory Patent Examiner, Art Unit 4187

Notice of References Cited	Application/Control No. 13/089,986		Applicant(s)/Patent Under Reexamination COOPER ET AL.	
	Examiner KIMBERLY E. COGHILL		Art Unit 4187	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2009/0086877	04-2009	Hagelstein et al.	376/100
*	B	US-2007/0275160	11-2007	Maldonado et al.	427/122
*	C	US-2002/0127171	09-2002	Smalley et al.	423/447.6
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			


FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS


*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	Report of the Review of Low Energy Nuclear Reactions, 2004
	V	F. Raiola et al., Electron Screening in d(d,p) t for deuterided metals and the periodic table, Physics Letters B, V. 547 (3-4), pp. 193-199, 2002
	W	Knief, Nuclear Engineering, Hemisphere Publishing Co., pp. 636, 641 (1992).
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

<i>Index of Claims</i> 	Application/Control No. 13089986	Applicant(s)/Patent Under Reexamination COOPER ET AL.
	Examiner KIMBERLY E. COGHILL	Art Unit 4187


✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant		<input type="checkbox"/> CPA		<input type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47			
CLAIM		DATE							
Final	Original	11/27/2013							
	1	✓							
	2	✓							
	3	✓							
	4	✓							
	5	✓							
	6	✓							
	7	✓							
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	34	✓							
	35	✓							
	36	✓							

<i>Index of Claims</i> 	Application/Control No. 13089986	Applicant(s)/Patent Under Reexamination COOPER ET AL.
	Examiner KIMBERLY E. COGHILL	Art Unit 4187

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant		<input type="checkbox"/> CPA		<input type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47			
CLAIM		DATE							
Final	Original	11/27/2013							
	37	✓							
	38	✓							
	39	✓							
	40	✓							
	41	✓							
	42	✓							

Search Notes 	Application/Control No. 13089986	Applicant(s)/Patent Under Reexamination COOPER ET AL.
	Examiner KIMBERLY E. COGHILL	Art Unit 4187

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
376	100 - as limited by text, see attached EAST Search History	12/9/2013	KEC

SEARCH NOTES		
Search Notes	Date	Examiner
Consulted with S. Burke and M. O'Connor regarding search terms	12/9/2013	KEC
Inventor search in EAST/PALM - See attached EAST Search History	12/9/2013	KEC
NPL search using google scholar with keywords such as "graphene" "hydrogen" "deuterium" "fusion"	12/9/2013	KEC

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

/KIMBERLY E COGHILL/ Examiner.Art Unit 4187	
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CONFIRMATION NO. 1497

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.		
13/089,986	04/19/2011	376	4187	09102.0014-04		
RULE						
APPLICANTS INVENTORS Christopher H. Cooper, Windsor, VT; William K. Copper, Santa Fe, NM; ** CONTINUING DATA ***** This application is a CIP of 12/898,807 10/06/2010 ABN which is a CON of 12/258,568 10/27/2008 ABN which is a CON of 11/633,524 12/05/2006 ABN which claims benefit of 60/741,874 12/05/2005 and claims benefit of 60/777,577 03/01/2006 This application 13/089,986 04/19/2011 claims benefit of 61/427,140 12/24/2010 ** FOREIGN APPLICATIONS ***** ** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** ** SMALL ENTITY ** 05/13/2011						
Foreign Priority claimed	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Met after Allowance	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
35 USC 119(a-d) conditions met	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		VT	10	42	4
Verified and	/KIMBERLY E COGHILL/	Initials				
Acknowledged	Examiner's Signature					
ADDRESS FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER LLP 901 NEW YORK AVENUE, NW WASHINGTON, DC 20001-4413 UNITED STATES						
TITLE METHODS OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS						
FILING FEE RECEIVED 1209	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:			<input type="checkbox"/> All Fees		
				<input type="checkbox"/> 1.16 Fees (Filing)		
				<input type="checkbox"/> 1.17 Fees (Processing Ext. of time)		
				<input type="checkbox"/> 1.18 Fees (Issue)		
				<input type="checkbox"/> Other _____		
				<input type="checkbox"/> Credit		

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	137	((CHRISTOPHER) near2 (COOPER)).INV.	US-PGPUB; USPAT	ADJ	ON	2013/12/09 16:21
L2	2	((WILLIAM) near2 (COPPER)).INV.	US-PGPUB; USPAT	ADJ	ON	2013/12/09 16:21
S1	185	376/100	US-PGPUB; USPAT	ADJ	ON	2013/11/18 13:58
S2	159	(376/100).OCLS.	US-PGPUB; USPAT	OR	OFF	2013/11/18 13:59
S3	1	S2 and graphene	US-PGPUB; USPAT	ADJ	ON	2013/11/18 13:59
S4	54	S2 and carbon	US-PGPUB; USPAT	ADJ	ON	2013/11/18 13:59
S5	2	graphene with deuterium	US-PGPUB; USPAT	ADJ	ON	2013/11/18 14:33
S6	1100	"I2" and carbon adj3 nanotube	US-PGPUB; USPAT	ADJ	ON	2013/11/18 16:06
S7	159	(376/100).OCLS.	US-PGPUB; USPAT	OR	OFF	2013/11/18 16:06
S9	5	S7 and carbon adj3 nanotube	US-PGPUB; USPAT	ADJ	ON	2013/11/18 16:06
S10	10	cold fusion and nanotube	US-PGPUB; USPAT	ADJ	ON	2013/11/18 16:27
S11	146	cold fusion and (nanotube or fullerene or carbon)	US-PGPUB; USPAT	ADJ	ON	2013/11/18 16:29
S12	44	S11 and deuterium	US-PGPUB; USPAT	ADJ	ON	2013/11/18 16:29
S13	1	"10440426".rlan. or ("10".src. and "440426".ap.)	US-PGPUB; USPAT; USOCR; DERWENT	ADJ	ON	2013/11/18 16:51
S14	6	"3444377"	US-PGPUB; USPAT	ADJ	ON	2013/11/18 17:06
S15	0	pct/us90/01328	US-PGPUB; USPAT	ADJ	ON	2013/11/18 17:07
S16	0	pons et "al."	US-PGPUB; USPAT	ADJ	ON	2013/11/18 17:07
S17	14305	pons	US-PGPUB; USPAT	ADJ	ON	2013/11/18 17:07
S18	636	pons.inv.	US-PGPUB; USPAT	ADJ	ON	2013/11/18 17:07
S19	56	pons.inv. and fusion	US-PGPUB; USPAT	ADJ	ON	2013/11/18 17:07
S20	0	ep adj "463089"	US-PGPUB; USPAT; EPO	ADJ	ON	2013/11/18 17:09

S21	0	ep adj "0463089"	US-PGPUB; USPAT; EPO	ADJ	ON	2013/11/18 17:09
S22	0	ep adj "0463089"	US-PGPUB; USPAT; EPO; DERWENT	ADJ	ON	2013/11/18 17:09
S23	0	ep adj "19900905756"	US-PGPUB; USPAT; EPO; DERWENT	ADJ	ON	2013/11/18 17:10
S24	0	method and apparatus for power generation	US-PGPUB; USPAT; EPO; DERWENT	ADJ	ON	2013/11/18 17:10
S25	0	heat generating method and apparatus pons	US-PGPUB; USPAT; EPO; DERWENT	ADJ	ON	2013/11/18 17:10
S26	0	heat generating method and apparatus and pons	US-PGPUB; USPAT; EPO; DERWENT	ADJ	ON	2013/11/18 17:10
S27	13	stanley adj pons	US-PGPUB; USPAT; EPO	ADJ	ON	2013/11/18 17:11
S28	13	stanley adj2 pons	US-PGPUB; USPAT; EPO	ADJ	ON	2013/11/18 17:11
S29	0	wo adj "323513"	US-PGPUB; USPAT; EPO; DERWENT	ADJ	ON	2013/11/18 17:12
S30	2	wo adj "9010935"	US-PGPUB; USPAT; EPO; DERWENT	ADJ	ON	2013/11/18 17:13
S31	9272	graphene	US-PGPUB; USPAT	ADJ	ON	2013/11/26 08:40
S32	4194	graphene and "400"	US-PGPUB; USPAT	ADJ	ON	2013/11/26 08:40
S33	158	graphene and "400" degrees	US-PGPUB; USPAT	ADJ	ON	2013/11/26 08:40
S34	76	graphene with (purify or purification or remov\$3 adj4 contaminant) and heat\$3	US-PGPUB; USPAT	ADJ	ON	2013/11/26 08:41
S35	37	graphene with (purify or purification or remov\$3 adj4 contaminant) and heat\$3 and "400"	US-PGPUB; USPAT	ADJ	ON	2013/11/26 08:49
S36	76	graphene with (purify or purification or remov\$3 adj4 contaminant) and heat\$3	US-PGPUB; USPAT	ADJ	ON	2013/11/26 08:55
S37	531	(carbon with crystal\$5 or graphene or fullerene) with (purify or purification or remov\$3 adj4 contaminant) and heat\$3	US-PGPUB; USPAT	ADJ	ON	2013/11/26 08:56
S38	37	(carbon with crystal\$5 or graphene or fullerene) with (remov\$3 adj4 contaminant) and heat\$3	US-PGPUB; USPAT	ADJ	ON	2013/11/26 08:57
S39	0	(carbon with lattice) with (remov\$3 with	US-PGPUB;	ADJ	ON	2013/11/26

		contaminants)	USPAT			09:01
S40	1	(carbon with lattice) same(remov\$3 with contaminants)	US-PGPUB; USPAT	ADJ	ON	2013/11/26 09:01
S41	1	(carbon with lattice) same (remov\$3 with contaminants)	US-PGPUB; USPAT	ADJ	ON	2013/11/26 09:01
S42	327	(carbon with lattice) and (remov\$3 with contaminants)	US-PGPUB; USPAT	ADJ	ON	2013/11/26 09:01
S43	19	(carbon same lattice) same (remov\$3 with contaminants)	US-PGPUB; USPAT	ADJ	ON	2013/11/26 09:01
S44	12	(carbon same lattice) same (deoxygen\$5 or remov\$3 adj5 oxygen or remove adj5 hydrogen) same heat	US-PGPUB; USPAT	ADJ	ON	2013/11/26 09:02
S45	27	(carbon same lattice) same (deoxygen\$5 or remov\$3 adj5 oxygen or remove adj5 hydrogen) same heat\$5	US-PGPUB; USPAT	ADJ	ON	2013/11/26 09:02
S46	34	(carbon same lattice) and graphene and "400" with degree	US-PGPUB; USPAT	ADJ	ON	2013/11/26 09:14
S47	284	graphene and "400" with degree	US-PGPUB; USPAT	ADJ	ON	2013/11/26 09:14
S48	461	(purify or purification) with graphite	US-PGPUB; USPAT	ADJ	ON	2013/11/26 09:28
S49	96	remove adj4 contaminant with graphite	US-PGPUB; USPAT	ADJ	ON	2013/11/26 09:28
S50	88	remove adj4 contaminant with graphite and heat\$5	US-PGPUB; USPAT	ADJ	ON	2013/11/26 09:28
S51	3	remove adj4 contaminant with graphite with heat\$5	US-PGPUB; USPAT	ADJ	ON	2013/11/26 09:28
S52	1	"20120251432"	US-PGPUB; USPAT	ADJ	ON	2013/11/26 09:31
S53	137	((CHRISTOPHER) near2 (COOPER)).INV.	US-PGPUB; USPAT	ADJ	ON	2013/11/26 10:00
S54	13	S53 and graphene	US-PGPUB; USPAT	ADJ	ON	2013/11/26 10:00
S55	44	S53 and heat	US-PGPUB; USPAT	ADJ	ON	2013/11/26 10:05
S56	1	("20120114551").PN.	US-PGPUB; USPAT	OR	OFF	2013/11/26 10:13
S57	1145	(graphene or graphite) with (clean or cleaning)	US-PGPUB; USPAT	ADJ	ON	2013/11/26 10:52
S58	49	(graphene or graphite) with (clean or cleaning) with heat	US-PGPUB; USPAT	ADJ	ON	2013/11/26 10:53
S59	202	(graphene or graphite) with (pre-heat\$3 or preheat\$3) and "400.degree"	US-PGPUB; USPAT	ADJ	ON	2013/11/26 11:01
S60	20	(graphene or graphite) with (pre-heat\$3 or preheat\$3) and ("400" with degree)	US-PGPUB; USPAT	ADJ	ON	2013/11/26 11:01
S61	30	(graphene or graphite) with (pre-heat\$3 or preheat\$3) and (hour with degree)	US-PGPUB; USPAT	ADJ	ON	2013/11/26 11:04
S62	21	(graphene or graphite) with (pre-heat\$3 or preheat\$3) same (impurity or impurities or contaminants or contaminant)	US-PGPUB; USPAT	ADJ	ON	2013/11/26 11:05
S63	735	(graphene or graphite) with (pre-heat\$3 or preheat\$3)	US-PGPUB; USPAT	ADJ	ON	2013/11/26 11:06
S64	10	(graphene) with (pre-heat\$3 or	US-PGPUB;	ADJ	ON	2013/11/26

		preheat\$3)	USPAT			11:06
S65	69	carbon adj2 nanotube same (release or releasing) same (2H or H2 or Hydrogen) same heat\$3	US-PGPUB; USPAT	ADJ	ON	2013/11/26 11:10
S66	180	carbon adj2 nanotube same heat\$3 same amorphous same hydrogen	US-PGPUB; USPAT	ADJ	ON	2013/11/26 11:22
S67	76	carbon adj2 nanotube same heat\$3 same amorphous same hydrogen same degree same time	US-PGPUB; USPAT	ADJ	ON	2013/11/26 11:35
S68	76	carbon adj2 nanotube same heat\$3 same (purify or purification or impurity or decontaminate or decontaminating or purifying) same hydrogen same degree same time	US-PGPUB; USPAT	ADJ	ON	2013/11/26 11:39
S69	81	carbon adj2 nanotube same heat\$3 same (purify or purification or impurity or decontaminate or decontaminating or purifying) same degree same time	US-PGPUB; USPAT	ADJ	ON	2013/11/26 11:40
S70	0	carbon adj2 nanotube same (purify or purification or impurity or decontaminate or decontaminating or purifying) same degree same time and 200-400	US-PGPUB; USPAT	ADJ	ON	2013/11/26 11:41
S71	0	carbon adj2 nanotube same (purify or purification or impurity or decontaminate or decontaminating or purifying) same degree same time and "200" to "400"	US-PGPUB; USPAT	ADJ	ON	2013/11/26 11:42
S72	1	("20020127171").PN.	US-PGPUB; USPAT	OR	OFF	2013/11/26 11:47
S73	25	carbon adj2 nanotube same aging and room adj temperature	US-PGPUB; USPAT	ADJ	ON	2013/11/26 12:09
S74	26	carbon adj2 nanotube same deuterium	US-PGPUB; USPAT	ADJ	ON	2013/11/26 12:10
S75	1	carbon adj2 nanotube same deuterium.clm.	US-PGPUB; USPAT	ADJ	ON	2013/11/26 12:11
S76	299	carbon adj2 nanotube same degree.clm.	US-PGPUB; USPAT	ADJ	ON	2013/11/26 12:11
S77	1	carbon adj2 nanotube same deuterium and degree.clm.	US-PGPUB; USPAT	ADJ	ON	2013/11/26 12:11
S78	26	carbon adj2 nanotube same deuterium	US-PGPUB; USPAT	ADJ	ON	2013/11/26 12:12
S79	247	carbon nanotube doped	US-PGPUB; USPAT	ADJ	ON	2013/11/26 12:14
S80	30	carbon nanotube doped with nitrogen	US-PGPUB; USPAT	ADJ	ON	2013/11/26 12:14
S81	140	carbon nanotube and aging and "0" with degree	US-PGPUB; USPAT	ADJ	ON	2013/11/26 12:39
S82	1	carbon nanotube and aging and below with "0" with degree	US-PGPUB; USPAT	ADJ	ON	2013/11/26 12:40
S83	1	carbon nanotube and aging and below with room temperature with degree	US-PGPUB; USPAT	ADJ	ON	2013/11/26 12:41
S84	1297	carbon nanotube and aging and degree	US-PGPUB; USPAT	ADJ	ON	2013/11/26 12:41
S85	32	carbon nanotube and aging with degree	US-PGPUB; USPAT	ADJ	ON	2013/11/26 12:41
S86	232	carbon nanotube and aging and degree same celsius	US-PGPUB; USPAT	ADJ	ON	2013/11/26 12:42

S87	1	("20120252662").PN.	US-PGPUB; USPAT	OR	OFF	2013/12/05 09:35
S88	0	wo "2009080204"	US-PGPUB; USPAT	ADJ	ON	2013/12/05 09:36
S89	1	carbon-doped nanotube	US-PGPUB; USPAT	ADJ	ON	2013/12/05 09:37
S90	9	nitrogen-doped nanotube	US-PGPUB; USPAT	ADJ	ON	2013/12/05 09:37
S91	0	(doped or doping) with nitrogen with absorb with hydrogen with carbon with nanotube	US-PGPUB; USPAT	ADJ	ON	2013/12/05 16:53
S92	233	(doped or doping) with nitrogen with carbon with nanotube	US-PGPUB; USPAT	ADJ	ON	2013/12/05 16:53
S93	14	(doped or doping) with nitrogen with carbon with nanotube with hydrogen	US-PGPUB; USPAT	ADJ	ON	2013/12/05 16:53
S94	9	(doped or doping) with nitrogen with carbon with nanotube with (absorb or absorption or diffuse or diffusion)	US-PGPUB; USPAT	ADJ	ON	2013/12/05 16:55

EAST Search History (Interference)

< This search history is empty >

12/ 9/ 2013 4:21:52 PM
C:\ Users\ kcoghill\ Documents\ EAST\ Workspaces\ 13089986.wsp



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UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/089,986	04/19/2011	Christopher H. Cooper	09102.0014-04

CONFIRMATION NO. 1497

22852
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER
LLP
901 NEW YORK AVENUE, NW
WASHINGTON, DC 20001-4413

PUBLICATION NOTICE



OC000000050493508

Title:METHODS OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS

Publication No.US-2011-0255644-A1

Publication Date:10/20/2011

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <http://pair.uspto.gov/>. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number
13/089,986

APPLICATION AS FILED - PART I

(Column 1)

(Column 2)

SMALL ENTITY

OR

OTHER THAN SMALL ENTITY

FOR	NUMBER FILED	NUMBER EXTRA
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A
TOTAL CLAIMS (37 CFR 1.16(i))	42 minus 20 =	* 22
INDEPENDENT CLAIMS (37 CFR 1.16(h))	4 minus 3 =	* 1
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$270 (\$135 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).	
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))		

RATE(\$)	FEE(\$)
N/A	82
N/A	270
N/A	110
x 26 =	572
x 110 =	110
	0.00
	0.00
TOTAL	1144

RATE(\$)	FEE(\$)
N/A	
N/A	
N/A	
TOTAL	

* If the difference in column 1 is less than zero, enter "0" in column 2.

APPLICATION AS AMENDED - PART II

(Column 1)

(Column 2)

(Column 3)

SMALL ENTITY

OR

OTHER THAN SMALL ENTITY

AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total (37 CFR 1.16(i))	* Minus	**	=
Independent (37 CFR 1.16(h))	* Minus	***	=
Application Size Fee (37 CFR 1.16(s))			
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))			

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

(Column 1)

(Column 2)

(Column 3)

AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total (37 CFR 1.16(i))	* Minus	**	=
Independent (37 CFR 1.16(h))	* Minus	***	=
Application Size Fee (37 CFR 1.16(s))			
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))			

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
13/089,986	04/19/2011	1736	1209	09102.0014-04	42	4

CONFIRMATION NO. 1497

UPDATED FILING RECEIPT



22852
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER
LLP
901 NEW YORK AVENUE, NW
WASHINGTON, DC 20001-4413

Date Mailed: 07/14/2011

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

Christopher H. Cooper, Windsor, VT;
William K. Copper, Santa Fe, NM;

Assignment For Published Patent Application

Seldon Technologies, Inc.

Power of Attorney: The patent practitioners associated with Customer Number 22852

Domestic Priority data as claimed by applicant

This application is a CIP of 12/898,807 10/06/2010
which is a CON of 12/258,568 10/27/2008 ABN
which is a CON of 11/633,524 12/05/2006 ABN
which claims benefit of 60/741,874 12/05/2005
and claims benefit of 60/777,577 03/01/2006
This application 13/089,986
claims benefit of 61/427,140 12/24/2010

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.)

If Required, Foreign Filing License Granted: 05/13/2011

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/089,986**

Projected Publication Date: 10/20/2011

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

METHODS OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING
GRAPHENE BASED MATERIALS

Preliminary Class

423

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

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Title 35, United States Code, Section 184
Title 37, Code of Federal Regulations, 5.11 & 5.15

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)
)
Christopher H. Cooper et al.) Group Art Unit: 1736
)
Application No.: 13/089,986) Examiner: Not assigned
)
Filed: April 19, 2011) Confirmation No.: 1497
)
For: METHOD OF GENERATING NON-)
IONIZING RADIATION OR NON-)
IONIZING 4He USING GRAPHENE)
BASED MATERIALS)
)

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

**RESPONSE TO NOTICE TO FILE
MISSING PARTS OF APPLICATION**

In response to the communication of May 17, 2011, Applicant submits a Declaration/Power of Attorney, Replacement Drawings (Figs. 1-10) for filing in this application, the fee in the amount of \$65.00 (small entity surcharge), and a copy of the Notice of Missing Parts.

Please associate the enclosed Declaration and Replacement Drawings with the application, grant any extensions of time required to enter this response, and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

Dated: July 7, 2011

By: 

Louis M. Troilo
Reg. No. 45,284
Phone: 202-408-6020
Fax: 202-408-4400
Email: lou.troilo@finnegan.com

REPLACEMENT DRAWINGS

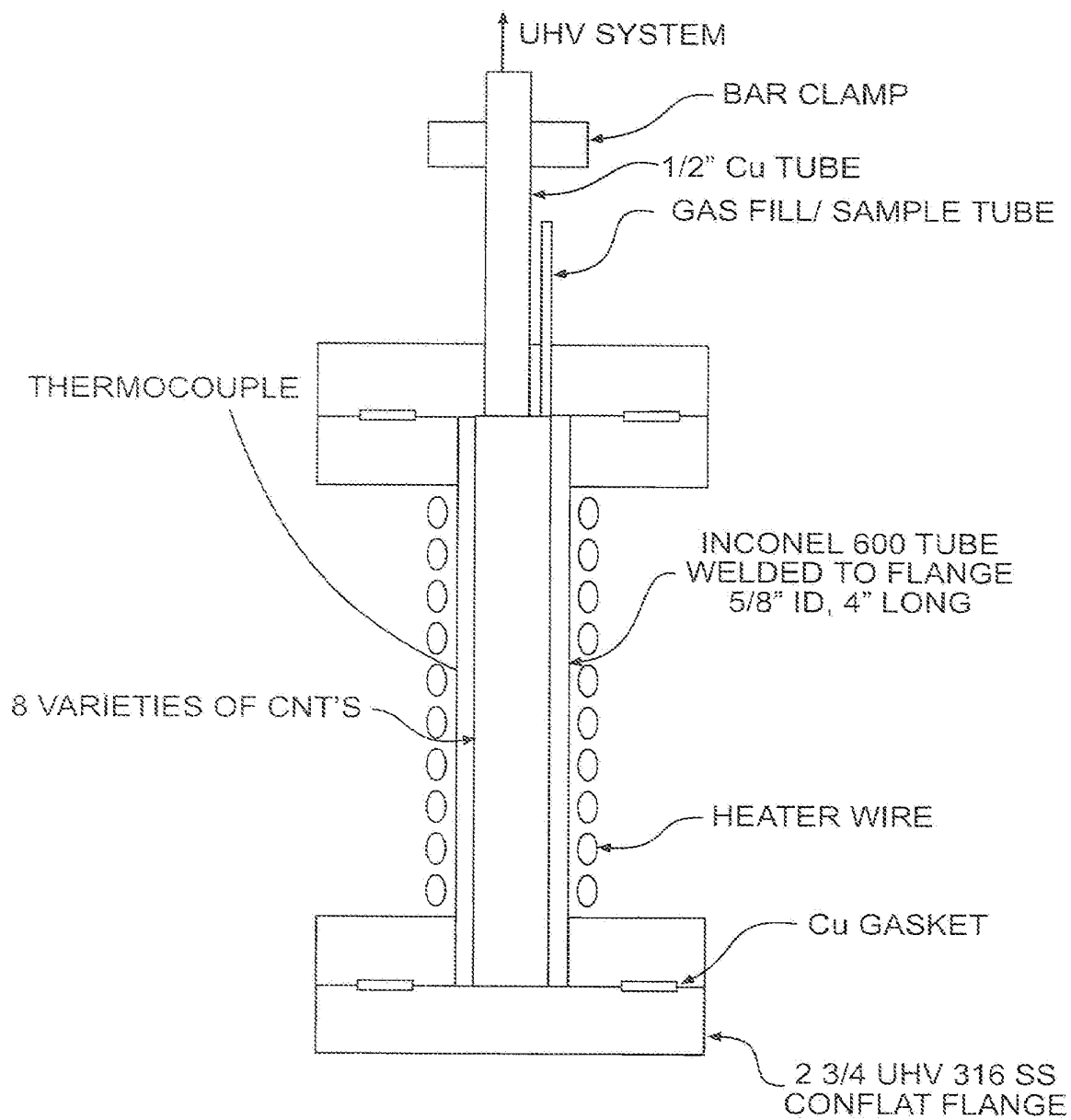


FIG. 1

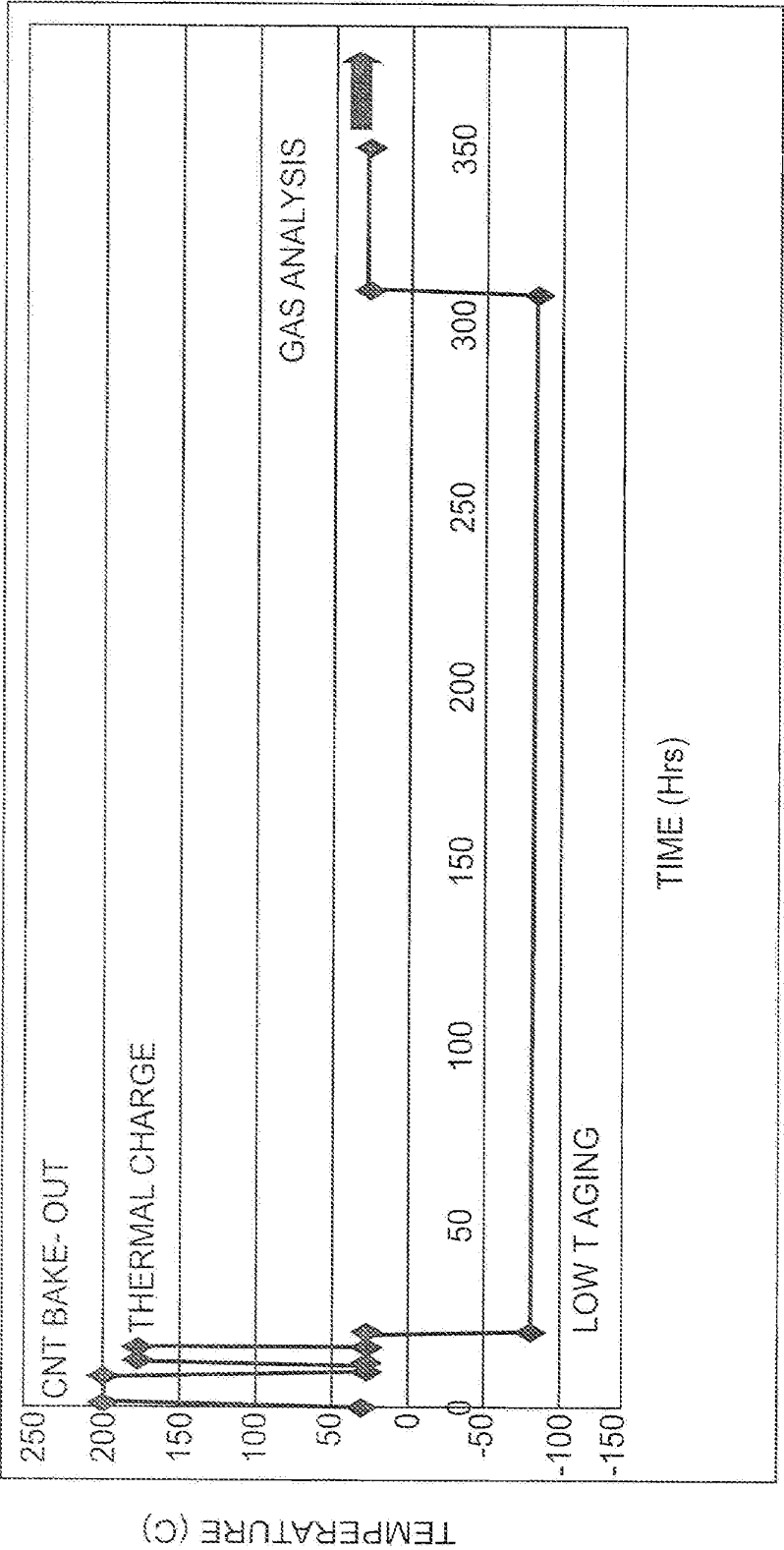


FIG. 2

REPLACEMENT DRAWINGS

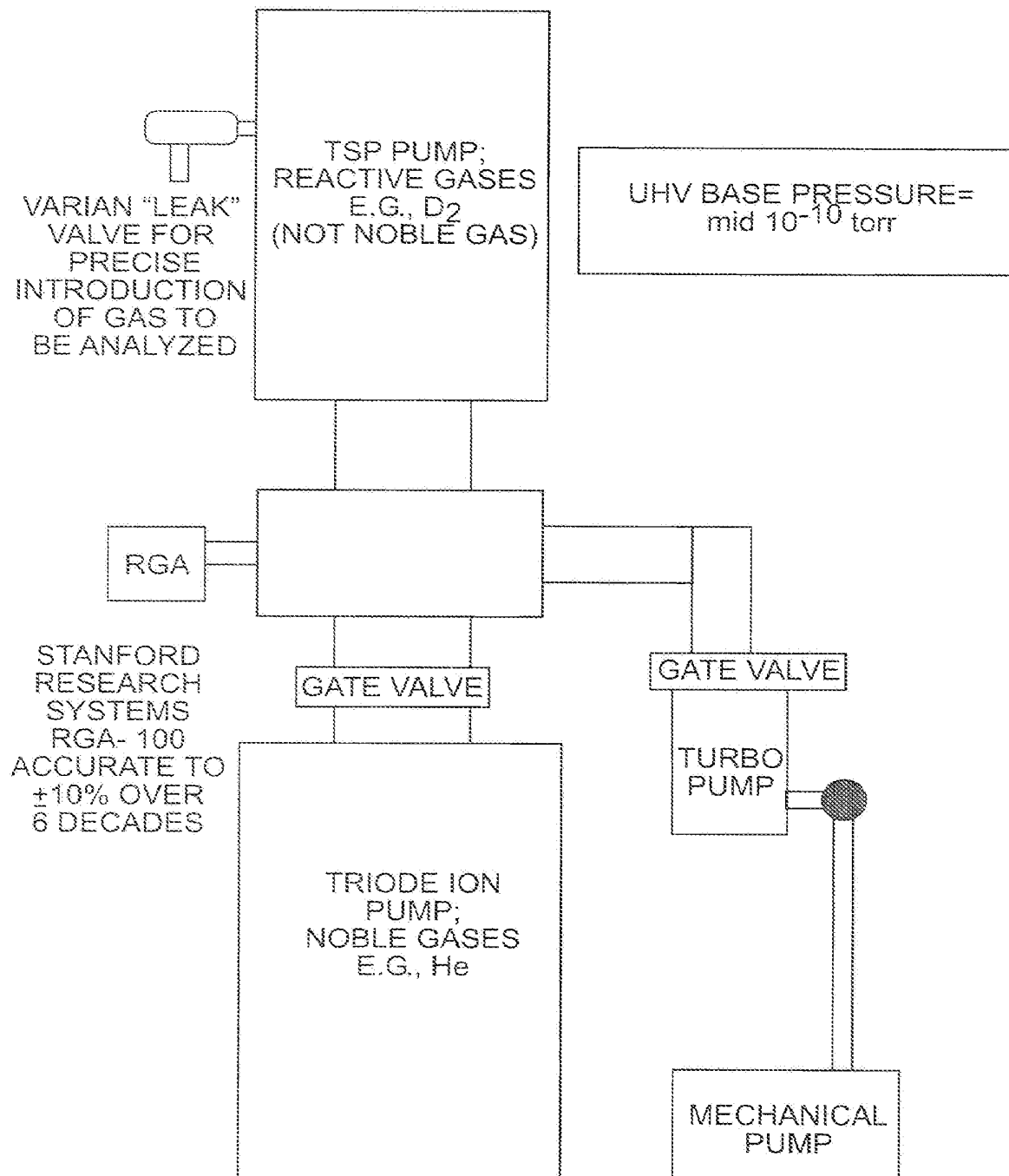


FIG. 3

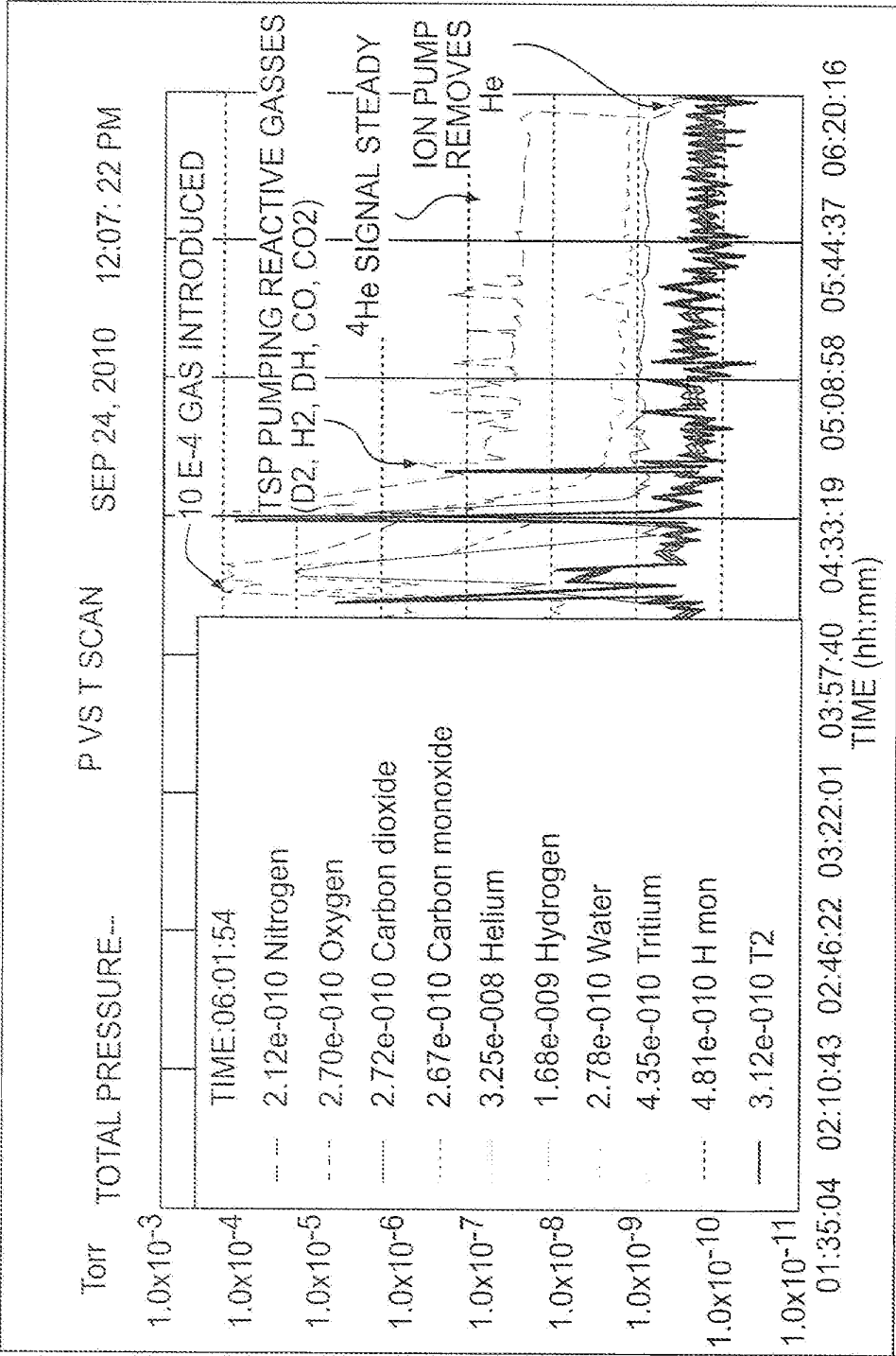


FIG. 4

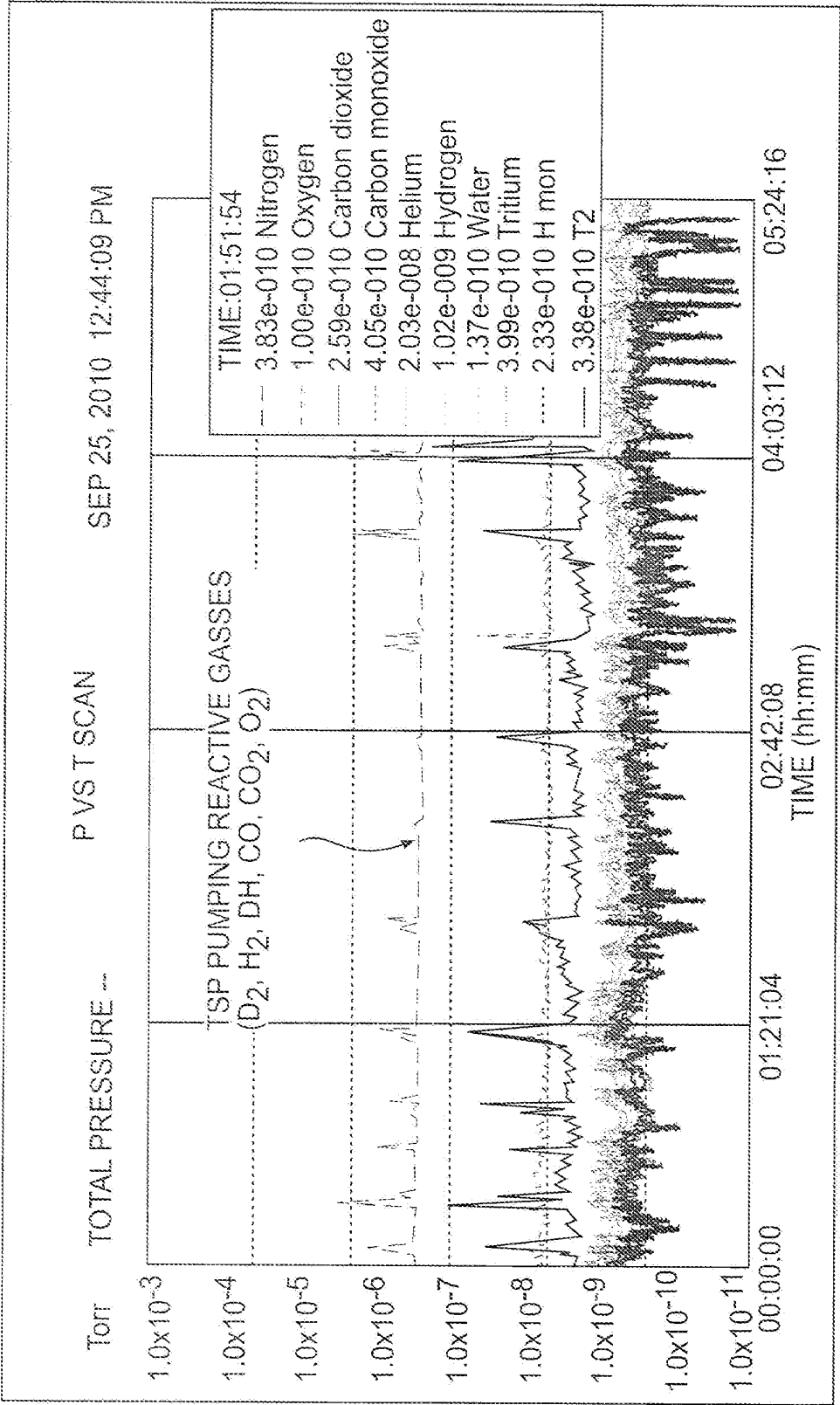


FIG. 5

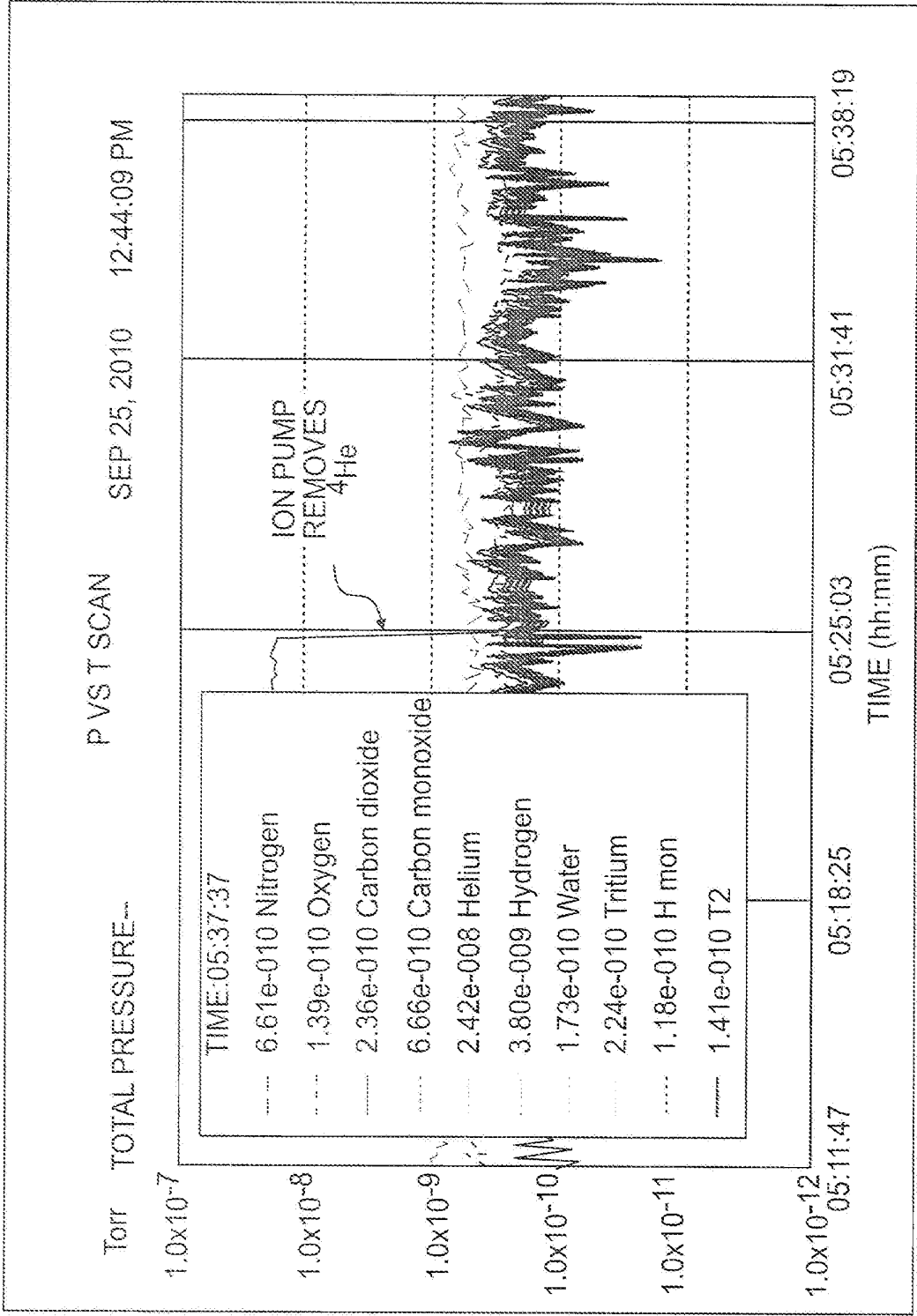


FIG. 6

REPLACEMENT DRAWINGS

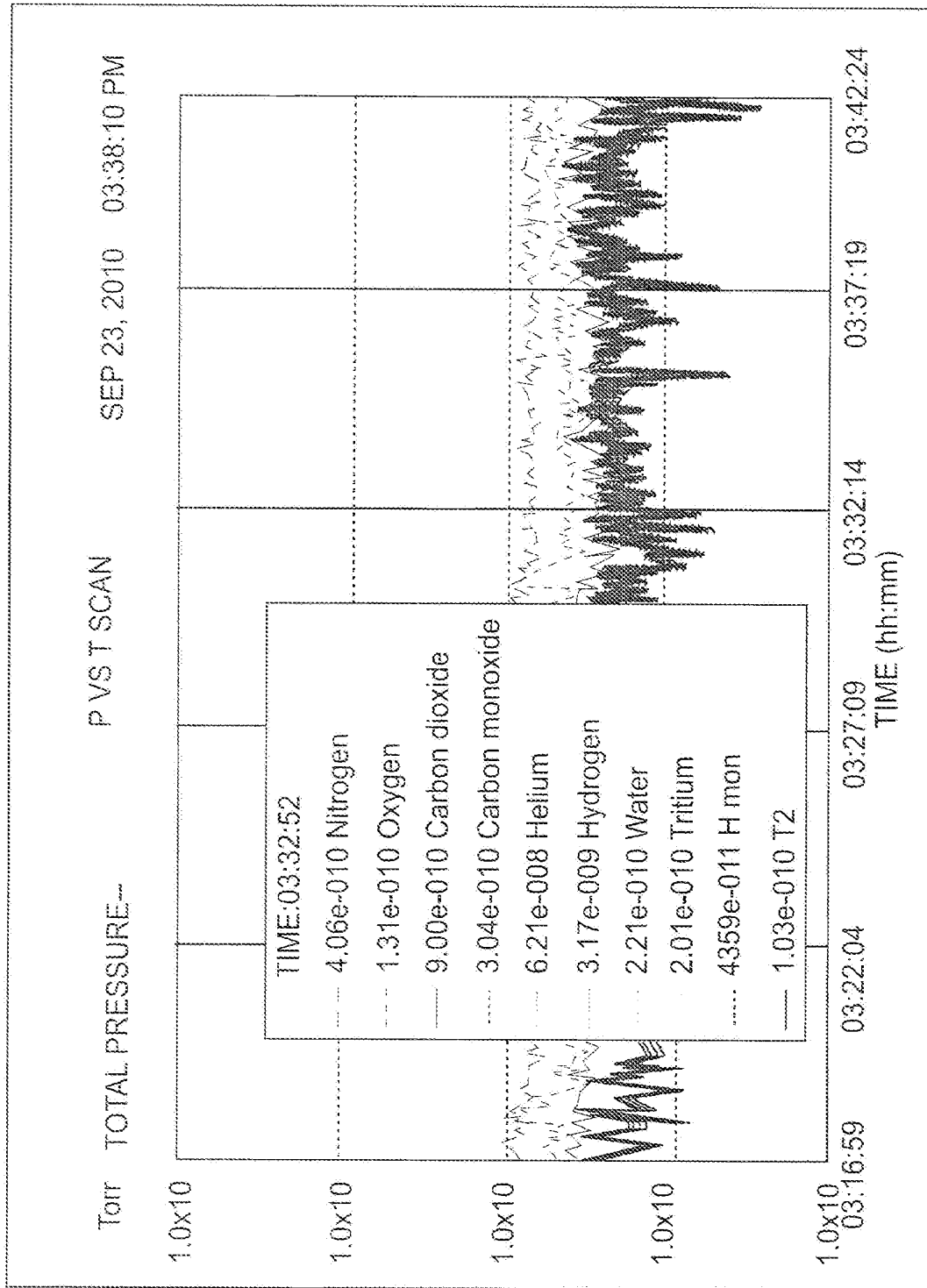
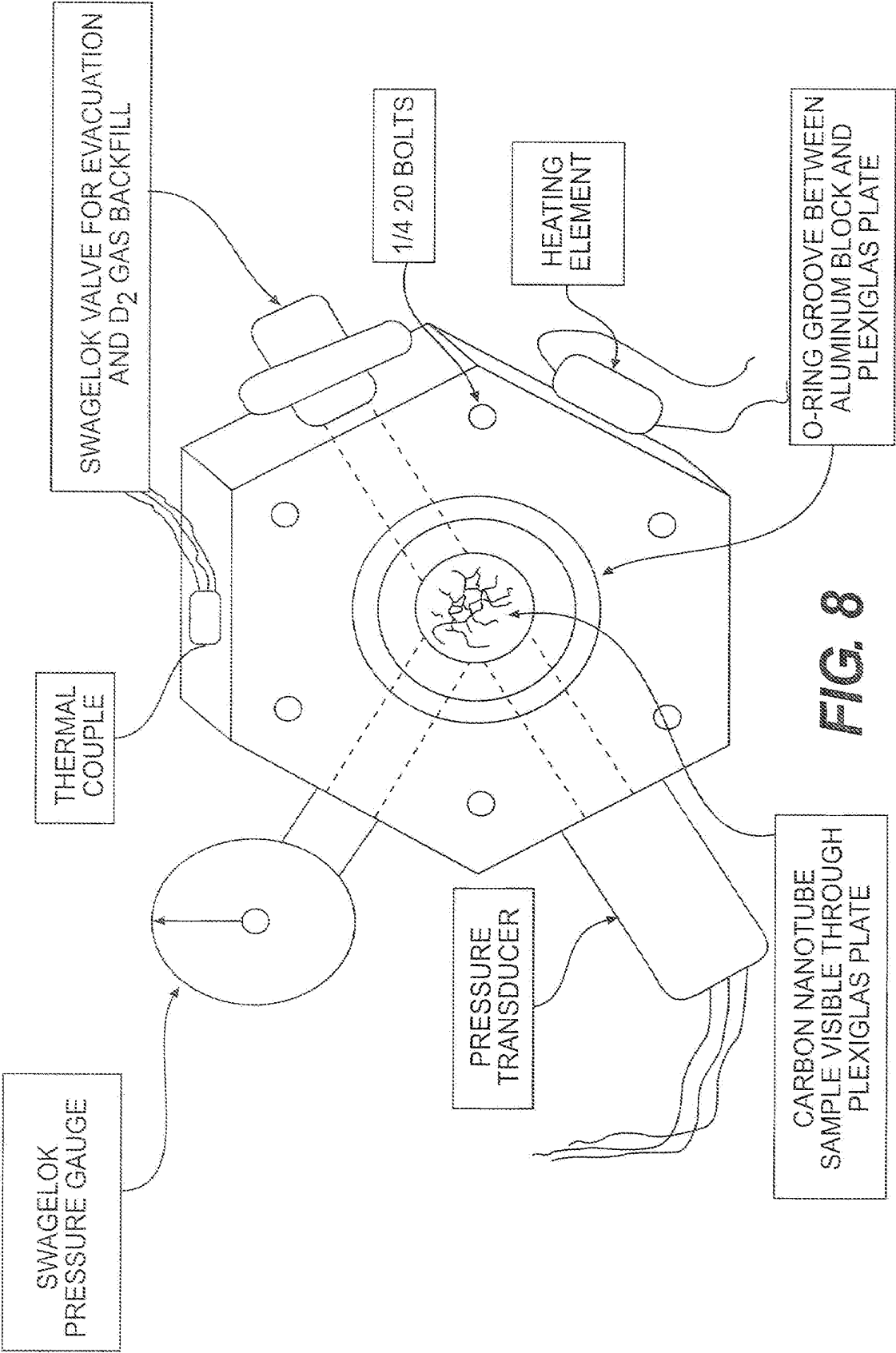


FIG. 7



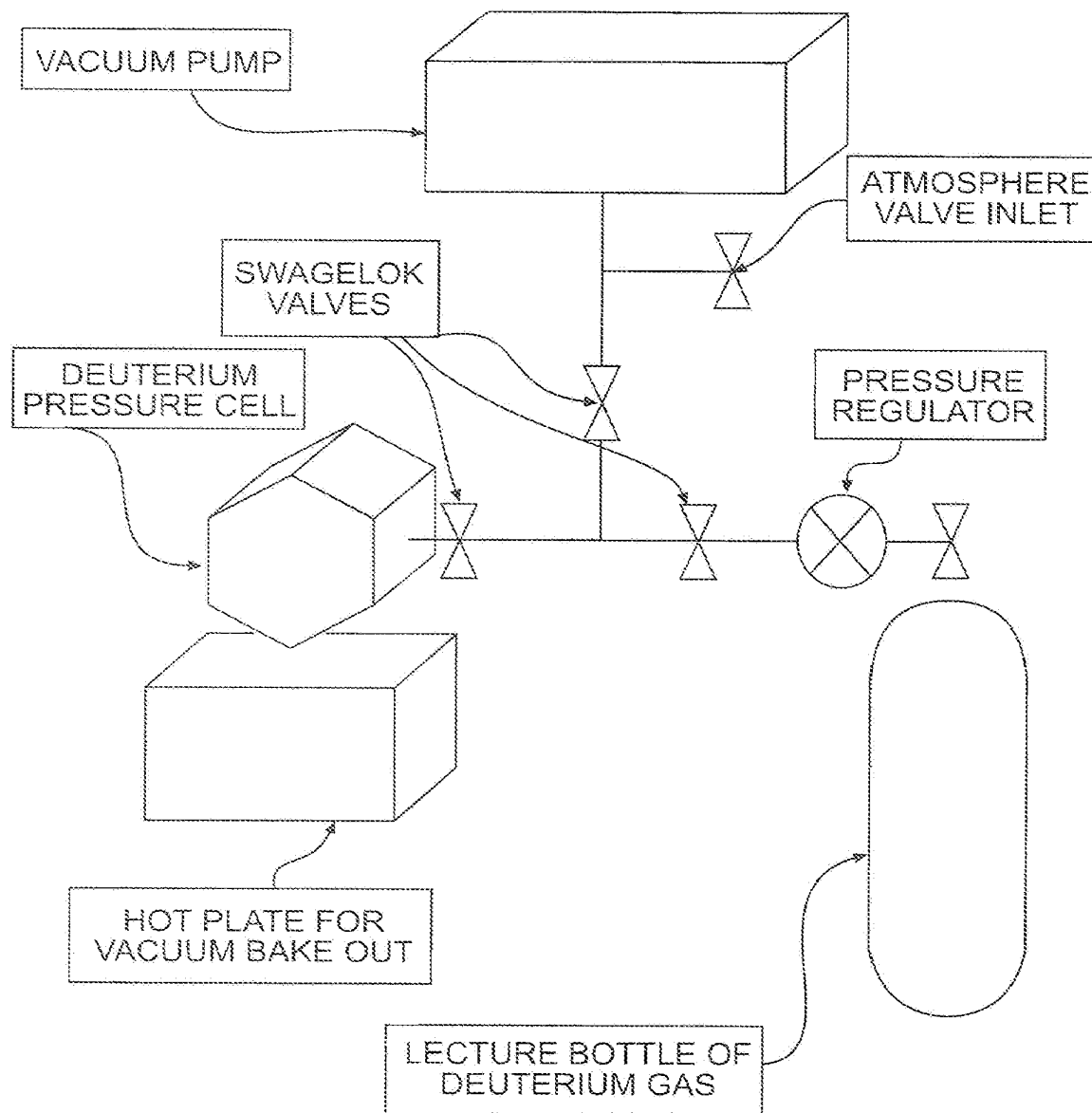


FIG. 9

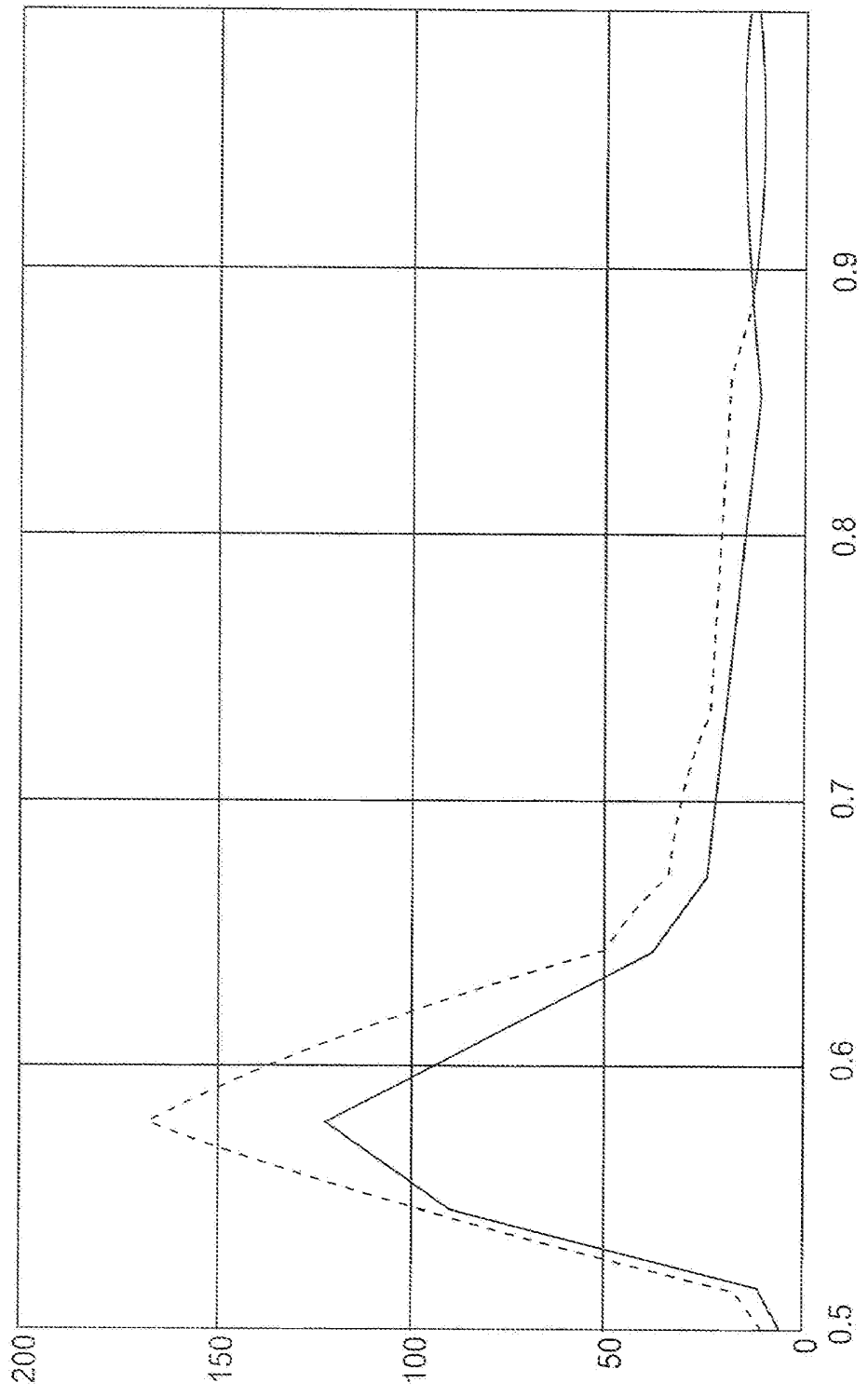


FIG. 10

DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that: my residence, post office address and citizenship are as stated below next to my name; I believe I am the original, first, and sole inventor (if only one name is listed below) or an original, first, and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: **METHODS OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS** the specification of which ☐ is attached and/or ☒ was filed on **April 19, 2011** as United States Application No. **13/089,986** and Confirmation No. **1497**, or PCT International Application No. _____ and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate or § 365(a) of any PCT international application(s) designating at least one country other than the United States, listed below and have also identified below, any foreign application(s) for patent or inventor's certificate, or any PCT International application(s) having a filing date before that of the application(s) of which priority is claimed:

Country	Application Number	Date of Filing	Priority Claimed Under 35 U.S.C.	
			<input type="checkbox"/> YES	<input type="checkbox"/> NO
			<input type="checkbox"/> YES	<input type="checkbox"/> NO

I hereby claim the benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) listed below:

Application Number	Date of Filing
60/741,874	12/05/2005
60/777,577	03/01/2006
61/427,140	12/24/2010


I hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s) or § 365(c) of any PCT International application(s) designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application(s) in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56 which became available between the filing date of the prior application(s) and the national or PCT International filing date of this application:

Application Number	Date of Filing	Status (Patented, Pending, Abandoned)
12/898,807	10/06/2010	Pending
12/258,568	10/27/2008	Abandoned
11/633,524	12/05/2006	Abandoned

I hereby appoint the patent practitioners associated with **FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER, L.L.P., CUSTOMER NUMBER 22,852** to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of

Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Full Name of First Inventor Christopher H. Cooper	Inventor's Signature 	Date 7/5/2011
Residence 16 Pine Street, Windsor, Vermont		Citizenship United States
Post Office Address c/o Seldon Technologies, PO Box 710, Windsor, VT 05089		
Full Name of Second Inventor William K. Cooper	Inventor's Signature	Date
Residence 224 E. Buena Vista, Santa Fe, New Mexico		Citizenship United States
Post Office Address c/o Seldon Technologies, PO Box 710, Windsor, VT 05089		

Title 18 of the United States Code, and that such wilful false statements may jeopardize the validity of the application or any patent issuing thereon.

Full Name of First Inventor Christopher H. Cooper	Inventor's Signature	Date
Residence 16 Pine Street, Windsor, Vermont		Citizenship United States
Post Office Address c/o Seldon Technologies, PO Box 710, Windsor, VT 05089		
Full Name of Second Inventor William K. Cooper	Inventor's Signature <i>William K. Cooper</i>	Date 6 July 2011
Residence 224 E. Buena Vista, Santa Fe, New Mexico		Citizenship United States
Post Office Address c/o Seldon Technologies, PO Box 710, Windsor, VT 05089		



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/089,986	04/19/2011	Christopher H. Cooper	9102.0014-04

CONFIRMATION NO. 1497

22852
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER
LLP
901 NEW YORK AVENUE, NW
WASHINGTON, DC 20001-4413

FORMALITIES LETTER



Date Mailed: 05/17/2011

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The oath or declaration is missing.

A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.

Note: If a petition under 37 CFR 1.47 is being filed, an oath or declaration in compliance with 37 CFR 1.63 signed by all available joint inventors, or if no inventor is available by a party with sufficient proprietary interest, is required.

The application is informal since it does not comply with the regulations for the reason(s) indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- Replacement drawings in compliance with 37 CFR 1.84 and 37 CFR 1.121(d) are required. The drawings submitted are not acceptable because:
 - The drawings have a line quality that is too light to be reproduced (weight of all lines and letters must be heavy enough to permit adequate reproduction) or text that is illegible (reference characters, sheet numbers, and view numbers must be plain and legible) see 37 CFR 1.84(l) and (p)(1)); See Figure(s) All.
 - The drawings submitted to the Office are not electronically reproducible because portions of figures All are missing and/or blurry.

Applicant is cautioned that correction of the above items may cause the specification and drawings page count to exceed 100 pages. If the specification and drawings exceed 100 pages, applicant will need to submit the required application size fee.

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- A surcharge (for late submission of filing fee, search fee, examination fee or oath or declaration) as set forth in 37 CFR 1.16(f) of **\$65** for a small entity in compliance with 37 CFR 1.27, must be submitted.

SUMMARY OF FEES DUE:

Total fee(s) required within **TWO MONTHS** from the date of this Notice is **\$65** for a small entity

- **\$65** Surcharge.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web.

<https://portal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html>

For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at <http://www.uspto.gov/ebc>.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

/aabranys/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

Electronic Patent Application Fee Transmittal

Application Number:	13089986			
Filing Date:	19-Apr-2011			
Title of Invention:	METHODS OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS			
First Named Inventor/Applicant Name:	Christopher H. Cooper			
Filer:	Louis M. Troilo/Anna Michaud			
Attorney Docket Number:	9102.0014-04			
Filed as Small Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Late filing fee for oath or declaration	2051	1	65	65
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Total in USD (\$)				65

Electronic Acknowledgement Receipt

EFS ID:	10469080
Application Number:	13089986
International Application Number:	
Confirmation Number:	1497
Title of Invention:	METHODS OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS
First Named Inventor/Applicant Name:	Christopher H. Cooper
Customer Number:	22852
Filer:	Louis M. Troilo/Anna Michaud
Filer Authorized By:	Louis M. Troilo
Attorney Docket Number:	9102.0014-04
Receipt Date:	07-JUL-2011
Filing Date:	19-APR-2011
Time Stamp:	13:45:39
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$65
RAM confirmation Number	14
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
-----------------	----------------------	-----------	----------------------------------	------------------	------------------

1	Applicant Response to Pre-Exam Formalities Notice	MISS-PRTS-RESPONSE.pdf	37197 01a9bbade7cf583d26ef0c4ef50ef2b6959d178	no	1
Warnings:					
Information:					
2	Drawings-only black and white line drawings	Final-Replacement-Drawings.pdf	2609744 196b4a0cf1ec4f1b438a7b2d34f7eb51e41cabf	no	10
Warnings:					
Information:					
3	Oath or Declaration filed	DECANDPOA.pdf	265467 ab9ac8da182fa80ccd38876a13bccae67c5e480b	no	3
Warnings:					
Information:					
4	Certification and Request for Missing Parts	Notice-to-File-Missing-Parts.pdf	76747 32ee3b9d895747496817f64f0f6ca00160d36818	no	2
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	30331 721ab65fa0b3edb8f66849bc8b7b99814681fb86	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			3019486		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					



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www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
13/089,986	04/19/2011	1736	1144	9102.0014-04	42	4

CONFIRMATION NO. 1497

22852
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER
LLP
901 NEW YORK AVENUE, NW
WASHINGTON, DC 20001-4413

FILING RECEIPT



OC000000047655999

Date Mailed: 05/17/2011

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

Christopher H. Cooper, Residence Not Provided;

Assignment For Published Patent Application

Seldon Technologies, Inc.

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CIP of 12/898,807 10/06/2010
which is a CON of 12/258,568 10/27/2008 ABN
which is a CON of 11/633,524 12/05/2006 ABN
which claims benefit of 60/741,874 12/05/2005
and claims benefit of 60/777,577 03/01/2006
This application 13/089,986
claims benefit of 61/427,140 12/24/2010

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.)

If Required, Foreign Filing License Granted: 05/13/2011

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/089,986**

Projected Publication Date: To Be Determined - pending completion of Missing Parts

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

METHODS OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS

Preliminary Class

423

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER**Title 35, United States Code, Section 184****Title 37, Code of Federal Regulations, 5.11 & 5.15****GRANTED**

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where

the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number
13/089,986

APPLICATION AS FILED - PART I

(Column 1)

(Column 2)

SMALL ENTITY

OR

OTHER THAN SMALL ENTITY

FOR	NUMBER FILED	NUMBER EXTRA
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A
TOTAL CLAIMS (37 CFR 1.16(i))	42 minus 20 =	* 22
INDEPENDENT CLAIMS (37 CFR 1.16(h))	4 minus 3 =	* 1
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$270 (\$135 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).	
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))		

RATE(\$)	FEE(\$)
N/A	82
N/A	270
N/A	110
x 26 =	572
x 110 =	110
	0.00
	0.00
TOTAL	1144

RATE(\$)	FEE(\$)
N/A	
N/A	
N/A	
TOTAL	

* If the difference in column 1 is less than zero, enter "0" in column 2.

APPLICATION AS AMENDED - PART II

(Column 1)

(Column 2)

(Column 3)

SMALL ENTITY

OR

OTHER THAN SMALL ENTITY

AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total (37 CFR 1.16(i))	*	Minus	**	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=
	Application Size Fee (37 CFR 1.16(s))				
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))				

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

(Column 1)

(Column 2)

(Column 3)

AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total (37 CFR 1.16(i))	*	Minus	**	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=
	Application Size Fee (37 CFR 1.16(s))				
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))				

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

RATE(\$)	ADDITIONAL FEE(\$)
x =	
x =	
TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/089,986	04/19/2011	Christopher H. Cooper	9102.0014-04

CONFIRMATION NO. 1497

22852
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER
LLP
901 NEW YORK AVENUE, NW
WASHINGTON, DC 20001-4413

FORMALITIES LETTER



Date Mailed: 05/17/2011

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The oath or declaration is missing.

A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.

Note: If a petition under 37 CFR 1.47 is being filed, an oath or declaration in compliance with 37 CFR 1.63 signed by all available joint inventors, or if no inventor is available by a party with sufficient proprietary interest, is required.

The application is informal since it does not comply with the regulations for the reason(s) indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- Replacement drawings in compliance with 37 CFR 1.84 and 37 CFR 1.121(d) are required. The drawings submitted are not acceptable because:
 - The drawings have a line quality that is too light to be reproduced (weight of all lines and letters must be heavy enough to permit adequate reproduction) or text that is illegible (reference characters, sheet numbers, and view numbers must be plain and legible) see 37 CFR 1.84(l) and (p)(1)); See Figure(s) All.
 - The drawings submitted to the Office are not electronically reproducible because portions of figures All are missing and/or blurry.

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The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- A surcharge (for late submission of filing fee, search fee, examination fee or oath or declaration) as set forth in 37 CFR 1.16(f) of **\$65** for a small entity in compliance with 37 CFR 1.27, must be submitted.

SUMMARY OF FEES DUE:

Total fee(s) required within **TWO MONTHS** from the date of this Notice is **\$65** for a small entity

- **\$65** Surcharge.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

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<https://portal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html>

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If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

/aabranys/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

<input type="checkbox"/> Presentation of Multiple Dep. Claim(s)		+ \$390	
Size Fee: Paper Filing Total Application Pages (specification, drawings, printed sequence or computer listing, preliminary amendment)	26 - 100 ÷ 50 = [number]* x \$270 *Rounded up to next whole number		
Size Fee: EFS-Web Filing Total Application Pages (specification, drawings, printed sequence or computer listing, preliminary amendment)	26 X .75 - 100 ÷ 50 = [number]* x \$270 *Rounded up to next whole number		
Subtotal			\$ 2454.00
Reduction by 1/2 if small entity			- 1227.00
TOTAL FEES DUE			\$ 1227.00

5. ☒ The fee of \$1396 is submitted herewith
6. ☒ The Commissioner is hereby authorized to charge any fees which may be required including fees due under 37 C.F.R. § 1.16 and any other fees due under 37 C.F.R. § 1.17, or credit any overpayment during the pendency of this application to Deposit Account No. 06-0916.
7. ☐ New acceptable drawings are enclosed.
8. ☒ The prior application is assigned of record to: Seldon Technologies, Inc.
9. ☐ Priority of Application No. [Text], filed on [Text] in [Country] is claimed under 35 U.S.C. § 119. A certified copy

☐ is enclosed or ☐ is on file in the prior application.
10. ☒ Small entity status is appropriate and applies to this application.
11. ☒ The power of attorney in the prior application is to FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER, L.L.P., Customer No. 22,852.
12. ☐ A Listing Under 37 C.F.R. § 1.32(c)(3) of Ten or Fewer Practitioners to be Recognized by the PTO as Being of Record is attached.
13. ☒ The power appears in the original declaration of the prior application.

05/13/2011 MNGUYEN 00000007 060916 13089986

2

01 FC:4011	82.00 DA
02 FC:2111	270.00 DA
03 FC:2311	110.00 DA
04 FC:2201	110.00 DA
05 FC:2202	572.00 DA

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Prior Application Art Unit: 3663 Prior Application Examiner: Erin M. Boyd

SIR: This is a request for filing a

☐ Continuation ☒ Continuation-in-Part ☐ Divisional Application under 37 C.F.R. § 1.53(b) of pending prior Application No. 12/898,807 filed October 6, 2010, which is a Continuation of 12/258,568 filed October 27, 2008, which is a Continuation of U.S. Application No. 11/633,524, filed December 5, 2006, and claims the benefit of domestic priority under 35 USC §119(e) to U.S. Provisional Application Nos. 61/427,140 filed December 24, 2010, 60/777,577, filed March 1, 2006, and 60/741,874, filed December 5, 2005, of Christopher H. Cooper, and William K. Cooper for METHODS OF GENERATING ENERGETIC PARTICLES USING NANOTUBES AND ARTICLES THEREOF.

1. ☐ Enclosed is a complete copy of the prior application including the oath or Declaration and drawings, if any, as originally filed. I hereby verify that the attached papers are a true copy of prior Application No. _____ as originally filed on _____, which is incorporated herein by reference.
2. ☐ Enclosed is a Request for Non-Publication of Application and Certification Under 35 U.S.C. § 122(b)(2)(B)(i).
3. ☒ A Preliminary Amendment is enclosed.
4. ☐ The filing fee is calculated on the basis of the claims existing in the prior application as amended in the Preliminary Amendment filed herewith.

Basic Utility Application Filing Fee					\$330	\$ 330.00
Search Fee					\$540	540.00
Examination Fee					\$220	220.00
	Number of Claims		Basic	Extra		
Total Claims	42	-	20	22	x \$ 52	1144.00
Independent Claims	4	-	3	1	x \$220	220.00

<input type="checkbox"/> Presentation of Multiple Dep. Claim(s)		+ \$390	
Size Fee: Paper Filing Total Application Pages (specification, drawings, printed sequence or computer listing, preliminary amendment)	26 - 100 ÷ 50 = [number]* x \$270 *Rounded up to next whole number		
Size Fee: EFS-Web Filing Total Application Pages (specification, drawings, printed sequence or computer listing, preliminary amendment)	26 X .75 - 100 ÷ 50 = [number]* x \$270 *Rounded up to next whole number		
Subtotal			\$ 2454.00
Reduction by 1/2 if small entity			- 1227.00
TOTAL FEES DUE			\$ 1227.00

5. ☒ The fee of \$1396 is submitted herewith
6. ☒ The Commissioner is hereby authorized to charge any fees which may be required including fees due under 37 C.F.R. § 1.16 and any other fees due under 37 C.F.R. § 1.17, or credit any overpayment during the pendency of this application to Deposit Account No. 06-0916.
7. ☐ New acceptable drawings are enclosed.
8. ☒ The prior application is assigned of record to: Seldon Technologies, Inc.
9. ☐ Priority of Application No. [Text], filed on [Text] in [Country] is claimed under 35 U.S.C. § 119. A certified copy
- ☐ is enclosed or ☐ is on file in the prior application.
10. ☒ Small entity status is appropriate and applies to this application.
11. ☒ The power of attorney in the prior application is to FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER, L.L.P., Customer No. 22,852.
12. ☐ A Listing Under 37 C.F.R. § 1.32(c)(3) of Ten or Fewer Practitioners to be Recognized by the PTO as Being of Record is attached.
13. ☒ The power appears in the original declaration of the prior application.

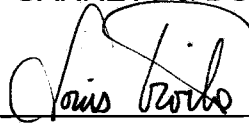
14. ☐ Since the power does not appear in the original declaration, a copy of the power in the prior application is enclosed.
15. ☒ Please address all correspondence to FINNEGAN, HENDERSON, FARABOW, GARRETT and DUNNER, L.L.P., **Customer Number 22,852.**
16. ☒ Also enclosed are copies of two PTO/SB/08 forms from the parent application.

PETITION FOR EXTENSION. If any extension of time is necessary for the filing of this application, including any extension in parent Application No. 12/898,807 filed October 6, 2010, for the purpose of maintaining copendency between the parent application and this application, and such extension has not otherwise been requested, such an extension is hereby requested, and the Commissioner is authorized to charge necessary fees for such an extension to Deposit Account 06-0916. A duplicate copy of this paper is enclosed for use in charging the deposit account.

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

Dated: April 19, 2011

By: _____



Louis M. Troilo
Reg. No. 45,284
Phone: 202-408-6020
Fax: 202-408-4400
Email: lou.troilo@finnegan.com

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Prior Application Art Unit: 3663 Prior Application Examiner: Erin M. Boyd

SIR: This is a request for filing a

☐ Continuation ☒ Continuation-in-Part ☐ Divisional Application under 37 C.F.R. § 1.53(b) of pending prior Application No. 12/898,807 filed October 6, 2010, which is a Continuation of 12/258,568 filed October 27, 2008, which is a Continuation of U.S. Application No. 11/633,524, filed December 5, 2006, and claims the benefit of domestic priority under 35 USC §119(e) to U.S. Provisional Application Nos. 61/427,140 filed December 24, 2010, 60/777,577, filed March 1, 2006, and 60/741,874, filed December 5, 2005, of Christopher H. Cooper, and William K. Cooper for METHODS OF GENERATING ENERGETIC PARTICLES USING NANOTUBES AND ARTICLES THEREOF.

1. ☐ Enclosed is a complete copy of the prior application including the oath or Declaration and drawings, if any, as originally filed. I hereby verify that the attached papers are a true copy of prior Application No. _____ as originally filed on _____, which is incorporated herein by reference.
2. ☐ Enclosed is a Request for Non-Publication of Application and Certification Under 35 U.S.C. § 122(b)(2)(B)(i).
3. ☒ A Preliminary Amendment is enclosed.
4. ☐ The filing fee is calculated on the basis of the claims existing in the prior application as amended in the Preliminary Amendment filed herewith.

Basic Utility Application Filing Fee					\$330	\$ 330.00
Search Fee					\$540	540.00
Examination Fee					\$220	220.00
	Number of Claims		Basic	Extra		
Total Claims	42	-	20	22	x \$ 52	1144.00
Independent Claims	4	-	3	1	x \$220	220.00

<input type="checkbox"/> Presentation of Multiple Dep. Claim(s)		+ \$390	
Size Fee: Paper Filing Total Application Pages (specification, drawings, printed sequence or computer listing, preliminary amendment)	26 - 100 ÷ 50 = [number]* x \$270 *Rounded up to next whole number		
Size Fee: EFS-Web Filing Total Application Pages (specification, drawings, printed sequence or computer listing, preliminary amendment)	26 X .75 - 100 ÷ 50 = [number]* x \$270 *Rounded up to next whole number		
Subtotal			\$ 2454.00
Reduction by 1/2 if small entity			- 1227.00
TOTAL FEES DUE			\$ 1227.00

5. ☒ The fee of \$1396 is submitted herewith
6. ☒ The Commissioner is hereby authorized to charge any fees which may be required including fees due under 37 C.F.R. § 1.16 and any other fees due under 37 C.F.R. § 1.17, or credit any overpayment during the pendency of this application to Deposit Account No. 06-0916.
7. ☐ New acceptable drawings are enclosed.
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9. ☐ Priority of Application No. [Text], filed on [Text] in [Country] is claimed under 35 U.S.C. § 119. A certified copy

☐ is enclosed or ☐ is on file in the prior application.
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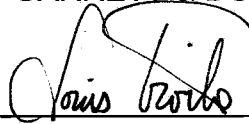
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FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

Dated: April 19, 2011

By: _____



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Electronic Patent Application Fee Transmittal

Application Number:				
Filing Date:				
Title of Invention:	METHODS OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS			
First Named Inventor/Applicant Name:	Christopher H Cooper			
Filer:	Louis M. Troilo/Anna Michaud			
Attorney Docket Number:				
Filed as Small Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Utility filing Fee (Electronic filing)	4011	1	82	82
Utility Search Fee	2111	1	270	270
Utility Examination Fee	2311	1	110	110
Pages:				
Claims:				
Claims in excess of 20	2202	22	26	572
Independent claims in excess of 3	2201	1	110	110
Miscellaneous-Filing:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1144

Electronic Acknowledgement Receipt

EFS ID:	9912928
Application Number:	13089986
International Application Number:	
Confirmation Number:	1497
Title of Invention:	METHODS OF GENERATING NON-IONIZING RADIATION OR NON-IONIZING 4He USING GRAPHENE BASED MATERIALS
First Named Inventor/Applicant Name:	Christopher H Cooper
Customer Number:	22852
Filer:	Louis M. Troilo/Anna Michaud
Filer Authorized By:	Louis M. Troilo
Attorney Docket Number:	
Receipt Date:	19-APR-2011
Filing Date:	
Time Stamp:	17:06:56
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		APPLICATION.pdf	1141556 360720c87b48caa3096723d66782633c8601247b	yes	35

	Multipart Description/PDF files in .zip description		
	Document Description	Start	End
	Specification	1	28
	Claims	29	34
	Abstract	35	35

Warnings:

Information:

2	Drawings-only black and white line drawings	DRAWINGS.pdf	3025909	no	9
			da14ec641ea551d2366840ecffc40ed959e7e410		

Warnings:

Information:

3	Transmittal of New Application	CIP-TRNSMTL.pdf	123018	no	3
			1c2eac0d721feae709732c6848fe2ca1c29f79f7		

Warnings:

Information:

4	Fee Worksheet (PTO-875)	fee-info.pdf	37828	no	2
			3e8fbb0f4d611518cd98eae4c29b71b842db765e		

Warnings:

Information:

Total Files Size (in bytes):			4328311		
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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT APPLICATION

FOR

METHODS OF GENERATING NON-IONIZING RADIATION OR
NON-IONIZING ^4He USING GRAPHENE BASED MATERIALS

BY

CHRISTOPHER H. COOPER

AND

WILLIAM K. COOPER

[001] This is a Continuation-in-Part of Application No. 12/898,807 filed October 6, 2010, which is a Continuation of 12/258,568 filed October 27, 2008, which is a Continuation of U.S. Application No. 11/633,524, filed December 5, 2006, and claims the benefit of domestic priority under 35 USC §119(e) to U.S. Provisional Application Nos. 61/427,140 filed December 24, 2010, 60/777,577, filed March 1, 2006, and 60/741,874, filed December 5, 2005, all of which are incorporated by reference herein.

[002] Disclosed herein are methods for generating non-ionizing radiation or non-ionizing ^4He , by contacting a graphene material with a source of deuterium. In one embodiment, there is a method of generating non-ionizing ^4He by contacting deuterium with a graphene material, such as carbon nanotubes. There is also disclosed methods of generating non-ionizing radiation, such as visible light, using the described method.

[003] There is a need to generate new sources of energy not based on fossil fuels. While nuclear energy remains a valuable alternative, various types of damaging ionizing radiation may be produced by radioactive decay, nuclear fission and nuclear fusion. For example, it is known that the negatively-charged electrons and positively charged ions created by ionizing radiation may cause damage in living tissue. If the dose is sufficient, the effect may be seen almost immediately, in the form of radiation poisoning. In contrast, non-ionizing radiation is thought to be essentially harmless below the levels that cause heating.

[004] With this in mind, Applicants recognized that a need exists for an alternative source of energy to alleviate our society's current dependence without further impact to the environment or to living organisms associated with nuclear waste or ionizing radiation. The present disclosure describes a method of meeting current and

future energy needs, producing commercially valuable non-ionizing radiation and isotopes, namely ^4He , in an environmentally friendly way.

SUMMARY

[005] In one embodiment, there is disclosed a method of generating non-ionizing radiation, non-ionizing ^4He atoms, or a combination thereof, the method comprising:

contacting graphene materials with a source of deuterium; and

placing the graphene materials in the source of deuterium for a time sufficient to generate non-ionizing radiation, non-ionizing ^4He atoms, such as from 30 minutes to 48 hours, more particularly 1 to 18 hours.

[006] For example, in one embodiment, ^4He is generated in an amount of at least ten ^4He atoms above background per hour per microgram of the graphene materials at 0°C . In another embodiment, 200-300 ppm ^4He were produced, leading to an average calculated power generation value of 2-3 Watts over a one month period.

[007] As used herein, graphene materials may comprise monolayer graphite, multilayer graphite, single walled carbon nanotubes, multiwalled carbon nanotubes, buckyballs, carbon onions, carbon nanohorns and combinations thereof.

[008] The source of deuterium can be in a liquid, gas, plasma, or supercritical phase.

[009] In one embodiment, the method further comprises the removal of contaminants from the surface of the graphene materials by heating the graphene materials prior to contacting them with a source of deuterium, wherein the heating is performed at conditions sufficient to remove unwanted material from the surface of the

graphene materials. In one embodiment, the unwanted materials comprise H₂O, OH, H₂, atomic hydrogen (protium), polymers, oils, amorphous carbon, O₂, solvents, acids, bases, and combinations thereof.

[0010] The conditions used to remove contaminants may comprise a time up to 18 hours and a temperature up to 400 °C, such as a time ranging from 1 to 8 hours and a temperature ranging from 80 to 250 °C.

[0011] In one embodiment, the graphene material comprises carbon nanotubes, and the method further comprises heating the carbon nanotubes prior to placing them in contact with the source of deuterium at a temperature and for a time sufficient to promote absorption of the deuterium into or onto the carbon nanotubes. For example, the temperature and time sufficient to promote absorption ranges from 30 °C to 300 °C, and from 30 minutes to 8 hours, respectively.

[0012] In one embodiment, aging is performed at or below room temperature, such as at a temperature ranging from 20 °C to -100 °C.

[0013] In one preferred embodiment, the graphene materials comprise carbon nanotubes that are functionalized and/or doped with nitrogen.

[0014] Unlike an alpha particle, the non-ionizing ⁴He atoms generated herein are a low energy particles, such as one having an energy of less than 1 KeV, such as less than 100 eV.

[0015] In another embodiment, there is disclosed a method of generating non-ionizing radiation, non-ionizing ⁴He atoms, or both, the method comprising:

providing graphene materials in a sealable vessel;

evacuating the sealable vessel to a pressure below atmospheric pressure;

adding deuterium gas to the vessel to achieve a pressure above atmospheric pressure;

performing at least one heating step that further increases pressure inside the vessel;

cooling the vessel; and

keeping the graphene materials in the vessel at room temperature or below for a time sufficient to generate non-ionizing radiation, non-ionizing ^4He atoms, or both.

[0016] Non-limiting examples of the non-ionizing radiation that can be generated by the disclosed process include x-rays, visible light, infrared, microwaves, radio waves or combinations thereof.

[0017] In yet another embodiment, there is disclosed a method of inducing local nuclear fusion, comprising the steps of:

contacting graphene materials with deuterium; and

placing graphene materials in the deuterium for a time sufficient to generate primarily a plurality ^4He atoms and energy.

[0018] In one embodiment, the graphene material consists essentially of carbon nanotubes, such as nitrogen-containing carbon nanotubes, placed in a deuterium gas.

[0019] Aside from the subject matter discussed above, the present disclosure includes a number of other exemplary features such as those explained hereinafter. It is to be understood that both the foregoing description and the following description are exemplary only.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] The accompanying figures are incorporated in, and constitute a part of this specification.

[0021] **Fig. 1** is a schematic diagram of ampoule filled with carbon nanotubes according to the present disclosure. All of the flanges, fittings and tubes are UHV tight.

[0022] **Fig. 2** is a "Thermal History" diagram used to enhance storage of hydrogen isotopes in and on the surfaces of the carbon nanotubes including the inter-wall cavities in multi-walled carbon nanotubes according to the present disclosure.

[0023] **Fig. 3** is a schematic diagram of an ultra-high vacuum system according to the present disclosure with a quadrupole mass spectrometer (a "residual gas analyzer" or RGA).

[0024] **Fig. 4** is a plot showing the RGA data from the first analysis of the gas sample taken from the ampoule containing D₂ gas and carbon nanotubes according to the present disclosure.

[0025] **Fig. 5** is a plot showing the stable "mass 4" RGA signal that persisted for more than 5 hours during titanium sublimation pump (TSP) pumping.

[0026] **Fig. 6** is an RGA data plot showing the elimination (10⁻¹⁰ torr range) of the "mass 4" signal upon opening of the Ion-pump gate valve. Note, also the "mass 2" signal is eliminated, indicating it was likely due to doubly ionized ⁴He (what is referred to as a "mass 4" fragment).

[0027] **Fig. 7** is an RGA plot of the analysis of the UHP D₂ source gas showing a ⁴He concentration of less than 10 ppm.

[0028] **Fig. 8** is a diagram of deuterium pressure cell used according to the present disclosure.

[0029] **Fig. 9.** is a diagram of the fueling station used according to the present disclosure.

[0030] **Fig. 10** is a plot showing (top) a typical histogram for the pressure cell facing toward the detector, (bottom) plot showing the associated background run.

DETAILED DESCRIPTION OF THE INVENTION

A. Definitions

[0031] The following terms or phrases used in the present disclosure have the meanings outlined below:

[0032] The term “graphene” is defined as a one-atom-thick sheet of sp^2 -bonded carbon atoms that are densely packed in a honeycomb crystal lattice.

[0033] The term “**nanotube**” refers to a tubular-shaped, molecular structure generally having an average diameter in the inclusive range of 1-60 nm and an average length in the inclusive range of 0.1 μ m to 250 mm.

[0034] The term “**carbon nanotube**” or any version thereof refers to a tubular-shaped, molecular structure composed primarily of carbon atoms arranged in a hexagonal lattice (a graphene sheet) which closes upon itself to form the walls of a seamless cylindrical tube. These tubular sheets can either occur alone (single-walled) or as many nested layers (multi-walled) to form the cylindrical structure.

[0035] The term “**ionizing radiation**” refers to particles or electromagnetic waves energetic enough to detach electrons from atoms or molecules, thus ionizing

them. Examples of ionizing particles include alpha particles, beta particles, neutrons, gamma-ray, hard x-ray, and cosmic rays.

[0036] The term “**non-ionizing radiation**” refers to lower-energy radiation, such as visible light, infrared, microwaves, and radio waves. The ability of an electromagnetic wave (photons) to ionize an atom or molecule depends on its frequency. Radiation on the short-wavelength end of the electromagnetic spectrum—x-rays, and gamma rays—is ionizing. Therefore, when using the term “non-ionizing radiation” it is intended to mean electromagnetic waves having a frequency not sufficient to ionize an atom or molecule.

[0037] The term “**nuclear fusion**” is the process in which two or more atomic nuclei join together, or “fuse”, to form a single heavier nucleus. This is usually accompanied by the release or absorption of large quantities of energy.

[0038] The term “local **nuclear fusion**” is defined as a distinct, localized, transient fusion event as opposed to a self-sustaining, high energy, nuclear reaction event.

[0039] The term “**aging**” is defined as the period of time the graphene material remains in contact with the source of deuterium. When used in the disclosed method, aging is performed for a time sufficient to promote absorption of the deuterium into or onto the carbon nanotubes, such as 30 minutes to 48 hours, 1 to 24 hours, or in some embodiments, 2 to 12 hours.

[0040] The term “**functional group**” is defined as any atom or chemical group that provides a specific behavior. The term “functionalized” is defined as adding

a functional group(s) to the surface of the nanotubes and/or the additional fiber that may alter the properties of the nanotube, such as zeta potential.

[0041] The term “**impregnated**” is defined as the presence of other atoms or clusters inside of nanotubes. The phrase “filled carbon nanotube” is used interchangeably with “impregnated carbon nanotube.”

[0042] The term “**doped**” is defined as the insertion or existence of atoms, other than carbon, in the nanotube crystal lattice.

[0043] The term “**coated**” is defined as the layering of materials onto the outside of a carbon nanotube or carbon nanotube structure.

[0044] The term “**decorated**” is defined as the attachment of nano-scale particles onto the outside of a carbon nanotube or carbon nanotube structure.

[0045] The terms “**nanostructured**” and “**nano-scaled**” refers to a structure or a material which possesses components having at least one dimension that is 100nm or smaller. A definition for nanostructure is provided in *The Physics and Chemistry of Materials*, Joel I. Gersten and Frederick W. Smith, Wiley publishers, p382-383, which is herein incorporated by reference for this definition.

[0046] The phrase “**nanostructured material**” refers to a material whose components have an arrangement that has at least one characteristic length scale that is 100 nanometers or less. The phrase “characteristic length scale” refers to a measure of the size of a pattern within the arrangement, such as but not limited to the characteristic diameter of the pores created within the structure, the interstitial distance between fibers or the distance between subsequent fiber crossings. This measurement may also be done through the methods of applied mathematics such as principle

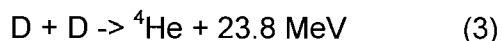
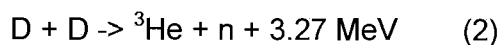
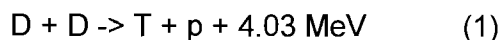
component or spectral analysis that give multi-scale information characterizing the length scales within the material.

[0047] The term “**particle size**” is defined by a number distribution, e.g., by the number of particles having a particular size. The method is typically measured by microscopic techniques, such as by a calibrated optical microscope, by calibrated polystyrene beads, by calibrated scanning probe microscope scanning electron microscope, or optical near field microscope. Methods of measuring particles of the sizes described herein are taught in Walter C. McCrone’s et al., *The Particle Atlas, (An encyclopedia of techniques for small particle identification), Vol. I, Principles and Techniques*, Ed. 2 (Ann Arbor Science Pub.), which are herein incorporated by reference.

[0048] The phrases “**chosen from**” or “**selected from**” as used herein refers to selection of individual components or the combination of two (or more) components. For example, the nanostructured material can comprise carbon nanotubes that are only one of impregnated, functionalized, doped, charged, coated, and defective carbon nanotubes, or a mixture of any or all of these types of nanotubes such as a mixture of different treatments applied to the nanotubes.

B. Deuteron-Based Reactions

[0049] Fusion of two deuterons that are confined in a solid can theoretically result in three different outcomes as shown in the following equations (Y. E. Kim, *Purdue Univ., The 15th International Conf. on Condensed Matter Nuclear Sci. (ICCF-15) Oct 5 -9, 2009*),



[0050] There is a growing consensus that the reaction rate given in equation (3) is much greater than that of equations (1) and (2).

[0051] For each ${}^4\text{He}$ produced by two deuterons 23.8 MeV energy is released because of the well known relationship between change in mass during a fusion process and energy release ($E=mc^2$). It is speculated that the energy released is in the form of electromagnetic radiation with wave lengths ranging from Gigahertz to extreme UV, sometimes referred to as "soft x-rays".

[0052] It has been discovered that graphene materials have an unusual electronic structure making it an ideal candidate for a variety of applications, primarily in the field of electronics. In particular, it has been discovered that the single atomic layer of carbon, characteristic of graphene materials, effectively screens Coulomb interactions, causing graphene to act like an independent electron semimetal. Furthermore, one particular graphene material, carbon nanotubes, can be grown with remarkable uniform diameters, number of walls, and atomic structure. See, "The Effective Fine-Structure Constant of Freestanding Graphene Measured in Graphite,"

Science, Vol. 330 no. 6005 pp. 805-808 5 November 2010, which is herein incorporated by reference.

[0053] Carbon nanotubes have the additional benefit of being able to confine hydrogen in its interior, when properly treated. For example, previous studies have shown that carbon nanotubes, when encapsulated in palladium (Pd), can effectively store hydrogen. Lipson et. al. (*Phys. Rev. B* 77, 081405(R) 2008). The Pd was cathodically charged in a conductive aqueous solution to introduce hydrogen. After hydrogen charging, the tubes were carefully analyzed and found to have as much as 12% hydrogen by weight relative to the pure nanotubes, suggesting that the hydrogen was effectively stored in the nanotubes. Many other studies have demonstrated that H₂ gas (and presumably isotopes as well) can be effectively stored in carbon nanotubes, particularly at lower temperatures, and released from the carbon nanotubes by heating them.

C. Methods of Generating ⁴He Using Graphene Materials

[0054] In one embodiment, high pressure deuterium gas-phase charging of a wide variety of single and multiwall carbon nanotubes was performed in a sealed ampoule and was found to result in the generation of ⁴He in the range of 200 – 300 ppm. The observation of ⁴He suggests deuteron fusions were catalyzed by the carbon nanotubes. Within the resolution of the experiment ³He and tritium (T) were not observed.

[0055] For example, an ultra-high vacuum (UHV) system with a residual gas analyzer (RGA) was used to measure the concentration of ⁴He that evolved after approximately 12 days of "aging" in ultra-high purity D₂. Definitive measurements of

^4He (and ^3He) with essentially no interference from D_2 , H_2 and DH were achieved by using the pumping characteristics of different pumps on the UHV system. Base pressure in the UHV system was in the 10^{-10} Torr range and the maximum gas sample pressure was mid 10^{-4} , giving 6 decades resolution and a detection limit on the order of 1 ppm.

[0056] The possibility of background contamination of the experiment by ^4He present in the air and in the ultra-high purity D_2 source gas was examined and found to be less than 10 ppm in total, and therefore not significant with respect to the measured concentrations (less than 5%).

[0057] The results presented herein are, in general, consistent with other reported low-energy nuclear reaction (LENR) experimental results, most notably the work of McKubre at Stanford Research Inst. who reported a peak ^4He concentration of 11 ppm after 20 days of aging palladium powder in D_2 gas (APS meeting, Denver CO, March 5, 2007).

[0058] In the work disclosed below, a wide variety of carbon nanotubes and multi-walled carbon nanotubes contained in a sealed ampoule were exposed to ultra-high purity D_2 gas. An ultra-high vacuum system (UHV) with a residual gas analyzer was designed and constructed specifically to measure ^4He and ^3He in gas samples taken from the ampoule.

Examples

Example 1: Gas-Phase Experiment

[0059] The gas phase experiment involved the storage of isotopes of hydrogen gas at high pressure in and around carbon nanotubes that were loosely compacted and confined in an ampoule, as shown in Figure 1.

[0060] The surfaces of the carbon nanotubes were prepared with several different treatments to enhance hydrogen isotope storage, including etching gas and/or liquids and various heat treatments. In all, a total of 8 varieties of nanotubes in roughly equal amounts were prepared and supplied by Seldon Technologies, Windsor, VT.

[0061] The eight graphene materials used in this example were:

- 1) 1.374g Norit Activated Carbon (Highly graphitized);
- 2) 0.940g CNI multi-walled carbon nanotubes batch P0320;
- 3) 0.478g NanoTechLabs N doped (nitrogen doped) multiwall carbon nanotubes;
- 4) 0.378g NanoTechLabs 3-4mm long multiwall carbon nanotubes;
- 5) 0.980g NanoTechLabs 3-4mm long multiwall carbon nanotubes acid etched in Neat Nitric acid (1mg/ml) for 1hr at 80°C;
- 6) 0.044g NanoTechLabs of double walled carbon nanotubes;
- 7) 0.225 Korean ~25nm diameter carbon nanotubes; and
- 8) 1.784g Korean ~15nm diameter etched in Neat Nitric acid (10mg/ml) for 1hr at 80°C.

[0062] All of the carbon nanotubes were mixed in one beaker, then "poured" into the ampoule, lightly compacted and then topped off. The ampoule was then sealed by bolting on the top Conflat® flange, and the gas-fill tube was attached. All of the fittings and valves used in the experiment were clean (Swagelok® Inc. SC-11 spec) and UHV rated. When possible, subassemblies (e.g. nanomaterial preparations) were performed in a class 1000 clean room.

[0063] The ampoule had an insulated heater wire attached to elevate the temperature of the carbon nanotube/gas mixture with respect to ambient conditions. Temperature was controlled and measured with a type K thermocouple attached to the side of the ampoule, as shown in Figure 1. A pressure transducer (Omega® PX302 1000 psia) was in line with the gas-fill tube to monitor pressure throughout the experiment. The ampoule was placed in a dewar (insulated flask) that could be filled with ice or dry-ice or any cryogenic liquid for the purpose of decreasing the temperature of the carbon nanotubes and hydrogen isotope gas in the ampoule with respect to ambient conditions (note, dewar is not shown in Figure 2).

Procedure:

Thermal History

[0064] A "thermal history" was applied to the ampoule to enhance the storage (adsorption and absorption) of the D₂ by the Carbon nanotubes. The different steps in the thermal history are shown in Figure 2, and the details and rationale are outlined below.

Bake-out

[0065] The first step in enhancement of the storage of a particular hydrogen isotope, for example deuterium, was to rid the carbon nanotubes of all other isotopes they may have been exposed to. For example, if the carbon nanotubes were exposed to humid air, they will have absorbed H₂O, H₂ and perhaps atomic hydrogen (protium). They may also have various hydrocarbon molecules adsorbed on their surfaces. To rid the carbon nanotubes of unwanted hydrogen, a thermal "bake-out" was performed during which a vacuum was drawn through a large diameter tube. The "bake-out" time/temperature history of the experiment is shown in Figure 2 (approximately 200 °C for 8 hours under a vacuum on the order of 1×10^6 torr.)

[0066] During the bake-out unwanted hydrogen isotopes were drawn out of the carbon nanotubes and surrounding metal surfaces into the UHV system. The bake out also removed any residual helium gas that may have been in the system from the helium leak testing used to render the system vacuum tight at ultra high vacuums. The ampoule was allowed to cool to room temperature after the bake-out, and the pressure decreased to a value of on the order of 10^8 torr. After the ampoule with carbon nanotubes was baked-out, the 12.7 mm diameter copper tube that was used to evacuate the ampoule was clamped shut, sealing the carbon nanotubes from the UHV system.

Gas-fill

[0067] Subsequent to clamping the Cu tube, the ampoule was filled with ultra-high purity (UHP) deuterium gas to a pressure of approximately 175 psia. The D₂ was supplied by Voltaix Inc. (North Branch, N.J.) and was certified to be 99.999% pure with

respect to non-hydrogen gases and to have less than 1 ppm He. An evacuation/back-fill procedure was used to insure that the gas lines were purged of air prior to filling the ampoule with gas.

Hydrogen Charge

[0068] After the ampoule was filled with the desired hydrogen isotope (deuterium), there still could have been unwanted hydrogen in various forms absorbed and/or adsorbed to the carbon nanotubes. To essentially "mix" remaining hydrogen with deuterium, a "thermal charging" heat treatment was used. In this example, the ampoule was heated to a temperature of approximately 175 °C for 3 hours. The increase in temperature caused the pressure of the deuterium gas to increase to approximately 220 psia. During the thermal charging heat treatment, a greater percentage of deuterium molecules were dissociated and more single deuterium atoms were present in the gas and presumably on and/or in the carbon nanotubes. This could have promoted absorption of the deuterons into inter-wall cavities of multi-walled carbon nanotubes.

Low Temperature Aging

[0069] It is known that lowering of the temperature of carbon nanotube-hydrogen mixtures promotes the storage of the gas by the carbon nanotubes. In this experiment, the ampoule was placed in an insulated container, and the exterior of the ampoule was packed with dry-ice. Subsequently the temperature of the carbon nanotubes and gas dropped to approximately -90 °C. This temperature was held for 288 hours and is referred to as "low temperature aging." Low temperature aging was performed to promote the segregation of hydrogen to grain boundaries. In this

experiment aging was intended to segregate deuterons to inter-wall spaces and defects in the graphene structured tube walls (e.g., Stone-Wales defects).

Gas Analyses

[0070] After the "thermal history" the ampoule was allowed to return to ambient temperature and the gas sample tube (shown in Figure 1) was attached to the "leak valve" on the UHV system to analyze the gas for the presence of ^4He and ^3He . The leak valve (Varian Inc.) allowed precise control of the introduction of gas to the vacuum system.

[0071] The tool used to analyze gas samples from the ampoule was a Stanford Research Systems RGA-100 quadrupole mass spectrometer (SRS, Palo Alto, CA) which can effectively measure partial pressures of gases with an accuracy of approximately $\pm 10\%$ over a range of 1×10^{-4} to 1×10^{-4} to 10^{-10} torr and thus giving a detection limit on the order of 1 ppm. The performance of this "residual gas analyzer" (RGA) was verified by an independent lab (*Rao and Dong, J. Vac. Sci. Technol. A 15(3), May/June 1997*). RGAs of this variety measure mass-to-charge ratio (m/Q). Most atoms and molecules were single-charged by the RGA ionizer, and hence the RGA data is simply "mass" detection. The use of this instrument to measure a dilute concentration of ^4He atoms in a predominately D_2 gas presents the problem of discerning between two species that are nominally of "mass 4". A special procedure was developed to effectively remove hydrogen isotopes (and other reactive gases) so that a definitive measurement of He could be made.

[0072] To eliminate the presence of D_2 gas in the UHV chamber, the gas sample was pumped using the titanium sublimation pump (TSP) with the gate valves to

the ion-pump and Turbo-pump closed. The TSP pumps reactive gases very efficiently (H_2 at 1,200 L/min. as shown in Table 1). However, noble gases such as 4He are not pumped at all. Thus, the basic strategy was to introduce the sample gas, pump on the sample gas with the TSP until the "mass 4" signal stabilizes. The stabilized "mass 4" signal was essentially the partial pressure of 4He in the gas sample (assuming it is a small contributor to the total pressure). The ion-pump (Varian® triode) was very efficient in pumping noble gases and was used to verify the 4He signal by eliminating it, and also to check that the base pressure was in the 10^{-10} torr range.

Table 1. Pumping characteristics of the vacuum pumps on the UHV system

Pump Type	Pressure (torr)	Gas removed	Pump Efficiency
Mechanical	10^{-4}	all	400 liters/min
Turbo	10^{-8}	all	150 liters/min
Ti Sublimation	10^{-10}	reactive	1200 liters/min
Triode Ion	10^{-10}	noble and others	220 liters/min

[0073] In these experiments, the gas from the ampoule was analyzed twice with slightly different procedures. The basic procedure is given in Table 2. The RGA data from the first analysis of the ampoule gas is shown in Figure 4. Based on this data the partial pressure of 4He was determined to be 3.25×10^{-8} torr, and the concentration of 4He in the ampoule gas was 3.25×10^{-8} torr / 1×10^{-4} torr = 325 ppm.

[0074] In one embodiment, the procedure for the unambiguous determination of 4He partial pressure in predominately D_2 gas samples was as follows. The system was baked-out at 200 °C for 24 hours to achieve base pressure of mid 10^{-10} torr. Next,

all flanges and fittings were leaked tested. If leaks occurred, there were fixed and the system was re-baked, if necessary. The turbo-pump and ion-pump gate-valves were then closed. Next, gas from experimental-ampoule was bled to a pressure of 1×10^{-4} torr. The system was then pumped down with TSP to equilibrium to establish ^4He level. Finally, the ion-gate-valve was opened to verify ^4He concentration and base pressure.

[0075] A second analysis was also performed. Instead of bleeding in the gas to a level of 10^{-4} torr with the leak valve, gas from the ampoule was allowed to fill the entire vacuum chamber (with the ion and turbo pumps valved off) to a pressure of approximately 1 psia. The turbo-pump backed by the mechanical pump was then used to pump the chamber down 1×10^{-4} torr by opening and then closing the gate valve. The turbo-pump pumps all gases with "mass 4" with equal speed, so this procedure accurately established the starting gas pressure in a way that did not affect $^4\text{He}/\text{D}_2$ concentration ratio.

[0076] The RGA data with the ion pump gate valve closed is shown in Figure 5. In this second analysis the gas sample was subjected to TSP pumping for over 5 hours to establish that the "mass 4" signal was due only to ^4He . This data shows a very steady signal $203 \text{ ppm} \pm 2 \text{ ppm}$ ($2.03 \times 10^{-8} \text{ torr} / 1 \times 10^{-4} \text{ torr}$). Upon opening of the ion pump gate valve, all signals dropped to the noise level (10^{-10} torr) establishing, without any ambiguity, a concentration of 203 ppm ^4He in the gas sampled from the ampoule.

[0077] The UHP D_2 source gas was analyzed using the same procedure used in the second analysis (UHV chamber filled with 1 psia D_2 source gas and then pumped down to 1×10^{-4} torr with turbo-pump.) The RGA data (Figure 7) shows the source gas to have 8 ppm ^4He at most and thus was a small contributor.

[0078] Background contamination of the ampoule gas by ^4He in the air was also considered. Air contains approximately 5 ppm ^4He , or a partial pressure of about 7×10^{-5} psia. If ^4He leaked into the ampoule and came into equilibrium it would result in a concentration of on the order of 0.5 ppm (7×10^{-5} psia / 150 psia) which is a relatively insignificant level.

Calculated Energy and Power

[0079] Based on the release of 23.8 MeV per ^4He atom produced, the total energy released was calculated using the measured concentration of ^4He , D_2 pressure and internal volume of the ampoule and was found to be on the order of 10^6 cal. The power output, averaged over a span of 3 weeks, was then calculated and found to be in the range of 2 - 3 W.

[0080] As shown, high pressure deuterium gas-phase charging of a wide variety of multiwall and single wall carbon nanotubes was performed in a sealed ampoule and was found to result in the generation of ^4He in the range of 200 - 300 ppm. The observation of ^4He suggests deuteron fusions resulted from interaction with the carbon nanotubes. Within the resolution of the experiment ^3He and T were not observed suggesting that the following reaction was dominate: $\text{D} + \text{D} \rightarrow ^4\text{He} + 23.8 \text{ MeV}$.

Example 2. Measurement of optical radiation from transmutation of deuterium to helium.

[0081] The purpose of this experiment was to look for evidence of the expected energy to be given off by a slow nuclear decay of deuterium to ^4He . The mass difference between 2 deuterium nucleuses and one Helium nucleus can be related to energy through Einstein's energy equation $E = mc^2$. The expected energy is 23.9 MeV. If the energy is radiated by non-ionizing photons of 1eV then one would expect to see a flash of nearly 24 million photons each time a slow deuterium decay to ^4He happened. As described below, flashes of light from a sample of carbon nanotubes when exposed to deuterium gas at a pressure 55 psi was observed and measured.

Procedure:

Pressure cell with Plexiglas window

[0082] A pressure cell was made out of a block of 6064 Aluminum measuring 2.6 x 2.6 x 1.2 inches, and a plate of Plexiglas measuring 2.6 x 2.6 x 0.5 inches. Six equally spaced $\frac{1}{4}$ -20 bolt were drilled and taped at a diameter of 2 in. to hold the Plexiglas against an O-ring seal to the Al block. An O-ring groove was machined into the center of the Aluminum block with an ID of 1 in. The groove was then polished to ensure that there would be no leaking of deuterium through the o-ring seal. At a diameter of $\frac{1}{2}$ inch hole was drilled into the center of the block to a depth of 0.800 in. to contact the sample, viewable through the Plexiglas, with the deuterium gas.

[0083] One of the sides of the aluminum block was drilled with a "through hole" that intersected the center hole of the block. This through hole was positioned so that it would not interfere with the threaded bolt holes for holding the Plexiglas to the

Aluminum block. Both sides of the through hole was then taped for a ¼ NPT. On one side a high pressure Swagelok valve was mounted and on the other a Honeywell pressure transducer. Additionally a 1/8 inch NPT was drilled and taped for a Swagelok pressure gauge, so the pressure in the cell could be measured and observed.

[0084] Once all of the components were mounted the cell was moved to a glove box filled with dry nitrogen where upon the sample of carbon nanotubes was inserted into the ½ hole center topside. The Plexiglas was then bolted to the block with six ¼ 20 bolts. See Figure 8.

D₂ Fueling station & Vacuum bake out Procedure

[0085] The fueling station was comprised of three basic components: (1) the cell, (2) the vacuum pump and (3) a bottle of deuterium with high pressure regulator. These three components were plumbed together with in a T style assembly of ¼ stainless steel pipe sections, three valves, and vacuum tight Swagelok connectors. In addition to this, a valve was mounted to the atmosphere close to the vacuum pump. The cell gas manifold was mounted at an elevation so the gas cell could be placed on a hotplate. See Figure 9.

[0086] A check was made to ensure that the valve on the lecture bottle was closed. The valves through the regulator, to the cell, to the vacuum pump were all opened, and the valve to the atmosphere was closed. The vacuum pump was turned on and a vacuum was pulled on the gas manifold, the cell and the regulator to remove all atmospheric gases. The cell was then heated to a temperature of 80 °C, for a low temperature bake out for 2 hrs.

[0087] The cell was then allowed to cool to a room temperature of 25 °C before being back filled with deuterium. Once the cell had cooled, the valve to the vacuum pump was closed while the valve from the cell to the regulator was left open. The regulator was then closed prior to the opening of the lecture bottle valve. Once the lecture bottle was open, the cell with deuterium was slowly backfilled to a pressure of 55 psi.

[0088] The valve mounted to the cell was then closed, trapping the deuterium gas in the cell. The lecture bottle valve was closed as well as the regulator. Next, the valves to the vacuum pump and the atmosphere were slowly opened. Once the pressure equalized, the Swagelok connector connecting the cell to the gas manifold was unscrewed. Now, there was a self enclosed pressure vessel filled with only deuterium gas and a sample of carbon nanotubes, that was observable through the Plexiglas.

Carbon Nanotube Preparation

[0089] The carbon nanotubes used in this experiment were 4mm long multi-walled carbon nanotubes from NanoTechLabs, Yankensville, NC, a supplier of ultra long multi-walled carbon nanotubes.

[0090] 100mg of the carbon nanotubes were acid etched in 100 ml of Neat Nitric acid for 1 hr at 80 °C to remove amorphous carbon and other contaminants or catalyst particles. The acid was then removed through vacuum filtration. The carbon nanotubes were then washed three times in deionized water to remove acid residue.

[0091] A thin layer of carbon nanotubes weighing 1mg was formed over a cylindrical sample holder 0.100 inch in diameter and ¼ in long and placed in an nitrogen furnace for 2 hrs at 400 °C.

[0092] The sample was removed directly into a nitrogen glove box where it was then loaded into the gas cell.

Measurement, Detection & Data Logging Station

[0093] Flashes of light were detected and recorded. The basic set up for this data collection station had the same basic components of a typical radiation detection experimental set up. A high voltage (1,000 Volts) photo multiplier tube was used to detect flashes of light from the window side of the cell. The multi-channel analyzer consisted of a pre-amplifier, a sample and hold circuit, an analog to digital converter, and a laptop computer with LabVIEW®.

[0094] The pre-amplifier was capacitively coupled to the photo multiplier to produce a low voltage output signal reflecting the change in current through the photo multiplier tube. This low voltage signal was then input to a sample and hold circuit that would save the value of the highest voltage from the voltage pulse.

[0095] This data was then converted to a digital signal and sent to the computer. LabVIEW® would then record the data and tabulate in a histogram. Once this action was completed LabVIEW® would send the sample and hold circuit a signal to look for the next voltage pulse. This data collection latency period was on the order of 1 millisecond. A data channel was also used to record the pressure of the cell and a channel to control and record the temperature of the cell.

The Experiment

[0096] This experiment was performed by placing both the pressure cell and the photo multiplier tube in a completely dark steel box with a sealable hinged lid. Holes were drilled through the box and conducting feed-throughs were mounted for the high voltage photo multiplier, signal wires, temperature control, and the pressure transducer signal wires. The window side of the deuterium pressure cell containing the sample of carbon nanotubes was placed toward the photo multiplier window with a space of about 1 cm. When a flash of light even occurred an electron cascade within the photo-multiplier tube would generate a voltage spike.

[0097] Between each data run the background was measured and recorded. This was performed by turning the cell so that the solid aluminum back side of the cell faced the window, and the Plexiglas window was facing away from the detector. Figure 10.

[0098] A total of 18 data runs were performed. As one can see from the following table, all of the experimental runs show a larger number of counts than background ranging from 2c/hr to as high as 200c/hr above background (c/hr = counts per hour). During the last 6 runs, the temperature of the samples were under active control. During longer duration runs, a temperature dependence was shown. At higher temperatures, the cell produced more fusion events per hour than at lower temperatures. It was also clearly shown that the histogram distribution of flash intensity was clearly different from background. The experimental run is nearly equal to background at high intensity, however the low intensity flashes are far more numerous than background. Not only are the total number of events larger for the cell facing the

detector but that the histogram has a different shape than when the cell is facing away from the detector.

[0099] The temperature dependence may make sense due to the fact that that there will be a larger population of relativistic electrons in the graphene structure of the carbon nanotubes than at lower temperatures. The work of other have shown that graphene structures contain relativistic electrons. When a particle is moving at relativistic velocities it gains mass in proportion to the Lorentz contraction. It is expected that massive electrons will drop the radius of the hydrogen Bohr orbit, thus allowing nuclear binding forces to cause a slow decay of two deuterium nuclei into helium. Deuterium, having the same charge as hydrogen has essentially the same Bohr orbit.

Date	Background Laps Time	Background Counts per Hour	Sample Laps time	Sample Counts per Hour	Difference	% Difference	Temperature degrees C
11/5/2010	1:00	108	1:00	142	34	24%	
11/5/2010	1:00	113	1:00	139	26	19%	
11/5/2010	1:00	136	1:00	138	2	1%	
11/5/2010	10:00	125	1:00	132	7	5%	
11/6/2010	10:00	125	4:00	133	8	6%	
11/6/2010	24:00	116.6	4:00	136	19	14%	
11/6/2010	24:00	116.6	24:00	138	21	16%	
11/9/2010	24:00	115.9	24:00	148.7	33	22%	
11/11/2010	24:00	123.2	24:00	131.2	8	6%	
11/14/2010	24:00	106.5	24:00	138.4	32	23%	
11/15/2010	24:00	106.5	24:00	132	26	19%	
11/17/2010	24:00	106	24:00	118	12	10%	
12/5/2010	10:00	138	2:00	143	5	3%	11
12/6/2010	10:00	136.2	10:00	154	18	12%	14
12/10/2010	4:12	898	24:00	1029.6	132	13%	10
12/13/2010	24:00	865	11:00	973.4	108	11%	8
12/16/2010	10:00	855.3	13:06	874.5	19	2%	8
12/19/2010	16:18	827	10:02	1026.5	200	19%	32

Table 2. Experimental Data for the pressure cell containing carbon nanotubes in contact with deuterium gas, as well as background data for each run.

[00100] Unless otherwise indicated, all numbers expressing quantities of ingredients, reaction conditions, and so forth used in the specification and claims are to be understood as being modified in all instances by the term “about.” Accordingly, unless indicated to the contrary, the numerical parameters set forth in the following specification and attached claims are approximations that may vary depending upon the desired properties sought to be obtained by the present invention.

[00101] Other embodiments of the invention will be apparent to those skilled in the art from consideration of the specification and practice of the invention disclosed herein. It is intended that the specification and examples be considered as exemplary only, with the true scope of the invention being indicated by the following claims.

What Is Claimed Is:

1. A method of generating non-ionizing ^4He atoms, said method comprising:
contacting graphene materials with a source of deuterium; and
placing said graphene materials in said source of deuterium for a time sufficient to generate a plurality of non-ionizing ^4He atoms.
2. The method of claim 1, wherein ^4He is generated in an amount of at least ten non-ionizing ^4He atoms per hour per microgram of said graphene materials at 0°C .
3. The method of claim 1, wherein said graphene materials comprise monolayer graphite, multilayer graphite, single walled carbon nanotubes, multiwalled carbon nanotubes, buckyballs, carbon onions, carbon nanohorns and combinations thereof.
4. The method of claim 1, wherein the source of deuterium is in a liquid, gas, plasma, or supercritical phase.
5. The method of claim 1, further comprising the removal of contaminants from the surface of the graphene materials by heating the graphene materials prior to the contacting step, wherein said heating is performed at conditions sufficient to remove unwanted material from the surface of the graphene materials.
6. The method of claim 5, wherein said unwanted materials comprise H_2O , OH , H_2 , atomic hydrogen (protium), polymers, oils, amorphous carbon, O_2 , solvents, acids, bases, and combinations thereof.
7. The method of claim 5, wherein said conditions comprise a time up to 18 hours and a temperature up to 400°C .

8. The method of claim 7, wherein said conditions comprise a time ranging from 1 to 8 hours and a temperature ranging from 80 to 250 °C.

9. The method of claim 1, wherein said graphene material comprises carbon nanotubes, and said method further comprises heating the carbon nanotubes prior to aging at a temperature and for a time sufficient to promote absorption of the deuterium into or onto the carbon nanotubes.

10. The method of claim 9, wherein the temperature and time sufficient to promote absorption ranges from 30 °C to 300 °C, and from 30 minutes to 8 hours, respectively.

11. The method of claim 1, wherein said aging is performed at or below room temperature.

12. The method of claim 11, wherein said aging is performed at a temperature ranging from 20 °C to -100 °C.

13. The method of claim 1, wherein said graphene materials comprise carbon nanotubes that are functionalized and/or doped with nitrogen.

14. The method of claim 1, wherein said non-ionizing ^4He atoms have an energy of less than 1 KeV.

15. The method of claim 14, wherein said non-ionizing ^4He atoms have an energy of less than 100 eV.

16. The method of claim 1, wherein said graphene materials are placed in the source of deuterium for a time ranging from 30 minutes to 48 hours.

17. The method of claim 16, wherein said graphene materials are placed in the source of deuterium for a time ranging from 1 to 18 hours.

18. The method of any one of claim 1, which comprises generating non-ionizing ^4He and non-ionizing radiation chosen from electromagnetic radiation, phonons or energetic electrons within the graphene material or a combination thereof, wherein said non-ionizing ^4He and non-ionizing radiation has an energy totaling 23.8 MeV.

19. A method of generating non-ionizing radiation, non-ionizing ^4He atoms, or both, said method comprising:

providing graphene materials in a sealable vessel;

evacuating the sealable vessel to a pressure below atmospheric pressure;

adding deuterium gas to said vessel to achieve a pressure above atmospheric pressure;

performing at least one heating step that further increases pressure inside the vessel;

cooling said vessel; and

placing said graphene materials in said vessel at room temperature or below for a time sufficient to generate non-ionizing radiation, non-ionizing ^4He atoms, or both.

20. The method of claim 19, wherein ^4He is generated in an amount of at least ten ^4He atoms per hour per microgram of said graphene materials at 0 °C.

21. The method of claim 19, further comprising heating the graphene materials prior to adding deuterium gas.

22. The method of claim 21, wherein said heating is performed in a sealed chamber and a temperature to bake-out unwanted materials, said method further comprising evacuating the sealed container to remove the unwanted materials from the sealed container.

22. The method of claim 19, wherein said at least one heating step is performed at temperature ranging from 50 °C to 500 °C for a time ranging from 20 minutes to 6 hours.

24. The method of claim 19, wherein said aging is performed at a temperature ranging from 20 °C to -100 °C.

25. The method of claim 19, wherein said non-ionizing radiation comprises x-rays, visible light, infrared, microwaves, radio waves or combinations thereof.

26. The method of claim 19, wherein said graphene materials are placed in the source of deuterium for a time ranging from 1 to 18 hours.

27. The method of any one of claim 19, which comprises generating non-ionizing ^4He and non-ionizing radiation chosen from electromagnetic radiation, phonons or energetic electrons within the graphene material or a combination thereof, wherein said non-ionizing ^4He and non-ionizing radiation has an energy totaling 23.8 MeV.

28. A method of generating non-ionizing radiation, said method comprising:
contacting graphene materials with a source of deuterium; and
aging said graphene materials in said source of deuterium for a time sufficient to generate non-ionizing radiation.

29. The method of claim 28, wherein said non-ionizing radiation comprises x-rays, visible light, infrared, microwaves, radio waves or combinations thereof.

30. The method of claim 28, wherein said graphene materials comprise monolayer graphite, multilayer graphite, single walled carbon nanotubes, multiwalled carbon nanotubes, buckyballs, carbon onions, carbon nanohorns and combinations thereof.

31. The method of claim 28, wherein the source of deuterium is in a liquid, gas, plasma, or supercritical phase.

32. The method of claim 28, further comprising the removal of contaminants from the surface of the graphene materials by heating the graphene materials prior to the contacting step, wherein said heating is performed at conditions sufficient to remove unwanted material from the surface of the graphene materials.

33. The method of claim 28, wherein said graphene material comprises carbon nanotubes, and said method further comprises heating the carbon nanotubes prior to aging at a temperature and for a time sufficient to promote absorption of the deuterium into or onto the carbon nanotubes.

34. The method of claim 28, wherein said graphene materials comprise carbon nanotubes that are functionalized and/or doped with nitrogen.

35. The method of claim 28, wherein said non-ionizing radiation ^4He atoms have an energy of less than 1 KeV.

36. The method of claim 35, wherein said non-ionizing ^4He atoms have an energy of less than 100 eV.

37. The method of any one of claim 28, which comprises generating non-ionizing ^4He and non-ionizing radiation chosen from electromagnetic radiation, phonons or energetic electrons within the graphene material or a combination thereof, wherein said non-ionizing ^4He and non-ionizing radiation has an energy totaling 23.8 MeV.

38. The method of any one of claim 28, which comprises generating non-ionizing ^4He and non-ionizing radiation chosen from electromagnetic radiation, phonons

or energetic electrons within the graphene material or a combination thereof, wherein said non-ionizing ^4He and non-ionizing radiation has an energy totaling 23.8 MeV.

39. A method of inducing local nuclear fusion, comprising the steps of:
contacting graphene materials with deuterium; and
placing said graphene materials in said deuterium for a time sufficient to
generate primarily a plurality ^4He atoms and energy.

40. The method of claim 39, wherein said graphene material comprise carbon nanotubes.

41. The method of claim 39, wherein said graphene materials further include nitrogen.

42. The method of claim 39, wherein said deuterium is a gas.

ABSTRACT

There is disclosed a method of generating non-ionizing radiation, non-ionizing ^4He atoms, or a combination of both, the method comprising: contacting graphene materials with a source of deuterium; and aging the graphene materials in the source of deuterium for a time sufficient to generate non-ionizing radiation, non-ionizing ^4He atoms. In one embodiment, graphene materials may comprise carbon nanotubes, such as nitrogen doped single walled or multi-walled carbon nanotubes. Unlike an alpha particle, the non-ionizing ^4He atoms generated by the disclosed method are a low energy particles, such as one having an energy of less than 1 MeV, such as less than 100 keV. Other non-ionizing radiation that can be generated by the disclosed process include soft x-rays, phonons or energetic electrons within the carbon material, and visible light.

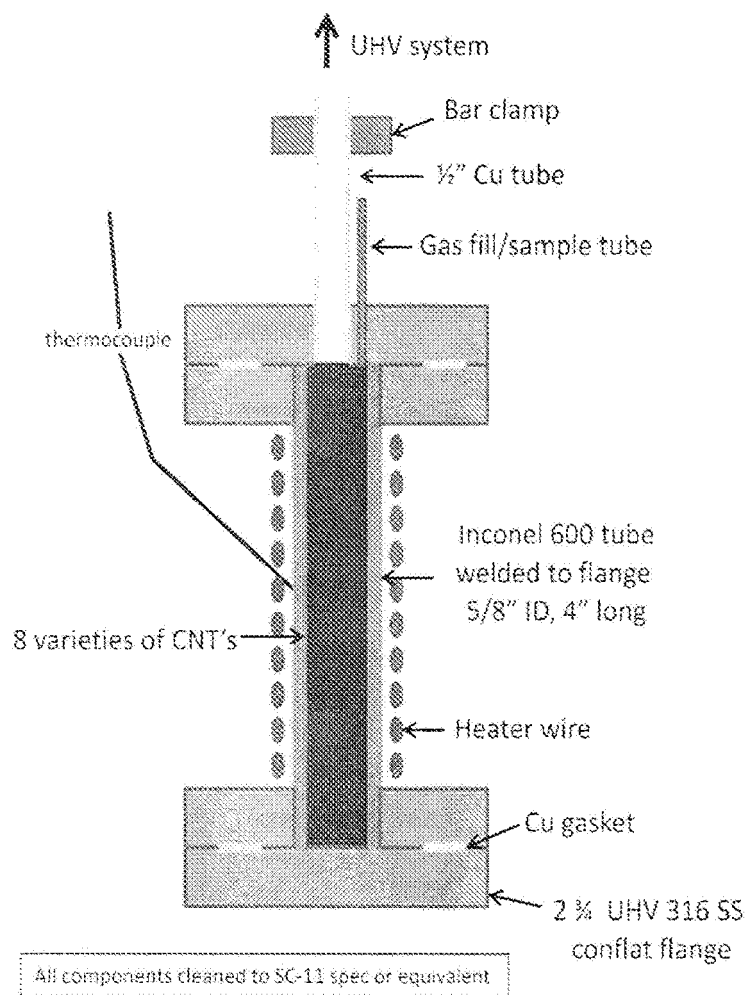


Figure 1

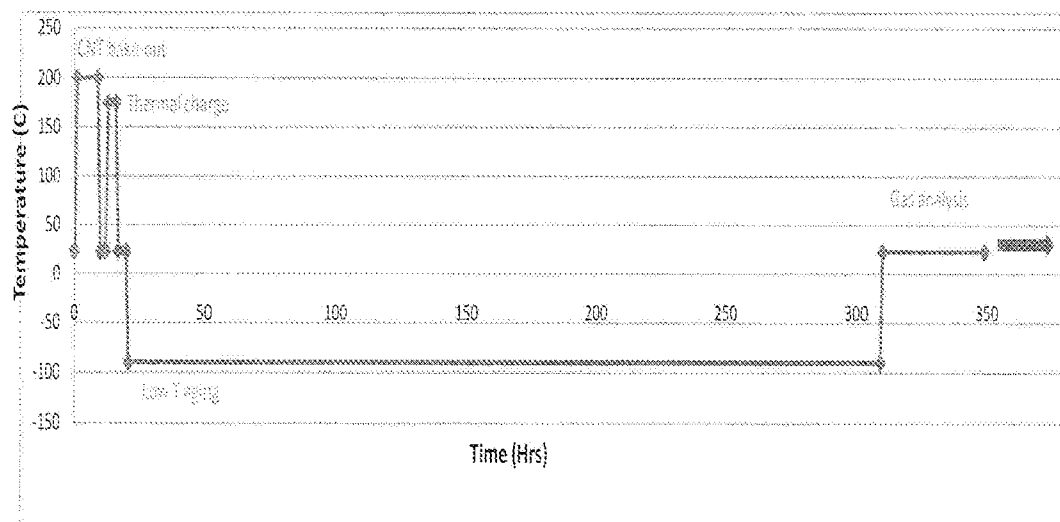


Figure 2

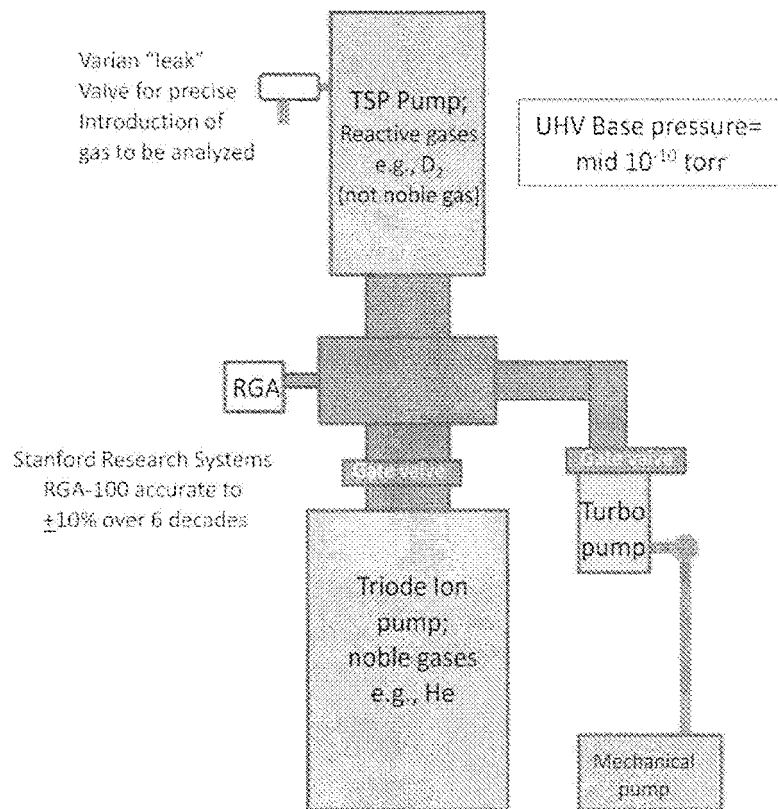


Figure 3

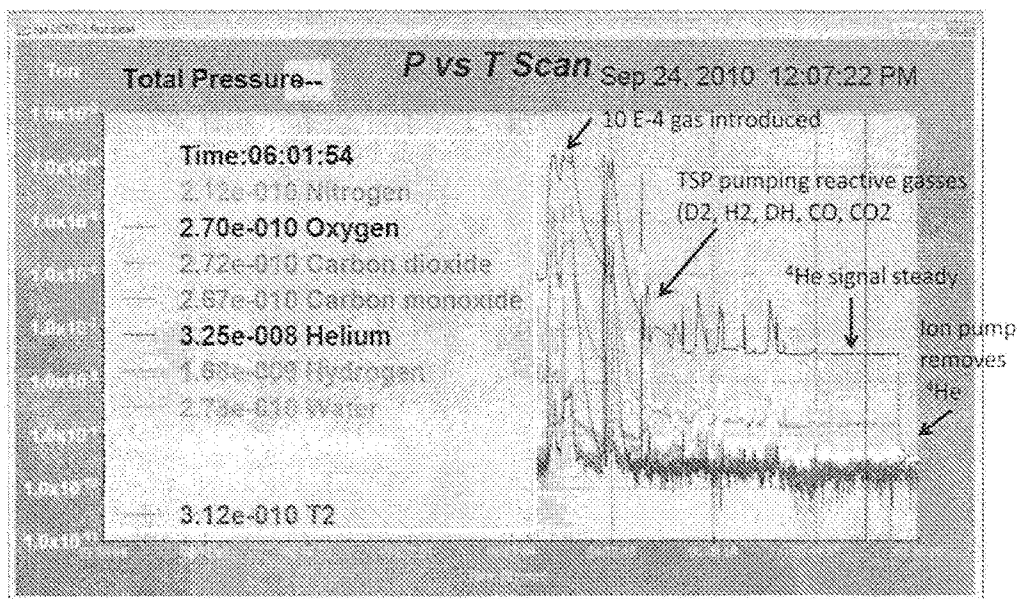


Figure 4

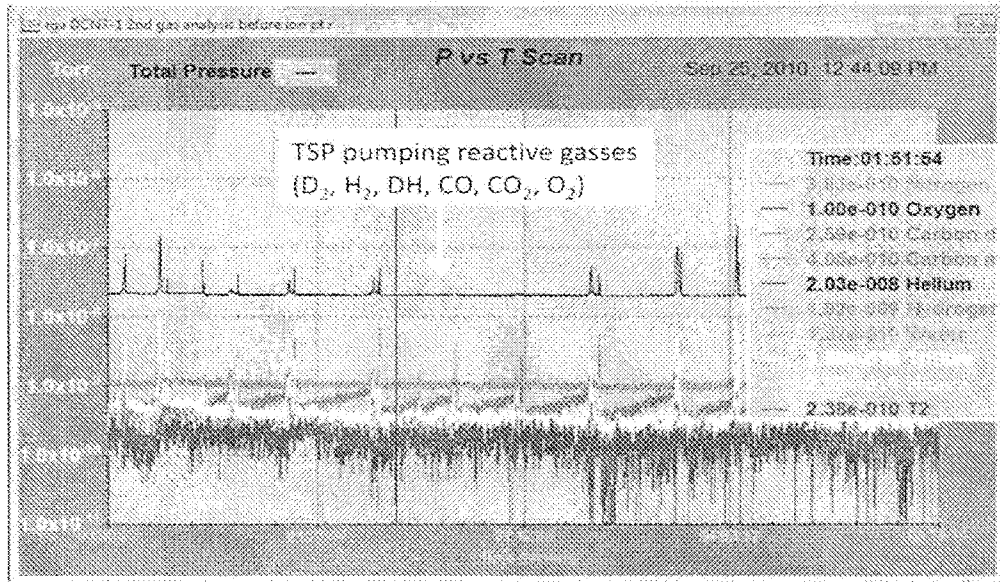


Figure 5

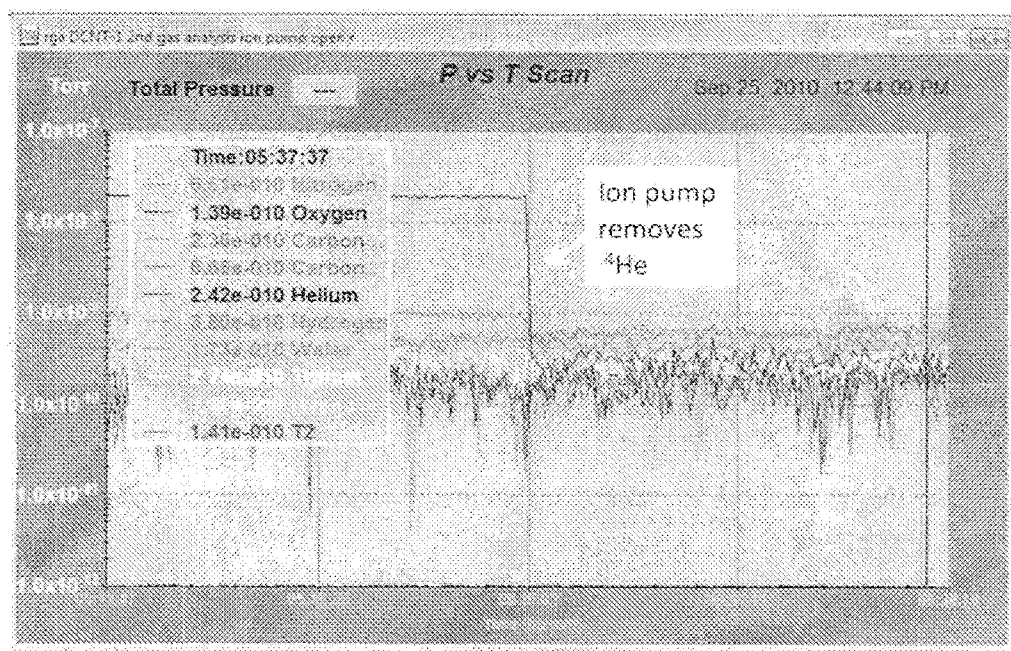


Figure 6

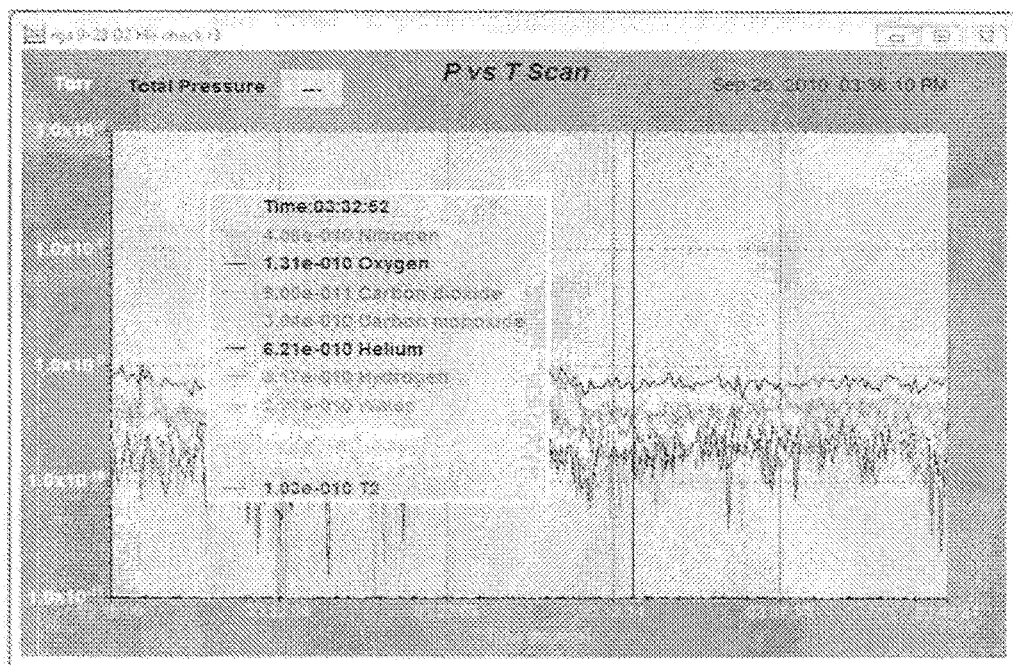


Figure 7

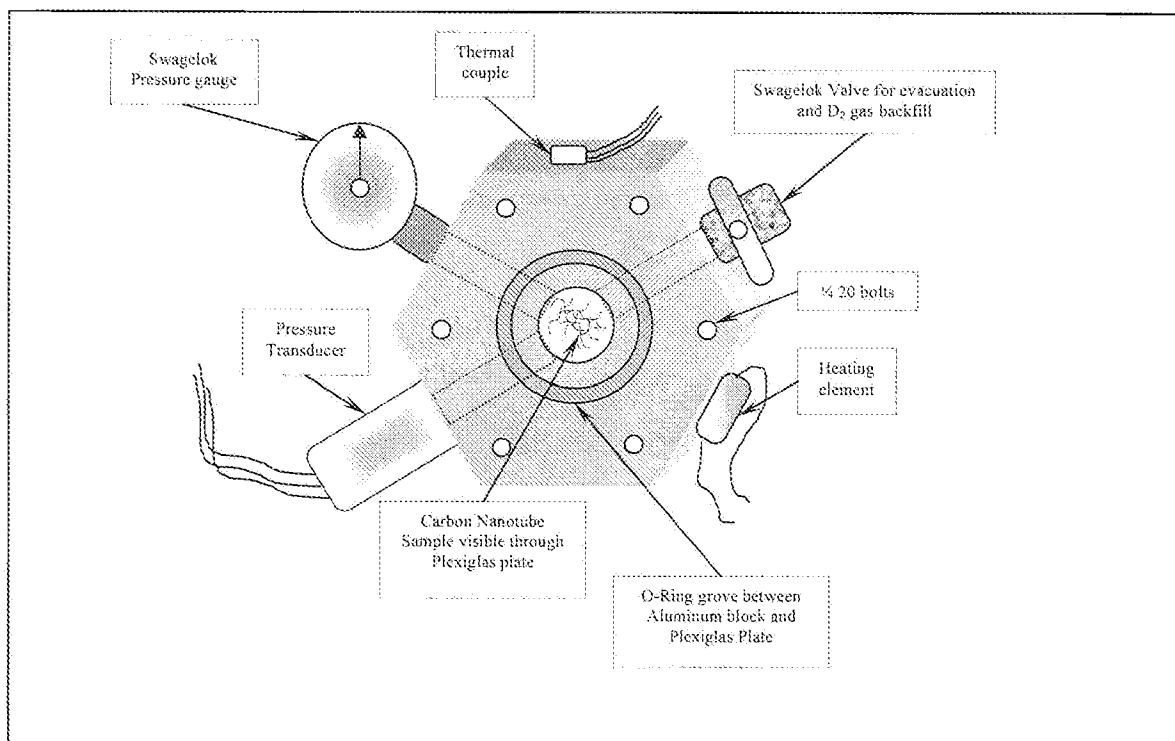


Figure 8

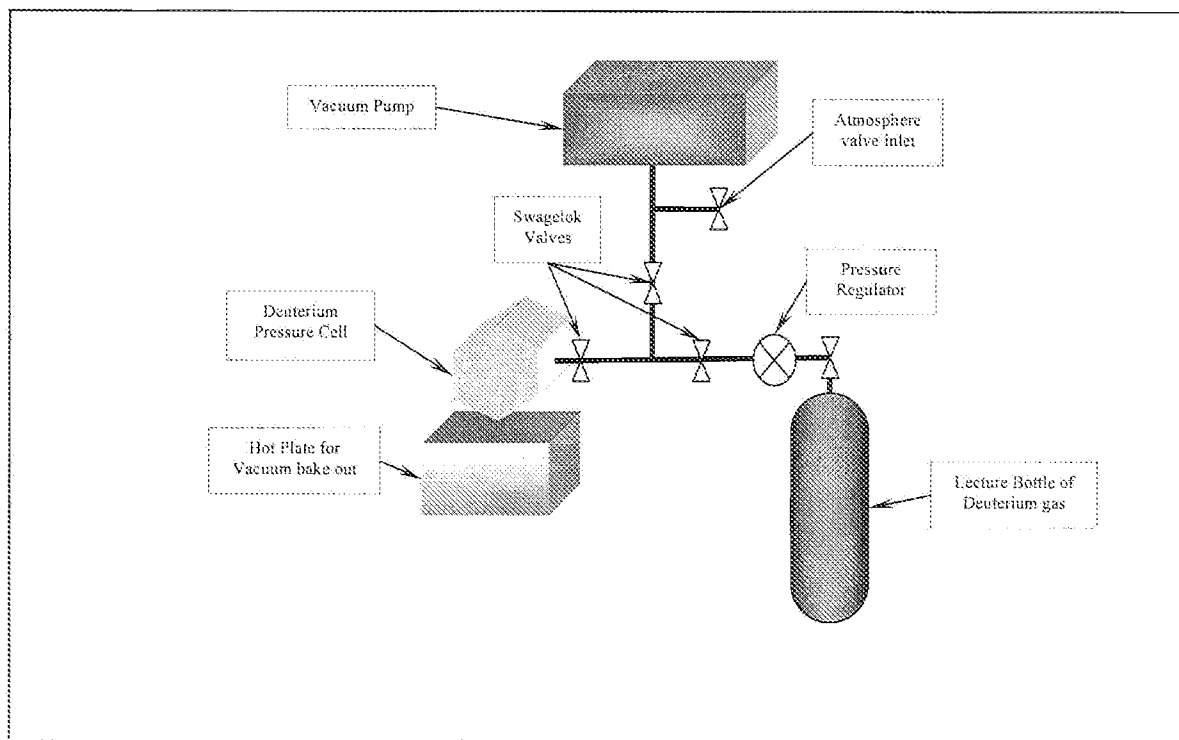


Figure 9

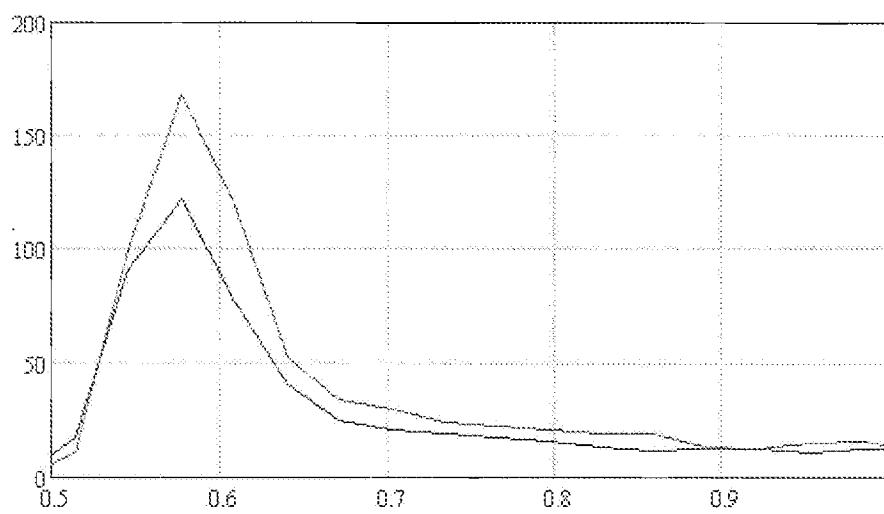


Figure 10

SCORE Placeholder Sheet for IFW Content

Application Number: 13089986

Document Date: 4/19/2011

The presence of this form in the IFW record indicates that the following document type was received in electronic format on the date identified above. This content is stored in the SCORE database.

- Drawings – Other than Black and White Line Drawings

Since this was an electronic submission, there is no physical artifact folder, no artifact folder is recorded in PALM, and no paper documents or physical media exist. The TIFF images in the IFW record were created from the original documents that are stored in SCORE.

To access the documents in the SCORE database, refer to instructions developed by SIRA.

At the time of document entry (noted above):

- Examiners may access SCORE content via the eDAN interface.
- Other USPTO employees can bookmark the current SCORE URL (<http://es/ScoreAccessWeb/>).
- External customers may access SCORE content via the Public and Private PAIR interfaces.