



## 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and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114.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  $^4\text{He}$  atoms and energy...comprising...transmuting the deuterium to  $^4\text{He}$  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 (CCPA1962). 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, H<sub>2</sub>O) 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, CH<sub>4</sub>, H<sub>2</sub>O, CO, C<sub>2</sub>H<sub>6</sub>, and CO<sub>2</sub>] *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 <sup>3</sup>He (Helium 3) or T (tritium <sup>3</sup>H). Both of these gases are transmutation byproducts of a nuclear reaction.” Loan ignores the fact that <sup>3</sup>He 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, H<sub>2</sub>O) 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.<sup>1</sup> 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

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<sup>1</sup> 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.<sup>2,3</sup> 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.<sup>4</sup> 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.<sup>5</sup>

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

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

<sup>3</sup> 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.

<sup>4</sup> *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.

<sup>5</sup> 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 Frascati-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.<sup>6</sup> 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, Morrison<sup>7</sup> 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

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

<sup>7</sup> Morrison, "Cold Fusion Update No. 8," November 27, 1993.

be misinterpreted as excess heat.<sup>8</sup> 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, Huizenga<sup>9</sup> 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

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<sup>8</sup> 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.

<sup>9</sup> 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.<sup>10</sup> Experimenters who previously found evidence of excess heat could not reproduce their results when better calorimetry equipment was used.<sup>11</sup> 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.

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

<sup>11</sup> 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.<sup>12,13,14</sup> 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

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<sup>12</sup> 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.

<sup>13</sup> 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.).

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

cold fusion cell, Applicant is referred to Huizenga.<sup>15</sup> Pages 152-156 of the reference<sup>16</sup> 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,<sup>17</sup> 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".

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,<sup>18</sup> see pages 6-7 which states:

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

<sup>16</sup> *Id.*

<sup>17</sup> *Id.*

<sup>18</sup> 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.<sup>19</sup> 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.

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<sup>19</sup> 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.<sup>20</sup> 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.<sup>21,22</sup> 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 <sup>4</sup>He atoms and energy...comprising...transmuting the deuterium to <sup>4</sup>He 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.

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

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

<sup>22</sup> *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 O<sub>2</sub> (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 D<sub>2</sub>O, 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

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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> <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
		Attorney Docket Number	DE-1
Sheet 1	of 1		

U.S. PATENT DOCUMENTS					
Examiner Initials*	Cite No. <sup>1</sup>	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 <sup>2</sup> (if known)			

FOREIGN PATENT DOCUMENTS						
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		Country Code <sup>3</sup> - Number <sup>4</sup> - Kind Code <sup>5</sup> (if known)				

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No. <sup>1</sup>	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 <sup>2</sup>
		New state of water molecule discovered (2016, April 22) retrieved 26 April 2016 from <a href="http://phys.org/news/2016-04-state-molecule.html">http://phys.org/news/2016-04-state-molecule.html</a>	
		Quantum Tunneling of Water in Beryl: A New State of the Water Molecule. PRL, <a href="http://journals.aps.org/prl/abstract/10.1103/PhysRevLett.116.167802">journals.aps.org/prl/abstract/10.1103/PhysRevLett. 116.167802</a>	

/SHARON M DAVIS/

01/30/2018