



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

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)
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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
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Commissioner:

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)1571-1575)², 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 H_2O " (Examiner's Answer p. 13). The Examiner is apparently inferring that heavy water (D_2O) 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 H_2O (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 D_2O , hence deuterium. While removal of the D_2O 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 D_2O was removed from the water they used and that it consisted exclusively of H_2O . 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

¹⁰Private 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

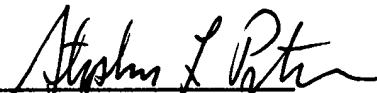
technology shall pass. When credible evidence demonstrates facts that are in conflict with theory, the questionable theory cannot be used to prevent the conventional application of the law. The Lawson Criteria have been proved to be inapplicable for atomic level reactions. When viewed on its merits the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

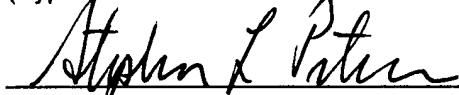
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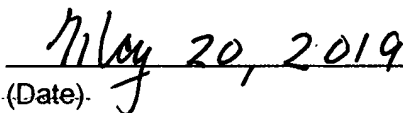
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