

**UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT**

**18-1122
Swartz v. PATO**

MITCHELL R. SWARTZ,
Plaintiff - Appellant

v.

UNITED STATES PATENT AND TRADEMARK OFFICE,
JOSEPH MATAL, Performing the Functions & Duties of Director of the US
Patent & Trademark Ofc,
Defendants – Appellees

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**APPENDIX ACCOMPANYING
OPENING BRIEF OF
PRO SE APPELLANT**

United States Court of Appeals
For The Federal Circuit

(CORRECTED)

Appellant Mitchell R. Swartz, ScD, MD, EE *pro se*
16 Pembroke Road
Weston, MA
(781) 237-3625

December 28, 2017

(corrected January 16, 2018)

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**IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA**

Alexandria Division

Mitchell R. Swartz

Plaintiff,

v.

Joseph Matal, et al.,

Defendants.

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Civil Action No. 1:17-cv-482-LMB/TCB

JUDGMENT

Pursuant to the order of this Court entered on August 22, 2017 and in accordance with Federal Rules of Civil Procedure 58, JUDGMENT is hereby entered in favor of Joseph Matal and United States Patent and Trademark Office and against Michael R. Swartz.

FERNANDO GALINDO, CLERK OF COURT

By: _____ /s/
Deisy Estevez
Deputy Clerk

Dated: 8/22/2017
Alexandria, Virginia

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IN THE UNITED STATES DISTRICT COURT FOR THE
EASTERN DISTRICT OF VIRGINIA
Alexandria Division

MITCHELL R. SWARTZ,

Plaintiff,

v.

JOSEPH MATAL, Performing the Functions and
Duties of the Under Secretary of Commerce for
Intellectual Property and Director of the United
States Patent and Trademark Office.

Defendant.

No. 1:17-cv-482 (LMB/TCB)

ORDER

For the reasons stated in the accompanying Memorandum Opinion, defendant's Motion to Dismiss [Dkt. Nos. 15 and 16] is GRANTED, and it is hereby

ORDERED that the Complaint be and is DISMISSED WITH PREJUDICE, except for Count 3, which is DISMISSED WITHOUT PREJUDICE.

To appeal this decision, plaintiff must file a written Notice of Appeal with the Clerk of this Court within 60 days of the date of the entry of this Order. A written Notice of Appeal is a short statement stating a desire to appeal an order and noting the date of the order plaintiff wants to appeal. Plaintiff need not explain the grounds for appeal until so directed by the Court. Failure to file a timely Notice of Appeal waives plaintiff's rights to appeal this decision.

The Clerk is directed to enter judgment in the defendant's favor pursuant to Fed. R. Civ. P. 58 and to forward copies of this Order and the accompanying Memorandum Opinion to counsel of record and plaintiff, pro se.

Entered this 22nd day of August, 2017.

Alexandria, Virginia



Leonie M. Brinkema
United States District Judge

Appx 2

Moving to plaintiff's Motion for Reconsideration, plaintiff argues principally that (1) he was never given a chance to respond to defendant's reply brief, see Pl. Mem. [Dkt. No. 35-1] ¶ 2; and (2) the opinion contains various inaccuracies, see id. ¶ 4. Neither of these arguments is persuasive. Under Fed. R. Civ. P. 60(b),¹ relief from a final judgment is only available for the following reasons:

(1) mistake, inadvertence, surprise, or excusable neglect; (2) newly discovered evidence that, with reasonable diligence, could not have been discovered in time to move for a new trial under Rule 59(b); (3) fraud . . . , misrepresentation, or misconduct by an opposing party; (4) the judgment is void; (5) the judgment has been satisfied, released or discharged; it is based on an earlier judgment that has been reversed or vacated; or applying it prospectively is no longer equitable; or (6) any other reason that justifies relief.

Fed. R. Civ. P. 60(b). Neither of plaintiff's arguments demonstrates entitlement to relief under any of the above categories.

First, plaintiff was not entitled to file a sur-reply because under this court's local rules, parties are entitled to file only opening, response, and reply briefs; any further briefs may not be filed "without first obtaining leave of Court," which is not granted as a matter of right. Local R. Civ. P. 7(F)(1). Moreover, inability to file a sur-reply is, as discussed above, not one of the justifications for granting relief under Rule 60(b).

Second, although plaintiff does not specifically fit his claim of inaccuracies in the opinion into the Rule 60(b) framework, the Court construes his argument as claiming "mistake" under Rule 60(b)(1). Plaintiff identifies many statements in the Memorandum Opinion, mostly related to the patentability of his claims, with which he disagrees; however, he has not persuasively demonstrated that any of those statements are incorrect, and, indeed, in many places, plaintiff simply asserts

¹ Plaintiff styles his motion as a "Motion to Reconsider Pursuant to CR 59(a)." Rule 59(a) does not authorize the filing of a motion to reconsider an order granting a motion to dismiss—it only governs motions for new trials. See Fed. R. Civ. P. 59(a). Because the Court must construe plaintiff's Motion liberally in deference to his pro se status, the Court has construed his Motion as a proper motion for relief under Rule 60(b). See id. 60(b).

disagreement, without appropriate citation to the record,² with the Memorandum Opinion or merely rehashes the unsuccessful arguments that he made in his brief opposing the Motion to Dismiss. A Rule 60(b) motion is an “extraordinary remedy” and is not an appropriate avenue to simply relitigate an issue already decided or ask the court to change its mind. See Mayfield v. Nat’l Ass’n for Stock Car Auto Racing, Inc., 674 F.3d 369, 378 (4th Cir. 2012). Plaintiff’s arguments cannot clear this hurdle.

Because plaintiff has not demonstrated an appropriate “mistake” in the Court’s Memorandum Opinion to entitle him to relief under Rule 60(b), it is hereby

ORDERED that plaintiff’s Motion for Leave to File a Memorandum in Support [Dkt. No. 35] be and is DENIED AS MOOT, and it is further

ORDERED that plaintiff’s Motion for Reconsideration [Dkt. No. 34] be and is DENIED.

To appeal this decision, plaintiff must file a written Notice of Appeal with the Clerk of this Court within 60 days of the date of the entry of this Order. A written Notice of Appeal is a short statement stating a desire to appeal an order and noting the date of the order plaintiff wants to appeal. Plaintiff need not explain the grounds for appeal until so directed by the Court. Failure to file a timely Notice of Appeal waives plaintiff’s right to appeal this decision.

The Clerk is directed to forward copies of this Order to counsel of record and plaintiff, pro se.

Entered this 7th day of September, 2017.

Alexandria, Virginia

1/s/ LMB
Leonie M. Brinkema
United States District Judge

² Plaintiff asks the Court to consider seven additional exhibits filed for the first time with his Motion for Reconsideration. See Pl. Mem. Exs. 61-65. Although he has not attempted to demonstrate that any of these exhibits constitute newly discovered evidence, out of an abundance of caution, the Court has reviewed the exhibits and is not persuaded that any of them demonstrates error in either the analysis or conclusions reached in the Memorandum Opinion.

his patent applications is properly resolved by evaluating his complaint, the defendant's Motion to Dismiss that complaint, and plaintiff's opposition to that motion, not by striking the motion. Plaintiff's second allegation about not receiving all of the defendant's pleadings stems from his misunderstanding of how pleadings are docketed by the Clerk's office. If one document appears to constitute two separate recognized motions, that document will be given two different docket numbers. That is what happened in this case. The defendant's Motion to Dismiss raised jurisdictional issues under Federal Rule of Civil Procedure 12(b)(1) as well as arguments as to the sufficiency of the complaint under Rule 12(b)(6). As a result, it was docketed as two motions, although there is just one physical motion. Plaintiff's extensive response to the Motion to Dismiss demonstrates that he, in fact, did receive the defendant's motion. Lastly, nothing in this record supports plaintiff's call for an investigation by a Special Counsel. Accordingly, it is hereby

ORDERED that plaintiff's Motion to Strike [Dkt. No. 21] be and is DENIED.

Plaintiff has also filed a Motion for Reciprocity re: Roseboro ("Motion for Reciprocity") [Dkt. No. 22] in which he argues that defense counsel should be required to swear to the veracity of the representations in their pleadings just as pro se litigants are. This request is meritless. The reason pro se litigants are required to affirm the truth of their representations, is to provide the Court with some assurance of veracity which enables the Court to sanction a party who knowingly files false information with the Court. Because attorneys are governed by codes of professionalism and could lose their privilege to practice law if they violate their duty of candor to the Court, there is no need to request an affirmation from counsel.

Plaintiff's Motion for Reciprocity also argues that defendant has failed to file an answer to the complaint, which the Court construes as a motion for default. But, a motion to dismiss prevents default by a defendant, therefore plaintiff's argument is baseless. Boyd v. Jordan, 60 F.R.D. 203,

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205 (E.D.N.C. 1973); see also Hill v. Didio, 191 F. App'x 13, 14 (2d Cir. 2006) (explaining that the defendant "filed a motion to dismiss in lieu of an answer, as he was permitted to do" under Fed. R. Civ. P. 12(b)). Accordingly, it is hereby

ORDERED that plaintiff's Motion for Reciprocity [Dkt. No. 22] be and is DENIED.

The Clerk is directed to forward copies of this Order to counsel of record and plaintiff, pro se.

Entered this ¹⁴17 day of August, 2017.

Alexandria, Virginia



Leonie M. Brinkema
United States District Judge

Appx B

IN THE UNITED STATES DISTRICT COURT FOR THE
EASTERN DISTRICT OF VIRGINIA
Alexandria Division

MITCHELL R. SWARTZ,

Plaintiff,

v.

No. 1:17-cv-482 (LMB/TCB)

JOSEPH MATAL, Performing the Functions and
Duties of the Under Secretary of Commerce
for Intellectual Property and Director of the
United States Patent and Trademark Office,

Defendant.

MEMORANDUM OPINION

Before the Court is defendant Joseph Matal's Motion to Dismiss [Dkt. Nos. 15 and 16], which has been fully briefed. For the reasons that follow, defendant's motion will be granted.

I. BACKGROUND

Plaintiff Mitchell Swartz ("plaintiff" or "Swartz"), proceeding pro se, is a medical doctor, electrical engineer, and inventor who holds several patents both in the United States and abroad. Compl. [Dkt. No. 1] ¶¶ 7, 9. At issue in this civil action are six patent applications—U.S. Patent Serial Nos. 12/932,058 ("the '058 application"), 12/589,258 ("the '258 application"), 13/544,381 ("the '381 application"), 12/316,643 ("the '643 application"), 09/748,691 ("the '691 application"), and 09/750,765 ("the '765 application")—all of which plaintiff describes as relating to inventions that allegedly generate heat and electricity quietly and efficiently. Compl. [Dkt. No. 1] ¶¶ 10, 18.

Each application went through the internal two-stage review process at the United States Patent and Trademark Office ("USPTO"). At the first stage, each application was assigned to a patent examiner, who reviewed its claims to determine patentability. See 35 U.S.C. § 131. For

each application, the examiner determined on both an initial review and after reconsideration that the claims failed to meet the legal requirements for patentability. Cf. id. § 132. After the examiner twice rejected each application, plaintiff filed appeals with the Patent Trial and Appeal Board (“PTAB” or “Board”), an administrative appellate tribunal inside the USPTO. See id. § 134(a). The PTAB affirmed the rejection of five of his applications; however, the appeal of the sixth, the ‘381 application, is still pending.¹ See Mem. in Supp. of Mot. to Dismiss (“Def. Mem.”) [Dkt. No. 18] 6. Dissatisfied with the decisions of the PTAB, plaintiff has exercised his right under 35 U.S.C. § 145 to bring the present civil action against the Director of the USPTO, in which he requests in Count 1 that the Court find that he is entitled to a patent on each application. See Compl. [Dkt. No. 1] ¶¶ 315-19. Plaintiff also alleges that the USPTO and its officers have engaged in a variety of misconduct while evaluating his applications. The Complaint includes thirteen additional counts based on these allegations: two counts alleging violations of constitutional rights, one negligence-based tort count, one access-to-records count, eight counts alleging violations of various criminal laws, and one count alleging civil violations of the Racketeer Influenced and Corrupt Organizations Act (“RICO”). See id. ¶¶ 320-60.

Defendant has moved to dismiss each of the fourteen counts for a variety of substantive and procedural reasons, see Def. Mem. [Dkt. No. 18], plaintiff has responded, see Mem. in Opp’n to Mot. to Dismiss (“Pl. Opp.”) [Dkt. No. 25], and defendant has replied, see Reply in Supp. of Mot. to Dismiss (“Reply”) [Dkt. No. 29]. Finding that the briefs are comprehensive and

¹ Paragraphs 19 through 277 of plaintiff’s 120-page Complaint relate the substance of each of the six relevant patent applications as well as plaintiff’s interactions with the USPTO with respect to each application. Because many of the facts alleged are immaterial to the present Motion to Dismiss, the Court will discuss only the relevant details rather than the entire factual background as related in the Complaint.

that oral argument would not aid the decisional process, the Court will resolve defendant's motion on the materials submitted.

II. DISCUSSION

Defendant bases his Motion to Dismiss on Fed. R. Civ. P. 12(b)(1) and 12(b)(6). First, he argues that Count 1 should be dismissed under Rule 12(b)(6) for failure to state a claim because plaintiff does not plausibly allege entitlement to a patent for his various applications, all of which relate to "cold fusion," a "hypothetical technology that has not been shown to be technically feasible."² Def. Mem. [Dkt. No. 18] 1, 14-22. Second, he argues that under Rule 12(b)(1), the Court lacks subject matter jurisdiction to consider some of the patent claims and all of the non-patent claims for a variety of reasons, including sovereign immunity, collateral estoppel, failure to administratively exhaust, and failure to establish a private right of action. See id. at 8-13, 22-28.

A. Standard of Review

Under Rule 12(b)(1), a civil action must be dismissed whenever the court lacks subject matter jurisdiction. Although the plaintiff has the burden of establishing subject matter jurisdiction, Demetres v. East West Const., Inc., 776 F.3d 271, 272 (4th Cir. 2015), a court should accept "as true the jurisdictionally significant facts claimed by the" plaintiff, Motley v. Va. State Bar, 403 F. Supp. 2d 468, 471 (E.D. Va. 2005). After accepting those facts as true, the

² As defendant explains, "[c]old fusion is generally understood to refer to a nuclear reaction that occurs at, or near, room temperature and generates excess heat and transmutation products when hydrogen is introduced to a small piece of nickel or palladium." Def. Mem. [Dkt. No. 18] 5 (quoting id. Ex. 1 at 9 n.6). Plaintiff argues that his applications relate to devices "which are different from classic 'cold fusion'" and believes it is "inappropriate" to label his applications as "cold fusion" devices. Pl. Opp. [Dkt. No. 25] ¶¶ 134-36. In deference to plaintiff's belief that "cold fusion" is a loaded term, the Court will refer to these room temperature nuclear reactions as "low energy nuclear reactions" or "LENRs." Cf. Def. Mem. [Dkt. No. 18] Ex. 6 (using the term "LENR" to describe these reactions).

court must determine “whether those facts are sufficient as a matter of law to establish subject matter jurisdiction.” Id.

Under Rule 12(b)(6), a civil action must be dismissed if the complaint does not “contain sufficient facts to state a claim that is ‘plausible on its face.’” E.I. du Pont de Nemours & Co. v. Kolon Indus., Inc., 637 F.3d 435,440 (4th Cir. 2011) (quoting Bell Atl. Corp. v. Twombly, 550 U.S. 544, 570 (2007)). Although the court must assume for the purposes of deciding the motion that all “well-pleaded allegations” are true and must “view the complaint in the light most favorable to the plaintiff,” Philips v. Pitt Cnty. Mem’l Hosp., 572 F.3d 176, 180 (4th Cir. 2009), allegations that are merely conclusory need not be credited, see Ashcroft v. Iqbal, 556 U.S. 662, 678 (2009).

B. Analysis

1. Count 1 (35 U.S.C. § 145 Claims)

Count 1 alleges under 35 U.S.C. § 145 that plaintiff’s six patent applications—the ’058, ’258, ’381, ’643, ’691, and ’765 applications—should be granted. Defendant argues that three of these applications are ineligible for this Court’s review because the PTAB has not yet rendered a final decision on the ’381 application and plaintiff is collaterally estopped from arguing for the patentability of the ’058 and ’765 applications. Defendant further contends that plaintiff’s allegations as to the remaining three applications should be rejected because he has failed to plausibly allege that they involve patentable claims.

a. ’381 Application

It is uncontested that plaintiff’s appeal of the examiner’s denial of the ’381 application was still pending at the PTAB when he filed this action. See Def. Mem. [Dkt. No. 18] Ex. 13 (“As of [July 17, 2017], the PTAB has not issued any decision in Appeal No. 2017-006193.”). A

patent applicant may only bring a suit under 35 U.S.C. § 145 if he is “dissatisfied with the decision of the Patent Trial and Appeal Board in an appeal under” 35 U.S.C. § 134(a). Section 145 waives the federal government’s sovereign immunity only when the PTAB has issued a final decision on the patent application at issue. See Fleming v. Coward, 534 F. App’x 947, 950 (Fed. Cir. 2013). Therefore, because the PTAB has not issued a final decision on the ’381 patent application, defendant retains its sovereign immunity and plaintiff’s suit must be dismissed with respect to that application. See id.

In response to this argument, plaintiff does not claim that the PTAB has issued a final decision on his application; instead, he appears to claim that the PTAB’s “refusal to admit Evidence and Briefs” into the record during the appeal “were final decisions.” Pl. Opp. [Dkt. No. 25] ¶ 112. To the contrary, these decisions are the antitheses of final decisions; they are, indeed, only intermediate decisions preceding a future final decision on the patentability of the claims in the ’381 application. As such, Count 1 will be dismissed as to the ’381 application.³

b. ’058 and ’765 Applications

Under the doctrine of collateral estoppel, a party may not relitigate an issue that is (1) identical to an issue (2) actually litigated in an earlier proceeding if (3) resolution of the issue was necessary to the judgment in the earlier proceeding and (4) the party had a full and fair opportunity to litigate the issue in the earlier proceeding. Jet, Inc. v. Sewage Aeration Sys., 223 F.3d 1360, 1366 (Fed. Cir. 2000). Defendant argues that two of plaintiff’s patent applications (the ’058 application and the ’765 application) are “substantively identical” to two earlier applications (Application Nos. 08/406,457 and 07/760,970) that plaintiff submitted to the

³ A dismissal for failure to exhaust would typically be without prejudice; however, the reasons the Complaint fails to plausibly allege patentability with respect to plaintiff’s ’258, ’643, and ’691 applications, see infra, apply with equal force to his ’381 application. As such, this dismissal will be with prejudice.

USPTO. Def. Mem. [Dkt. No. 18] 9-13. The USPTO rejected both of the earlier applications for lack of utility under 35 U.S.C. § 101 and for lack of enablement under 35 U.S.C. § 112. See id. Plaintiff appealed the rejection of both applications to the Federal Circuit and, in both cases, the Federal Circuit affirmed the Board's determination that the patent applications failed to satisfy §§ 101 and 112. See id.; In re Swartz, 50 F. App'x 422, 424-25 (2002) (per curiam); In re Swartz, 232 F.3d 862, 864 (2000) (per curiam).

In response, plaintiff does not contend that the claims at issue in the current applications are distinct from the claims at issue in the earlier applications; instead, he argues that "collateral estoppel is not appropriate here because here there are new materials and evidence." Pl. Opp. [Dkt. No. 25] ¶ 58. He also appears to believe that because the earlier cases proceeded under 35 U.S.C. § 141, rather than § 145, collateral estoppel should not apply. See id. Neither of these arguments is persuasive. The application of collateral estoppel does not depend on whether new evidence has been uncovered or whether the plaintiff has identified a different cause of action; instead, collateral estoppel depends on "the identity of the issues that were litigated" in the earlier suit. Ohio Willow Wood Co. v. Alps S., LLC, 735 F.3d 1333, 1342 (Fed. Cir. 2013); see also Black v. Office of Pers. Mgmt., 641 F. App'x 1007, 1009 (Fed. Cir. 2016) ("[C]ollateral estoppel appl[ies] even if new evidence exists . . ."). Here, (1) plaintiff implicitly concedes that the '058 and '765 applications are substantively identical to earlier applications; (2) the issues whether those earlier applications were patentable under §§ 101 and 112 were previously litigated in the Federal Circuit; (3) the Federal Circuit expressly decided the §§ 101 and 112 issues as the basis for affirming the USPTO's decision; and (4) plaintiff, as a party in the earlier litigation, had a full and fair opportunity to litigate those issues. As such, plaintiff is collaterally

estopped from relitigating the patentability of the '058 and '765 patent applications and Count 1 will be dismissed with respect to those two applications.

c. '258, '643, and '691 Applications

Under § 145, an applicant who is dissatisfied with the PTAB's decision affirming the rejection of his patent application may file a civil action against the Director of the USPTO in district court. Section 145 instructs the court to determine whether the applicant is "entitled to receive a patent for his invention" and, if the court determines the applicant is so entitled, to "authorize the Director to issue such patent." See id. Furthermore, the district court's review is not limited to the record before the PTAB; instead, the applicant may present additional evidence to the court and, when new evidence is introduced, review is de novo. Kappos v. Hyatt, 132 S. Ct. 1690, 1693-94 (2012).

To establish entitlement to a patent, an applicant must show (among other things) that his claimed invention is "useful," 35 U.S.C. § 101, and that the specification is "full, clear, concise, and exact" enough to "enable any person skilled in the art to which it pertains" to "make and use" it, id. § 112(a). In this case, the PTAB rejected all three applications for lack of utility and lack of enablement. See Def. Mem. [Dkt. No. 18] Ex. 1 at 28; Ex. 2 at 27; Ex. 3 at 25-26.⁴ In all three appeals, the PTAB resolved both issues on the "single question of operability of the claimed invention." See, e.g., id. Ex. 2 at 13. Because the PTAB found that all three inventions were inoperable, it also found that they were not useful and could not be made and used by

⁴ The Court may refer to documents referenced in or integral to the complaint without converting defendant's motion to dismiss into a motion for summary judgment. See Davis v. George Mason Univ., 395 F. Supp. 2d 331, 335 (E.D. Va. 2005), aff'd, 193 F. App'x 248 (4th Cir. 2006). In this case, the Complaint explicitly incorporates the full record of each patent application at issue and refers to a variety of academic literature relating to LENR technology. See Compl. [Dkt. No. 1] ¶¶ 18, 61-69. These items have been incorporated by reference and may be properly considered in evaluating defendant's Motion to Dismiss and plaintiff's objections to that motion.

persons skilled in the relevant art. See id. Ex. 1 at 28; Ex. 2 at 27; Ex. 3 at 25-26; see also Process Control Corp. v. HydReclaim Corp., 190 F.3d 1350, 1358 (Fed. Cir. 1999) (“If a patent claim fails to meet the utility requirement because it is not . . . operative, then it also fails to meet the how-to-use aspect of the enablement requirement.”). In this litigation, defendant claims that the § 145 claims should be dismissed on the same basis. See Def. Mem. [Dkt. No. 18] 14 (“Specifically, [plaintiff] fails to plausibly allege that his cold fusion inventions are operable.”).

In addition, because plaintiff has included evidence on the issue of operability that allegedly goes beyond the evidence submitted to the PTAB, see, e.g., Pl. Opp. [Dkt. No. 25] Ex. 24 (“Oscillating Excess Power Gain and Magnetic Domains in NANOR-type CF/LANR Components”), plaintiff is entitled to de novo review on the issue of operability. As such, to survive defendant’s Motion to Dismiss, plaintiff must allege facts sufficient to make out a plausible claim that his inventions are operable.

Both the USPTO and the Federal Circuit have long believed that LENR technology is presently inoperable. See, e.g., In re Swartz, 232 F.3d at 864 (discussing the “substantial evidence” that claimed LENR results are “irreproducible” and that “those skilled in the art would ‘reasonably doubt’ the asserted utility and operability” of LENR technology); see also Eli Lilly & Co. v. Actavis Elizabeth LLC, 435 F. App’x 917, 924 (Fed. Cir. 2011) (referencing LENR technology as an example of something “so incredible” as to warrant “special procedures” at the USPTO); Def. Mem. [Dkt. No. 18] Ex. 1 at 18 (“[V]irtually none of the scientific community consider[s] the alleged positive results of cold fusion experiments as being confirmed” (internal quotation marks omitted) (second alteration in original)).

In response, plaintiff argues: (1) that his patent applications are not directed to LENR technology, see, e.g., Compl. [Dkt. No. 1] ¶¶ 24-25, 109-11, 203-04;⁵ and (2) that he has submitted evidence showing both that LENR technology is becoming more widely accepted and also that he has produced positive experimental results, see, e.g., id. ¶¶ 61-69; Pl. Opp. [Dkt. No. 25] Ex. 24 (“Oscillating Excess Power Gain and Magnetic Domains in NANOR-type CF/LANR Components”).

Setting aside the apparent incompatibility of these two responses, neither is persuasive. First, as the PTAB decisions in this case explain, all of plaintiff’s applications relate to the room-temperature nuclear reactions that are the hallmark of LENR technology. See Def. Mem. [Dkt. No. 18] Ex. 1 at 20 (“[T]he claims, including, in particular, representative claim 1, are directed to a process for controlling the production of a cold fusion product.”); Ex. 2 at 11 (establishing “on the record before us that representative independent claim 12 is drawn to a cold fusion process, and more particularly a machine for monitoring electrochemically-induced nuclear fusion reactions in a cold fusion reactor”); Ex. 5 at 15 (“[Plaintiff’s] claimed invention is drawn to methods for controlling a cold fusion reaction or cold fusion product output.”). Moreover, although plaintiff asserts in his Complaint that his technology is not directed to LENR, nowhere does he substantively respond to the PTAB’s characterization of his applications as directed to these low-energy nuclear processes.

Second, neither the evidence plaintiff submits relating to LENR in general nor his evidence of experiments and demonstrations he has run establishes the operability of LENR or of

⁵ It is not entirely clear from plaintiff’s Complaint whether his argument is that his patent applications are not at all directed to LENR technology or that the patent examiner and the PTAB inappropriately referred to his LENR technology as “cold fusion.” For the purposes of the present motion, the Court will construe plaintiff’s argument as the former, more forceful, argument.

the claims in plaintiff's applications. Plaintiff's general LENR evidence consists of various government reports discussing LENR technology. Unhelpfully to plaintiff, these reports make clear that LENR technology is not currently operable. See, e.g., id. Ex. 6 at 1, 6 (explaining that "much skepticism remains" about LENR and describing "real and controllable" LENR experiments in only hypothetical terms); Ex. 7 at 26 (explaining that LENR experiments "remain only thinly reproducible" and that "it seems unlikely that deployable/usable devices could be expected within a five to ten year horizon").⁶ Although these reports may help plaintiff plausibly allege the scientific possibility of future LENR technology, they do not help him plausibly allege the current operability necessary to show patentability. Cf. In re Fisher, 421 F.3d 1365, 1371 (Fed. Cir. 2005) ("[A]n application must show that an invention is useful to the public as disclosed in its current form, not that it may prove useful at some future date after further research."). Moreover, nowhere does plaintiff explain how his specific patent applications relate to the processes described in these reports.

In support of his opposition to defendant's Motion to Dismiss, plaintiff has submitted a variety of academic papers and declarations explaining (allegedly successful) experiments and demonstrations that he has done. See, e.g., Smith Decl. [Dkt. No. 3] ¶¶ 3-5; Pl. Opp. [Dkt. No. 25] Ex. 24 ("Oscillating Excess Power Gain and Magnetic Domains in NANOR-type CF/LANR Components"). Again, plaintiff fails to draw any clear connection between his patent

⁶ Plaintiff discusses both of these reports—one from the Defense Intelligence Agency ("DIA") and one from the Defense Threat Reduction Agency ("DTRA")—in his Complaint. See Compl. [Dkt. No. 1] ¶¶ 61-69. Although plaintiff appears to claim that he attached both reports to his Complaint, see id. ¶ 61 ("Exhibit 11 is from the DIA Report . . ."); id. ¶ 65 ("A closeup of the DTRA report is shown in Exhibit 12."), neither report was filed with the court. Defendant included copies of both reports with his Motion to Dismiss. See Def. Mem. [Dkt. No. 18] Ex. 6; Ex. 7. Because both documents were extensively discussed in the Complaint, they have been incorporated by reference and may be properly considered in evaluating defendant's Motion to Dismiss and plaintiff's objections to that motion. See Davis, 395 F. Supp. 2d 331.

applications and the evidence presented—nowhere, for example, does he explain how an invention described in any of the relevant patent applications was used in the course of any of the referenced demonstrations or experiments. Therefore, although plaintiff may plausibly allege both the theoretic potential of LENR technology and also that he has achieved some positive experimental results (presumably related to the LENR field), he has not plausibly alleged that the inventions claimed in his patent applications were involved in those experiments or that those inventions have any current operability.

Because plaintiff has failed to plausibly allege that his patent applications describe operable inventions, he has failed to plausibly allege his entitlement to a patent and his § 145 claims must be dismissed with respect to the remaining—'258, '643, and '691—applications.

2. Counts 2 and 8 (Constitutional Claims)

In Counts 2 and 8, the Complaint alleges violations of plaintiff's constitutional due process and equal protection rights.⁷ In both counts, plaintiff appears to be requesting damages rather than injunctive relief, see Compl. [Dkt. No. 1] ¶ 322 (“Defendants . . . are hereby sued for monetary damages.”); id. ¶ 341 (citing 42 U.S.C. § 1983 and Bivens v. Six Unknown Named Agents of Fed. Bureau of Narcotics, 403 U.S. 388 (1971)); however, plaintiff has only sued Joseph Matal, the acting Director of the USPTO, in his official capacity. Further, neither § 1983

⁷ In both Counts, plaintiff appears to rest his constitutional arguments on the Fourteenth Amendment. See Compl. [Dkt. No. 1] ¶ 322 (“The Defendants have ignored and rejected controlling Authorities including the 14th Amendment of the Constitution of the United States”); id. ¶ 341 (“The Defendants have ignored and reject controlling Authorities including the 14th Amendment’s ‘equal protection’ clause”). The Fourteenth Amendment is not binding on the federal government. See U.S. Const. amend. XIV (“[N]or shall any State deprive any person of life, liberty, or property, without due process of law; nor deny to any person within its jurisdiction the equal protection of the laws.” (emphasis added)). Because the Court must construe plaintiff’s pro se Complaint liberally, see, e.g., Haines v. Kerner, 404 U.S. 519, 520-21 (1972), both Counts will be considered to assert claims under the Fifth Amendment, which does apply to the federal government, see U.S. Const. amend. V; Bolling v. Sharpe, 347 U.S. 497 (1954).

nor Bivens allows a plaintiff to bring such a suit because § 1983 only applies to state officials, see 42 U.S.C. § 1983, and Bivens actions may not be brought against federal agencies or officials in their official capacity, see Doe v. Chao, 306 F.3d 170, 184 (4th Cir. 2002).⁸ Moreover, in his brief [Dkt. No. 25], plaintiff does not clarify the relief he is seeking for the constitutional violations nor does he develop an argument for this Court's jurisdiction. Instead, plaintiff merely argues that his "Action is Supported by Bivens." Id. ¶ 85. Therefore, the Court lacks jurisdictions over Counts 2 and 8, which must be dismissed.

Even if plaintiff were suing the defendant in his personal capacity or were requesting only injunctive relief on his constitutional claims, his Complaint would have to be dismissed for failing to state a claim upon which relief could be granted. In both Count 2 and Count 8, plaintiff alleges only vague violations of his constitutional rights. See Compl. [Dkt. No. 1] ¶ 321 (claiming that the evidence plaintiff submitted to the PTO was "all ignored by Defendants"); id. ¶¶ 342-43 (claiming that "[d]efendants' unlawful dual-tiered system, rather than a single uniform approach, rejecting the reasoning of the Supreme Court's decision in United States v. Nixon (1974) [sic] that all are 'equal under the law'" and that the "equal protection clause has been broken by the fact that individual applicants in other states have their evidence docketed, addressed, and properly delivered to supervising authorities"). Without additional factual allegations explaining, for example, what plaintiff means by "[d]efendant's unlawful dual-tiered system"; how plaintiff was treated unequally from others; or what liberty or property interest plaintiff has been denied, his Complaint does not state a plausible claim for relief. Therefore, Counts 2 and 8 will be dismissed.

⁸ Although defendant only explicitly argues this point with respect to Count 8 (plaintiff's equal protection claim), see Def. Mem. [Dkt. No. 18] 22-23, it applies equally forcefully to Count 2 (plaintiff's due process claim).

3. Count 3 (Negligence Claim)

In Count 3, plaintiff contends that defendant was “negligent” in “maintain[ing] the [e]videntiary record.” Under the Federal Tort Claims Act (“FTCA”), which operates as a “limited congressional waiver of sovereign immunity for injury or loss caused by the negligent or wrongful act of a Government employee acting within the scope of his or her employment,” Medina v. United States, 259 F.3d 220, 223 (4th Cir. 2001), negligence actions cannot be brought in federal court “unless the claimant shall have first presented the claim to the appropriate Federal agency,” 28 U.S.C. § 2675(a); see also McNeil v. United States, 508 U.S. 106, 113 (1993) (“The FTCA bars claimants from bringing suit in federal court until they have exhausted their administrative remedies.”).⁹

Plaintiff does not dispute that he failed to appropriately file an administrative claim with the USPTO, see Def. Mem. [Dkt. No. 18] Ex. 12, instead arguing that (1) he “has submitted Petitions (pursuant to the Board of Patent Appeals) seventeen times in the last two years”; (2) “the FTCA is only for federal employees” and does not apply to “independent contractors”; and (3) “in this case, foreign governments may be involved,” Pl. Opp. [Dkt. No. 25] ¶¶ 76-79, 103-11. None of these responses is compelling. To satisfy the FTCA’s administrative exhaustion requirement, claims against the USPTO must be filed with the USPTO Office of General Counsel, not merely discussed in a petition submitted to the PTAB. See 37 C.F.R. § 104.41. Moreover, plaintiff’s claims about independent contractors and foreign governments are nonsensical, as he has sued only the Director of the USPTO. Because he failed to exhaust the

⁹ In his brief [Dkt. No. 25], plaintiff appears to claim that his third count is “Supported by Bivens . . . which is outside the purview of the Federal Tort Claims Act,” id. ¶ 85. To the extent Count 3 is grounded on constitutional rather than tort law, it must be dismissed because, as explained above, Bivens actions cannot be brought against federal agencies or federal officials in their official capacity.

required administrative procedures, Count 3 will be dismissed without prejudice to plaintiff's ability to refile this claim if he properly exhausts the administrative requirements. See Henderson v. United States, 785 F.2d 121, 123 (4th Cir. 1986) ("It is well-settled that the requirement of filing an administrative claim is jurisdictional . . .").

4. Count 4 (Denial of Records Claim)

In Count 4, the Complaint alleges that defendant violated 37 C.F.R. § 41.109, which provides a right to access certain USPTO records in some proceedings before the PTAB. See 37 C.F.R. § 41.109(a) ("Any request from a party for access to or copies of Office records directly related to a contested case must be filed with the Board."). On its face, this provision provides no private right of action and does not grant jurisdiction to this Court to hear an action arising from violations of the regulation. Moreover, plaintiff provides no analysis in either his Complaint [Dkt. No. 1] or his brief [Dkt. No. 25] explaining the source of any right to sue under the regulation. Therefore, Count 4 will be dismissed for lack of jurisdiction.¹⁰

5. Counts 5-7, 9-12, and 14 (Criminal Claims)

Counts 5-7, 9-12, and 14 allege that the defendant has committed a variety of crimes, including obstruction of justice, Compl. [Dkt. No. 1] ¶¶ 327-28 (Count 5) (claiming violations of 18 U.S.C. §§ 1503, 1519); making false statements, id. ¶¶ 329-30 (Count 6) (claiming violations of 18 U.S.C. § 1001); conspiracy to commit an offense against or to defraud the United States,

¹⁰ Even if the Court did have jurisdiction over this Count, plaintiff has failed to plead sufficiently specific allegations to withstand dismissal under Rule 12(b)(6). He claims only that "[t]he PTO, and the Board, have ignored specific requests which would have clarified this for the Honorable court." Compl. [Dkt. No. 1] ¶ 326. He does not explain when he filed those requests, which records he was requesting, how his requests fell under § 41.109, or what those requests would have "clarified." In addition, § 41.109 applies only to a "contested case," 37 C.F.R. § 41.109; however, appeals like plaintiff's proceed under 35 U.S.C. § 134 and are not "contested cases," see 37 C.F.R. § 41.2 ("Contested case means a Board proceeding other than an appeal under 35 U.S.C. 134 or a petition under § 41.3"). Therefore, even on the merits of the claim, plaintiff has failed to plausibly allege any entitlement to relief.

id. ¶¶ 331-40 (Count 7) and 359-60 (Count 14) (claiming violations of 18 U.S.C. § 371); mail fraud, id. ¶¶ 344-46 (Count 9) (claiming violations of 18 U.S.C. § 1341); witness tampering, id. ¶¶ 347-54 (Counts 10 and 11) (claiming violations of 18 U.S.C. § 1512);¹¹ and misprision of a felony, id. ¶¶ 355-56 (Count 12) (claiming violations of 18 U.S.C. § 4). None of the specified criminal statutes contains a waiver of sovereign immunity and plaintiff does not claim that the federal government has in fact waived its immunity with respect to these criminal claims. As such, because plaintiff has only sued the Director of the USPTO in his official capacity, sovereign immunity bars plaintiff from bringing these counts, see Fed. Deposit Ins. Co. v. Meyer, 510 U.S. 471, 475 (1994) (“Absent a waiver, sovereign immunity shields the Federal Government and its agencies from suit.”). For these reasons, Counts 5-7, 9-12, and 14 will be dismissed.

6. Count 13 (Civil RICO Claim)

Count 13 alleges that defendant has violated RICO. As with the criminal statutes identified in plaintiff’s other counts, RICO does not contain a waiver of sovereign immunity. See Bloch v. Exec. Office of the President, 164 F. Supp. 3d 841, 856 (E.D. Va. 2016). In addition, plaintiff does not allege—in either his Complaint [Dkt. No. 1] or his brief [Dkt. No. 25]—that the federal government has waived sovereign immunity with respect to being sued under RICO. As such, plaintiff cannot bring a RICO claim against the Director of the USPTO in his official capacity and Count 13 must be dismissed.

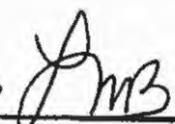
¹¹ In Count 11, plaintiff claims defendant has violated 18 U.S.C. § 1512 (a witness tampering statute) through violations of the Administrative Procedure Act (“APA”). To the extent plaintiff is alleging criminal law violations, his claim must be dismissed. To the extent plaintiff is alleging (non-criminal) violations of the APA, his claim must also be dismissed because the APA only provides a cause of action to review agency decisions when “there is no other adequate remedy in a court.” 5 U.S.C. § 704. As the present action demonstrates, 35 U.S.C. § 145 provides a cause of action to review the denial of a patent application; therefore, plaintiff cannot bring suit against the agency under the APA.

III. CONCLUSION

For the reasons stated above, defendant's Motion to Dismiss [Dkt. Nos. 15 and 16] will be granted by an appropriate Order to be issued with this Memorandum Opinion.

Entered this ¹⁰22 day of August, 2017.

Alexandria, Virginia

lsl 

Leonie M. Brinkema
United States District Judge

Swartz v. Lee et al

Virginia Eastern District Court

Case Filed:

Apr 21, 2017

Judge: Leonie M Brinkema

Terminated:

Aug 22, 2017

Referred: Theresa Carroll Buchanan

Case #: 1:17-cv-00482

Nature of Suit
830 Property Rights - Patent

Cause
35:145 Patent Non-Infringement- Patent Applicant
is Dissatisfied with PTO Decision

Docket

Parties (4)

Related Cases (1)

Last checked: **Wednesday Oct 18, 2017 5:24 AM EDT**

Defendant

Joseph Matal

Represented By

Kimere Jane Kimball
Us Attorney'S Office (alexandria-Na)
[contact info](#)

Defendant

United States Patent and Trademark Office

Represented By

Kimere Jane Kimball
Us Attorney'S Office (alexandria-Na)
[contact info](#)

Plaintiff

Mitchell R. Swartz
16 Pembroke Road
Weston, MA 02493

TERMINATED PARTIES

Appx 25

Defendant

Michelle Lee
Terminated: 08/17/2017

Represented By

Kimere Jane Kimball
Us Attorney'S Office (alexandria-Na)

[contact info](#)

0:18-cv-us-01122 - Swartz v. PATO

10/31/2017

Docket last updated: 01/11/2018 11:59 PM EST

Wednesday, November 01, 2017

38  appeal USCA Case Number Wed 5:19 PM

USCA Case Number 18-1122 U.S. Federal Circuit for37 Notice of Appeal, filed by Mitchell R. Swartz. (dest,)

Thursday, October 26, 2017

appeal Transmission of Notice of Appeal to US Federal Circuit Thu 11:29 AM

Transmission of Notice of Appeal to US Federal Circuit re37 Notice of Appeal, (dest,)

Tuesday, October 24, 2017

37  appeal Notice of Appeal Thu 11:11 AM

NOTICE OF APPEAL as to33 Judgment,31 Memorandum Opinion,36 Order on Motion for Reconsideration, Order on Motion for Leave to File.,30 Order on Motion for Leave to File, Order on Motion to Strike, Order on Motion for Miscellaneous Relief,32 Order on Motion to Dismiss for Failure to State a Claim, Order on Motion to Dismiss/Lack of Jurisdiction, by Mitchell R. Swartz. Filing fee \$ 505.(dest,)

Att: 1  Letter,

Att: 2  Receipt

Thursday, September 07, 2017

36  3 pgs order Order on Motion for Reconsideration Order on Motion for Leave to File Thu 5:17 PM

ORDER- it is hereby ORDERED that plaintiff's Motion for Leave to File a Memorandum in Support [Dkt. No. 35] be and is DENIED AS MOOT, and it is further ORDERED that plaintiffs Motion for Reconsideration [Dkt. No. 34] be and is DENIED. Signed by District Judge Leonie M. Brinkema on 9/7/2017. (see Order for further details) (dest,) (copy mailed to Pro Se by chambers)

Appx 26

Friday, September 01, 201735  **motion** **Leave to File Document** **Thu 10:23 AM**

MOTION for Leave to File Memorandum in Support by Mitchell R. Swartz.(dest,)

- Att: 1  Proposed Memorandum in Support,
- Att: 2  Exhibit 59,
- Att: 3  Exhibit 60,
- Att: 4  Exhibit 61,
- Att: 5  Exhibit 62,
- Att: 6  Exhibit 63 Part 1,
- Att: 7  Exhibit 63 Part 2,
- Att: 8  Exhibit 63 Part 3,
- Att: 9  Exhibit 64 Part 1,
- Att: 10  Exhibit Part 2,
- Att: 11  Exhibit Part 3,
- Att: 12  Exhibit 65

34  **motion** **Reconsideration** **Thu 10:17 AM**

MOTION for Reconsideration re33 Judgment,32 Order on Motion to Dismiss for Failure to State a Claim, Order on Motion to Dismiss/Lack of Jurisdiction, by Mitchell R. Swartz.(dest,)

- Att: 1  Letter

Tuesday, August 22, 201733  **order** **Judgment - Clerk** **Tue 11:16 AM**

JUDGMENT- Pursuant to the order of this Court entered on August 22, 2017 and in accordance with Federal Rules of Civil Procedure 56, JUDGMENT is hereby entered in favor of Joseph Matal and United States Patent and Trademark Office and against Michael R. Swartz. Signed by Clerk on 8/22/2017. (dest,)

32  **order** **Order on Motion to Dismiss for Failure to State a Claim Order on Motion to Dismiss/Lack of Jurisdiction** **Tue 10:23 AM**

ORDER- For the reasons stated in the accompanying Memorandum Opinion, defendant's Motion to Dismiss [Dkt. Nos. 15 and 16] is GRANTED, and it is hereby ORDERED that the Complaint be and is DISMISSED WITH PREJUDICE, except for Count 3, which is DISMISSED WITHOUT PREJUDICE. Signed by District Judge Leonie M. Brinkema on 8/22/2017. (see Order for further details) (dest,) (copy mailed to plaintiff by chambers)

31  **18 pgs** **order** **Memorandum Opinion** **Tue 10:20 AM**

MEMORANDUM OPINION. Signed by District Judge Leonie M. Brinkema on 8/22/2017. (dest,)(copy mailed to plaintiff by chambers)

Appx 27

Thursday, August 17, 2017

- 30  **order** **Order on Motion for Leave to File Order on Motion to Strike Order on Motion for Miscellaneous Relief** **Thu 3:51 PM**
 ORDER granting [Dkt. No. 20] Motion for Leave to File, and it is hereby ORDERED that plaintiff's opposition brief is accepted for filing; and it is hereby ORDERED that plaintiff's Motion to Strike [Dkt. No. 21] be and is DENIED; and it is hereby ORDERED that plaintiff's Motion for Reciprocity [Dkt. No. 22] be and is DENIED. Signed by District Judge Leonie M. Brinkema on 8/17/2017. (see Order for further details) (dest,) (copy sent as directed in the Order)
- 29  **respm** **Reply to Response to Motion** **Thu 3:50 PM**
 REPLY to Response to Motion re16 MOTION to Dismiss for Lack of Jurisdiction with Roseboro,..15 MOTION to Dismiss for Failure to State a Claim with Roseboro,. filed by Michelle Lee, United States Patent and Trademark Office.(Kimball, Kimere)
- Att: 1  Exhibit Def. Ex. 15 ('058 Final Rejection),
 Att: 2  Exhibit Def. Ex. 16 ('643 Final Rejection)
- 28  **notice** **Notice (other)** **Thu 3:46 PM**
 NOTICE by Michelle Lee, United States Patent and Trademark Office of Substitution of Defendant (Kimball, Kimere)

Monday, August 14, 2017

- 27  **order** **Order on Motion for Extension of Time to File Response/Reply** **Mon 12:47 PM**
 ORDER- it is hereby ORDERED that Defendant's motion for an extension of time is GRANTED; and it is hereby ORDERED that Defendant shall file its reply memorandum on or before August 17, 2017. Signed by District Judge Leonie M. Brinkema on 8/14/2017. (dest,) (copy mailed to pro se)
- 26  **motion** **Extension of Time to File Response/Reply** **Mon 11:54 AM**
 MOTION for Extension of Time to File Response/Reply as to16 MOTION to Dismiss for Lack of Jurisdiction with Roseboro,..15 MOTION to Dismiss for Failure to State a Claim with Roseboro,. by Michelle Lee, United States Patent and Trademark Office.(Kimball, Kimere)
- Att: 1  Proposed Order

Tuesday, August 08, 2017

- 25  **respm** **Memorandum in Opposition** **Tue 5:37 PM**
 Memorandum in Opposition to Defendant's Motion to Dismiss filed by Mitchell R. Swartz.(dest,) Modified on 8/8/2017 (dest,)
- Att: 1  Exhibit 1,
 Att: 2  Exhibit 2,
 Att: 3  Exhibit 3,
 Att: 4  Exhibit 4,

A ppx 28

- Att: 5  Exhibit 5,
- Att: 6  Exhibit 6,
- Att: 7  Exhibit 7,
- Att: 8  Exhibit 8,
- Att: 9  Exhibit 9,
- Att: 10  Exhibit 10,
- Att: 11  Exhibit 11,
- Att: 12  Exhibit 12,
- Att: 13  Exhibit 13,
- Att: 14  Exhibit 14,
- Att: 15  Exhibit 15,
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- Att: 28  Exhibit 28,
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- Att: 30  Exhibit 30,
- Att: 31  Exhibit 31,
- Att: 32  Exhibit 32,
- Att: 33  Exhibit 33,
- Att: 34  Exhibit 34,
- Att: 35  Exhibit 35,
- Att: 36  Exhibit 36,
- Att: 37  Exhibit 37,
- Att: 38  Exhibit 38,

Appx 29

- Att: 39  Exhibit 39,
- Att: 40  Exhibit 40,
- Att: 41  Exhibit 41,
- Att: 42  Exhibit 42,
- Att: 43  Exhibit 43,
- Att: 44  Exhibit 44,
- Att: 45  Exhibit 45,
- Att: 46  Exhibit 46,
- Att: 47  Exhibit 47,
- Att: 48  Exhibit 48,
- Att: 49  Exhibit 49,
- Att: 50  Exhibit 50,
- Att: 51  Exhibit 51,
- Att: 52  Exhibit 52,
- Att: 53  Exhibit 53,
- Att: 54  Exhibit 54,
- Att: 55  Exhibit 55 part 1,
- Att: 56  Exhibit 55 part 2,
- Att: 57  Exhibit 56,
- Att: 58  Exhibit 57,
- Att: 59  Exhibit 58,
- Att: 60  Attachment- Supreme Court of the United States case booklet

24  **motion** **Appoint Counsel** **Tue 4:43 PM**
 MOTION to Appoint Counsel by Mitchell R. Swartz.(dest,)

Att: 1  Letter

23  **misc** **Declaration** **Tue 3:53 PM**
 Declaration of Dr. Mitchell Swartz by Mitchell R. Swartz.(dest,)

Att: 1  Letter

22  **motion** **Miscellaneous Relief (MOTION)** **Tue 3:52 PM**
 MOTION for Reciprocity Re: Roseboro by Mitchell R. Swartz. (dest,) (Attachment(s): #1 Letter) (dest,)

21  **motion** **Strike** **Tue 3:50 PM**
 MOTION to Strike Defendant's Motion by Mitchell R. Swartz.(dest,)

Att: 1  Letter

20 **motion** **Leave to File Document** **Tue 3:48 PM**

MOTION for Leave to File Plaintiff's Opposition to Defendant's Motion to Dismiss by Mitchell R. Swartz (dest,)

Att. 1 Letter

Tuesday, July 18, 2017

utility **Set Motion and R&R Deadlines/Hearings** **Tue 9:28 AM**

Set Deadlines as to 16 MOTION to Dismiss for Lack of Jurisdiction with Roseboro... 15 MOTION to Dismiss for Failure to State a Claim with Roseboro... Motion Hearing set for 9/15/2017 at 10:00 AM in Alexandria Courtroom 600 before District Judge Leonio M. Brinkema. (clar,)

Monday, July 17, 2017

19 **misc** **Notice of Hearing Date** **Mon 12:06 PM**

Notice of Hearing Date set for 9/15/17 re 16 MOTION to Dismiss for Lack of Jurisdiction with Roseboro... 15 MOTION to Dismiss for Failure to State a Claim with Roseboro.. (Kimball, Kimere)

18 **respm** **Memorandum in Support** **Mon 12:04 PM**

Memorandum in Support re 16 MOTION to Dismiss for Lack of Jurisdiction with Roseboro... 15 MOTION to Dismiss for Failure to State a Claim with Roseboro.. filed by Michelle Lee, United States Patent and Trademark Office.

- Att. 1 Exhibit Ex. 1 ('691 Board Decision),
- Att. 2 Exhibit Ex. 2 ('258 Board Decision),
- Att. 3 Exhibit Ex. 3 ('058 Board Decision),
- Att. 4 Exhibit Ex. 4 ('765 Board Decision),
- Att. 5 Exhibit Ex. 5 ('643 Board Decision,
- Att. 6 Exhibit Ex. 6 (DIA Report),
- Att. 7 Exhibit Ex. 7 (DTRA Report),
- Att. 8 Exhibit Ex. 8 ('457 Specification),
- Att. 9 Exhibit Ex. 9 ('970 Specification),
- Att. 10 Exhibit Ex. 10 ('058 Specification),
- Att. 11 Exhibit Ex. 11 ('765 Specification),
- Att. 12 Exhibit Ex. 12 (Damelin Decl.),
- Att. 13 Exhibit Ex. 13 (Bartlett Decl.),
- Att. 14 Exhibit Ex. 14 (Unpublished Cases))(Kimball, Kimere

17 **misc** **Roseboro Notice** **Mon 11:50 AM**

Roseboro Notice as to Motion to Dismiss (Dkt Nos. 15, 16) by Michelle Lee, United States Patent and Trademark Office (Kimball, Kimere)

Appx 31

16  **motion** **Dismiss/Lack of Jurisdiction** **Mon 11:48 AM**
MOTION to Dismiss for Lack of Jurisdiction with Roseboro., by Michelle Lee, United States Patent and Trademark Office. (Kimball, Kimere)

15  **motion** **Dismiss for Failure to State a Claim** **Mon 11:47 AM**
MOTION to Dismiss for Failure to State a Claim with Roseboro., by Michelle Lee, United States Patent and Trademark Office. (Kimball, Kimere)

Wednesday, May 17, 2017

14  **service** **Summons Returned Executed as to USA** **Wed 4:56 PM**
SUMMONS Returned Executed as to U.S. Patent and Trademark Office; served on 5/17/2017. (dest,)

13  **service** **Summons Returned Executed as to USA** **Wed 4:53 PM**
SUMMONS Returned Executed as to Michelle Lee; served on 5/17/2017 (dest,)

12  **service** **Summons Returned Executed as to USA** **Wed 4:51 PM**
SUMMONS Returned Executed as to U.S. Attorney General; served on 5/17/2017. (dest,)

11  **service** **Summons Returned Executed as to USA** **Wed 4:49 PM**
SUMMONS Returned Executed as to U.S. Attorney; served on 5/17/2017, answer due 7/17/2017. (dest,)

Wednesday, May 03, 2017

10  **service** **Summons Issued as to USA** **Wed 5:36 PM**
Summons Issued to be served via SPS mailed to Plaintiff as to Michelle Lee, United States Patent and Trademark Office, U.S. Attorney and U.S. Attorney General (dest,)

Tuesday, May 02, 2017

9  **misc** **Letter** **Wed 5:07 PM**
Letter to the Court providing service addresses for defendants by Mitchell R. Swartz. (dest,)

Friday, April 21, 2017

8  **misc** **Filing Fee Received** **Mon 4:28 PM**
Filing fee: \$400, receipt number 14683065584 (dest,)

7  **misc** **Declaration** **Mon 1:27 PM**
Declaration of Gayle Verner by Mitchell R. Swartz. (dest,)

6  **misc** **Declaration** **Mon 1:26 PM**
Declaration of Dr. Jean-Paul Biberian by Mitchell R. Swartz. (dest,)

5  **misc** **Declaration** **Mon 1:25 PM**
Declaration of Dr. Brian Ahern by Mitchell R. Swartz. (dest,)

Appx 3a

- 4  misc Declaration Mon 1:24 PM
Declaration of Dr. Frank Gordon by Mitchell R. Swartz. (dest,)

- 3  misc Declaration Mon 1:23 PM
Declaration of Robert Smith by Mitchell R. Swartz. (dest,)

- 2  notice Notice of Appearance Mon 1:22 PM
NOTICE of Appearance pro se by Mitchell R. Swartz (dest,)

- 1  121 pgs cmp Complaint Mon 1:18 PM
COMPLAINT against Michelle Lee, United States Patent and Trademark Office (Filing fee \$ 400, receipt number XXXXX.), filed by Mitchell R. Swartz.(dest,)
 - Att: 1  Letter,
 - Att: 2  Civil Cover Sheet

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Appx 33

**IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA Alexandria Division**

MITCHELL R. SWARTZ, Plaintiff

v.

JOSEPH MATAL, Performing the Functions and
Duties of the Under Secretary of Commerce
for Intellectual Property and Director of the
United States Patent and Trademark Office,
Defendant.)

No. 1:17-cv-482
(LMB/TCB)

August 30, 2017

**Plaintiff's Memorandum in Support of
Plaintiff's "MOTION TO RECONSIDER PURSUANT TO CR 59(a)"**

1. Now comes the Plaintiff in the above-entitled case petitioning this court for a Reconsideration of the Order and Judgment, and correction of the Memorandum Opinion ["Memorandum"] or a corrected Finding of Facts pursuant to CR 59(a).
2. On 8/22/2017, the court dismissed the above action without a single Hearing, and without permitting the Plaintiff to respond to the Defendant's Reply [Pleading 29] which was received by mail the very same day. This Motion is brought within 10 days of said Order and Judgment.
3. Plaintiff thanks Honorable Judge Leonie M. Brinkema for the detailed explanation and analysis.

Appx 34

4. However, not all relevant and important statements in the Opinion are accurate. Thus, there are several reasons that "materially" affect Plaintiff's substantial rights. First, the court has misperceived evidence, thus applying the wrong standard. Second, judicial economy favors correction of this mistake as early as possible, enabling a better understanding of the reasoning of the court's intent and logic. Third, irregularities such as the acceptance of factually false statements made by the Defendant's counsel is improper. These false statements, shown to be false and made without sworn Oath, are not evidence and combined with the sudden Judgment denying Plaintiff opportunity to respond, have prevented the Plaintiff from a fair trial or even a single hearing.

5. This pleading is now the ONLY opportunity of the Plaintiff to reply to the latest factually false statements in the Defendant's Reply. In response to the Defendant's counsels' Reply with the factually false statements, the Plaintiff submits 7 Exhibits including three sworn Declarations with this pleading which DISPROVE the factually false statements.

6. There is no reasonable inference from the actual evidence to justify the order, and the damages against the Plaintiff will be so excessive in light of Defendant's mischaracterizations and factually false statements that the order is more a result of misunderstanding and/or prejudice, than substantial justice.

7. In the discussion below, reference is made to the Declarations of several individuals of significant probative value to the court, including of Dr. David J. Nagel, who was at the DTRA meeting from which the Report was derived, Lawrence Forsley who was at the DIA meeting from which the Report was derived, and Gayle Verner who sent the DTRA and DIA reports to this court.

8. In the discussion below, reference is made to the very relevant attached Exhibits. These are submitted in response to the factually false statements made in the Memorandum and Reply, to rebut the false statements, and thus offer the court opportunity to correct the record early, so as to apply justice.

REMARKS

9. The Defendant s [Office s] attorneys have filed a Reply to Plaintiff's MOTION to Dismiss [Pleading 29; Reply"] on Aug. 17. As with the Defendant's ["Office s] attorneys previous Memoranda, this latest Reply contains many factually false statements, inaccuracies and innuendos, which are disproved by the record.

10. The Defendant s Memoranda falsely mischaracterizes the actual patent applications, calling them all the same, and calling all six (6) as "cold fusion" which attempts to demean, ridicule, and eliminate them.

Speedy Judgment has Denied Plaintiff's Right to Respond to Defendant's Factually False Statements

11. The Memorandum states:

Finding that the briefs are comprehensive and that oral argument would not aid the decisional process, the Court will resolve defendant's motion on the materials submitted.

It is unfair the plaintiff was not allowed to respond to the Reply by the Defendant and counsel, just as it is unfair that certain false statements by the Defendant's counsel are being rubber-stamped by this court, despite the request for a jury trial. The Defendant's statements have been shown to be inaccurate and they demonstrate attempt at evasion.

The Memorandum is Factually Wrong about Remedy

12. The Memorandum states:

Dissatisfied with the decisions of the PTAB, plaintiff has exercised his right under 35 U.S.C. § 145 to bring the present civil action against the Director of the USPTO, in which he requests in Count 1 that the Court find that he is entitled to a patent on each application.

As an alternative remedy, the plaintiff also submitted in the Complaint [page 119] that an Order could be made by the Court that the patent applications be re-considered based this time upon their actual content and, this time, based on the evidence that was actually previously submitted but not docketed, but simply ignored.

The Memorandum is Factually Wrong about Plaintiff's Response

13. The Memorandum states:

Moreover, although plaintiff asserts in his Complaint that his technology is not directed to LENR, nowhere does he substantively respond to the PTAB's characterization of his applications as directed to these low-energy nuclear processes.

This is a factually false statement. It exists because it is what the Defendant(s) claim, which is wrong, but is rubber-stamped by the court as "true" - when it is not. It is provably wrong and therefore Exhibits 63 and 64 are hereby submitted. They demonstrate that the plaintiff DID substantially and timely respond, and did also conclusively show fraud by some at the USPTO. Many more could be given, but these two are cited by the Defendant's counsel, misdescribed, and used to thwart justice. In Exhibit 63, the Appeal Brief of '058 shows the misdescription of the invention and failure to consider Evidence submitted are discussed, including on pages 108, and 86,104, 117 & 212 respectively. Defendants' corruption is discussed, including on pages 225, 237, 240, and 244. In Exhibit 64, the Appeal Brief of '258 the misdescription of the invention and failure to consider Evidence submitted are discussed, including on pages 51-53 & 212, and 42-44 respectively.

For this court to simply go along with these falsehoods when disputing proof is in the Evidence of THIS court, is a miscarriage of justice.

The Memorandum is Factually Wrong about What Are the Inventions

14. The Memorandum states:

"[Plaintiff's] claimed invention is drawn to methods for controlling a cold fusion reaction or cold fusion product output."

This is totally untrue. These patent applications, discussed in the above-entitled action, are not about what Fleischmann and Pons reported in 1989 ["F+P" or "cold fusion"]. Rather, these are different inventions and different claims. What is described in THESE applications was never filed by F+P, was never described by them, OR described, discussed, or mentioned by the USPTO's cited art and critics. How could ALL of the patent applications be the same as F+P?

THESE inventions include an improved calorimeter, an improvement to optimize output of a heat producing system, new improved diagnostic techniques, a new method to measure loading (which the USPTO gave to another applicant who filed later), and a new way to propel cars and heat homes, and new methods to benefit the United States by making quieter heating (which helps submarines remain stealthy), by making energy production cheaper, by making water cleanliness through boiling cheaper and making it more available, and possibly even by mitigating some nuclear materials used in terrorism.

The Memorandum Ignores that the Inventions were Misdescribed

15. The Memorandum states:

Defendant further contends that plaintiffs allegations as to the remaining three applications should be rejected because he has failed to plausibly allege that they involve patentable claims.

First, in this case, the actual content and nature of the filed inventions, as described in

each of the original specifications, were ignored and called 'cold fusion'. It did not matter that '058 is a measurement system of heat production which is applicable to obstetrics, to space travel, and laboratory use. It did not matter that '765 involved the measurement of hydrogen loading into a metal which is applicable to metallurgy, medicine, and automobiles' energy production.

16. Patent applications should be judged upon what they say in the original specification and on the evidence which was timely submitted. In this case that did not happen. Although discussed in the Complaint, including on page 13, this is ignored by the court. Also in these cases, evidence was wrongly excluded.

The Memorandum is Factually Wrong about Operability

17. The Memorandum states:

Because the PTAB found that all three inventions were inoperable, it also found that they were not useful and could not be made and used by persons skilled in the relevant art. As such, to survive defendant's Motion to Dismiss, plaintiff must allege facts sufficient to make out a plausible claim that his inventions are operable.

This is a factually false statement. First, the 35 U.S.C. § 145 Claims have scientific and engineering plausibility. Second, the Plaintiff did allege the facts. At least five (5) types of Evidence have been submitted but systematically ignored by the Defendants. Plaintiff's multiply-submitted Evidence included unclassified relevant reports from DIA, DTRA, NASA, and the US Navy. Supplementing the previous, ignored, Declarations in this court, as the Declaration of Dr. David J. Nagel states,

"In my opinion, the field of LENR is real due to many and strong experimental results from scientists in at least ten countries over the past 28 years. Operability of LENR has been demonstrated by the production of tritium, helium and other elements, none of which can be generated by chemical reactions. Thermal energy far beyond what is possible from chemistry has been measured many times by competent, well-equipped and careful scientists. That also points to the operation of nuclear reactions."

18. Third, the USPTO has absolutely NO foundation to support their mistaken opinions about the above-entitled technologies. The office is rebutted by the following: the growing peer reviewed scientific literature, the sworn testimony of those skilled in the art, the open demonstrations given at MIT over months, the indelible fact that the same thing which the Plaintiff's patent described and claimed was actually given to other applicants by USPTO at a later date, and finally that other patents, in the very same field, that actually cite the Plaintiff's applications, were issued to others by the USPTO, proving their indelible bias and blatantly cruel discrimination toward the Plaintiff. In this case there has been no substantive response to, or dispute of the Evidence. The Office was, and the court is, Obligated by law to assume that all Declarants assertions are true [Lewis v. Bours, 119 Wn.2d 667, 670, 1992]. Neither has, but instead uses unnamed sources, unsworn individuals discussing other things and other people's art.

19. In an unbiased venue, such peer-reviewed publications (like the timely submitted Declarations) establish facts. Such Evidence consisting of published peer-reviewed scientific articles which prove Plaintiff was correct on the filing date of the application, would have already met the bar of enablement [In re Hogan, 559 F.2d 595, 60S, 194 USPQ 527, 537 (CCPA 1977)]. Therefore, the USPTO has ignored In re Oetiker, 977 F.2d at 1445, 24 USPQ2d at 1444 requiring them to substantively respond with a prima facie case of unpatentability. They have not. They cannot because there is no real basis to substantiate their opinion.

The Memorandum is Factually Wrong about the DIA and DTRA Reports

20. The Memorandum states:

Although these reports may help plaintiff plausibly allege the scientific possibility of future LENR technology, they do not help him plausibly allege the current operability necessary to show patentability.

These reports cited by DTRA and the DIA were submitted, first to the USPTO, then to the PTAB, and now to the court, NOT because they allege "scientific possibility" but because they actually, explicitly, discuss the plaintiff's technology. **In fact, DTRA, DIA, and other agencies report utility and operability bascd on Plaintiff s presentation of his technologies.** [emboldened and underlined for emphasis] This is corroborated in the Declaration of Lawrence Forsley, which states:

"While operating under a US Navy NCRADA at the US Navy SPAWAR-Pacific, I was instrumental in setting up a meeting at SPAWAR to better acquaint the Defense Intelligence Agency with the field. Dr. Swartz was one of the participants of over 20 whom we invited to assess the state of the Cold Fusion/Low Energy Nuclear Reaction/Lattice Assisted Nuclear Reaction field. Subsequent to this meeting, the DIA published a report in 2009 [#DIA-08-0911-003 13 November 2009]."

As the Declaration of Dr. David J. Nagel states,

"I went with Dr. Swartz, when he presented about this new field to the Defense Threat Reduction Agency in 2006. That meeting lcd to the DTRA report, which is now in evidence in this case.

21. This satisfies the double prong requisite for "validation" and proves the Defendant has not been honest with respect to this matter. These Reports positively discuss the Plaintiff's technologies, and the Defendants and Office cannot rebut them. Specifically, in addition to Chinese, Japanese, French, Israeli and Indian scientists, the DIA Report explicitly mentions the Navy SPAWAR group, SRI International, the Plaintiff in Massachusetts, and the China Lake Naval Air Warfare Center in California. On what possible basis could the court purport this are not good enough?

The Memorandum is Factually Wrong about Submission of DIA and DTRA Reports to THIS COURT

22. The Memorandum states:

Plaintiff discusses both of these reports--one from the Defense Intelligence Agency ("DIA") and one from the Defense Threat Reduction Agency ("DTRA")-in his Complaint. See Compl. [Dkt. No. 1] ~ 61-69. Although plaintiff appears to claim that he attached both reports to his Complaint, see id. ~ 61 ("Exhibit 11 is from the DIA Report "); id. ~ 65 ("A closeup of the DTRA report is shown in Exhibit 12."), neither report was filed with the court.

On the bottom of page 10, the Memorandum Opinion purports that, regarding the DIA and DTRA reports, that "neither report was filed with the court". This is an incredulous statement., because as the Declaration of Gayle Verner states:

"The Court has stated that the Plaintiff did not include the DIA and DTRA reports with the Complaint, but that they did receive it, only from the Defendant or Defendant's counsel. That could not possibly be accurate because I, indeed, saw the Plaintiff include these documents with the Complaint; and I helped put the package together for the court.

I have first-hand knowledge of these matters and am a probative witness to the fact that I saw these reports being included into the package along with the entire Complaint that was mailed to the court. They were packaged appropriately as I helped compile them, check them, then insert them into the mailing box, and then hand delivered it to the clerk at the US Post Office."

23. The DTRA and DIA reports were cited in the above-entitled Complaint, and pages of the relevant portions citing the Plaintiff's technology were shown. They were also appended to the Complaint and also sent to the US Attorney General [Attachment 1 to pleading 1].

Both the DIA Report and the DTRA Report were both sent, and they were both received by the court.

It is outrageous that the Memorandum Opinion ignores that they not only cited Plaintiff's technology explicitly, but also misstates that they were not with the Complaint, when they WERE submitted as exhibits in a readable form by the Plaintiff. Therefore, this is also a prejudicial explanation which is outrageous. Whomever removed these exhibits did not want the court to realize that they discuss substantively and explicitly the plaintiff's technology. The court should decide if this is just obstruction of justice, or includes further elements of injustice.

The Memorandum is Factually Wrong about the Significance of the Open Demonstrations at MIT

24. The Memorandum states:

Second, neither the evidence plaintiff submits relating to LENR in general nor his evidence of experiments and demonstrations he has run establishes the operability of LENR or of the claims in plaintiff's applications.

The plaintiff, and any jury, would disagree because open demonstrations [**] DO establish operability, and peer-reviewed scientific publications DO establish operability, and products and sales do establish operability.

[**]It is interesting that the U.S. patent office has made the two scientists who openly presented their systems in this field, at the tenth international meeting (ICCF-10), that being Dr. Dash and Dr. Swartz the plaintiff, go to the U.S. Supreme Court to attempt to right the wrongs made by the U.S. patent office. In BOTH cases, the USPTO misdescribed the patent applications, and ignored timely-submitted evidence. This has the appearance of impropriety.

The Office is wrong because the existence of Plaintiff's demonstrations saliently prove that the inventions do operate as indicated and are capable of providing a useful output. The Office is wrong by ignoring this evidence because these open demonstrations were highly specific and relevant and conducted in the Department of Electrical Engineering at MIT, a reputable institution.

25. These demonstrations at MIT attracted many scientists and those interested in the invention, and that is proof of utility, and consistent with operability. As the Declaration of Lawrence Forsley states:

"I observed videos of the technology described by Dr. Swartz during his open demonstration of his high-impedance aqueous Pd/D2O/Pt Phusor-type CF/LENR component in 2003 at MIT in Cambridge MA during the 10th International Conference of this field [ICCF-10].

.... In my opinion there is utility to inventions in this field. ... Dr. Swartz NANOR and PHUSOR type devices exhibit positive thermal gain and by scaling up would be militarily and commercially useful."

As the Declaration of Dr. David J. Nagel states,

"I have observed the technology Dr. Swartz is one of the leaders in the field of LENR, having published many papers on the topic, invented two major approaches to generating energy by LENR, and developed several techniques for confidently measuring energy from LENR.

Plaintiff's open demonstrations at MIT, and the Plaintiff's submitted peer-reviewed articles and Declarations are MORE than sufficient [In re Brana, 51 F.3d at 1566, 34 USPQ2d at 1441] to meet the

"burden shift ... to provide rebuttal evidence sufficient to convince such a person of the invention's asserted utility".

The Memorandum is Factually Wrong about the number of Declarations supporting Operability

26. The Memorandum states:

In support of his opposition to defendant's Motion to Dismiss, plaintiff has submitted a variety of academic papers and declarations explaining (allegedly successful) experiments and demonstrations that he has done. See, e.g., Smith Deci.

On page 10, the memorandum discusses declarations that explain "allegedly successful experiments and demonstrations that he has done" (e.g. Robert Smith). In fact there have been many more declarations and Amicus Briefs (consistent with the videos online)

submitted which have all probative value and were submitted here as exhibits including Dr. Gordon, and Dr. Ahern, and they are supplemented by the declaration of Lawrence Forsley. Several others were discussed in the Complaint.

The Memorandum is Factually Wrong about the previous cases

27. The Memorandum states:

.. the Federal Circuit expressly decided the §§ 101 and 112 issues as the basis for affirming the USPTO's decision; and (4) plaintiff, as a party in the earlier litigation, had a full and fair opportunity to litigate those issues. As such, plaintiff is collaterally estopped from relitigating the patentability of the '058 and '765 patent applications and Count 1 will be dismissed with respect to those two applications.

This is utterly unfair. The plaintiff never had an opportunity in earlier litigation for a full and fair opportunity to litigate because the materials were not docketed, and because the materials were sequestered, and because they were never responded to, and most importantly because the inventions were misdescribed.

Application 058 was originally 457 and is a calorimeter used to measure generated heat. The Defendant misdescribed it, too, and also wrote fraudulent case law about it. In both these cases, the Response Briefs, appended and included as if attached herein.

Ignoring this has the indelible appearance of impropriety.

The Memorandum is Factually Wrong about this case re: Collateral estoppel

28. The Memorandum states:

The application of collateral estoppel does not depend on whether new evidence has been uncovered or whether the plaintiff has identified a different cause of action; instead, collateral estoppel depends on "the identity of the issues that were litigated" in the earlier suit.

These cases are a different group of the issues, a different group of claims, and clearly a different and larger group evidence, from those previously submitted. It is factually false that this court says otherwise.

There is not a repeat of previous court issues because previously there is real indication of sequestration of Evidence. And there is new Evidence. The doctrine of collateral estoppel is not appropriate here because here there are new materials and evidence including additional new evidence of a cover-up in violation of the Plaintiff s civil rights. This is a serious matter that was discovered AFTER the Appellate court, and is discussed in the Complaint, including on page 100 where a docket with '1/2' numbers are shown, but substantively ignored by the court. It is also discussed in more detail when it was first seredipitously observed [Plaintiff's Exhibit 65 - Petition for Panel Rehearing [00-1107]].

29. None of this was in any previous action. Furthermore, there is now additional evidence including new sworn declarations and new peer-reviewed publications proving operability and utility, in addition to the previous evidence which was submitted and not logged or properly addressed.

Most egregious, in addition USC 145 enables the entry of new evidence such as the Group II and Group III Evidence making this a completely different case, and one that the US Supreme court said is appropriate for this court.

Therefore, collateral estoppel is not relevant in 058 and 765 as the Memorandum purports because new material was presented in the most recent application. Said new material was not available at the time of the previous applications (these are continuations) and the added newer material includes new declarations, new evidence of open demonstrations, new scientific results, and new peer-reviewed scientific publications.

Appx 46

30. Furthermore, it only effects two of the patent applications. It is inhumane for the court to make this case Dismissed with Prejudice on this matter, since those other applications are not even relevant here. [emboldened and underlined for emphasis]

The Memorandum is Factually Wrong about the Existence of the Field

31. The Memorandum states:

Both the USPTO and the Federal Circuit have long believed that LENR technology is presently inoperable. See, e.g., In re Swartz, 232 F.3d at 864 (discussing the "substantial evidence" that claimed LENR results are "irreproducible" and that "those skilled in the art would 'reasonably doubt' the asserted utility and operability" of LENR technology); referencing LENR technology as an example of something "so incredible" as to warrant "special procedures" at the USPTO)... ("[V]irtually none of the scientific community consider[s] the alleged positive results of cold fusion experiments as being confirmed " (internal quotation marks omitted) (second alteration in original)).

The field by whatever name is real [confer the Affidavits of Forsley, Nagel, Mallove, Fox, Bass, Swartz, Biberian, Hagelstein] . As the Declaration of Lawrence Forsley states:

"In my opinion, the field of cold fusion whether called low energy nuclear reactions (LENR) or lattice assisted nuclear reactions (LANR) is real, scientifically significant, militarily important and possibly commercially useful. I have spent 27 years primarily researching and harnessing the energetic particles that give rise to the excess heat attributed to the phenomena and am engaged in scaling development for deep space power using the phenomena."

As the Declaration of Dr. David J. Nagel states,

"I am very familiar with the subject of Low Energy Nuclear Ractions LENR), having worked in the field since 1989 and chaired the international convention of the subject as its 14th meeting (ICCF-14) in Washington DC in 2008. LENR (initially called cold fusion), which is operable and has great utility, was invented in the U.S. It is expected to be the basis for a new global industry. The U.S., given the proper basis of intellectual property, can be the global leader in the new industry."

The Memorandum is Inaccurate, Unfair and Cruel

32. The Memorandum states:

Plaintiff appealed the rejection of both applications to the Federal Circuit and, in both cases, the Federal Circuit affirmed the Board's determination that the patent applications failed to satisfy §§ 101 and 112. See id.; In re Swartz, 50 F. App'x 422, 424-25 (2002) (per curiam); In re Swartz, 232 F.3d 862, 864 (2000) (per curiam).

This statement is unfair because the plaintiff did not know -- and the judicial authority at that time did not know -- that filed evidence had been removed, and not docketed until much later. It was only later, and as a result of subpoena power, that it was observed that the USPTO had a systematic 'failure to docket' along with their 'failure to discuss'. Thus the USPTO failed to give adequate due process [**] to timely-submitted documents. Patent applications should be judged upon what they say in the original specification and on the evidence which was timely submitted. In this case that did not happen.

Ignoring this has the appearance of impropriety.

[**] Previously, the original specifications were not even described accurately, the words of the original specifications were not used but others imposed by the USPTO. The responses involved, and fixated on words, which were not even in the application or mentioned once in passing. Egregiously, the submitted data and evidence were ignored including any and all Evidence that rebutted the opinion of the U.S. patent office. For this court to ignore this, and "rubber-stamp" the USPTO has the appearance of impropriety.

The Memorandum is Factually Wrong about What Plaintiff Alleged about Operability

33. The Memorandum states:

Therefore, although plaintiff may plausibly allege both the theoretic potential of LENR technology and also that he has achieved some positive experimental results (presumably related to the LENR field), he has not plausibly alleged that the inventions claimed in his patent applications were involved in those experiments or that those inventions have any current operability."

This is not true. Despite what is in the Opinion, and despite what was seemingly rubber stamped by this court, the plaintiff DID allege over and over that the inventions in the patent applications precisely identified in the above-entitled action WERE involved in those experiments AND in those open demonstrations at MIT. There is operability and there has been manufacturing and development. This was discussed in the Complaint [averments 90-93, pages 45-47].

The Exhibits demonstrate that the USPTO was informed about this, but continues to misdirect the court - which is highly improper.

The Memorandum is Factually Wrong about the Plausibility of the Invention to Measure Loading by Vibration

34. The Memorandum states:

Because plaintiff has failed to plausibly allege that his patent applications describe operable inventions, he has failed to plausibly allege his entitlement to a patent and his § 145 claims must be dismissed with respect to the remaining-'258, '643, and '691-applications."

This is demonstrably not true. Despite what is said in the opinion memorandum, the invention in '258 was then granted to an automobile company AND this court was notified of that in the Complaint of the above-entitled action. This is improper for the Opinion to falsely purport that the plaintiff did not do this, because the Office has misdescribed an invention with great consequences. As one example, the Declaration of Lawrence Forsley states:

"I have read the above-entitled Complaint and am surprised that In re Swartz, used by the USPTO to stifle cold fusion, is actually about a vibrating sensor whose frequency is used to measure loading, and not about cold fusion, but relevant to it as to other things such as metallurgy."

The fraudulent behavior of the USPTO with respect to In re Swartz is further discussed in

Exhibit 63, including on pages 158 and 161. Although discussed in the Complaint, including on page 97, this is ignored by the court. If the Opinion is not corrected, this will make future generations of Americans understand that this important matter, which is not de minimus just because it involves hydrogen, was possibly "judged" with a wink and nod.

The Memorandum is Factually Wrong about Constitutional Right Claimed by Plaintiff

35. The Memorandum states:

Even if plaintiff were suing the defendant in his personal capacity or were requesting only injunctive relief on his constitutional claims, his Complaint would have to be dismissed for failing to state a claim upon which relief could be granted. In both Count 2 and Count 8, plaintiff alleges only vague violations of his constitutional rights."

The plaintiff did give clear violations of this Constitutional rights including those that protect his right to his inventions, including those upon which he has worked on for 29 years (and after contributing to courses at MIT teaching how to file for inventions).

The Memorandum is Factually Wrong about the Dual-Tiered System

36. The Memorandum states:

Without additional factual allegations explaining, for example, what plaintiff means by "[d]efendant's unlawful dual-tiered system"; how plaintiff was treated unequally from others; or what liberty or property interest plaintiff has been denied, his Complaint does not state a plausible claim for relief. "

This is just not true. There is no question that the plaintiff has demonstrated to this court a dual-tiered system several ways. The simplest, clearest, and most relevant is that some other patent applications in this field have been granted, but because the patent applications associated with this action were filed at earlier dates, apparently to discuss them honestly would give the USPTO the proverbial "black eye". As one example, as the Declaration of Lawrence Forsley states:

"I have a patent issued in this field USPTO 8,419,919 that cites multiple patent applications by Dr. Swartz."

37. As another example, Plaintiff demonstrated the USPTO systematically failing to docket submitted Evidence, and then even granting '258, claims of the identical invention, to an automobile company, at a later date [***].

[***] The Defendants issued Nissan Motor Co., Ltd. the invention from the 258 application [US 8247122 B2 was issued on Jul 8, 2004 to Masaru Okamoto of Nissan] even though Plaintiff was first to submit, and unlike Nissan, Plaintiff actually submitted data, clear claims, and a far more definite application (averment 38, corr. Complaint).

38. As another example, and in fact, no better proof of the dual-tiered system disproving the claim that the USPTO does not accept "cold fusion" for other applicants, is Exhibit 59. In that Sept. 27, 2012 letter from Anthony Caputa, Office of the Commissioner for Patents to David J. French, Second Counsel Services, Ottawa, Canada, it states,

"We also thank you for your suggestion to have a message that "The USPTO is open for business in the field of Cold Fusion for properly prepared patent filings" before the Cold Fusion revolution arrives. This is already the case "

The Memorandum and this court are creating an indelible stain of impropriety by claiming that the plaintiff did not demonstrate conclusively the dual-tiered system when it was proven to anyone who reads the entire Complaint.

The Memorandum is Factually Wrong about the Administrative Notices Given

39. The Memorandum states:

Plaintiff does not dispute that he failed to appropriately file an administrative claim with the USPTO, see Def. Mem. [Dkt. No. 18] Ex. 12, instead arguing that (1) he "has submitted Petitions (pursuant to the Board of Patent Appeals) seventeen times in the last two years"; (2) "the FTCA is only for federal employees" and does not apply to "independent contractors"; and (3) "in this case, foreign governments may be involved,"

The plaintiff DID dispute and file administrative notice and claims with the USPTO and copies and notices were given to this court and apparently just ignored. In addition, the plaintiff followed the orders of the PTAB explicitly and this court has not even recognized what the PTA Ordered the Plaintiff to do -- and which he then did.

The Memorandum is Factually Wrong about FTCA (Relevance and Timing)

40. The Memorandum states:

None of these responses is compelling. To satisfy the FTCA's administrative exhaustion requirement, claims against the USPTO must be filed with the USPTO Office of General Counsel, not merely discussed in a petition submitted to the PTAB."

The Federal Tort Claims Act ("FTCA"), 28 U.S.C. §§ 2671-2680 is not relevant for the following reasons. It only allows certain kinds of lawsuits against federal employees who are acting within the scope of their employment [negligence or careless conduct], but defendants abrogations are systematic intentional misconduct. Also, FTCA is irrelevant because the USPTO had 6 months to respond after the Plaintiff had submitted Notices and Petitions more than a dozen times in the last two years alone. In this case, The Defendants Memorandum stated that two of the Defendants were out of their reach and FTCA is not applicable for apparent (on information and belief, including upon findings of Senator Charles Grassley s Committee) independent contractors.

The Court has Ignored the PTAB

41. The Plaintiff thereafter did Obey the Decision of Appeal 2009-001853, Application 10/646,143, in the DECISION ON REQUEST FOR REHEARING made Feb. 22, 2011. The Plaintiff repeatedly DID file the appropriate Petitions to the Commissioner and thereafter did send more than seventeen Petitions to the Commissioner of Patents (Defendant) as the USPTO PTAB directed, just during the period of 2015 to 2016.

Appx 5a

Most importantly, the Plaintiff has also presented more than a dozen administrative claims to the USPTO prior to commencing this suit, and did so, including by Petition pursuant to the Order of the Board. Plaintiff did exactly what that USPTO required prior to commencing this suit. The Plaintiff absolutely did exhaust all his remedies, including multiple Petitions to the Commissioner, supported as required by multiple declarations, and also supported by timely-submitted Evidence from the DIA, DTRA, DARPA, and NASA.

SUMMARY and CONCLUSION

42. There are strong and significant grounds for reconsideration pursuant to CR 59(a)(4). The court has issued an Order built on considerable misunderstanding, and without substantive relevant foundation. The Complaint, and the Evidence submitted along with the record, itself, show that some of the statements made in the Memorandum and Opinion are factually false statements.

43. The court has wrongly accepted the Defendants counsels statements as accurate and truthful while overlooking facts discussed in several of the pro se Plaintiff s pleadings cited herein.

44 The *pro se* Plaintiff demonstrated significant Evidence and justifiable reasons for not dismissing this case. The Plaintiff clearly described his claims including for constitutional violations, including that there was new material, including that the inventions were misdescribed, including that the federal court and PTAB had been "tricked" by some at the Office and counsel, and including that the equal protection clause was clearly shown to be broken several ways.

45. This pleading has shown that the Plaintiff has been specific, substantive and precise, and that the Memoranda, Reply and Opinion have factually false statements. This is in the light that the Defendants have not refuted even one fact in said above-entitled Complaint, which therefore must be taken as true.

46. The above-entitled complaint has alleged sufficient facts, and precise specific allegations, so that the Court should not dismiss any claims. Nothing in the United States Constitution, or any law or directive from Congress authorizes the destruction, spoliation, sequestration, or destruction of Evidence involving that the DIA, DARPA, NASA, or DTRA.

47. Most importantly, this court has jurisdiction over the Defendant because the US Board of Patent Appeals and Interferences did say so when they declared "**procedural misconduct by the Examiner in this or any other case (35 U.S.C. § 6(b) (is not reviewable) .** The Plaintiff's ONLY avenue for justice with respect to these matters is in THIS court.

48. There are no grounds for dismissal under Rule 12(b)(6). The above-entitled Complaint particularly states facts that support each element of Plaintiff's claims and thus withstands the Defendants Motion to Dismiss.

49. This wrongful judgment makes the Plaintiff suffer immediate, continuous and irreparable injury, and because this action cited the Lincoln Law, civil rights of many others will also be lost (Complaint, page 120). If that is not enough, America's military in the future will lose vital technology requisite to protect stealth

submarines and moving Marines, and worldwide people will not gain the means to obtain cheaper clear water and energy.

50. This wrongful judgment attempts to deny justice, using unethical, egregious, and unreasonable practices, and to deny civil rights, including Constitutionally protected rights, will cease [Braaten v. Deere & Co., Inc., 1997 ND 202, ¶9, 569 N.W.2d 563; North Dakota Supreme Court Opinions, Nastrom v. Nastrom, 1998 ND 142, 581 N.W.2d 919 Filed July 16, 1998].

WHEREFORE, for the above reasons, the Plaintiff requests Reconsideration or a Finding of the Facts by the Honorable court, because permitting this court to correct these misapprehensions serves the interests of judicial economy and justice for all.

Respectfully submitted,

Mitchell Swartz, ScD, MD, *pro se*

CERTIFICATE OF SERVICE

Plaintiff certifies that a copy of the above has been delivered to Defendants this August 30, 2017 by First Class mail, sent to United States Attorney, sent to Attorney Dana J. Boenta, US Attorney, U.S. Attorney's Office, 2100 Jamieson Avenue, Alexandria, Virginia 22314.

Respectfully submitted,

Mitchell R. Swartz, ScD, MD, *pro se*
Weston, MA

Appx 55

**IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA Alexandria Division**

MITCHELL R. SWARTZ, Plaintiff

v.

JOSEPH MATAL, Performing the Functions and
Duties of the Under Secretary of Commerce
for Intellectual Property and Director of the
United States Patent and Trademark Office,
Defendant.)

No. 1:17-cv-482
(LMB/TCB)

August 30, 2017

**Plaintiff s Motion For Leave to File Plaintiff's
Memorandum in Support of Plaintiff's "MOTION TO
RECONSIDER PURSUANT TO CR 59(a)"**

Now comes the *pro se* Plaintiff who moves in this Court for permission to file a long Memorandum to respond to the factually false statements in the Defendant's Reply and the secondary false statements in the Opinion.

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1. On 8/22/2017, the court dismissed the above action without a single Hearing, and without permitting the Plaintiff to respond to the Defendant's Reply [Pleading 29] which was received by mail the very same day. Plaintiff NEVER had a chance to Respond.

2. The Defendant s pleadings have factually false statements and are a frivolous attempt to confuse and bias the court -- continuing their pattern of attempting to deceive the court **while hiding behind their governmental privilege as a shield.** [underlined and emboldened for emphasis]. Addressing these factually false statements is quite important.

3. The Plaintiff s Opposition may enable the court to more accurately understand and weigh the issues, and said Opposition may also present additional relevant information that should be of interest to the Honorable court.

4. The U.S. Supreme Court has ruled that any *pro se* litigant is entitled to less stringent standards [U.S. Rep volume 404, pages 520-521 (72)].

Respectfully submitted,

Mitchell Swartz, ScD, MD, *pro se*

CERTIFICATE OF SERVICE

Appx 57

Plaintiff certifies that a copy of the above has been delivered to Defendants this August 30, 2017 by First Class mail, sent to United States Attorney, sent to Attorney Dana J. Boenta, US Attorney, U.S. Attorney's Office, 2100 Jamieson Avenue, Alexandria, Virginia 22314.

16 Pembroke Road
Weston, Massachusetts 02493

August 30, 2017

Office of the Clerk, Civil Actions
US District Court, Eastern District Virginia
Albert V. Bryan U.S. Courthouse
401 Courthouse Square
Alexandria, VA 22314

To Whom it does Concern:

Attached to this letter are:

1. Plaintiff's MOTION TO RECONSIDER PURSUANT TO CR 59(a)
2. Plaintiff's Motion For Leave to File Plaintiff's Memorandum in Support of Plaintiff's 'MOTION TO RECONSIDER PURSUANT TO CR 59(a)'
3. Plaintiff's Memorandum in Support of Plaintiff's "MOTION TO RECONSIDER PURSUANT TO CR 59(a)"
4. Six attachments (6 Exhibits), rebutting Defendant's factually false statements, are included with it:

Att: 1 Plaintiff's Exhibit 59 - USPTO Letter to David French
from Anthony Caputa, Office of the Commissioner for Patents
Att: 2 Plaintiff's Exhibit 60 - Declaration of Dr. David Nagel
Att: 3 Plaintiff's Exhibit 61 - Declaration of Lawrence P.G. Forsley
Att: 4 Plaintiff's Exhibit 62 - Declaration of Gayle Verner
Att: 5 Plaintiff's Exhibit 63 - Appeal Brief '058
Att: 6 Plaintiff's Exhibit 64 - Appeal Brief '258
Att: 7 Plaintiff's Exhibit 65 - Petition for Panel Rehearing [00-1107]

5. A postal card for the stamp of the Post Office of the US District court.

Patent Appendix

1. The Plaintiff submitted more than ten patent applications to the Defendants involving clean energy production which is safe and has no carbon emissions, no toxicity, and no radioactivity. The inventions make, monitor, and measure the generated heat very quietly and efficiently [shown schematically in Exhibit 1]. - and generate electricity. Heat means ordinary thermal energy such as used to heat homes, and to heat and purify water, as needed in industrial laboratories and hospitals, worldwide.

Seven patent applications [258, '381, '058, '765, '691, '643 and '342] are the subject matter of the above-entitled Complaint.

TABLE - PATENTS/PREVIOUS CASES BEFORE FEDERAL COURT

S.N. 12/589,258 [filed 10/20/2009; Appeal 2013-004667]
S.N. 13/544,381 [filed: 07/09/2012; Appeal 2017-006193]
S.N. 12/932,058 [filed: 7/05/2003; Appeal 2012-012622]
S.N. 09/750,765 [Filed: 12/28/2000; Appeal 2012-011287]
S.N. 09/748,691 [filed: 12/26/2000; Appeal 2012-000333]
S.N. 12/316,643 [filed: 12/15/2008; Appeal 2013-002922]
S.N. 13/066,342 [filed: 04/11/2011; Appeal 2015-006052]

2. Previously before the court were earlier versions of applications '058 and '258 [the heat measuring calorimeter, and the loading measurement system by vibration which were both just called: 'cold fusion' and ignored as to their real content]. This was discussed in the Appellant's Briefs in those cases, and excerpts proving that fact are also attached in the Appendix.

'258 is a Continuation of S.N. 07/371,937 [filed 06/27/1989, before the Federal Court as case 00-1107, and before the Supreme Court of the United States as 2000-1191.

'058 is a Continuation of S.N. 08/406,457 [filed 3/20/1995] before the Federal Court as case 2002-1240, and before the Supreme Court of the United States as 2002-1565.

3. The Complaint (and Exhibits) saliently show that in each case the original specification has been ignored, that submitted evidence (before Final) was ignored, that declarations were ignored, and that every notification of these issues and Constitutional- and legal-violations were ignored.

Instead of an appropriate response, in every one of the present patent applications discussed here, the Defendant has used tactics such as non-docketing, late-docketing, mislabeling, claiming fees were not paid (after the checks were cashed), sequestration and/or ignoring of Evidence, and once even purporting the Evidence was suddenly "lost".

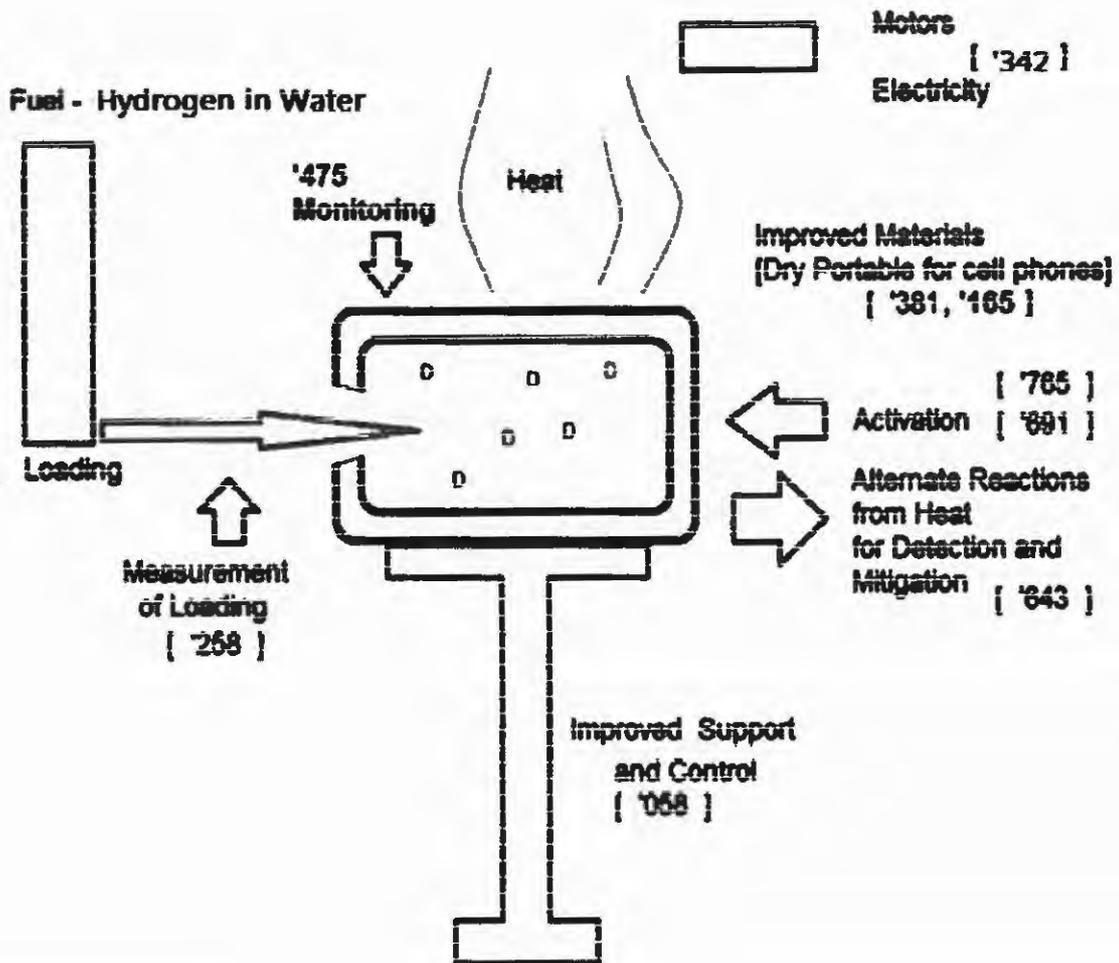


Figure Patent 1 - This figure shows a schematic overview of these several inventions, described herein, that make heat. These energy-production and energy-conversion patent applications make heat efficiently; and have also been used to generate electricity and drive small motors. Their roles of application arc shown by position in the figure; one measures loading (entry of fuel)), another two control the reaction, while others monitor and detect the loading and output, and others convert the heat to electricity. The Defendant claims they do not exist and are all the same.

DIA/DTRA APPENDIX

The Defendant Ignored the DIA REPORT

1. Figure 1 is from the DIA Report which the Defendant ignored, and the court now ignores. In Figure 1, the DIA Report (***) cites the Appellant's technology which is explicitly mentioned. The DIA report discusses the Applicant's technology. It is ignored.

[(***) The DIA (Defense Intelligence Agency) Report is a Defense Analysis Report [DIA-08-09U-003, November, 13 2009] which notes "Technology Forecast: Worldwide Research on Low-Energy Nuclear Reactions Increasing and Gaining Acceptance".]

2. Why would the Defendant ignore the DIA Report, and never even mention the DTRA Report? Answer: Because these Reports positively discuss the Plaintiff 's technologies, and give them credence which the Defendant and Office cannot rebut.

The DIA discusses research on this purportedly non-existent field ongoing by Chinese, Japanese, French, Israeli, and Indian scientists.

Attention is directed to the fact that the DIA Report explicitly mentions the Navy SPAWAR group, SRI International, the Plaintiff in Massachusetts, and the China Lake Naval Air Warfare Center in California.

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3. The Declaration of Dr. Frank Gordon states,

“Three published U.S. Government reports both document and add credibility to the existence of this technology, called LENR (or LANR, or "cold fusion"). A report by the Defense Intelligence Agency (DIA) dated 13 November 2009 titled *“Technology Forecast: Worldwide Research on Low-Energy Nuclear Reactions Increasing and Gaining Acceptance”* documents experimental results from scientists throughout the world and states that “This body of research has produced evidence that nuclear reactions may be occurring under conditions not previously believed possible.” The report includes multiple uses for this technology and further states that “...LENR power sources could produce the greatest transformation of the battlefield for U.S. forces since the transition from horsepower to gasoline power.”

4. The Evidence presented should never be overlooked, as it has been systematically here to transfer technology to other Countries and to prevent Americans from obtaining their Constitutional rights [confer Denied Field Appendix]. Evidence should not be dismissed out of hand, or hidden by false statements, or otherwise sequestered or “lost”, ending only with other exculpatory behavior as the Defendant has odiously done.

The Defendant Ignored the DTRA REPORT

5. Figure 2 has copies of pages from the DTRA Report (***).

Plaintiff’s technology is explicitly discussed.

Why is the DTRA Report ignored in its entirety?

Answer: Because of the its quality and substantive support of the Applicant.

DIA/DTRA APPENDIX - 3

On page 25 of said DTRA Report is the fact finders are listed.

"Feedback from Panel of Experts - The Honorable Dr. H Smith, Dr. Jack Davis, Dr. Fred Wikner, and Dr. Gerald Yonas".

On page 26 of said DTRA Report, it states:

"Low Energy Nuclear Reactions are showing some remarkable progress with respect to energy (excess heat) production and transmuted element detection".

Page 28 of the DTRA Report states in the (now Declassified) conclusion of the DTRA Group in response to Appellant's technology.

"There is good evidence of excess heat and transmutation "

In fact, DTRA, DIA, and other agencies report utility and operability of CF/LANR/LENR and specifically the Appellant's technologies – and this satisfies the double prong requisite for "validation". It also indelibly proves, by does not explain why, the Defendant has not been honest with respect to this matter – including in the federal court for years [Confer Wrong Description Appendix and Patent Appendix].

[(***) The DTRA Report is from the Defense Threat Reduction Agency [8725 John J. Kingman Road, MSC 6201 Fort Belvoir, VA 22060-6201] and is the High Energy Science and Technology Assessment [FINAL REPORT, June 29, 2007]. It was prepared for the Defense Threat Reduction Agency Advanced Systems and Concepts Office under Contract No: DTRAOI-03-D-0017 Task Order 18 Technical Instruction 18-06-11, and was prepared by Richard Sutton and Dr. George Ullrich of Science Applications International Corporation (SAIC; 1710 SAIC Drive, MCLEAN, VA 22102).]

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6. The Declaration of Dr. Frank Gordon states,

“In addition to the Defense Threat Reduction Agency (DTRA) Report from the 2006 meeting discussed by Dr. Swartz in the above-entitled Complaint, there was a subsequent report from (DTRA) titled *“Investigations of Nano-Nuclear Reactions in Condensed Matter”* that updates and compliments the information in the DIA report. The internal DTRA scientific and technical review process was completed and cleared for public release on June 7, 2016. Both the DIA and DTRA review/signoff process could be considered to be comparable to peer-review for a technical journal article. In addition to the DIA and DTRA Reports, the U.S. Navy has issued reports documenting this technology, including TECHNICAL REPORT 1862, February 2002 [*Thermal and Nuclear Aspects of the Pd/D₂O System*, two volumes].”

This is important because the overlooked Evidence proves that the Defendant's notions are built on disingenuous statements at variance with the facts that the Applicant's theory and data and invention are accepted by scientists at the US Navy, at both SPAWAR and NRL, DTRA, DIA, and the American Nuclear Society. Several companies and scores of scientists are highly supportive of Applicant's high impedance NANOR®-type and aqueous PHUSOR®-type LANR (lattice assisted nuclear) systems.

7. Attention is directed to the fact that the Applicant has repeatedly undertaken the full burden of coming forward with his evidence as required [In re Oetiker, 977 F.2d at 1445, 24 USPQ2d at 1444]. By ignoring Evidence, the Defendant continues impropriety as he ignores In re Wands, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988).

UNCLASSIFIED



Defense Intelligence Agency

Defense Analysis Report

DIA-08-0911-003

13 November 2009

Technology Forecast: Worldwide Research on Low-Energy Nuclear Reactions Increasing and Gaining Acceptance

Scientists worldwide have been quietly investigating low-energy nuclear reactions (LENR) for the past 20 years. Researchers in this controversial field are now claiming paradigm-shifting results, including generation of large amounts of excess heat, nuclear activity and transmutation of elements.^{1,2,3} Although no current theory exists to explain all the reported phenomena, some scientists now believe quantum-level nuclear reactions may be occurring. 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.^{4,5}

Background

In 1989, Martin Fleischmann and Stanley Pons announced that their electrochemical experiments had produced excess energy under standard temperature and pressure conditions.⁶ Because they could not explain this physical phenomenon based on known chemical reactions, they suggested the excess heat could be nuclear in origin. However, their experiments did not show the radiation or radioactivity expected from a nuclear reaction. Many researchers attempted to replicate the results and failed. As a result, the physics community disparaged their work as lacking credibility, and the press mistakenly dubbed it "cold fusion." Related research also suffered from the negative publicity of cold fusion for the past 20 years, but many scientists believed something important was occurring and continued their research with little or no visibility. For years, scientists were intrigued by the possibility of producing large amounts of clean energy through LENR, and now this research has begun to be accepted in the scientific community as reproducible and legitimate.

Source Summary Statement

This assessment is based on analysis of a wide body of intelligence reporting, most of which is open source information including scientific briefings, peer-reviewed technical journals, international scientific conference proceedings, interviews with scientific experts and technical media. While there is little classified data on this topic due to the S&T nature of the information and the lack of collection, DIA judges that these open sources generally provide the most reliable intelligence available on this topic. The information in this report has been corroborated and reviewed by U.S. technology experts who are familiar with the data and the international scientists involved in this work.

Although much skepticism remains, LENR programs are receiving increased support worldwide, including state sponsorship and funding from major corporations.^{7,8,9,10} DIA

Figure 1 (part 1) – Copy of the cover from the DIA Report - The DIA (Defense Intelligence Agency) Report; a Defense Analysis Report [DIA-08-09U-003, November, 13 2009] which notes "Technology Forecast: Worldwide Research on Low-Energy Nuclear Reactions Increasing and Gaining Acceptance".

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- Chinese researchers described LENR experiments in 1991 that generated so much heat that they caused an explosion that was not believed to be chemical in origin.²⁵
- Japanese, French, and U.S. scientists also have reported rapid, high-energy LENR releases leading to laboratory explosions, according to scientific journal articles from 1992 to 2009.^{26, 27}
- Israeli scientists reported in 2008 that they have applied pulsating electrical currents to their LENR experiments to increase the excess energy production.²⁸
- As of January 2008, India was reportedly considering restarting its LENR program after 14 years of dormancy.²⁹

U.S. LENR researchers also have reported results that support the phenomena of anomalous heat, nuclear particle production, and transmutation.^{30, 31, 32}

- At the March 2009 American Chemical Society annual meeting, researchers at U.S. Navy SPAWAR Pacific reported excess energy,³³ nuclear particles,³⁴ and transmutation,^{35, 36} stating that these effects were probably the result of nuclear reactions.³⁷
- A research team at the U.S. company SRI International has been studying the electrochemistry and kinetics of LENR since the early 1990's, reporting excess heat and helium production.³⁸

2

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- In May 2002, researchers at JET Thermal in Massachusetts reported excess heat and optimal operating points for LENR manifolds.³⁹
- Researchers at the China Lake Naval Air Warfare Center in California first reported anomalous power correlated with Helium-4 production in 1996.⁴⁰

Although no one theory currently exists to explain all the observed LENR phenomena,

Figure 1 (part 2) - Copy of pages 2 and 3 of the DIA Report; DIA (Defense Intelligence Agency) Report is a Defense Analysis Report [DIA-08-09U-003, November, 13 2009]. Pages 2 and 3 notes efforts by the Chinese, Japanese, French, Israeli and Indian scientists, the US Navy SPAWAR group, SRI International, the Plaintiff in Massachusetts, and China Lake Naval Air Warfare Center in California.

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Defense Threat Reduction Agency
8725 John J. Kingman Road, MSC 6201
Fort Belvoir, VA 22060-6201



2007 001

Advanced Systems and Concepts Office
FINAL REPORT

**High Energy Science & Technology
Assessment**

June 29, 2007

Authors:
Rich Sutton
George Ulrich, PhD

Prepared by:
Science Applications International
Corporation (SAIC)
1710 SAIC Drive
MCLEAN, VA 22102



Distribution Statement D:
Distribution authorized to U.S. government agencies and their contractors only, Critical Technology, 30 June 2004. Other requests for this document shall be referred to the Defense Threat Reduction Agency.

Disclaimer:
The views expressed herein are those of the author(s) and not necessarily those of the Department of Defense, the Defense Threat Reduction Agency, or any other agency or component of the US government.

DTRA01-03-D-0017/Task Order 18-05-14

Figure 2 (part 1) – Copy of the cover of the DTRA Report, page 1 [next two pages are copies of pages 18 and 28]. The DTRA Report is the High Energy Science and Technology Assessment [FINAL REPORT, June 29, 2007], prepared for the Defense Threat Reduction Agency Advanced Systems and Concepts Office.

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~~Dr. Mitchell Swartz, JET Energy, LLC~~ presented a brief summary of the results of excess heat experiments in electric-field loaded deuterated metals:

**EXCESS HEAT IN
ELECTRIC-FIELD LOADED DEUTERATED
METALS**
Research and Development

BRIEF SUMMARY OF RESULTS:

SIGNIFICANT EXCESS HEAT OBSERVED IN PALLADIUM HEAVY WATER (PdD) SYSTEM, PALLADIUM HEAVY WATER (PdD) CODEPOSITIONAL SYSTEM, SOME NICKEL LIGHT and HEAVY/LIGHT WATER SYSTEMS

EXCESS HEAT NOT OBSERVED IN IRON, ALUMINUM, OR DAMAGED PALLADIUM NICKEL SYSTEMS



 DTRA ASCO Workshop
on High Energy Science and Technology Oct.
12, 2006

He explained his methods for controlling measurement error and system noise by using dual calorimeter measurements that allowed precise differential measurement and integration of power. He was thus able to compare measurements of several different instruments to allow judgment of consistency in his reported results.

The diffusion and electrophoresis equations show the advantages of low conductivity electrolytes and relatively high voltages for loading D into the electrodes with co-deposition of electrode material. Dr. Swartz obtained energy and power gains over the D charging (loading) input power and discussed the importance of determining optimized operating points. Impressively, he showed a video demonstrating enough power to spin the propeller of a model airplane.

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Figure 2 (part 2) - Copy of page 18 of The DTRA Report; the High Energy Science and Technology Assessment [FINAL REPORT, June 29, 2007], prepared for the Defense Threat Reduction Agency Advanced Systems and Concepts Office.

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FOR OFFICIAL USE ONLY**9.0 Recommendations**

Novel Energy Strategy: The Expert Panel noted that there many potentially interested agencies and that DTRA, as a new 6.1 agency, will need to find its niche. It is recommended that DTRA form and/or participate in an Interagency Novel Energy Working Group. Partnering agencies would include DTRA, DOE/NSSA, the National Laboratories, DHS, DARPA, NSF, and the Service Labs. The charter would be to coordinate budgets for maximum return and chart a course that would accelerate development of advanced energy concepts.

Isomer Energy Storage: The extraordinary claims regarding the de-excitation of Hf^{178m2} appear to have been thoroughly discredited. Nonetheless, it may be warranted to fund some basic research to continue screening candidate isomers, to develop an improved understanding of the physics of isomer de-excitation, and to explore de-excitation methods other than x-ray stimulation. There are no likely near-term military applications of nuclear isomers.

LENR: LENR still suffers from negative publicity associated with Cold Fusion and is viewed as being conducted outside the domain of legitimate, mainstream science. Nonetheless, the persistent and increasingly repeatable demonstrations of excess heat and transmutation suggest that there is something here worth pursuing. DTRA should not do so alone, but rather foster consortia that would help bring discipline and rigorous experimental protocol to this field. Additionally, efforts to better understand the physics of LENR as well as the development of first-principle predictive models are encouraged.

Anti-Matter: The challenge of stable storage of positrons in the form of positronium may be surmountable but progress to date has been modest. Near-term applications of this technology appear to be ill-advised. Additionally, the large parasitic mass associated with the storage of positronium and the small amount that can be stored, even under the most optimistic projections, effectively limits the system-level energy density. Nonetheless, some basic 6.1 research should be invested in keeping the effort alive. Perhaps an alliance between DTRA and NSF would be useful in this regard.

4th Generation Nuclear Weapons: DTRA, in cooperation with NNSA and with the approval of OSD, should consider supporting a few pilot studies to explore the potential applications of 4th generation nuclear weapons to meet projected future national security needs, explore the potential impact of such weapons if they were to be used against U.S. forces or infrastructure, and examine their overall policy implications.

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Figure 2 (part 3) - Copy of page 28 of The DTRA Report; the High Energy Science and Technology Assessment [FINAL REPORT, June 29, 2007], prepared for the Defense Threat Reduction Agency Advanced Systems and Concepts Office. On page 28, the (now Declassified) conclusion of the DTRA Group, partially in response to Plaintiff's technology, is that "(t)here is good evidence of excess heat ..".

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SCIENTIFIC PUBLICATIONS APPENDIX

1. There is sterling evidence heralding operability and utility for each of the inventions of the Appellant. The proof is in the range of peer-reviewed publications. Some of them are listed below.

TABLE - EVIDENCE

NEW EVIDENCE OF OPERABILITY

1. Swartz, M.R. "Optical Detection of Phonon Gain Distinguishes an Active Cold Fusion/LANR Component", JCMNS, 20, 29-53 (2016); www.iscmns.org/CMNS/JCMNS-Vol20.pdf
2. Swartz, M.R. P. Hagelstein, G. Verner, Impact of Electrical Avalanche Through a ZrO₂-NiD Nanostructured CF/LANR Component on its Incremental Excess Power Gain", ICCF-19, JCMNS, 19, (2016)
3. Swartz, M. G. Verner, J. Tolleson, P. Hagelstein, Dry, preloaded NANOR®-type CF/LANR components, Current Science, 108, 4, 595 (2015); <http://www.currentscience.ac.in/Volumes/108/04/0595.pdf>
4. Swartz M., Verner, G., et al., Imaging of an Active NANOR®-type LANR Component using CR-39, J. Condensed Matter Nucl. Sci. 15, (2015), p 81; www.iscmns.org/CMNS/JCMNS-Vol15.pdf
5. Swartz, M. R, "Oscillating Excess Power Gain and Coerced Magnetic Domains in M-NANOR-type CF/LANR Components", J. Condensed Matter Nucl. Sci. 22, 35-46 (2017)
6. Swartz M., Incremental High Energy Emission from a ZrO₂-PdD Nanostructured Quantum Electronic Component CF/LANR, J. Condensed Matter Nucl. Sci. 15, (2015), p 92; www.iscmns.org/CMNS/JCMNS-Vol15.pdf
7. Swartz M., Verner, G., et al., Amplification and Restoration of Energy Gain Using Fractionated Magnetic Fields on ZrO₂-PdD Nanostructured Components, J. Condensed Matter Nucl. Sci. 15, (2015), p 66; www.iscmns.org/CMNS/JCMNS-Vol15.pdf

NEW EVIDENCE OF EXISTENCE OF FIELD

1. Verner, G., M. Swartz, P. Hagelstein, Development of a Science and Engineering CF Course, J. Condensed Matter Nucl. Sci. 22, 47-52 (2017)
2. Mosier-Boss, P.A, L. P. Forsley, F. E. Gordon, D. Letts, D. Cravens, M. H. Miles, M. Swartz, J. Dash, F. Tanzella, P. Hagelstein, M. McKubre, J. Bao, Condensed matter nuclear reaction products observed in Pd/D codeposition experiments, Current Science, 108, 4, 656 (2015); <http://www.currentscience.ac.in/Volumes/108/04/0656.pdf>
3. Verner, G., M. Swartz, P. Hagelstein, Summary report: 'Introduction to Cold Fusion'—IAP course at the Massachusetts Institute of Technology, Current Science, 108, 4, 653 (2015); <http://www.currentscience.ac.in/Volumes/108/04/0653.pdf>
4. Cravens, D., M. Swartz, B. Ahern, Condensed matter nuclear reactions with metal particles in gases, Current Science, 108, 4, 582 (2015); <http://www.currentscience.ac.in/Volumes/108/04/0582.pdf>

OLD EVIDENCE OF OPERABILITY REMOVED/IGNORED/NOT LOGGED

1. Swartz M. R., Hagelstein P.I., Demonstration of Energy Gain from a Preloaded ZrO₂-PdD Nanostructured CF/LANR Quantum Electronic Device at MIT, J. Condensed Matter Nucl. Sci. 13, (2014), p 516 www.iscmns.org/CMNS/JCMNS-Vol13.pdf
2. Swartz M. R., Verner G., et al., Energy Gain From Preloaded ZrO₂-PdNi-D Nanostructured CF/LANR Quantum Electronic Components, J. Condensed Matter Nucl. Sci. 13, (2014), p 528 www.iscmns.org/CMNS/JCMNS-Vol13.pdf
3. Swartz M., Verner G., et al., Non-Thermal Near-IR Emission from High Impedance and Codeposition LANR Devices, Proc. ICCF14 1, (2008), p 343; Ed D.J. Nagel and M.E.Melich, ISBN: 978-0-578-06694-3, 343, (2010); www.iscmns.org/iccf14/ProcICCF14a.pdf

Scientific Publications Appendix - 3

4. Swartz M., Verner G., The Phusor®-type LANR Cathode is a Metamaterial Creating Deuteron Flux for Excess Power Gain, Proc. ICCF14 2, (2008), p 458; Ed D.J. Nagel and M.E.Melich, ISBN: 978-0-578-06694-3, 458, (2010); www.iscmns.org/iccf14/ProcICCF14b.pdf
5. Swartz M., Excess Power Gain using High Impedance and Codepositional LANR Devices Monitored by Calorimetry, Heat Flow, and Paired Stirling Engines, Proc. ICCF14 1, (2008), p 123; Ed D.J. Nagel and M.E.Melich, ISBN: 978-0-578-06694-3, 123, (2010); www.iscmns.org/iccf14/ProcICCF14a.pdf
6. Swartz M., Optimal Operating Point Manifolds in Active, Loaded Palladium Linked to Three Distinct Physical Regions, Proc. ICCF14 2, (2008), p 639; Ed D.J. Nagel and M.E.Melich, ISBN: 978-0-578-06694-3, 639, (2010); www.iscmns.org/iccf14/ProcICCF14b.pdf
7. Swartz, M., Bass, R.W., "Empirical System Identification (ESID) and Optimal Control of Lattice-Assisted Nuclear Reactors," Proceedings of the 14th International Conference on Condensed Matter Nuclear Science and the 14th International Conference on Cold Fusion (ICCF-14), Ed D.J. Nagel and M.E.Melich, ISBN: 978-0-578-06694-3, 497, (2010).
8. Swartz, M., "Electrical Breakeven from LANR Phusor Device Systems: Relative Limitations of Thermal Loss in Feedback Loop", Proceedings of the 14th International Conference on Condensed Matter Nuclear Science and the 14th International Conference on Cold Fusion (ICCF-14), Ed D.J. Nagel and M.E.Melich, ISBN: 978-0-578-06694-3, 689, (2010).
9. Swartz, M., G. Verner, "Excess Heat from Low Electrical Conductivity Heavy Water Spiral-Wound Pd/D₂O/Pt and Pd/D₂O-PdCl₂/Pt Devices", Condensed Matter Nuclear Science, Proceedings of ICCF-10, eds. Peter L. Hagelstein, Scott, R. Chubb, World Scientific Publishing, NJ, ISBN 981-256-564-6, 29-44; 45-54 (2006).
10. Swartz, M., "Can a Pd/D₂O/Pt Device be Made Portable to Demonstrate the Optimal Operating Point?", Condensed Matter Nuclear Science, Proceedings of ICCF-10, eds. Peter L. Hagelstein, Scott, R. Chubb, World Scientific Publishing, NJ, ISBN 981-256-564-6, 29-44; 45-54 (2006).
11. Swartz, M., "Photoinduced Excess Heat from Laser-Irradiated Electrically-Polarized Palladium Cathodes in D₂O", Condensed Matter Nuclear Science, Proc. ICCF-10, eds. Peter L. Hagelstein, Scott Chubb, NJ, ISBN 981-256-564-6, 213-226 (2006).

Scientific Publications Appendix - 4

12. Swartz, M., "The Impact of Heavy Water (D₂O) on Nickel-Light Water Cold Fusion Systems", Proceedings of the 9th International Conference on Cold Fusion (Condensed Matter Nuclear Science), Beijing, China, Xing Z. Li, pages 335-342. May (2002).
13. Swartz, M., "Improved Electrolytic Reactor Performance Using p-Notch System Operation and Gold Anodes, Transactions of the American Nuclear Association, Nashville, Tenn. Meeting, (ISSN:0003-018X publisher LaGrange, Ill) 78, 84-85 (1998).
14. Swartz, M., "Consistency of the Biphasic Nature of Excess Enthalpy in Solid State Anomalous Phenomena with the Quasi-1-Dimensional Model of Isotope Loading into a Material", Fusion Technology, 31, 63-74 (1997).
15. Swartz, M., "Codeposition Of Palladium And Deuterium", Fusion Technology, 32, 126-130 (1997).
16. Swartz, M., "Phusons in Nuclear Reactions in Solids", Fusion Technology, 31, 228-236 (March 1997).
17. Swartz M., Isotopic Fuel Loading Coupled to Reactions at an Electrode, Proc. ICCF4 2, (1993), p 429; Fusion Technology, 26, 4T, 74-77 (1994); www.lenr-canr.org/acrobat/EPRiproceedinga.pdf
18. Swartz, M., "Quasi-One-Dimensional Model of Electrochemical Loading of Isotopic Fuel into a Metal", Fusion Technology, 22, 2, 296-300 (1992).

OLDER EVIDENCE OF EXISTENCE OF FIELD WHICH WAS NOT LOGGED AND/OR NOT SUBSTANTIVELY ADDRESSED

1. Swartz, M., with Marwan, J, M. C. H. McKubre, F. L. Tanzella, P. L. Hagelstein, M. H. Miles, Edmund Storms, Y. Iwamura, P. A. Mosier-Boss and L. P. G. Forsley, "A new look at low-energy nuclear reaction (LENR) research: a response to Shanahan", J. Environ. Monit., (2010).
2. Swartz, M., "Survey of the Observed Excess Energy and Emissions In Lattice Assisted Nuclear Reactions", Journal of Scientific Exploration, 23, 4, 419-436 (2009).
3. Swartz M., A Method to Improve Algorithms Used to Detect Steady State Excess Enthalpy, Proc. ICCF4 2, (1993), p 257; Transactions of Fusion Technology, 26, 156-159 (1994); www.lenr-canr.org/acrobat/EPRiproceedinga.pdf
4. Swartz M., Some Lessons from Optical Examination of the PFC Phase-II Calorimetric Curves, Proc. ICCF4 2, (1993), p 283 www.lenr-canr.org/acrobat/EPRiproceedinga.pdf

Wrong Description Appendix - 1

WRONG DESCRIPTION APPENDIX

UNDISPUTED FACT: Defendant Has Systematically Ignored the Content of the Plaintiff's Applications

1. It is an uncontested fact that ONLY the claimed invention should be the focus of the Office review. Although discussed in the Complaint, including on page 13, this is ignored by the court.

The court is mistaken and ignores the actual inventions, and falsely purports that they are all "cold fusion" (called "F+P" after Drs. Fleischman and Pons). These inventions are not what was then described as "cold fusion" then, and do not even use the materials which F+P did, or the methods F+P did, and they work for other systems, from 3D printing to submarines to artificial hearts. In the Declaration of Dr. Swartz, he states:

“ The Office ignored the original specifications, the figures, and even the words of the original specifications, falsely claiming they only involved “cold fusion” which they then ridiculed and ignored. The USPTO has absolutely NO foundation to support their mistaken opinions about my technologies.”

In application '258, the Plaintiff's cathode vibrator to measure loading? The USPTO says it is F+P.

The Plaintiff's generation of electricity? The USPTO ignores the actual invention and says it is "cold fusion" and F+P (Drs. Fleischman and Pons) invented it 28 years ago.

Wrong Description Appendix - 2

The Plaintiff's system to assemble multiple LANR systems? The USPTO ignores the actual invention and says it is "cold fusion" and F+P (Drs. Fleischman and Pons) invented it 28 years ago.

The Plaintiff's use of increasing temperature to trigger reactions? The USPTO ignores the actual invention and says it is "cold fusion" and F+P (Drs. Fleischman and Pons) invented it 28 years ago.

The Plaintiff's optimal operating points? The USPTO ignores the actual invention and says it is "cold fusion" and F+P (Drs. Fleischman and Pons) invented it 28 years ago.

The Plaintiff's system to increase tardive heat? The USPTO ignores the actual invention and says it is "cold fusion" and F+P (Drs. Fleischman and Pons) invented it 28 years ago.

The Plaintiff's unique multiring calorimeter? The USPTO ignores the actual invention and says it is "cold fusion" and F+P (Drs. Fleischman and Pons) invented it 28 years ago.

The Plaintiff's use of incident microwave radiation? The USPTO ignores the actual invention and says it is "cold fusion" and F+P (Drs. Fleischman and Pons) invented it 28 years ago.

The Plaintiff's use of nickel metamaterials with ultrapure water? The USPTO ignores the actual invention and says it is "cold fusion" and F+P (Drs. Fleischman and Pons) invented it 28 years ago.

Wrong Description Appendix - 3

2. No matter what the Plaintiff's invention, there is one response from the USPTO. The USPTO ignores the actual invention and says it is "cold fusion" and F+P (Drs. Fleischman and Pons) invented it 28 years ago. Truly, that is cloth cut of other art than the above-entitled application.

FACT: Attention is directed to the fact that given that the Plaintiff, unlike F+P, has demonstrated the above-entitled application at MIT in open demonstrations, and elsewhere, heralds that there should be allowance. If something is successfully demonstrated twice, over months, with hundreds of visiting scientists, students and others followed by positive investigative write-ups in the press both in print and online, then it is both operable and has utility.

The Office's segue to less relevant art is meant to confuse the issue, and end the matter without examination of the above-entitled invention. Such hand waving to other much less relevant art, and in the light of obstruction of justice and destroyed Evidence, is unfair as well as non-responsive as required by duty.

The Declaration of Dr. Brian Ahern states,

"I have never experienced such a response from any Examiner before, like I have from Ricardo Palabrica. His response was inappropriate for a Patent Examiner. The comments involve attempting to change an invention by overstepping his directives and acting as a 'protector' of scientific knowledge. ... Dr. Mitchell Swartz appears to be laboring under the same misuse of authority."

Wrong Description Appendix - 4

In fact, that the Office disingenuously LEADS AWAY from the real issues and matters and structures THIS INVENTION has the appearance of impropriety. In that light, the Office's repeated, unsubstantiated claim that the (nay, each) invention lacks operability is full of oceans of impropriety. And so, for two decades, no matter which of the Plaintiff's invention's in this field has been "examined", there has been essentially one, and only one, response from the USPTO. They say "It is F+P." And therefore does not exist. And therefore has no utility. Ignored is the obvious discrimination and corrupt false statements that must be made to continue this under color of Law.

At the end of the day, THESE patent applications are NOT about Fleischman and Pons' work but about the Plaintiff's invention and his discovery(ies) and secondary inventions and more than 80 published scientific papers.

3. Even the most inexperienced individual, the proverbial 'fifth grader', can recognize that each of the inventions cannot possibly all be the same thing, whether it is 'F+P' or anything else. Therefore, this behavior is blatant discrimination to prevent the Requirement of the POTUS, and an attempt to circumvent the US Constitution and the will of the US Congress [S. Rep. No. 1979, 82d Cong., 2d Sess., 5 (1952); H. R. Rep. No. 1923, 82d Cong., 2d Sess., 6 (1952)], and to deny the energy needs and security of the United States of America.

Denied Field Appendix - 1

==== DENIED FIELD APPENDIX ====

1. The Defendant cites nonrelevant, unsworn, sources mainly from 1989. Therefore, the Plaintiff submits a photograph from the recent 2014 Cold Fusion and Lattice assisted nuclear reaction colloquium, he ran, at the Massachusetts Institute of Technology in Cambridge Massachusetts from March 21 thru March 23, 2014. The scientists, teachers, and engineers shown in those photographs and in the sites listed below, are from MIT and other academic and R&D centers, and are clearly skilled-in-the art.



When will the court finally reach out to these people in the real community of skilled in the art, who see both operability and utility in the Plaintiff's above-entitled inventions.

Appx 79

Denied Field Appendix - 2

More pictures of some of the scientific meetings at MIT and some reviews of the colloquia are here:

2014 CF/LANR Colloquium at MIT Full Coverage

<http://coldfusionnow.org/interviews/2014-cflanr-colloquium-at-mit-full-coverage/>

2014 CF/LANR Colloquium at MIT video files

<http://coldfusionnow.org/2014-cflanr-colloquium-at-mit-video-files/>

25th Anniversary of Cold Fusion at MIT Sees Major Progress
Toward Real Energy Solutions

<http://coldfusionnow.org/25th-anniversary-of-cold-fusion-at-mit-sees-major-progress-toward-real-energy-solutions/>

videos by Ruby Carat and Jeremy Rhys?

<http://www.e-catworld.com/2014/03/report-of-day-two-at-the-cold-fusion-colloquium-at-mit/>

<http://www.exposingthetruth.co/mit-scientists-discover-secret-cold-fusion/#axzz2xPIXrM25>

MIT Scientists Discover Secret to Cold Fusion

Successful Applications of the Deuteron Flux Equation in Cold Fusion

<https://www.youtube.com/watch?v=RBDImkDZ4h8>

<http://www.e-catworld.com/2014/03/mit-cold-fusion-conference-report-nanor-100-cop/>

MIT Cold Fusion Conference Report (NANOR Reportedly 100 COP)

**UNDISPUTED FACT: Defendant Has Systematically, yet wrongly,
Denied an Entire Scientific Field**

2. The court falsely purports: "*Both the USPTO and the Federal Circuit have long believed that LENR technology is presently inoperable. See, e.g., In re Swartz, 232 F.3d at 864...*"

First, this is using fruit of the poisoned tree which is why this case was brought to the court in the first place.

Appx 80

Denied Field Appendix - 3

Second, existence is proven by the endless growth of science papers and engineering devices and R&D. These are more important than the Defendant's unsupported "belief". The field is real [cf. Affidavits of Forsley, Nagel, Mallove, Fox, Bass, Swartz, Biberian, or Hagelstein] .

3. As the Declaration of Lawrence Forsley states:

"In my opinion, the field of cold fusion whether called low energy nuclear reactions (LENR) or lattice assisted nuclear reactions (LANR) is real, scientifically significant, militarily important and possibly commercially useful. I have spent 27 years primarily researching and harnessing the energetic particles that give rise to the excess heat attributed to the phenomena and am engaged in scaling development for deep space power using the phenomena."

As the Declaration of Dr. David J. Nagel states,

"I am very familiar with the subject of Low Energy Nuclear Reactions (LENR), having worked in the field since 1989 and chaired the international convention of the subject as its 14th meeting (ICCF-14) in Washington DC in 2008. LENR (initially called "cold fusion"), which is operable and has great utility, was invented in the U.S. It is expected to be the basis for a new global industry. The U.S., given the proper basis of intellectual property, can be the global leader in the new industry."

4. Odiously, it has been learned [NEW Evidence] that the Defendant has secretly planned a priori to deny **"the right to exclude others from making, using, or selling the invention throughout the United States,"** for a period of 17 years [35 U.S.C. 154].

5. In the complaint, Exhibits 53 through 56 demonstrate some of this improper behavior, and corrupt actions, by the Defendant. Attention is directed to the US Patent Office's own records, uncovered by Honorable

APPX 81

Denied Field Appendix - 4

Judge Moore, confer "IN THE MATTER OF ARBITRATION Between Patent Office Professional Association FMCS Case No. 00-01666, US Department of Commerce, Patent and Trademark Office (2005). Robert T. Moore, Arbitrator, US Department of Commerce, Patent and Trademark Office, stated,

"Seemingly lost on those with control over slicing the government pie who are persuaded by the relentless drumbeat of the Parks and Zimmermans, is that those questing for "free energy," whether through cold fusion or by way of some other "emerging technology," may be similar to the alchemists of centuries back who never turned base metals into gold, but were the forerunners of modern chemistry, got the Periodic Table of Elements off to a start, and among all things, discovered how to duplicate Asian porcelain which at the time was worth more than its weight in gold. So too, those in pursuit of "free energy" could well spinoff useful advances in knowledge while failing to achieve their "holy grail. I was struck by the discomfort of Mr. Godici as he struggled to explain why the blanket exclusion of cold fusion remains in effect when during the intervening 16 years since its adoption, certainly some better understandings and approaches to cold fusion and its related technologies must have occurred which, ordinarily and but for the ban, would meet the new and useful criteria for a patent, or constitute what I'll call, a "non-obvious improvement of existing technology." ... "None of Mr. Godici's answers was totally satisfactory, and the urge, not well restrained, to say, if not scream: Hold it a minute! Isn't time to go back to the earlier days of the PTO when inventors had to produce working models of their devices?"

"(There is a) prevailing policy of the PTO. Currently, patent applications for alternative or non-conventional sources of nuclear fusion energy, including cold fusion, are routed to (Examiner's Group Art). This routing has been going on for more than 16 years pursuant to a June 5, 1989 memo to all Group Directors with the subject; Cold Fusion Applications. It reads: 'Although the media attention relating to cold fusion has diminished, we are just now beginning to see a large number of

Denied Field Appendix - 5

applications relating to this subject. Although we are attempting to identify all of these applications in the pre-examination screening process, there is the possibility that a few applications may slip through without being identified. Please have your examiners be on the look out for any application that may relate to cold fusion.

.... If one of your examiners should receive an application related to cold fu-sion, he or she should check to make sure the words "COLD FUSION" are stamped on the file wrapper. If not, the application should be referred to Licensing and Review [] for marking. Also, any action on one of these applications should be routed through the Group 220 Director's Office and the Office of the Assistant Commissioner for Patents prior to mailing."

"The Agency's witnesses avoided directly answering the question of what explicit instructions were given Mr. Behrend and other examiners in the "fusion" group on how to handle applications for cold fusion patents. However, their testimony and demeanor when questioned were clear enough. Figuratively speaking, (they have) a "rejected" stamp he wields on patent applications which claim to achieve cold fusion. That is, whether well fPounded or not, the PTO has a bias against the concept and theories of cold fusion. the PTO considers cold fusion to be "inoperable technology."

[IN THE MATTER OF ARBITRATION Between Patent Office Professional Association FMCS Case No. 00-01666, 2005, Robert T. Moore, Arbitrator, US Department of Commerce, Patent and Trademark Office, Decision AND AWARD ON THE MERITS]

6. Confirming this, the SAWS Memorandum, dated March 27, 2006, confirms the conspiracy against the America Constitution, against the will of the American Congress, and formed secretly by some in the US Patent Office to absolutely positively insure that the American people never maximize their likelihood of advanced energy production and security.

Appx 83

Denied Field Appendix - 6

7. The SAWS memo proves that a policy of 'flagging' existed, and obviously for the Appellant, still exists. The discrimination and abuse of the Applicant, now Appellant, is a sadistic plan which continued after the 911 Attacks against the United States of America, using false statements on federal documents, even when clean energy production was involved, and even after the Board of Patent Appeal made the first of these US patent applications "SPECIAL".

UNDISPUTED FACT: Defendant Dismisses ALL of Plaintiff's Patent Applications with the same Hand-Wave, as 'Cold Fusion'

8. Contrary of the court-rubberstamped false innuendo by the Defendant's counsel, the Plaintiff's applications involve the production of, and measurement of, and monitoring of, heat - which can be used for many purposes, although in the end, it is irrelevant what it is used for.

9. Second, in In re Swartz, Plaintiff's patents application involved a means to measure loading (H in a metal) which the USPTO falsely called "cold fusion" to dismiss it, and later another invention involved a means to diagnostically measure the heat produced, and this too the USPTO also falsely called "cold fusion". No matter the spectroscopy, no matter the diagnostic, no matter the metamaterial, and no matter the scientific or engineering advance, the USPTO has done NOTHING -- except remove documents, failure to address, timely submitted as Evidence disputing the opinion of the USPTO. All the evidence has been "deep sixed". Where is the justice of that? Why does the counsel of Defendant not address this abuse of process?

Appx 84

Denied Field Appendix - 7

UNDISPUTED FACT: Cancer is Successfully Treatable

10. The Plaintiff of this action, Dr. Mitchell R. Swartz, has four degrees in electrical engineering from the Massachusetts Institute of Technology, including an Doctorate in Science (ScD) and an MD from Harvard. His background includes biomedical engineering, the interaction of radiation and materials, and imaging systems such pattern recognition, positron emission scanning and imaging processing. He studied water and ice at MIT with the late Arthur von Hippel from 1968 to 1971, and then studied water in living systems at Massachusetts General Hospital (MGH) in the Departments of Anaesthesia and Nuclear Physics where he conducted the first positron emission tomography (PET) on patients afflicted with cancer. He served a surgical internship at New England Deaconess and at MGH, and followed that with a residency at MGH, becoming Board Certified in Therapeutic Radiology.

11. Many cancers have long been curable, and it began with radium a year after it was discovered, and engineering with 220v power supplies used against Hodgkin's disease and then the use of van de Grafs against deeper tumors (before Co60 became available).

Plaintiff used MV electron at MIT, and at MGH used linacs (10 to 25 MeV) and Co60, and at Harvard used the cyclotron (~ca. 100 MeV protons) with its superb Bragg peak to treat cancer. Plaintiff was among the first to treat patients with proton beam, intraoperative radiotherapy, and initiated electrophotochemotherapy.

12. Exhibit 57 discusses the first time a medical patient, as described therein, ever left the hospital to survive for a short time with her affliction. Everyone said it could not happen. It did - and the Plaintiff wrote it up.

Denied Field Appendix - 8

Exhibit 58 was the first time a mammal with carcinoma was imaged by positron emission tomography. Everyone said it could not happen because it would take capturing 511 keV photons and measuring time of flight. It did happen - and the Plaintiff wrote it up. It is the same for this technology. The USPTO says it does not exist, and yet it does.

Therefore, this factually false statement is also a directed smear, reminiscent of other types of extreme unfounded bias.

UNDISPUTED FACT: Baldness is also Successfully Treatable

13. In this case, the subject has drawn a reaction historically similar to treating baldness which was once, many years ago, considered by the Office to also to be an inherently unbelievable undertaking. See *In re Ferens*, 417 F.2d 1072, 1074, 163 USPQ 609, 611 (CCPA 1969); *In re Oberwener*, 115 F.2d 826, 829, 47 USPQ 455, 458 (CCPA 1940). Since then, treatments for baldness have gained acceptance with minoxidil and other materials now recognized as effective in treating baldness. The Office must eventually admit that, as in baldness control, the field discussed by the Office where the present invention can be used, does exist. Furthermore, corroborating that fact, the PTO has granted patents in this field, just as they are granted in a number of countries around the world.

UNDISPUTED FACT: Reproducibility is another avoidance

14. The Office ignores the peer reviewed published scientific papers associated with the above-entitled inventions, and the actual original specification's words and figures. By substituting its curse word: 'cold fusion', the USPTO Memorandum impugns the Plaintiff, making an error

Appx 86

Denied Field Appendix - 9

of logic. The Office purports non-"reproducibility" of these phenomena, as a "reason" for rejection.

This is illogical and wrong because the Office's arguments are clouded by the two different meanings of the word(s) "(not) reproducible". In the parlance of the Office, when referring to "cold fusion", the word(s) "(not) reproducible" are a euphemism for "wrong". When used more generally, however, these words can even apply to scientific (and medical) fields which actually do engender respect and/or validity, and where "reproducible" only refers to the number of samples in a cohort developing the desired effect.

The restriction that the Office creates using the word "reproducible" in the present case would obviously create unreasonable hurdles for inventors in such fields as cancer treatment, meteorology, or the sciences of earthquakes, lightning, sun-spots, or solar storms.

15. Second, despite the erroneous logic of the Office, radiation therapy accounts for the cure of more than 60+% of adults afflicted with solid tumors composed of malignant disease, and obtunds the pain in 80% (or more) of patients treated palliatively, there is almost always a clinical effectiveness. Yet it is not possible to know in advance which patients are going to be cured nor is it necessarily reproducible in any single patient. Thus there is clinical proof and utility, despite the lack of reproducibility in any single individual or cohort of patients. Thus, the claim that "reproducibility" must necessarily be absolute for there to be "utility" is also simply not true.

16. Would the Judge or clerk in this court withhold curative treatment of a patient --of their own family member-- because such therapy is not "reproducible"? Of course not.

Appx 87

Denied Field Appendix - 10

17. In summary, if the court throws out alleged 'cold fusion' patent applications because there is not 100% reproducibility, then probably all of the pharmaceutical and biomedical device patents should, for similar reasons, also be voided *nunc pro tunc*.

There is reputable evidence of record to support the claim that the present invention works, and that it has resulted in reproducible systems which have led to multiple open demonstrations at MIT.

Furthermore, attention is directed to the fact that the Plaintiff substantially solved the reproducibility issue. The Office has not given a reason why the Plaintiff should be abused and denied a patent solely for being ahead of his time.

18. Therefore no basis exists for a rejection under either section 112, 1 for lack of enablement as a result of "the specification's ... failure to disclose adequately to one ordinarily skilled-in-the-art 'how to use' the invention without undue experimentation," or section 101 for lack of utility "when there is a complete absence of data supporting the statements which set forth the desired results of the claimed invention." [Enviroitech Corp. v. Al George, Inc., 730 F.2d 753, 762, 221 USPQ 473, 480 (Fed. Cir. 1984); also In re Brana, 51 F.3d 1560, 1564 n.12, 34 USPQ2d 1436, 1439 n.12 (Fed. Cir. 1995)].

Appx 88

COMPLIANCE APPENDIX

1. The Patent Trial and Appeal Board [PTAB] previously directed the Appellant (then Applicant) to report the failure to log materials and other corruption to the Commissioner through a Petition to the Commissioner.

“(S)uch a matter of discretion is reviewable by petition not by an appeal to this Board (see Manual of Patent Examining Procedure (MPEP) § 1002 and 1201), and therefore is not within our jurisdiction.”

[*Ex parte* MITCHELL R. SWARTZ in Appeal 2009-001853, Application 10/646,143, DECISION ON REQUEST FOR REHEARING, Feb. 22, 2011]. Details are in the Compliance Appendix and record.]

The Appellant, thereafter, did obey the PTAB, including following its Decision of Appeal 2009-001853, Application 10/646,143, in the DECISION ON REQUEST FOR REHEARING made Feb. 22, 2011. The Plaintiff repeatedly filed the appropriate Petitions to the Commissioner and thereafter sent more than seventeen Petitions to the Commissioner of Patents (Defendant) as the USPTO PTAB directed, just during the period of 2015 to 2016 alone.

UNDISPUTED FACT: Defendant Has used Perjury Perjury Count 1

2. In Rachel B. Damelin’s January 23, 2017 Declaration [Office of the General Counsel, Office of General Law United States Patent and Trademark Office] sworn Affidavit, Attorney Damelin swore under pains and penalties of perjury,

Compliance Appendix - 2

"I have conducted a review and search of all administrative tort claims filed with the OGC within the last two years, According to my search, no administrative tort claim has been filed by Mitchell Swartz with the USPTO."

The alleged "search" is both untruthful and unconvincing. First, the Plaintiff thereafter did Obey the Decision of Appeal 2009-001853, Application 10/646,143, in the DECISION ON REQUEST FOR REHEARING made Feb. 22, 2011. The Plaintiff repeatedly did file the appropriate Petitions to the Commissioner [Figure 4]. Plaintiff followed the repeated explicit orders of the Board of Patent Appeals and sent seventeen Petitions to the Commissioner of Patents in the period of 2015 to 2016. Plaintiff did exactly what that USPTO required at the USPTO prior to commencing this suit. And yet the Defendant's Memorandum and the Declarations of Damelin purports otherwise.

In the Declaration of Dr. Swartz, he states:

"I did obey the Decision of Appeal 2009-001853, Application 10/646,143, in the DECISION ON REQUEST FOR REHEARING made Feb. 22, 2011. I DID file the appropriate Petitions to the Commissioner. This was exactly what the USPTO ["Board"] required prior to commencing these legal proceedings.

Despite what the Defendant's Memorandum falsely purports, I gave multiple warnings ("Notices") of the upcoming tort action to each of the parties involved. This was done BOTH by Petition (17 times in 2015 through 2016 alone) and by Notice (9 times in May 2016 alone)."

Figure 1 demonstrates seventeen (17) Petitions made just in the period of 2015 to 2016. These were made to the Commissioner -- and yet none (zero) made it to Ms. Damelin? Why? Where did the 17 Petitions go? Why was there no record of these of the nine Notices made in just May 2016?

Compliance Appendix - 3

UNDISPUTED FACT: Notices of Tort and Petitions Were Received

3. Second, also, before this case was filed, the Plaintiff DID give multiple warnings ("Notices") of a possible upcoming tort action, long before it was filed, to each of the parties involved. Attention of the court is directed to the simple fact that despite the factually false statements, the Defendant received letters and repeated explicit warnings -- and therefore Notice. Figure 2 is a compilation of nine (9) warnings ("Notices") of the possible upcoming tort action to the Defendant in May 2016 alone.

Is the court to believe that NONE (zero) of the Notices to the Defendant and Petitions to the Commissioner (as Plaintiff was Ordered by the the Board of Patent Appeals) made it into the records which Attorney Damelin allegedly "search(ed)".

4. The Declaration of Rachel B. Damelin, January 23, 2017 is perjurious. Defendant's Associate Counsel Rachel B. Damelin, Office of the General Counsel, Office of General Law United States Patent and Trademark Office is either totally untruthful in a deceptive Affidavit, or led astray for reasons unclear.

Perjury Count 2

5. In Rachel B. Damelin's June 2017 Declaration [Office of the General Counsel, Office of General Law United States Patent and Trademark Office]

Appx 91

Compliance Appendix - 4

sworn Affidavit, Attorney Damelin swore under pains and penalties of perjury,

"6. I have conducted a review and search of all administrative tort claims filed with the OGC within the last two years. According to my search, no administrative tort claim has been filed by Mitchell Swartz with the USPTO."

[Case 1:17-cv-00482-LMB-TCB Document 18-12 Filed 07/17/17 Page 3 of 3 PageID# 598]

The alleged "search" is both again untruthful and further unconvincing. Where was the due diligence. This and last year there should have been some light of awareness from the federal court system and/or Dept. of Justice where further notifications were made, and the wrongful actions specified exactly.

UNDISPUTED FACT: Post-Notification of Notices of Tort and Petitions

6. Despite what the Defendant's Memorandum falsely purports, the Plaintiff gave multiple warnings ("Notices") of the upcoming tort action. This happened nine (9) times in May 2016 alone. Where are any of these twenty-six (26) filings in counsel Damelin's records? Why are none of these in counsel Damelin's records?

Is the court to believe that NONE (zero) of the Notices to the Defendant and Petitions to the Commissioner made it into the records which Attorney

Compliance Appendix - 5

Damelin allegedly "search(ed)", even after being re-informed by the Plaintiff during case 16-12144? What is clear is that an honest "review and search" did NOT happen either time, but perjury was used both times in a brazen attempt to trick the court -- a significant error which the court should want to be made aware of, and which it should want to correct.

Is the court to believe that NONE (zero) of more than 26 documents, involving Notices and Petitions were logged. Or is the court to believe that the data was logged and then erased to hide them to cover it all up?

=> What is clear is that an honest "review and search" did NOT happen.

7. The Declaration of Rachel B. Damelin, signed on or about June 2017, is clearly reprehensible FRAUD before this court. THIS perjury was fabricated to deny Plaintiff his civil and Constitutional rights. Sanctions are warranted.

8. In summary, the two Declarations of Damelin contain perjury. They are factually false statements to avoid justice and are barratry, abuse of power, and a betrayal of Trust. Sanctions are warranted, and most importantly, the Plaintiff's ONLY remedy with respect to that matter is this court.

Compliance Appendix - 6

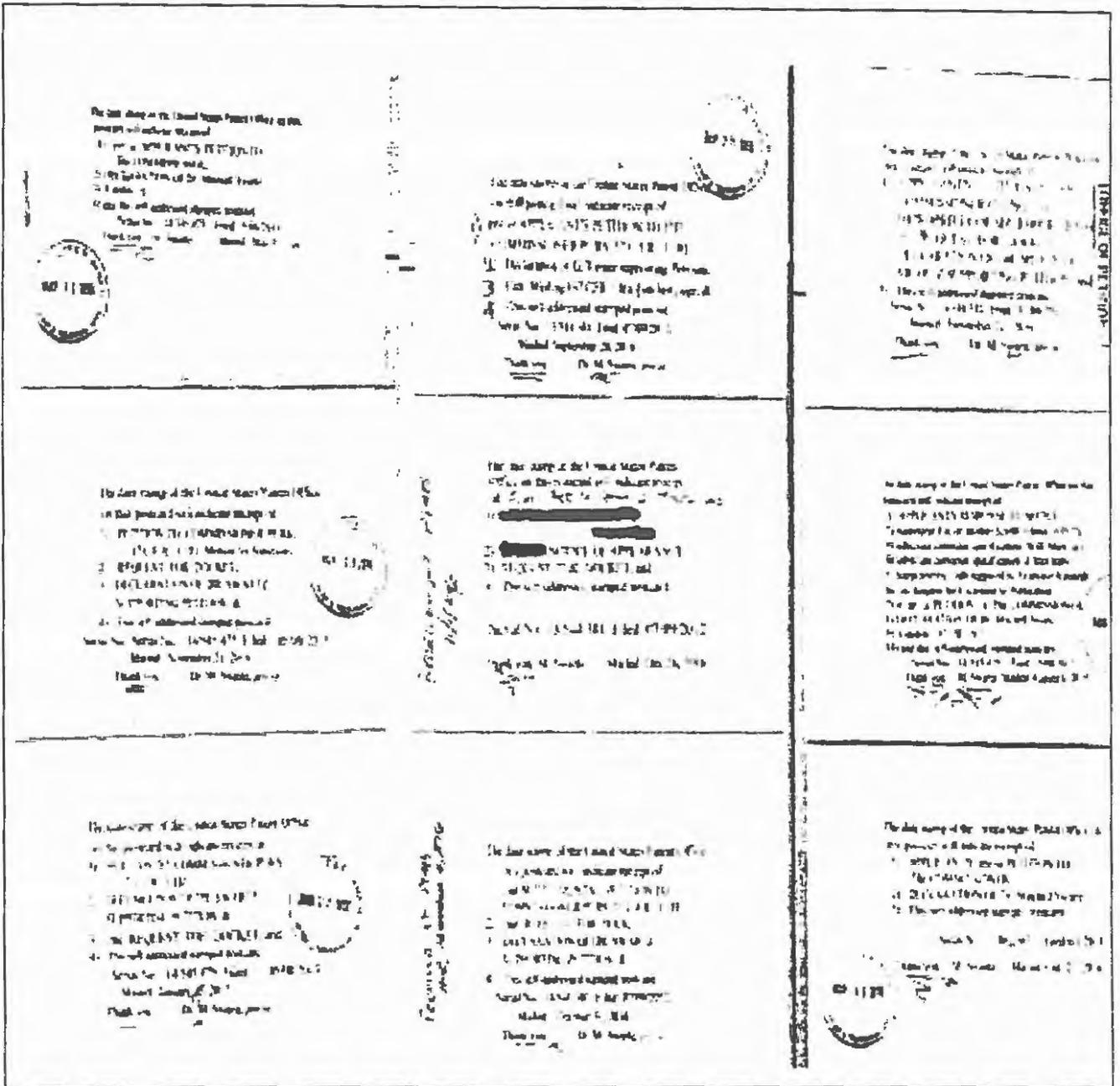


Figure Compliance 1 – [Part 1 of 2 parts] Copies of actual post cards, stamped by the Official Postal Office of the USPTO demonstrate Notice by Petition pursuant Order of the Board, and saliently and indelibly.

Compliance Appendix - 7

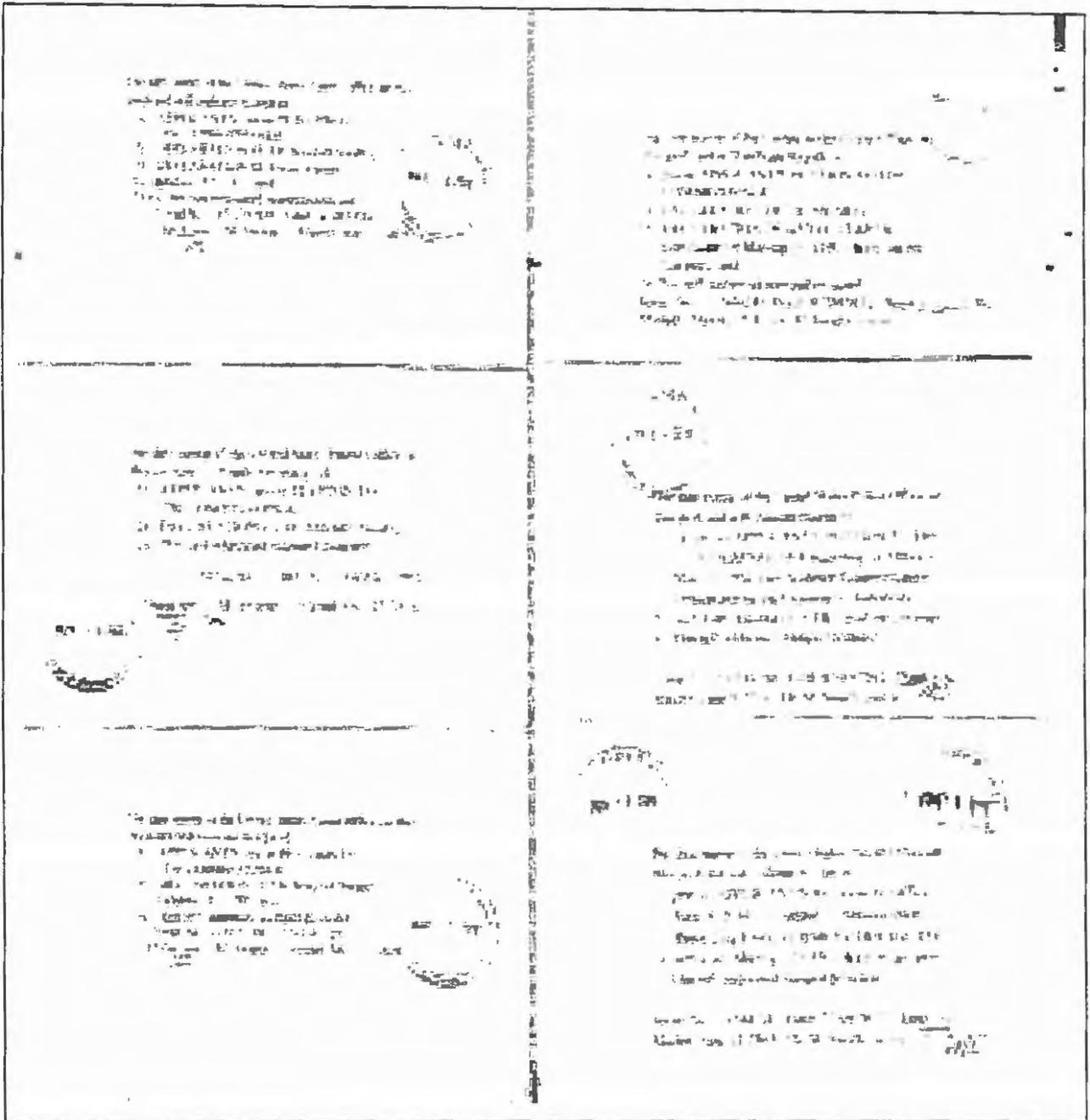


Figure 1 – [Part 2 of 2 parts] Copies of actual post cards, stamped by the Official Postal Office of the USPTO.

APPX 95

Compliance Appendix - 8

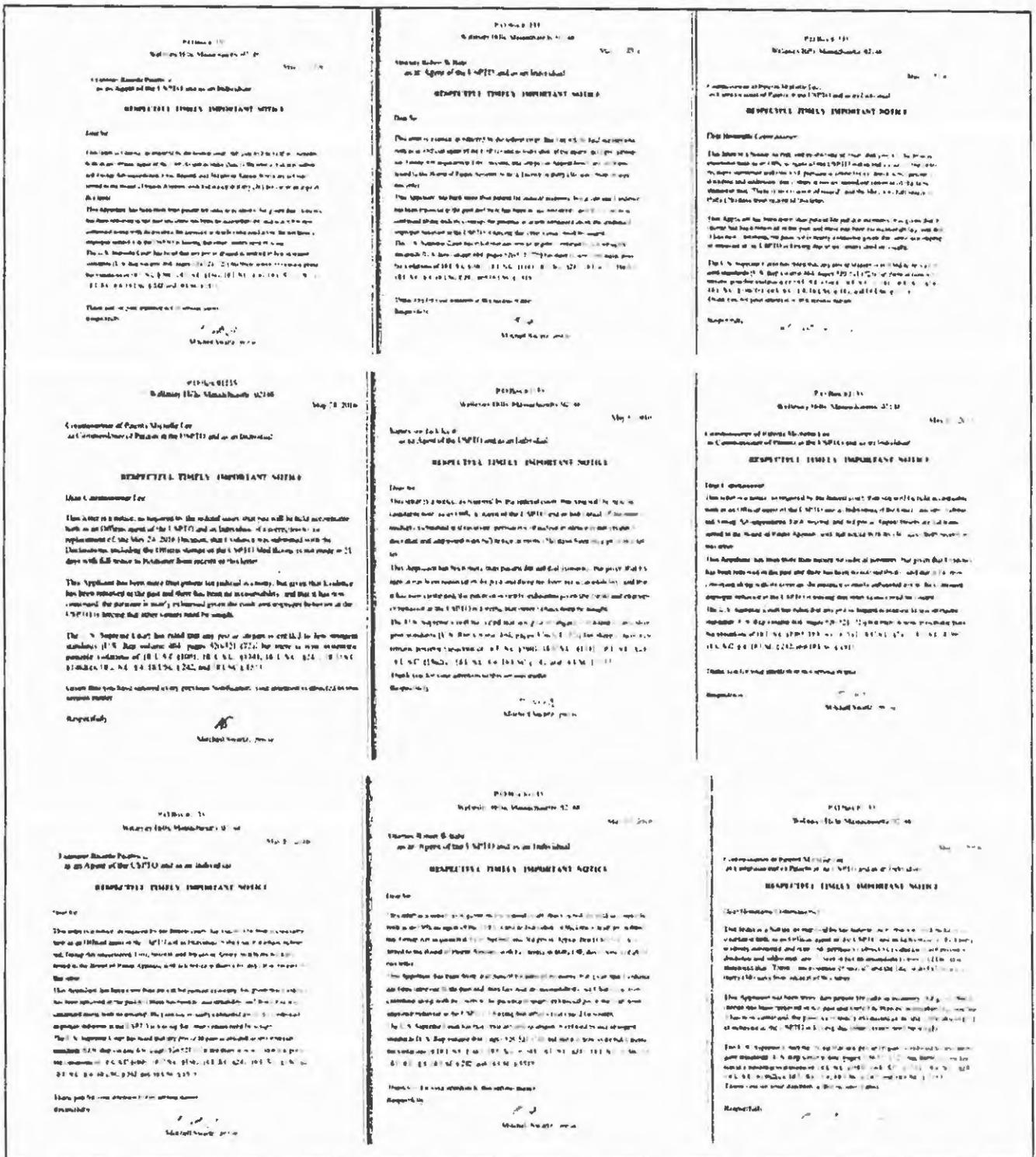


Figure Compliance 2 – Copies of the actual letters comprising these Notices were delivered to the Defendant.

Appx 96

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MITCHELL R. SWARTZ

Appeal 2009-001853
Application 10/646,143
Technology Center 3600

Before JOHN C. KERINS, STEVEN D.A. McCARTHY, and KEN B.
BARRETT, *Administrative Patent Judges*.

Opinion for the Board by BARRETT, *Administrative Patent Judge*.

Concurring opinion by McCARTHY, *Administrative Patent Judge*.

BARRETT, *Administrative Patent Judge*.

DECISION ON APPEAL¹

¹ The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, or for filing a request for rehearing, as recited in 37 C.F.R. § 41.52, begins to run from the "MAIL DATE" (paper delivery mode) or the "NOTIFICATION DATE" (electronic delivery mode) shown on the PTOL-90A cover letter attached to this decision.

Appeal 2009-001853
Application 10/646,143

STATEMENT OF THE CASE

Mitchell R. Swartz (Appellant) seeks our review under 35 U.S.C. § 134 of the Examiner's decision rejecting claims 6-13. Claims 1-5 and 14-20 have been withdrawn by the Examiner as being directed to a non-elected invention, and are not before us. *See* Decision on Petition, mailed May 22, 2006, at 2². We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

THE INVENTION

Appellant's claimed invention pertains to the production of electricity from metals loaded with hydrogen obtained from heavy water. *See* Spec. 1, 4. Claim 6, reproduced below, is representative of the subject matter on appeal.

Claim 6. A process for producing electricity from a metal loaded with hydrogen comprising the steps of:

using an electrolytic solution consisting of pure heavy water without additional salts for minimizing unwanted reactions in a reaction container;

providing an electric power system with two electrodes to load one electrode with said hydrogen to activate heat production by achieving an open circuit voltage of at least 2.4 volts between said electrodes;

² Appellant refers to a petition decision dated February 1, 2006, in which the Examiner was directed to withdraw the finality of a previous action and which stated that claims 1-5 and 14-20 were to be examined as being directed to the same or similar invention. Appeal Brief filed June 19, 2006 (hereinafter "App. Br.") at 2; *see also* Reply Br. 4. The May 22, 2006, petition decision superseded that earlier decision, and concluded on page 2 that the Examiner properly withdrew claims 1-5 and 14-20.

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enclosing said reaction container with a gas-catching hood and vertical wall to create two volumes for physically separating hydrogen gas from molecular oxygen;

adding a thermal barrier surrounding the reaction container to retain heat sufficient to continue the activation;

recovering energy lost to said gas generation during loading by generating electricity after directing said generated gases to a fuel cell;

producing electricity from the heat generated by said activation by a thermoelectric converter.

THE REJECTIONS

The evidence in support of unpatentability relied upon by the Examiner may be found on pages 3 through 5 of the Answer.

The following Examiner's rejections are before us for review:

1. Claims 6-13 are rejected under 35 U.S.C. § 101 because the claimed invention is inoperative and therefore lacks utility;
 2. Claims 6-13 are rejected under 35 U.S.C. § 112, first paragraph, for failing to comply with the enablement requirement³;
 3. Claims 6-13 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Appellant regards as the invention;
- and

³ The Examiner also objected to the Specification under 35 U.S.C. § 112, first paragraph, because the claimed method is inoperable. Ans. 6-13. To the extent that this objection relates to the rejections of claims 6-13, our decision with respect to the rejections likewise is dispositive as to the corresponding § 112 objection. Because we address the operability issue in our analysis of the rejections, the Examiner may take appropriate action with respect to the objection commensurate with our decision on the rejections.

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4. Claims 6, 8, 9, 11, and 13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Gunn (US 2,384,463, issued Sep. 11, 1945), Fowler (US 4,211,620, issued Jul. 8, 1980), and Schulten (US 4,274,938, issued Jun. 23, 1981).

ISSUE

The primary dispute in this case concerns the Examiner's finding that the claimed invention is inoperative and therefore lacks utility. The dispositive issue presented is:

Has Appellant shown that the Examiner erred in finding that the utility of Appellant's claimed invention has not been established and in concluding that the Specification lacks an enabling disclosure?⁴

FINDINGS OF FACT

We adopt as our own the Examiner's findings of fact contained in the Answer on page 5 through the second full paragraph on page 10, first full paragraph on page 11 through the first full paragraph on page 13, section d on pages 15-16, the response to argument section on page 19 through the second full paragraph on page 27 (except for the first full paragraph on page 26), and section d on page 30.

⁴ Appellant has chosen to argue the operability of the claimed subject matter in terms of whether the claimed methods produce excess heat in the deuterated metal (*e.g.*, App. Br. 13) and whether the system will convince educators, scientists and students of the importance of hydrogen loaded systems. We do not speculate as to whether the claimed methods may possess utility other than that asserted by Appellant in this appeal. *Ex Parte Frye*, 94 USPQ2d 1072, 1075-76 (BPAI 2010) (precedential).

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PRINCIPLES OF LAW

“The questions of whether a specification provides an enabling disclosure under § 112, ¶ 1, and whether an application satisfies the utility requirement of § 101 are closely related.” *In re Swartz*, 232 F.3d 862, 863 (Fed. Cir. 2000). The utility requirement of § 101 requires that the claimed invention be operable to achieve a useful result. *Id.* Where the invention is inoperative, the claims also fail to satisfy the enablement requirement of § 112, first paragraph, because a person of ordinary skill in the art cannot practice the invention. *Id.* Whether the invention satisfies the utility requirement is a question of fact, and enablement is a question of law based on underlying factual inquiries. *Id.*

Before the PTO can reject a patent application for lack of utility, it must have reason to doubt the objective truth of the statements provided in the written description. *In re Brana*, 51 F.3d 1560, 1566 (Fed. Cir. 1995). “The PTO may establish a reason to doubt an invention's asserted utility when the written description ‘suggest[s] an inherently unbelievable undertaking or involve[s] implausible scientific principles.’” *In re Cortright*, 165 F.3d 1353, 1357 (Fed. Cir. 1999) (quoting *In re Brana*, 51 F.3d 1560, 1566 (Fed. Cir. 1995)) (alterations in original). Once the PTO furnishes evidence that one of ordinary skill in the art would reasonably doubt the asserted utility of the claimed invention, the burden shifts to the applicant to provide evidence sufficient to convince such a skilled individual of the invention's asserted utility. *Swartz*, 232 F.3d at 864.

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ANALYSIS

The Utility and Enablement Rejections

The claims on appeal include independent claim 6 and claims 7-13, which depend therefrom. Although Appellant asserts that the claims do not stand or fall together, Appellant's arguments are almost exclusively directed to his invention generally rather than any particular claim. *See, e.g.*, App. Br. 13-14, 154. To the extent that Appellant addresses the dependent claims individually, Appellant asserts that the additional step recited in a dependent claim is clearly disclosed in the Specification and offers the conclusory assertion that the dependent claim is operable. *See, e.g.*, App. Br. 57-58 (discussing claim 7). As such, we do not consider Appellant to offer separate substantive arguments for the claims on appeal, and, accordingly, we consider the claims to be argued as a group. We select independent claim 6 as the representative claim, and dependent claims 7-13 stand or fall with claim 6. 37 C.F.R. § 41.37(c)(1)(vii).

Appellant's claim 6 recites "[a] process for producing electricity from a metal loaded with hydrogen" The Examiner found that Appellant's invention is directed to the production of excess heat by cold fusion. Ans. 6, 8, 30. Appellant does not appear to dispute this finding, but rather asserts that he has shown that his invention produces excess heat and that he has demonstrated how to reproducibly make cold fusion. App. Br. 13, 17. Thus, we find that Appellant's assertion of utility is that the claimed invention produces electricity via cold fusion. Appellant also asserts that the invention has usefulness as a teaching tool. App. Br. 15; Spec. 9. However, the invention's use as an education tool appears to involve either educating students and scientists as to the importance of cold fusion or activities not

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commensurate with the scope of claim 6 or of its dependent claims 7-13, such as delivering electricity to a load for measurement or educational demonstration. Spec. 9. Accordingly, we do not consider the educational aspect of the invention to be a separate asserted utility of the claimed invention.

The Examiner rejected the claims under §§ 101 and 112, first paragraph, based on the determination that the claimed invention is inoperative, lacks utility and, thus, is not enabled. Ans. 6-7, 15-16. The Examiner explains how Appellant's method is similar to prior unsuccessful cold fusion processes, such as that of Fleischmann and Pons, and notes that the scientific community has concluded that the excess heat identified by Fleischmann and Pons was due to experimental error. Ans. 7-8, 19-20. The Examiner also found that Appellant does not disclose additional features or components that would cause Appellant's method to be operable where previous attempts were not. *See* Ans. 11. The Examiner further finds that Appellant's assertion that the Specification evidences excess heat is suspect because Appellant has not adequately accounted for possible errors. *Id.* at 20-21.

The Examiner has provided several references demonstrating that the purportedly positive results of cold fusion experiments are not reproducible. *See, e.g.*, Ans. 7-10 (discussing several of the cited references). As such, we determine that the Examiner has established a reasonable basis for questioning the truth of Appellant's stated utility, and, specifically, has shown that one of ordinary skill in the art would reasonably doubt the utility of Appellant's invention.

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Appellant argues that the Examiner misunderstands the invention, and that his invention is different than prior experiments. *See, e.g.*, Reply Br. 38. For example, Appellant appears to argue that “the absence of ‘additional salts’” in the electrolytic solution is a distinguishing feature. *Id.* at 43. Appellant additionally asserts that the invention contains a monitoring step using the open circuit voltage, apparently to indicate full loading of hydrogen, and that the supplied energy in his method is 3,000 volts. Reply Br. 38, 40-41 (citing Spec. 10, 18-21); *see also* Reply Br. 40 (“the invention involve[d] is driven by hundred to thousands of volts, and the 2.4 volts is the monitoring voltage.”) It is questionable as to whether all of Appellant’s arguments – particularly the driving voltage argument – are commensurate with the scope of claim 6. Nonetheless, regardless as to how Appellant’s process might differ from past efforts, we agree that Appellant’s claimed invention is directed to cold fusion and is not so different from that of prior researchers’ work that the reasonable doubt disappears.

We determine that Appellant has not shown error in the Examiner’s finding that one of ordinary skill would reasonably doubt the asserted utility of the claimed invention. Accordingly, the burden shifts to Appellant to submit evidence sufficient to convince one of ordinary skill in the art of the invention’s utility. *Swartz*, 232 F.3d at 864.

As an initial matter regarding Appellant’s rebuttal evidence, we point out that even *pro se* appellants are required to substantially comply with the requirement of providing an appendix containing any evidence relied upon and indicating where in the record that evidence was entered by the Examiner. 37 C.F.R. § 41.37 (c)(1) and (c)(1)(ix). Appellant has not done so. The Examiner states that most of Appellant’s cited references and

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declarations “are not art of record.”⁵ Ans. 25; *see also* Ans. 23, 26; *accord* Reply Br. 19-21 (Appellant referring to evidence in the appendices of “sequestered” appeal briefs for several applications); *id.* at 160 (“the hundreds of pounds of peer-reviewed publications, Declarations, and Evidence in the Appendices of the sequestered Appeal Briefs”). Out of an abundance of caution, we have considered Appellant’s supporting documents appended to the Appeal Brief and the Reply Brief for this appeal, although it is not clear whether any of these documents was entered into the record prior to the appeal. We, however, decline to further scour the record⁶ in search of entered evidence to support Appellant’s positions.

Appended to Appellant’s Reply Brief is a document captioned as the “Declaration of Peter Hagelstein.” Reply Br., Appendix H. This document constitutes argument only, and not evidence, because it does not satisfy the formal requirements of an oath (made before a person within the United States authorized to administer oaths, 37 C.F.R. § 1.66) and also does not satisfy the requirements of a declaration in lieu of oath (37 C.F.R. § 1.68), in that it does not state that Declarant has been warned that willful false statements and the like are punishable by fine or imprisonment, or both, and may jeopardize the validity of the application or any patent issuing thereon. Furthermore the “declaration” is primarily directed to explaining why those who doubt the operability of cold fusion/excess heat are incorrect, and offers little or no specific opinion or facts directed to whether Appellant’s *claimed*

⁵ The procedural issue concerning any denial of entry of documents into the record is not before us.

⁶ The Image File Wrappers for the application before us and for its parent application (Appl. No. 07/339,976) together contain at least 541 items.

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invention is operable and reproducible. *See* Reply Br., Appendix H, ¶¶ 3-4 (asserting that Dr. Swartz's results "on his Phusor experiments ... look very good" and "are competitive in terms of reproducibility and power gain with the best results obtained by other groups," and that "the technology developed by Swartz looks to be very important.") The assertions in Appendix H do not persuade us that those in the art lacked reasonable doubt as to the operability and reproducibility of cold-fusion experiments generally or Appellant's claimed invention specifically. Similarly, we find that the other exhibits attached to the briefs would not convince one of ordinary skill in the art that Appellant's invention has utility.

Appellant argues that the Examiner has ignored Appellant's supplied data, several hundreds of pounds of exhibits, and declarations, and contends that this "is consistent with a conspiracy against America and the US Constitution." App. Br. 29. It does not appear to us that the Examiner has ignored any evidence *in the record*. *See* Ans. 23-24. Rather it seems that much of the purported supporting evidence is not in the record and that the Examiner simply has not given as much weight to Appellant's record evidence as Appellant deems appropriate. Furthermore, in assessing whether one of ordinary skill in the art would reasonably doubt the utility of Appellant's claimed invention, the Examiner need not, as Appellant suggests, respond to and rebut every assertion made in every document referenced by Appellant. *Contra, e.g.*, App. Br. 32 ("Where is the Examiner's Response to any or all of the twelve (12) volumes of the Cold Fusion Times?")

We have considered Appellant's remaining arguments offered in the Appeal Brief and the Reply Brief, and find them unpersuasive.

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While we appreciate Appellant's desire to foster America's energy independence, we simply cannot find that cold fusion research generally and the development of Appellant's invention specifically has progressed to the point where one of ordinary skill would no longer continue to reasonably doubt the utility and operability of Appellant's claimed invention. We determine that the Examiner did not err in finding that the utility of Appellant's invention has not been established. Because an inoperative invention cannot be enabled, the Examiner also did not err in concluding that Appellant's claims fail to satisfy the enablement requirement.

As mentioned above, we consider Appellant to have argued the claims on appeal as a group. However, even if we concluded that Appellant offered separate arguments for each claim, the outcome of this case would not change because all of the claims on appeal are directed to cold fusion and because we find that none of the dependent claims further limit the claimed invention to one that is operable.

For the reasons set forth above, we affirm the utility and enablement rejections of claims 6-13 under §§ 101 and 112, first paragraph. As we have affirmed the enablement rejection of all of the claims on appeal for lack of utility and operability, we do not reach the Examiner's additional bases for concluding that the claimed invention is not enabled. *See* Ans. 13-14, 27-28.

The Rejection under the Second Paragraph of § 112

The Examiner offers two bases for rejecting the claims under § 112, second paragraph. We cannot sustain the rejection under either basis.

First, the Examiner concludes:

The claims are vague, indefinite and incomplete for lacking support for the elements in claim 6 discussed in section a)

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above [concerning enablement]. Thus, the metes and bounds of the claims cannot be determined.

Ans. 15. The Examiner's reference to a lack of support suggests an inadequacy of the Specification, not the claims, and thus is directed to a rejection under the first paragraph of 112 rather than the second paragraph. Further, the Examiner does not adequately identify which elements of claim 6 are vague and indefinite. As such, we cannot sustain the rejection under § 112, second paragraph, on this first basis.

Second, the Examiner, citing the Manual of Patent Examining Procedure (MPEP) § 2172.01, concluded that the claims omit critical elements. Ans. 15. The Examiner maintains that the omitted elements are those additional structures not found in the combined teachings of Gunn, Fowler, and Schulten (the references cited for the obviousness rejection) that are necessary to produce heat energy by cold fusion. *Id.* This basis implicates the "subject matter which [Appellant] regards as his invention" requirement of § 112, second paragraph. As the cited portion of the MPEP indicates, the missing elements pertinent to this inquiry are those described by Appellant in the Specification or in other statements of record as essential to the invention. Thus, the proper analysis involves a comparison of the claimed invention to Appellant's description of the invention, not to the prior art. The Examiner does not identify a missing element described by Appellant as critical to the invention. Accordingly, we cannot sustain the rejection under the second paragraph of § 112 on this second basis.

In summary, we cannot sustain the rejection of claims 6-13 under the second paragraph of § 112. However, our decision in this regard should not be interpreted as a determination that the claims are definite or otherwise

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satisfy the requirements of § 112, second paragraph. We merely determine that, on the record before us, the Examiner has not set forth an adequate basis for the rejection.

The Obviousness Rejection

Independent claim 6 recites “using an electrolytic solution consisting of pure heavy water without additional salts.” The Examiner determined that Appellant intended to use the typically broader term “comprising” rather than “consisting of.” Ans. 18. The Examiner maintains that ordinary water contains a small amount of heavy water, and found that Fowler’s water reads on Appellant’s electrolytic solution under the Examiner’s interpretation. *Id.* The Examiner also maintains that the Specification does not define “pure heavy water,” and therefore the phrase is broad enough to encompass Fowler’s water. *Id.*

The Examiner finds that hydrogen is an isotope distinct from the deuterium isotope that forms heavy water and apparently reasons that, because the claim recites “hydrogen,” Appellant must have intended that the electrolytic solution include components other than pure heavy water. *See id.* The Examiner’s reasoning does not persuade us that Appellant’s intended meaning is so clear as to justify rewriting the claim – from “consisting of” to “comprising.” Further, even if there is no explicit definition of “pure heavy water” in the Specification, we cannot conclude that one of skill in the art reading the claim in light of the Specification would understand that phrase to encompass ordinary water. Thus, we determine that Examiner’s interpretation of claim 6 is unreasonably broad. As the obviousness rejection is based on this interpretation and the

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corresponding finding, we cannot sustain the rejection of independent claim 6 and of its dependent claims 8, 9, 11, and 13.

CONCLUSIONS

Appellant has not shown that the Examiner erred in finding that the utility of the claimed invention has not been established and in concluding that the Specification lacks an enabling disclosure. The rejections of claims 6-13 under §§ 101 and 112, first paragraph, for lack of utility and lack of enablement are affirmed.

On the record before us, we cannot sustain the other rejections, and therefore the rejections of claims 6-13 under § 112, second paragraph, and of claims 6, 8, 9, 11, and 13 under § 103 are reversed.

DECISION

The decision of the Examiner to reject claims 6-13 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

JRG

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McCARTHY, *Administrative Patent Judge, concurring.*

I join fully in my colleagues' findings, conclusions and decision. I write separately only to comment on certain statements in the Appellant's briefs which might be interpreted as personal attacks on the U.S. Patent and Trademark Office and the Office's employees. The following examples may be gleaned from the Appeal Brief and the Reply Brief:

Where is the Examiner's Response to Applicant's citation of confirmations of Dr. Miles nuclear (helium-4) findings? This is important because Dr. Miles was given a US patent, proving the application of Exhibit "C" and applicant-harassment are selective. How does the Examiner and Office decide which US Citizens to harass and deny their civil rights? The Applicant requests [an] answer, and will consider depositions if no answer is forthcoming.

(App. Br. 30).

Thus, there is growing evidence that the Office's opinion that cold fusion "does not exist" is incorrect, but is only made to conform with Exhibit "C" made to keep back the United States from energy independence, and to usurp authority from the United States Constitution, Congressional directive, and to impair Applicant's civil rights. The Applicant formally and explicitly requested that the Examiner should explain BOTH Exhibit "C" and why the Office has systematically undermined US security and the US Constitution from the time of Exhibit "C" through the 911 Atrocities to today.

(App. Br. 41).

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If the Examiner wishes to continue to quote altered data [Abagli], then in light of just-discovered Exhibit 'C' there is a conspiracy by the Office, and there continues serious violation of [18] USC 1001 because the Office does once again make knowingly disingenuous false statements known to be false *a priori*. . . . The Office communication is thus in error . . . and is using mail fraud.

(App. Br. 43-44).

The Examiner's statement is disingenuous and at variance with DTRA, the USN, Japan, and enough individuals that the Patent Office should question the loyalty of [the Examiner's] Group Art [Unit]. . . . Is this just blatant, unsupported, discrimination against the Appellant, while America is at war over energy (the very product produced by the present invention)[?]

(Reply Br. 26).

The Appellant submits no persuasive evidence to support these statements.

The Appellant appears to be an educated professional, experienced in the patent prosecution process and deeply committed to this field of study. Should the Appellant choose to pursue the present application further, I suggest that the Appellant might present the legal and technical arguments to better effect were the Appellant to omit statements such as these.

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Defense Intelligence Agency

Defense Analysis Report

DIA-08-0911-003

13 November 2009

Technology Forecast: Worldwide Research on Low-Energy Nuclear Reactions Increasing and Gaining Acceptance

Scientists worldwide have been quietly investigating low-energy nuclear reactions (LENR) for the past 20 years. Researchers in this controversial field are now claiming paradigm-shifting results, including generation of large amounts of excess heat, nuclear activity and transmutation of elements.^{1,2,3} Although no current theory exists to explain all the reported phenomena, some scientists now believe quantum-level nuclear reactions may be occurring. 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.^{4,5}

Background

In 1989, Martin Fleischmann and Stanley Pons announced that their electrochemical experiments had produced excess energy under standard temperature and pressure conditions.⁶ Because they could not explain this physical phenomenon based on known chemical reactions, they suggested the excess heat could be nuclear in origin. However, their experiments did not show the radiation or radioactivity expected from a nuclear reaction. Many researchers attempted to replicate the results and failed. As a result, the physics community disparaged their work as lacking credibility, and the press mistakenly dubbed it "cold fusion." Related research also suffered from the negative publicity of cold fusion for the past 20 years, but many scientists believed something important was occurring and continued their research with little or no visibility. For years, scientists were intrigued by the possibility of producing large amounts of clean energy through LENR, and now this research has begun to be accepted in the scientific community as reproducible and legitimate.

Source Summary Statement

This assessment is based on analysis of a wide body of intelligence reporting, most of which is open source information including scientific briefings, peer-reviewed technical journals, international scientific conference proceedings, interviews with scientific experts and technical media. While there is little classified data on this topic due to the S&T nature of the information and the lack of collection, DIA judges that these open sources generally provide the most reliable intelligence available on this topic. The information in this report has been corroborated and reviewed by U.S. technology experts who are familiar with the data and the international scientists involved in this work.

Although much skepticism remains, LENR programs are receiving increased support worldwide, including state sponsorship and funding from major corporations.^{7, 8, 9, 10} DIA assesses that Japan and Italy are leaders in the field, although Russia, China, Israel, and India¹¹ are devoting significant resources to this work in the hope of finding a new clean

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energy source. Scientists worldwide have been reporting anomalous excess heat production, as well as evidence of nuclear particles^{12, 13, 14} and transmutation.^{15, 16, 17}

- Y. Iwamura¹⁸ at Japan's Mitsubishi Heavy Industries first detected transmutation of elements when permeating deuterium through palladium metal in 2002.
- Researchers led by Y. Arata at Osaka University in Japan¹⁹ and a team led by V. Violante at ENEA in Italy (the Italian National Agency for New Technologies, Energy, and the Environment—the equivalent to the U.S. Department of Energy)²⁰ also made transmutation claims.
- Additional indications of transmutation have been reported in China, Russia, France, Ukraine, and the United States.^{21, 22}
- Researchers in Japan, Italy, Israel, and the United States have all reported detecting evidence of nuclear particle emissions.^{23, 24}
- Chinese researchers described LENR experiments in 1991 that generated so much heat that they caused an explosion that was not believed to be chemical in origin.²⁵
- Japanese, French, and U.S. scientists also have reported rapid, high-energy LENR releases leading to laboratory explosions, according to scientific journal articles from 1992 to 2009.^{26, 27}
- Israeli scientists reported in 2008 that they have applied pulsating electrical currents to their LENR experiments to increase the excess energy production.²⁸
- As of January 2008, India was reportedly considering restarting its LENR program after 14 years of dormancy.²⁹

U.S. LENR researchers also have reported results that support the phenomena of anomalous heat, nuclear particle production, and transmutation.^{30, 31, 32}

- At the March 2009 American Chemical Society annual meeting, researchers at U.S. Navy SPAWAR Pacific reported excess energy,³³ nuclear particles,³⁴ and transmutation,^{35, 36} stating that these effects were probably the result of nuclear reactions.³⁷
- A research team at the U.S. company SRI International has been studying the electrochemistry and kinetics of LENR since the early 1990's, reporting excess heat and helium production.³⁸

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- In May 2002, researchers at JET Thermal in Massachusetts reported excess heat and optimal operating points for LENR manifolds.³⁹
- Researchers at the China Lake Naval Air Warfare Center in California first reported anomalous power correlated with Helium-4 production in 1996.⁴⁰

Although no one theory currently exists to explain all the observed LENR phenomena, some scientists now believe these nuclear reactions may be small-scale deuterium fusion occurring in a palladium metal lattice.^{41, 42, 43} Some others still believe the heat evolution can be explained by non-nuclear means. Another possibility is that LENR may involve an intricate combination of fusion and fission triggered by unique chemical and physical configurations on a nanoscale level.^{44, 45} **This body of research has produced evidence that nuclear reactions may be occurring under conditions not previously believed possible.** Recent results suggest these anomalous LENR phenomena can be triggered by various energetic stimuli (electric and magnetic fields, acoustic waves, infrared, lasers)⁴⁶ and may have a variety of operational modes.⁴⁷

Nuclear Fusion
<p>Nuclear fusion as currently understood occurs only in the core of stars, in nuclear weapons, in high temperature plasmas, or in inertially confined high-energy collisions. Scientists for years have attempted to harness nuclear fusion through high-temperature plasma techniques but have been unable to produce more energy output than supplied. Fusion was once thought to be the answer to the world's future clean energy needs, but after 60 years of research still has yet to live up to this promise. "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.</p>

Potential Applications of LENR: The Technology Surprise Factor

LENR's potential as a future clean energy source is still unknown. However, recent results indicating nuclear activity and transmutation are intriguing and pose the following questions:

- If the excess heat from these experiments could be captured and intensified, could LENR be used as a power source for engines, batteries, or other equipment?
- If nuclear particles could be generated and transmute elements, could LENR be used to mitigate hazardous waste or to neutralize weapons of mass destruction?⁴⁸
- If the various modes of energy production could be identified and optimized, could LENR be used to create designer materials or critical resources that are in short supply or serve as a tailored, "dial-a-mode" power source?

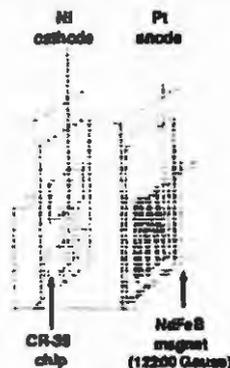
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- If rapid, explosive energy output can occur in one or several modes, could LENR serve as a new high-energy-density explosive?

International LENR research was highlighted in April 2009 on a U.S. television program focused on the 20th anniversary of the Fleischman and Pons announcement.⁴⁹ Many U.S. researchers are collaborating with foreign scientists, but each team has proprietary aspects of their experiments that are not shared. Because some peer-reviewed journals are reluctant to review or publish LENR data due to past controversies, most results are presented at international conferences, and foreign scientists have access to much of the U.S. data. In addition, U.S. experts have been invited to brief on LENR to nuclear institutes in India,⁵⁰ Belgium,⁵¹ and South Korea,⁵² and a reciprocal visit by South Koreans to SPAWAR Pacific to initiate collaboration is planned. This relatively free flow of information increases the likelihood of a technology breakthrough—as well as the potential for technology surprise—by an international team, especially those from countries that are devoting more resources to this research than is the United States, and are supported with major corporate funding (Mitsubishi, Toyota, and Honda in Japan; Pirelli in Italy).⁵³

The Experiments

Most LENR experiments involve electrodes immersed in solutions of metal salts such as lithium chloride or lithium sulfate, with heavy water substituted for natural water. Electric current is sent through the experimental apparatus, in most instances producing excess heat. This effect occurs over long periods (several hundreds of hours), and many early experimenters achieved negative results because they were unaware of this incubation period. Israeli researchers used pulsating electric fields to increase heat production. The application of magnetic fields has been shown to stimulate increased heat and power. Usually one of the electrodes is palladium, because it has a high ability to adsorb (hold on the surface) and absorb deuterium atoms in its metal matrix. Deuterium is an isotope of hydrogen that undergoes fusion in nuclear weapons at high temperatures and pressures; it also undergoes fusion and is one of the basic building blocks of the heavier elements formed in stars. The Navy SPAWAR experiments used a unique technique to place the palladium atoms in the heavy-water solution and to codeposit palladium and deuterium, which rapidly increases the deuterium "loading" necessary for the LENR phenomena to occur.



A Notional LENR Electrochemical Cell (Left) and a French LENR Apparatus After an Unexplained Explosion (Right)⁵⁴

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The countries with the most advanced LENR programs are Japan, Italy, and Israel. In addition, Russia, France, China, South Korea, and India are spending significant resources on LENR research. The following are among the most notable efforts:

- In Japan, Iwamura at Mitsubishi has been studying transmutation of elements in LENR experiments and multilayer palladium (Pd) complexes. His team includes the Japanese Synchrotron Radiation Research Institute and SPring-8 at Riken. Kitamura and other researchers at Kobe University are investigating Pd nanopowders and Helium-4 ash. Arata at Mitsubishi Heavy Industries has worked on catalysts containing nanopalladium. Yamaguchi at Kobe noted transmutation using multilayered Pd samples. Mizuno at Hokkaido is studying transmutations and heat generation. A team led by Hioki at Toyota is investigating deuterium gas permeation through Pd as well as transmutations. Toriyabe at Tohoku University is developing charged-particle detectors for LENR. Kasagi is looking at electron and ionic screening in LENR effects.
- Vittorio Violante, a leader in the field of Pd metallurgy and the role of surface effects in LENR, heads a team at ENEA, Frascati Rome, (the Italian equivalent to the U.S. Department of Energy) performing LENR experiments. A team led by Francesco Celani at INFN that includes STMicroelectronics and Pirelli labs is studying deuterium migration in nanocoated Pd for fast-loading and anomalous heat effects. The Italian Physical and Chemical Societies are supporting LENR research in Italy.
- Srinivasan in India noted that India is restarting its LENR program; the Bhabha Atomic Research Centre had several groups working on LENR from 1989 to the early 1990s. Sinha at IISc in Bangalore is studying models for fusion in metal deuterides. Lakshmanan at Saveetha College is exploring fusion in sodium metal solutions.
- Andrei Lipson and other researchers at the Russian Academy of Sciences and scientists in Tomsk are studying the emission of charged particles during the use of electron beams to excite palladium/deuterium (Pd/D) and titanium/deuterium (Ti/D) targets. Karabut and others at LUCH also are conducting LENR experiments. A Dubna team led by Gareev is studying nuclear fusion during cavitation and molecular transitions. LUCH's Savvatimova, Dash, Muromtsev, and Artamonov also are conducting LENR experiments. Adamenko and Vysotskii of Kiev are looking for magnetic monopoles in LENR experiments. Kurchatov-based scientist Goryachev is investigating LENR for alternative energy sources and for mitigating radioactive waste.
- Xing Z. Li at Tshinghua University claims 20 institutions in China are investigating LENR with governmental support. Tian's team at Cahnchun University of Science and Technology is investigating laser triggering in Pd/D systems. Zhang and other researchers at the Chinese Academy of Sciences have studied Pd-D kinetics in LENR since 1991.
- Israeli scientists at Energetics in Omer have shown that variations in energy output can be increased using variable frequency or pulsed "superwaves" to stimulate LENR effects.
- The French Atomic Energy Agency had an official LENR program from 1997 to 1999. EDF also had one for several years. Currently, Jean-Paul Biberian from the Universite Marseille and Jacques Dufour at CNAM are working on LENR in France.
- Jan Marwan of Dr. Marwan Chemie in Berlin, Germany, is studying the nanostructure of palladium hydride systems. Huke and others from the Technische Universitat Berlin are working with Czernski in Poland and Ruprecht in Canada on electron screening mechanisms for deuteron fusion.

UNCLASSIFIED**Outlook and Implications**

If nuclear reactions in LENR experiments are real and controllable, DIA assesses that whoever produces the first commercialized LENR power source could revolutionize energy production and storage for the future. The potential applications of this phenomenon, if commercialized, are unlimited. The anomalous LENR effects seen in these metal lattices containing deuterium may also have as-yet undetermined nanotechnology implications. LENR could serve as a power source for batteries that could last for decades, providing power for electricity, sensors, military operations, and other applications in remote areas, including space. LENR could also have medical applications for disease treatment, pacemakers, or other equipment. Because nuclear fusion releases **10 million times more energy per unit mass** than does liquid transportation fuel, the military potential of such high-energy-density power sources is enormous. And since the U.S. military is the largest user of liquid fuel for transportation, LENR power sources could produce the greatest transformation of the battlefield for U.S. forces since the transition from horsepower to gasoline power.

Prepared by: Beverly Barnhart, DIA/DI, Defense Warning Office. With contributions from: Dr. Patrick McDaniel, University of New Mexico; Dr. Pam Mosier-Boss, U.S. Navy SPAWAR/Pacific; Dr. Michael McKubre, SRI International; Mr. Lawrence Forsley, JWK International; and Dr. Louis DeChiaro, NSWC/Dahlgren.

Coordinated with DIA/DRI, CPT, DWO, DOE/IN, US Navy SPAWAR/Pacific and U.S. NSWC/Dahlgren, VA.

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2007 001

Advanced Systems and Concepts Office
FINAL REPORT

*High Energy Science & Technology
Assessment*

June 29, 2007

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DTRA01-03-D-0017/Task Order 18-05-14

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High Energy Science and Technology Assessment

FINAL REPORT

June 29, 2007

Prepared for:



**Defense Threat Reduction Agency
Advanced Systems and Concepts Office**

Contract No: DTRA01-03-D-0017

Task Order 18

Technical Instruction 18-06-11

Prepared by:

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FOR OFFICIAL USE ONLY**1.0 Executive Summary**

The potential energy that can be tapped from the nucleus ($> 10^6$ eV/atom) is vastly greater than the energy available from the electronic states of an atom (< 1 eV/atom). The conversion of mass into energy, via fission and fusion reactions, is the basis for the only existing "high-energy" weapons, but further refinements in the design of these weapons, to make them more relevant to the post-Cold War security environment, are certainly possible. Another possible way to extract energy from the nucleus is to exploit the energy stored in metastable isomeric states. Also, despite the negative publicity about "Cold Fusion," the nuclear community continues to watch research in the area of low energy nuclear reactions with guarded optimism for possible future commercial and military applications. Anti-matter annihilation reactions involve the complete conversion of mass to energy with energy densities three orders of magnitude higher than nuclear fission and fusion. The prospect of compactly storing positrons in the form of charge-neutral positronium holds promise for viable military applications of anti-matter.

The Defense Threat Reduction Agency (DTRA) is chartered to monitor new potentially militarily useful sources of energy and to maintain cognizance of others' work in these fields as a hedge against technology surprise.

DTRA tasked SAIC under Contract DTRA01-03-D-0017, Technical Instruction 18-06-11, to conduct a Workshop on a wide range of energy-related technologies that are not chemical in nature, but have credible scientific basis and preliminary experimental results.

The format for the Workshop included a Panel of invited Subject Matter Experts (collectively referred to as the Expert Panel) well versed in the candidate technologies with a broad experience base in past DoD/DTRA advanced technology programs. This Panel was charged with providing individual critiques regarding the status and potential of four primary high energy technology research areas. The Expert Panel consisted of the Honorable Harold Smith, former DoD/ATSD(NCB) and currently a Distinguished Visiting Scholar and Professor at UC, Berkeley; Dr. Jack Davis, ST Executive, Plasma Physics Division, NRL; Dr. Gerald Yonas, Director, Advanced Concepts Office, Sandia National Laboratory; and Dr. Fred Wikner, former OSD Director of Net Assessment and presently consultant to Applied Research Associates Inc.

To avoid a myriad of disparate perspectives on each of the topic areas, a key expert was assigned to coordinate the presentations in each topic area and to serve as the Chairman of the topic area Panel. The four topic areas and the respective Panel Chairs were:

Low Energy Nuclear Reactions (LENR), Dr. David Nagel, GWU

Anti-Matter Annihilation, (b)(6)

Nuclear Isomers, Dr. Jim Silk, IDA

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Advanced Nuclear Fission and Fusion Concepts, Dr. Don Linger, DTRA

An additional topic that was discussed but which did not have a Panel was, **Exotic/Extreme Physics.**

Each of the panels presented impressive results showing good progress in experimental design and execution and in first-principal demonstration of energy extraction, containment and control. Unfortunately, none of the energy sources studied are yet sufficiently advanced to be considered for development in the next five to seven years.

The Expert Panel noted the embryonic stage of development of most of the high energy technologies, and commented that DTRA, as a combat support organization, should stay abreast of the work but not necessarily serve as the primary sponsor for these technology areas.

The recommended course at this stage of development is for DTRA to provide some sponsorship, but more importantly, provide leadership in the form of working toward an interagency working agreement to assure its interests are protected and to speed the needed research by preventing overlap or duplication and identifying, with the other agencies, the most fruitful directions for new research.

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2.0 Introduction

The High Energy S&T Workshop was a follow-on to the Novel Energetics Workshop but with the focus on energetic materials and phenomena whose energy is derived from the nucleus or subatomic processes. The Workshop objectives were to explore the following five potential areas of high-energy research:

- **Nuclear isomers**
- **Low energy nuclear reactions (LENR)**
- **Anti-matter annihilation**
- **Advanced nuclear fission and fusion concepts**
- **Exotic/extreme physics**

Only the first three topics are discussed in detail this report, because they were the primary focus of the Workshop and could be treated at the unclassified level.

The Workshop was structured to include a Panel of Experts, well versed in the topical areas and familiar with DTRA's missions and research portfolio. The Panel of Experts consisted of:

The Honorable Harold Smith, former DoD/ATSD(NCB) and currently a Distinguished Visiting Scholar and Professor at UC, Berkeley

Dr. Jack Davis, ST Executive, Plasma Physics Division, NRL

Dr. Gerald Yonas, Director, Advanced Concepts Office, Sandia National Laboratory

Dr. Fred Wikner, former OSD Director of Net Assessment and presently consultant to Applied Research Associates Inc.

The panel of Experts was instructed to screen and critique candidate high-energy S&T topics and provide recommendations regarding their maturity and relevance for DTRA.

The three topics of Nuclear Isomers, LENR, and Anti-Matter Annihilation were presented as Panel Discussions, starting with an overview by the Panel Chairman; followed by a detailed presentation by each panelist, and finally a discussion period with the Panel of Experts and the Workshop participants.

The following questions were posed for the discussion period:

- Should the high energy S&T topics be included as part of a balanced investment portfolio in "Disruptive Energetics?"
 - Do we understand the underlying physics sufficiently well to proceed with confidence?
 - Do the potential pay-offs outweigh the risks?

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~~Dr. Mitchell Swartz, JET Energy, INC~~ presented a brief summary of the results of excess heat experiments in electric-field loaded deuterated metals:

**EXCESS HEAT IN
ELECTRIC-FIELD LOADED DEUTERATED
METALS**

Research and Development

BRIEF SUMMARY OF RESULTS:

SIGNIFICANT EXCESS HEAT OBSERVED IN PALLADIUM HEAVY WATER (PdD) SYSTEM, PALLADIUM HEAVY WATER (PdD) CODEPOSITIONAL SYSTEM, SOME NICKEL LIGHT and HEAVY/LIGHT WATER SYSTEMS

EXCESS HEAT NOT OBSERVED IN IRON, ALUMINUM, OR DAMAGED PALLADIUM NICKEL SYSTEMS

o

~~JET Energy, Inc.~~



DTRA ASCO Workshop
on High Energy Science and Technology Dec.
12, 2006

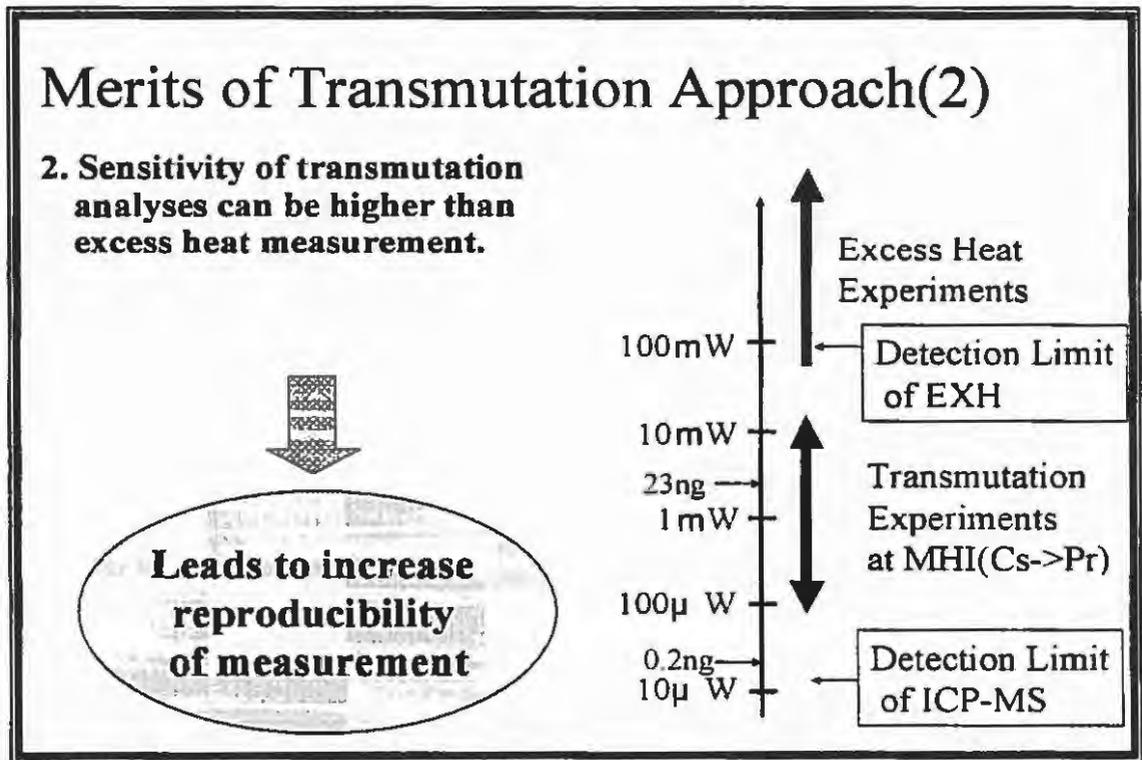
He explained his methods for controlling measurement error and system noise by using dual calorimeter measurements that allowed precise differential measurement and integration of power. He was thus able to compare measurements of several different instruments to allow judgment of consistency in his reported results.

The diffusion and electrophoresis equations show the advantages of low conductivity electrolytes and relatively high voltages for loading D into the electrodes with co-deposition of electrode material. Dr. Swartz obtained energy and power gains over the D charging (loading) input power and discussed the importance of determining optimized operating points. Impressively, he showed a video demonstrating enough power to spin the propeller of a model airplane.

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Professor Michael Melich, W.E. Meyer Institute for Systems Engineering, Naval Postgraduate School, talked about transmutation as the signal for detecting LENR using experiments conducted in a Deuterium cell with an electrolytic Pd diffusion barrier. Quantifying the transmutation products as an experimental approach potentially affords greater sensitivity and reproducibility than excess heat, since the new elements are not present initially and can be detectable in very small concentrations:



Recent trials confirmed that following standard electrolysis experiments, the diffusion barrier contained elements not present before the runs. In principle, the results of a single run can then be analyzed by other labs to determine the degree of consistency in detection of small concentrations of transmuted elements.

Lewis G. Larsen, President and CEO, Founder and Prof. Allan Widom Consultant and Member of Lattice Energy LLC and Northeastern University, Dept. of Physics presented proprietary material on the Widom-Larsen theory for metal hydride surface catalysis of LENR. A convincing thesis was advanced to describe many of the known features of LENR without invoking

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8.0 Workshop Summary

The High Energy Workshop endeavored to assemble the recognized experts in each of the energy categories to survey the state-of-art. The presentations did elucidate the state of science but of course were limited in depth based on time available. At the end of the Workshop, an early summary or "Hot Wash" debrief was presented to the senior DTRA leadership on the salient points made in the two days presentation. It is included in Appendix B.

Nuclear Isomers research has not yet provided evidence of reliable and effective triggering mechanisms. Production seems feasible, though engineering development is needed to scale up to practical amounts of material. The complexity of isomeric excited states and their induced depletion paths leads us not to expect too much from better theory or intense calculational efforts.

Yet, one cannot help but be intrigued by potentially gaining access to such highly energetic states for military applications. At this stage, modest investments related to the study of isomers and the physics of de-excitation would appear to be prudent. Also, improvements in experimental methods and diagnostic tools may be warranted.

Clearly, isomer production is not now the greatest roadblock to a proof-of-principal demonstration and should not be pursued at this time. A more fundamental issue is demonstration of a robust triggering approach. Here more experimental work is useful if focused on development of techniques for analyzing gamma spectra and measurement of depletion rates. Equally important would be innovative approaches to nuclear structure and transition probabilities. Weapons applications based on isomeric payloads are premature and should not be pursued.

Low Energy Nuclear Reactions are showing some remarkable progress with respect to energy (excess heat) production and transmuted element detection, but experiments remain only thinly reproducible. LENR also suffers from a basic lack of understanding of the governing physics.

There is also a compelling need for a theory that can explain production rates and lead to specific electrode treatments and electrolyte compositions and predictions of reaction power, energy and products. The Widom theoretical construct appears promising, but lacks robust experimental verification and rigorous peer review.

The polarizing history of LENR is a detriment to expanding research efforts and it seems unlikely that deployable/useable devices could be expected within a five to ten year horizon. Some low-level funding by 6.1 agencies seems appropriate, both to exploit the possibility of a breakthrough and to monitor other (international) research in this field. Nonetheless, DTRA should not go it alone; rather, it should provide the leadership to build interagency research consortia with a focus on fostering improved research facilities and rigorous experimental protocols.

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Findings & Recommendations Isomers

- Findings
 - Nuclear structure is complex and poorly understood
 - Experiments ad-hoc – not systematic
 - Some good data
 - Hafnium triggering inconclusive and not energetically break-even
- Recommendations
 - Theoretical structure and reaction studies are needed
 - Experiments –Long-term, guided by theory, red-teamed

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Findings & Recommendations LENR

- Findings
 - Good evidence of excess heat and transmutation
 - Widom-Larsen theory shows promise: collective surface effects ... not fusion
 - Low energy implantation of ions
- Recommendations
 - Careful experiments to confirm data base
 - Expand theory field – need more players
 - Other experiments warranted

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Full-Service Solutions

Low Energy Nuclear Reactions (LENR)



Park and Pomeroy,
Electrochemical Cell
1989

- Two branches of LENR
 - Excess Heat
 - Nuclear Transmutation
- Legitimate experiments by reputable researchers worldwide continue to demonstrate "excess heat" production in electro-chemistry experiments
- Other "chemistry" experiments have shown transmutation of elements and production of energetic tritons, helium and tritium
- None of these observations can be attributed to conventional chemistry
- The body of evidence supporting LENR continues to grow, but hard data still only thinly reproducible

Question: Why have LENR researchers not been killed by lethal doses of neutrons and gammas??

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New Theoretical Developments Widom-Larsen Theory

Purports to explain most LENR observations without invoking any new physics beyond the standard model.

- LENR is a manifestation of the weak interaction – it is not fusion or other forms of strong interaction
- Many-body "patches" of collectively oscillating protons or deuterons form on metallic hydride surfaces loaded with hydrogen isotopes
- Collective oscillations of the protons/deuterons start to loosely couple to the collective oscillations of nearby surface plasmon polariton (SSP) electrons, commonly found on the surface of metals
- Coupling between the two increases the local electric field to $>10^{11}$ V/m (about the same as the Coulomb fields seen by inner electrons)
- Intense local radiation field raises effective mass of SSP electrons so that they can react with nearby protons and deuterons to form neutrons
- Neutrons created collectively have huge quantum mechanical wavelengths and are almost always absorbed by nearby nuclei
- Gammas emitted as a result of neutron absorption are intercepted by SSP electrons and reradiated as much softer E-M energy

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However, Edwards did note that “no nuclear residue” would result from positron explosions, theoretically avoiding the environmental “contamination” that early test ban treaty proponents sought to prevent.

Low Energy Nuclear Reactions (Cold Fusion)

In a February 2002 report entitled, “Thermal and Nuclear Aspects of the Pd/D₂O System,” Dr. Frank E. Gordon, Head of the Navigation and Applied Sciences Department of the Space and Naval Warfare Systems Center, San Diego, wrote: “We do not know if Cold Fusion will be the answer to future energy needs, but we do know the existence of Cold Fusion phenomenon through repeated observations by scientists throughout the world. It is time that this phenomenon be investigated so that we can reap whatever benefits accrue from additional scientific understanding. It is time for government funding organizations to invest in this research.”⁵⁰ From July 31-August 3, 2006, the National Defense Industrial Association and the Office of Naval Research co-hosted a Naval Science & Technology Partnership Conference in Washington, D.C., where Dr. Gordon hosted an “LENR Breakout Session” to discuss Space and Naval Warfare Systems Command research developments in low energy nuclear reaction research.

Coverage of Dr. Gordon’s remarks in the *New Energy Times* contained the following claim about U.S. government support for Cold Fusion research: “Although the U.S. Department of Energy has yet to fund studies in the area, the Defense Advanced Research Projects Agency, long known for boldness in funding research, has been funding small LENR projects quietly for many years and recently has taken a renewed interest in the subject.”⁵¹

The Internet abounds with additional reports of undetermined veracity suggesting that DARPA support for LENR, while discreet, is ongoing. However, little evidence suggests that the focus of this research is oriented toward the development of weapons.

Miscellaneous – Foreign Investment in Alternative Nuclear Weapons

A 2006 report by the Center for the Study of Weapons of Mass Destruction at National Defense University notes that, “Moscow seems intent on maintaining a full range of weapon types and exploring new ones, including precision low-yield, pure fusion, ‘clean’ penetrators’, and nuclear isomer weapons.”⁵²

⁵⁰ Technical Report 1862. “Thermal and Nuclear Aspects of the Pd/D₂O System – Volume 1: A Decade of Research at Navy Laboratories.” <<http://www.spawar.navy.mil/sti/publications/pubs/tr/1862/tr1862-vol1.pdf>>

⁵¹ Krivit, Steven and Daviss, Bennett. “Extraordinary Evidence.” *New Energy Times*, November 10, 2006. <<http://lenr-canr.org/acrobat/KrivitSextraordin.pdf>>

⁵² WMD Center 2006 Annual Symposium: “The Future Nuclear Landscape: New Realities, New Responses.”: <<http://www.ndu.edu/WMDCenter/docUploaded/Symposium%202006%20-%20Key%20Themes.pdf>>

**UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS**

Civil Action No. 2016-CV-12144-LTS

Mitchell Swartz, Plaintiff

v.

Robert W. Bahr, as an Individual and as an Officer,
Jack Keith, as an Individual and as an Officer,
Ricardo J. Palabrica, as an Individual and as an Officer,
Sharon Davis, as an Individual and as an Officer,
Michelle Lee, as an Individual and as an Officer,
Johannes P. Mondt, as an Individual and as an Officer,
Marshall P. O'Connor, as an Individual and as an Officer,
Kathy Matecki, as an Individual and as an Officer, Defendants

February 7, 2017

DECLARATION OF ROBERT SMITH

I, Robert E. Smith Jr. , am a citizen of the United States and a Lt Colonel USAF (retired), and aver as follows:

1. I graduated from Purdue University (1959), and the Oak Ridge School of Nuclear Reactor Technology (1961), built the PM-1 Nuclear Power Plant, Sundance, Wyoming, and flew 234 missions in Vietnam in the F-4C/D Phantom jet fighter, before becoming flight test director for the television-guided Maverick missile, and project pilot and engineer for the AN/UPD-4 radar.

2. I have developed many weapons for the military and flew many combat missions. I initiated the AMRAAM missile and the AIM/9M Sidewinder missile programs, and the Air Defense Initiative in 1986, and served as the Program Manager for the SP-100 Space Nuclear Power System.

3. I personally observed two demonstrations of condensed matter nuclear science (CMNS) technology at MIT at the International Conference (ICCF-10) in 2003. One was operated and run by Dr. Mitchell Swartz from JET Energy/MIT; and in a separate demonstration in the same room, the second was conducted by Prof. John Dash from Portland State University, who was supported by several graduate students.

FROM :Oakton International Corporati FAX NO. :703-620-6247

Feb. 07 2017 03:36PM P2

2

4. The discussion of the demonstrations presented by Dr. Swartz was particularly noteworthy from an engineering sciences point of view. He explained how operating point manifolds, the inclusion of well-known controls, electromagnetic forces, and material properties of the supporting lattices, created the conditions for excess heat to be produced by the electrolytic CMNS devices. He further presented clear evidence that the output of the devices produced more energy than they consumed in the input operation of the devices. It made me wonder why the US Department of Energy was not investing substantially in this technology.

5. These condensed matter nuclear reactions have utility because they are radiation-less and do not have radioactive waste products. They produce clean products like helium, an inert gas. No smog, no increased carbon. The reactions are scalable, such that reactors of small up to very large can be designed. Therefore the practical applications of this technology are unlimited.

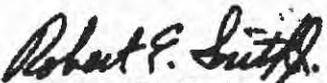
6. It is my professional as well as personal opinion that this field is real in spite of opinion of the Patent Office (USPTO). The real purpose here is for the USPTO to review carefully the conditions that are needed for proposed reactors and the written reviews and comments of the using organizations, such as DTRA, DARPA, DIA, USDOE, DOD, and NASA, which have the requirements and funding to further develop the technology. USPTO reviewers have an excellent source of relevant information for required understanding of this new science.

7. Patent protection for the intellectual property rights of developers is essential to investment in this technology by competent people and should not be questioned by uninformed US Patent Office reviewers.

8. Make no mistake that condensed matter nuclear science has numerous applications as has been determined by a detailed review of the US Air Force Energy Horizons requirements document. The number one application is nuclear propulsion of Aircraft reducing the requirements for fossil fuels.

I declare that all statements herein of my own knowledge are true and that all statements made on information and belief are believed to be true.

Date: February 7, 2017


Robert E. Smith Jr.
Oakton, Virginia

APPX 134

**UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS**

Civil Action No. 2016-CV-12144-LTS

Mitchell Swartz, Plaintiff

v.

Robert W. Bahr, as an Individual and as an Officer,
Jack Keith, as an Individual and as an Officer,
Ricardo J. Palabrica, as an Individual and as an Officer,
Sharon Davis, as an Individual and as an Officer,
Michelle Lee, as an Individual and as an Officer,
Johannes P. Mondt, as an Individual and as an Officer,
Marshall P. O'Connor, as an Individual and as an Officer,
Kathy Matecki, as an Individual and as an Officer. Defendants

February 6, 2017

DECLARATION OF DR. FRANK GORDON

I, Frank E. Gordon, declare that I am a citizen of the United States of America, and aver as follows:

1. I received a Doctor of Engineering degree in 1971 from the University of Kansas. After that, I was employed at the U.S. Navy Research and Development Laboratory currently known as SPAWAR Systems Center in San Diego from 1971 until my retirement in July, 2009. I was a member of the Navy's Senior Executive Service from March, 1987 until I retired. During that time, I served in a variety of senior management positions and at the time of my retirement, I was the head of the Research and Applied Sciences department, composed of more than 450 scientists and engineers and an annual budget of more than \$300 million.

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2. Access to sources of energy by the U.S. military at the location where it is needed is both a costly and tactical necessity. It has been widely reported that the U.S. Marines carry more weight in batteries for their equipment than ammunition.

Additionally, not only is transporting fuel to a remote base in theater expensive, it is also costly in terms of loss of life since the transportation vehicles become high priority targets for terrorists. A new source of energy that could replace even part of the current energy requirements would be very significant.

3. Three published U.S. Government reports both document and add credibility to the existence of this technology, called LENR (or LANR, or "cold fusion"). A report by the Defense Intelligence Agency (DIA) dated 13 November 2009 titled "*Technology Forecast: Worldwide Research on Low-Energy Nuclear Reactions Increasing and Gaining Acceptance*" documents experimental results from scientists throughout the world and states that "**This body of research has produced evidence that nuclear reactions may be occurring under conditions not previously believed possible.**" The report includes multiple uses for this technology and further states that "...LENR power sources could produce the greatest transformation of the battlefield for U.S. forces since the transition from horsepower to gasoline power."

4. In addition to the Defense Threat Reduction Agency (DTRA) Report discussed by Dr. Swartz in the above entitled complaint, a subsequent report from DTRA was issued in 2016 titled "*Investigations of Nano-Nuclear Reactions in Condensed Matter.*" The internal DTRA scientific and technical review process was completed and cleared for public release on June 7, 2016. Both the DIA and DTRA internal review/signoff process could be considered to be comparable to peer-review for a technical journal article.

5. In addition to the DIA and DTRA Reports, the U.S. Navy has issued reports documenting this technology, including **TECHNICAL REPORT 1862**, February 2002 [*Thermal and Nuclear Aspects of the Pd/D₂O System*, two volumes].

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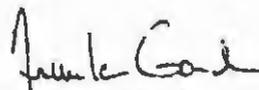
In the Foreword to that report, I wrote:

"As I write this Foreword, California is experiencing rolling blackouts due to power shortages. Conventional engineering, planned ahead, could have prevented these blackouts, but it has been politically expedient to ignore the inevitable. We do not know if Cold Fusion will be the answer to future energy needs, but we do know the existence of Cold Fusion phenomenon through repeated observations by scientists throughout the world. It is time that this phenomenon be investigated so that we can reap whatever benefits accrue from additional scientific understanding. It is time for government funding organizations to invest in this research.

6. Although additional research is required in order to develop and reduce it to commercial practice, I believe that LENR has the potential to be an extremely useful technology for a wide variety of applications.

I declare under penalty of perjury that all statements herein of my own knowledge are true and that all statements made on information and belief are believed to be true.

Date: February 6, 2017



Dr. Frank Gordon

San Diego, CA

**IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA Alexandria Division**

MITCHELL R. SWARTZ, Plaintiff

v.

JOSEPH MATAL, Performing the Functions and
Duties of the Under Secretary of
Commerce for Intellectual Property and
Director of the United States Patent and
Trademark Office.
Defendant.)

No. 1:17-cv-482
(LMB/TCB)

August 29, 2017

DECLARATION OF LAWRENCE P. G. FORSLEY

I, Lawrence P.G. Forsley, declare that I am a citizen of the United States of America and aver as follows:

1. I attended Nebraska Wesleyan University (Lincoln, Nebraska) in 1971 in Environmental Studies under a National Science Foundation Program; the University of Rochester, College of Engineering and Applied Science (Rochester, NY) until 1974 and the State University of New York, Empire State College in Computer Science (Rochester, NY) until 1980.
2. I was a research engineer and group leader at the University of Rochester, Laboratory for Laser Energetics between 1975 and 1988 as part of the DoE funded Omega Laser, Inertial Confinement Fusion research program, and lecturer at the University of Rochester in the College of Arts and Sciences and in the College of Engineering from 1984 to 1988.
3. I acted as a consultant to the DoE Lawrence Livermore National Mirror Fusion Test Facility (Livermore, California) from 1978 to 1987; a visiting scientist at the Max Planck Institut fur Plasma Physics (Garching, Germany) on the ASDEX

Tokamak in 1983; a consultant to the Defense Nuclear Agency program at Physics International Corporation (San Leandro, CA) in 1980 through 1981 on a modular bremsstrahlung source to simulate an exo-atmospheric nuclear gamma ray burst; and a US DARPA reviewer on the distantly related field of sono-fusion.

4. I am familiar with the subject discussed in the above-entitled action because of my work as a principal investigator under multiple US Navy LENR Cooperative Research and Development Agreements, with the US Navy SPAWAR-Pacific, (San Diego, CA); Naval Research Laboratory, (Washington, DC); US Naval Air Weapons Station China Lake (Ridgemont, CA) and the US Naval Surface Warfare Center, Dahlgren Division (Dahlgren, VA)

5. I have been an experimental physicist with the NASA Glenn Research Center (Cleveland, OH) for the past four years pursuing fundamental research and its application in this field. I am co-author of over 25 peer-reviewed papers and several US Government technical reports regarding the field. I am also a research associate with the University of Texas, Austin, Nuclear Engineering Teaching Laboratory, where I have been conducting scaling operations of these devices.

6. In my opinion, the field of cold fusion whether called low energy nuclear reactions (LENR) or lattice assisted nuclear reactions (LANR) is real, scientifically significant, militarily important and possibly commercially useful. I have spent 27 years primarily researching and harnessing the energetic particles that give rise to the excess heat attributed to the phenomena and am engaged in scaling development for deep space power using the phenomena.

7. I observed videos of the technology described by Dr. Swartz during his open demonstration of his high-impedance aqueous Pd/D₂O/Pt Phusor-type CF/LENR component in 2003 at MIT in Cambridge MA during the 10th International Conference of this field [ICCF-10].

8. While operating under a US Navy NCRADA at the US Navy SPAWAR-Pacific, I was instrumental in setting up a meeting at SPAWAR to better acquaint the Defense Intelligence Agency with the field. Dr. Swartz was one of the participants of over 20 whom we invited to assess the state of the Cold Fusion/Low Energy Nuclear Reaction/Lattice Assisted Nuclear Reaction field. Subsequent to this meeting, the DIA published a report in 2009 [#DIA-08-0911-003 13 November 2009].

9. In January, 1939 the first paper on nuclear fission was published in the Journal *Naturwissenschaften*. Less than 7 years later the first nuclear weapon was tested and shortly thereafter ended the Second World War. Exactly seventy years later I co-authored a paper [1] in the same Journal demonstrating lattice assisted nuclear fusion. The US DoE paid for, and their staff co-authored, three LENR papers [2],[3],[4] with me. Yet, unlike nuclear fission that the USPTO has participated in since its inception, the USPTO has deliberately abridged LENR research and development for nearly 30 years at a cost this Nation can ill afford.

[1.] P.A. Mosier-Boss, S. Szpak, F.E. Gordon, and L.P.G. Forsley, "Triple Tracks in CR-39 as the Result of Pd/D Co-deposition: Evidence of Energetic Neutrons," *Naturwissenschaften*. **96** (2009) 135-142

[2] P.A. Mosier-Boss, J.Y. Dea, L.P.G. Forsley, M.S. Morey, J.R. Tinsley, J.P. Hurley, and F.E. Gordon, "Comparison of Pd/D Co-Deposition and DT Neutron Generated Triple Tracks Observed in CR-39 Detectors," *Eur. Phys. J. Appl. Phys.* **51** (2010) 20901

[3] P.A. Mosier-Boss, L.P.G. Forsley, P. Carbonnelle, M.S. Morey, J.R. Tinsley, J. P. Hurley, F.E. Gordon, "Comparison of SEM and Optical Analysis of DT Neutron Tracks in CR-39 Detectors", *Hard X-Ray, Gamma-Ray, and Neutron Detector Physics XIII*, edited by Franks, James, and Burger, *Proc. of SPIE Vol. 8142*, (2011) pp K1 - K8.

[4] P.A. Mosier-Boss, L.P.G. Forsley, P. Carbonnelle, M.S. Morey, J.R. Tinsley, J. P. Hurley, F.E. Gordon, "Comparison of SEM and Optical Analysis of DT Neutron Tracks in CR-39 Detectors", *Radiation Measurement*, **47**, (2012) pp 57-66

10. I am aware that the U.S. PTO has not been truthful with applicants who applied for US patents in this field. I submitted a patent to the USPTO and to the PCT for a fusion-fast-fission nuclear reactor that was cited by the USPTO as unworkable with no utility yet by the PCT as having utility but not novel and obvious.

11. I have read the above-entitled Complaint and am surprised that In re Swartz, used by the USPTO to stifle cold fusion, is actually about a vibrating sensor whose frequency is used to measure loading, and not about cold fusion, but relevant to it as to other things such as metallurgy.

12. In my opinion there is utility to inventions in this field. Heat producing and energetic particle production caused by these phenomena are militarily significant. Four of my US NCRADAs were funded specifically for military applications of either power production or energetics. NASA has funded several years of my research on NASA's and the Nation's behalf. Dr. Swartz's NANOR and PHUSOR type devices exhibit positive thermal gain and by scaling up would be militarily and commercially useful.

13. I have a patent issued in this field USPTO 8,419,919 that cites multiple patent applications by Dr. Swartz.

Lawrence P.G. Forsley

I declare that all statements herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Lawrence P.G. Forsley

**UNITED STATES DISTRICT COURT
for the Eastern District of Virginia**

Mitchell R. Swartz, Plaintiff

v.

Joseph Matal, Acting Under Secretary of Commerce for Intellectual Property and

Director of the United States Patent and Trademark Office, Defendant

Filed: August 30, 2017

DECLARATION OF DR. DAVID J. NAGEL

1. David J. Nagel, declare that I am a citizen of the United States of America and of the State of Virginia, and aver as follows:

1. I earned a B.S. degree in Engineering Science (Magna Cum Laude, University of Notre Dame, 1960), an M.S. degree in Physics (University of Maryland at College Park, 1969) and a Ph.D. in Materials Engineering (University of Maryland at College Park, 1977)

2. I served as an Officer in the U.S. Navy, with four years of active duty, 26 years of reserve service, and three tours as a Commanding Officer, and retired in 1990 with the rank of Captain in the U. S. Naval Reserve.

3. I also served on the civilian staff of the Naval Research Laboratory as an experimental physicist measuring x-ray emissions from nuclear weapons and plasmas, and as the leader of a group of 150 scientists and engineers. In the former role, I am the co-inventor of plasma x-ray lithography. In the latter role, I was a member of the Senior Executive Service (ES-4).

4. I have been a Research Professor at The George Washington University for the past 18 years. I lead a research group in our LENR Energy and Spectroscopy Laboratory.

5. I am very familiar with the subject of Low Energy Nuclear Reactions (LENR), having worked in the field since 1989 and chaired the international convention of the subject as its 14th meeting (ICCF-14) in Washington DC in 2008. I also have a company in this field (NUCAT Energy LLC), and have provided a commercial course on the subject.

6. I have observed the technology described by Dr Mitchell Swartz during his open demonstration of the high-impedance aqueous Pd/D2O/Pt Phusor in MIT in 2003 at the 10th international meeting (ICCF-10). Dr. Swartz is one of the leaders in the field of LENR, having published many papers on the topic, invented two major approaches to generating energy by LENR, and developed several techniques for confidently measuring energy from LENR.

7. I went with Dr. Swartz, when he presented about this new field to the Defense Threat Reduction Agency in 2006. That meeting led to the DTRA report, which is now in evidence in this case.

8. In my opinion, the field of LENR is real due to many and strong experimental results from scientists in at least ten countries over the past 28 years. Operability of LENR has been demonstrated by the production of tritium, helium and other elements, none of which can be generated by chemical reactions. Thermal energy far beyond what is possible from chemistry has been measured many times by competent, well-equipped and careful scientists. That also points to the operation of nuclear reactions.

9. In my opinion, there is great utility to inventions in this field. LENR operate without dangerous prompt radiation, do not generate radioactive waste and do not produce greenhouse gases. Many civilian applications of heat from LENR are expected. The U.S. military would benefit greatly from the availability of small LENR generators for both installations and forward deployments. Generating heat and electricity in the field without a fossil fuel logistics tail would be a game changer for the U. S. Marine Corps and Army. Over 20 companies in nine countries are now seeking to commercialize LENR.

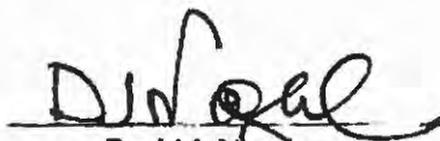
10. On 1 August 2017, my company published a 44 page NUCAT Energy LLC Report 2017-01, which cites laboratory evidence for the operability and utility of LENR. The title of the report is "Evidence of Operability and Utility from Low Energy Nuclear Reaction Experiments". The report is available by writing me at nucat.energy@gmail.com.

11. The industrial promise of LENR is so great, I co-founded LENRIA Corporation in 2015. It is a not-for-profit organization, which is serving as the Industrial Association for LENR companies globally. The Corporation is now organizing ICCF-21 to be held in 2018 in the U.S..

12. LENR (initially called "cold fusion"), which is operable and has great utility, was invented in the U.S. It is expected to be the basis for a new global industry. The U.S., given the proper basis of intellectual property, can be the global leader in the new industry.

I declare that all statements herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Respectfully submitted:


David J. Nagel

30 Aug 2017
Date

**UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS**

Civil Action No. 2016-CV-12144-LTS

Mitchell Swartz, Plaintiff

v.

Robert W. Bahr, as an Individual and as an Officer,
Jack Keith, as an Individual and as an Officer,
Ricardo J. Palabrica, as an Individual and as an Officer,
Sharon Davis, as an Individual and as an Officer,
Michelle Lee, as an Individual and as an Officer,
Johannes P. Mondt, as an Individual and as an Officer,
Marshall P. O'Connor, as an Individual and as an Officer,
Kathy Matecki, as an Individual and as an Officer, Defendants

February 5, 2017

DECLARATION OF DR. BRIAN AHERN

I, Brian Ahern, declare that I am a citizen of the United States of America, and aver as follows:

1. I, Brian Ahern, declare that I am a citizen of the United States of America.
2. I am an expert in material science, quantum chemistry and nanotechnology. I received my PhD in Materials Science from the Massachusetts Institute of Technology (Cambridge, MA) in 1984. I am the inventor of over 20 patents.
3. I served at USAF Rome Laboratory evaluating new material systems with potential importance for military applications, as a senior scientist in the Electromagnetic Materials Division. From 1985 until 1995 I was the U.S. representative to NATO Panel III on Electromagnetic Materials where my duties were to establish collaborations among scientists in the seven member countries.

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4. In 1987 I was charged with the duty to survey the field of the new superconductors which were at first a great shock to experts in the field. I was selected for this work in part due to my M.S. thesis in the field of low temperature physics. It is merely coincidental that my thesis topic was based on loading palladium alloys with hydrogen and deuterium and measuring the superconducting transition temperatures. My two year survey concluded that the theoretical underpinnings of superconduction were sadly lacking. The BCS theory was not only incapable of predicting the occurrence of the YBCO materials, it was incapable of making a priori predictions for any arrangement of matter. This observation regarding the lack of understanding in low temperature physics is not widely known. This lack of first principles level of understanding has been of little concern to experimentalists and has not discouraged extensive research support.

5. I sympathize with Dr. Mitchell Swartz. I can understand his frustration with USPTO Examiner Ricardo Palabrica, who was an examiner for my filing of a patent application on an invention involving high energy density discharges and their intensification by high voltage pulses in liquids. For this invention, I drew on the vast experience of decades of exploding wire experiments and other high energy density studies. I based the invention on the same principle that is routinely observed in femtosecond laser-matter interactions. This invention was useful because energy could be extracted. My patent application was taken and reviewed by Examiner Palabrica.

6. Mr. Palabrica denied my application and dismissed all of my claims on the grounds that he deemed that it was "cold fusion". My technology, my scientific explanations, and my arguments were summarily essentially ignored and dismissed by him, as he appeared to have pre-judged my technology and invention as part of the cold fusion phenomenon. It was not. I did not even use those words. I did not even use the word "fusion" in my filing. I did use the metal palladium and heavy water, and the similarities ended there.

7. In discussions, Mr. Palabrica implied that if I removed all references to palladium and heavy water that a successive patent application would be allowed. Mr. Palabrica said that a new filing without the words 'fusion', 'palladium' and 'heavy water' would have a much better chance of moving forward. This was an odd request by Mr. Palabrica because to comply with his demand would have made a second filing useless by removing the very materials used. Because Mr. Palabrica apparently has the power to decide what an inventor's technology would be, I gave up in frustration even though I believed, and continue to believe, that the technology was sound.

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8. I have never experienced such a response from any Examiner before, like I have from Ricardo Palabrica. His response was inappropriate for a Patent Examiner. The comments involve attempting to change an invention by overstepping his directives and acting as a 'protector' of scientific knowledge.

9. The Applicant, Dr. Mitchell Swartz appears to be laboring under the same misuse of authority.

10. I have known Mitchell Swartz since 1991. I would like to express my strong support for the work being conducted by Dr. Mitchell Swartz in the field of isotopic fuel loading of metal lattices and lattice assisted nuclear reactions. I believe his investigations are some of the most thorough and precise yet conducted in isotopic loading and lattice assisted nuclear reactions, and that the thermal effects he is observing are real and will ultimately be useful on a large scale.

11. It is my professional as well as personal opinion that this field is real in spite of opinion of the Patent Office.

I declare that all statements herein of my own knowledge are true and that all statements made on information and belief are believed to be true.

Date: February 5, 2017

Brian S. Ahern

Brian Ahern, PhD

Acton, MA

02/07/17

Jeff Chavannes



JEFF CHAVANNES
Notary Public
Commonwealth of Massachusetts
My Commission Expires March 23, 2023

**UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS**

Civil Action No. 2016-CV-12144-LTS

Mitchell Swartz, Plaintiff

v.

Robert W. Bahr, as an Individual and as an Officer,
Jack Keith, as an Individual and as an Officer,
Ricardo J. Palabrica, as an Individual and as an Officer,
Sharon Davis, as an Individual and as an Officer,
Michelle Lee, as an Individual and as an Officer,
Johannes P. Mondt, as an Individual and as an Officer,
Marshall P. O'Connor, as an Individual and as an Officer,
Kathy Matecki, as an Individual and as an Officer, Defendants

February 5, 2017

DECLARATION OF GAYLE VERNER

I, Gayle Verner, declare that I am a citizen of the United States of America.

1. My field of experience includes that of a journalist and educator. For over 18 years, I have been a nationally published journalist who has written extensively in many fields including science, medicine, and energy conversion. I have earned the degree of Master in Education from the Harvard Graduate School of Education. I have published (primarily for *People Magazine*, *USA Today*, and *American Health Magazine*) many articles for national and regional journals, newspapers, and newsletters. I make the following statements independently and not as a representative of any publication.

2. As a former professional journalist, I am highly experienced in poring through, sorting documents, and recognizing issues, the least of which is, legibility of documents; this is a nonsense, red-herring delay tactic that further obfuscates the Plaintiff's repeated requests for such documents as the official, up to date Docket—which so far has been denied.

3. The Defendants have a long history of mischaracterizing facts. Their flurry of false allegations are inconsistent and created to make it all difficult to keep track of. As one example, in patent application '381, the Defendant Sharon Davis and her supervisor first claimed that timely submitted Evidence (scientific peer reviewed papers and other documents) was never received. This was simply untrue. I know this because I personally reviewed the materials, stapled them together, compiled them, and inserted them into the mailing envelope. I personally hand-delivered them to the post office clerk. In addition, to prove the Defendants mischaracterized facts, the stamp of the USPTO Postal Office on the card which was affixed to the top of the mailed group of the submitted documents indicated that they were all timely received. To say that they were not received is so far-fetched, that it defies imagination.

4. Then, when the Defendants were shown they were wrong with respect to the "receipt", the Defendants claimed the documents were "unreadable". When shown, citing line and verse, that they were wrong; in their assertions, and that the documents were both received and readable, the persuasive objective evidentiary exhibits were ignored. Then later she said that I had no probative value when I was the one directly involved. Despite the Defendants' repeated false statements, Dr. Swartz's documents were sent to the Office, and they were all readable, legible, and in proper form. I mailed them each time, and over and over the Defendants have falsely purported that they were not received.

5. One conceivable reason for the Defendants to fabricate and switch the exact documents involved is to avoid any real examination and response to the submitted Evidence. A second possible reason is that to do so would also add credence to Dr. Swartz's position. It is, therefore, probable that this mischievous behavior by some at the USPTO was created for the sole purpose of harassing him, and thereby, discouraging the continuation of his patent application process.

6. The behavior of some of these defendants, such as Sharon Davis at the USPTO, cries out for correction by the federal court, especially since the USPTO's own judicial/administrative system has failed to do its job with respect to this matter.

I declare that all statements herein of my own knowledge are true and that all statements made on information and belief are believed to be true.

February 5, 2017


Gayle Verner

USPost Office Address: P.O. Box 81135
Wellesley Hills, MA 02181

RESPONSE UNDER 37 CFR 1.116
EXPEDITED PROCEDURE - EXAMINING GROUP NUMBER 2204
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE THE APPLICATION OF:

Inventor : Mitchell R. Swartz

Serial No.: 07/ 339,976

Filed: 04/18/1989

SYSTEMS TO INCREASE THE EFFICIENCY,
CONTROL, SAFETY AND ENERGY
UTILIZATION OF ELECTROCHEMICALLY

PAPER:

Group Art Unit: 2204

Examiner Anthony Chi

April 17, 1996

Commissioner of Patents and Trademarks
Washington, D.C. 20231

DECLARATION of ROBERT W. BASS, M.A. Oxon, Ph.D.

I, the undersigned Robert W. Bass, declare that I am a citizen of the United States of America.

1. I am an Inventor of U.S. Patents 4,235,668 (issued Nov. 25,1980), 4,236,964 (issued December 2, 1980) and 4,448,743 (issued May 15, 1984). I have also served as a Registered Patent Agent [29,130] with 18 years of experience in the practice of patent law before the PTO. This includes one year (1993) as a full-time Associate with the Intellectual Property Law firm of Poms, Smith, Lande & Rose in Century City, California, and a seventeen year practice as an avocation or part-time profession.

2. I am aware of this field both because I have continued to read the literature, because of my "hot" fusion inventions, because of my more recent QRT Cold Fusion invention [subject of a pending application filed in 1991], and because I have actually both personally drafted and submitted several cold fusion applications for, and also read numerous cold fusion applications by, other inventors who have submitted to the Patent Office. My "hot" fusion inventions include the Topolotron and the Plasmasphere which were issued patents.

Appx 149

-3. I, myself, as well as several collaborators in my fusion plasma confinement research and in my nuclear fusion reaction-rate equilibrium-stability optimization research have published many papers. These were published in both the *Proceedings of the Utah Academy of Arts & Sciences* and in the leading archival "hot" fusion journals, such as the APS *Physics of Fluids*, the IEEE *Transactions on Plasmas Science*, and the American Nuclear Association *Fusion Technology*. My inventions have been written up at length in the leading treatises on this subject, including Tom Dolan's 3-volume book "Fusion Research" and Reece Roth's book "Fusion Energy".

4. Academically, I have served on the Theoretical Division of Project Matterhorn at the Princeton Plasma Physics Lab ("hot" fusion) in 1957-59, and more recently have been a Professor of Physics & Astronomy at BYU (1971-81) and a Prof. of Aerospace Engineering Sciences at the U of Colorado, and of EE at UCLA (visiting Faculty member, 1986-87), and of Systems Engineering at the West Coast University.

5. Ever since the first patent applications on so-called "cold" fusion (or lattice-catalyzed low-energy nuclear fusion) I have noticed what has the appearance of an appalling pattern of deliberate conduct on the part of the Examiners in Art Group 220 and their supervisor, Mr. Garret. Before I had even met Dr. Swartz, and before I had even filed a "cold" fusion patent, I had complained verbally to Mr. Garret about the numerous inconsistencies in his Examiners pertaining to their treatment of "cold" fusion patent applications. Mr. Garret replied to me with what in retrospect appears to have been some brazen misstatements. Here are just two examples.

6. First, Mr. Garrett said that perhaps the PTO library did not subscribe to various technical journals cited by the "cold" fusion applicants, although a subsequent phone call to the PTO verified that every single one of the journals in question was in fact either subscribed to by, or maintained by, or located in, the PTO library.

7. Second, Mr. Garret vigorously - and with seeming plausibility - absolutely denied that there was any special "policy" pertaining to the handling of "cold" fusion patents. Mr. Garret claimed that each and every Examiner under him was acting on his own independent judgment without regard to any categorization. This erroneous claim appears to be contradicted by the Annual Report which was issued by Commissioner Lehman after his first year in office. Said Annual Report referred explicitly to "cold" fusion as an "emerging technology" and stated

that there were some 400 applications in that category still pending and that none had yet been acted upon.

8. It now appears that this inaction is in contrast to the European Economic Community which will issue the Fleischmann-Pons patents, based upon the recent public statements by the European patent authorities. Japan is reported to have issued more than 100 Cold Fusion patents.

9. I have read the Notice from the Examiner Chi to Dr. Swartz dated March 29, 1996. In my opinion, the Examiner is in error in paragraph 1, claims must not be "patentably distinct", but "materially distinct" as Dr. Swartz has attempted to explain within the papers associated with above-entitled application.

10. With respect to these series of applications, there does not seem to be a genuine attempt to follow the directives of the Appeal Board to provide Dr. Swartz with a substantive response to the Briefs and Declarations already submitted.

11. There is a pattern of behavior here. I have read many complaints on the Internet by disgruntled "cold" fusion patent applicants, most of whom complain of the same things. These individuals appear to have independently arrived at the same and probably only possible conclusion -- that there is an organized effort under Art Group 220 to delay, obstruct, obfuscate, harass, hinder, and otherwise retard the issuance of patents in this category.

12. These efforts to delay and obstruct include examples of intellectual dishonesty in patent papers which I have examined in this field, and which attempted only to go through this Art Group.

13. In contrast to what I believe may be an abnormal pattern, I have seen cold fusion patents in the same field issue, but these were examined by OTHER Art Groups. Unlike this Art Group, those applications which were prosecuted before other art groups were issued.

14. Further consistent with this abnormal pattern, the PTO has issued, and continues to regularly issue, patents which purport to disclose how to nullify gravity or to attain an "anti-gravity" device. In fact, at last count, there were scores of such patents issued, all apparently with no difficulty. These devices do not work, while "cold fusion" does, as one can regularly read about its success in many research articles.

15. There is a lot wrong with this. Here are two problems. First, it is now well-known to, and generally believed by, the scores of inventors in the Cold Fusion field that the ONLY way to

get fair treatment from the PTO is to word the patent application in such a way that the application does NOT get sent to Art Group 220.

16. Second, in this field, some applicants of inventions submitted to the Office avoid mentioning Drs. Fleischmann & Pons and even the words "cold" fusion. In my opinion, this is wrong, and is both inconsistent with, and a dereliction of duty from, the PTO's Canons of Professional Responsibility. The Office should never encourage, even implicitly, any lapse of the applicants' obligation of complete "candor". Any such application in this field should provide a full and complete citation of Drs. Fleischmann & Pons' work as prior related art.

17. In my opinion, the Appeals Board should ask Commissioner Lehman, as well as the Inspector Generals of both the General Accounting Office and of the PTO to initiate a serious, rigorous investigation into the conduct of Art Group 220. One should not forget that Admiral Short was Court Martialed for Dereliction of Duty for being asleep on his watch during Pearl Harbor.

I declare that all statements herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Respectfully submitted,

Robert W. Bass

April 17, 1996

Signature of Declarant:
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor : Mitchell R. Swartz
Serial No : 12/589,258
Filed 10/20/2009

Examiner:
Dr. Ricardo Palabrica

For:

**Apparatus and Process
for Monitoring Loading**

This is a continuation of:

Serial No. 07/371,937, Filed 06/27/1989
[Continuation Serial No. 09/750,480 Filed: 12/28/2000;
Continuation Serial No. 11/099,677 Filed 4/6/2005]

December 15, 2010

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

DECLARATION OF PROF. PETER HAGELSTEIN

I, Peter Hagelstein, declare that I am a citizen of the United States of America.

1. My field of experience is theoretical, computational, and applied physics. I have taught at the Massachusetts Institute of Technology and led a research group that has focused on problems of atomic physics, plasma physics, x-ray lasers, and quantum optics.
2. I have closely followed, and participated in, the field of cold fusion since 1989.
3. The scientific results presented by Dr. Mitchell Swartz on his Phusor experiments, in which excess power and total energy is measured, looks very good. His results are competitive in terms of reproducibility and power gain with the

best results obtained by other groups around the world. The reproducible energy gains that he has reported are the highest so far reported by any group.

4. Swartz demonstrated his Phusor experiment at MIT in connection with ICCF10 in August 2003. Data from this experiment show significant excess heat. Swartz has demonstrated his Phusor experiment in his Weston laboratory, in Weston, MA numerous times for me and for others.
5. Water heaters that run on electricity from household wall plugs are currently sold to produce hot water in parts of the country where oil delivery and natural gas delivery are unavailable or inconvenient. Electricity in the Boston area costs near \$0.20/kW-hr, which seems very expensive. Swartz's Phusor experiments have shown energy gains at least up to 10x. A Phusor-based water heater with an energy gain of 10x would be competitive with existing water heaters. I would buy one if available.
6. No one in the field considers Swartz's Phusor experiment to be the same as what Fleischmann and Pons did, or what others have done. It is clearly an original experiment distinct from all that have come before. The USPTO is simply mistaken if they assert otherwise.
7. The specification of "low paramagnetic, low conductivity deuterium oxide, 99.99%, from Cambridge Isotope Laboratories, Andover MA" adequately specifies what is meant by pure heavy water in the context of Swartz's Phusor experiment. Assertions to the contrary in this case by the USPTO are incorrect.

8. Following the announcement of cold fusion by Fleischmann and Pons in 1989, many labs carried out experiments to see whether they could replicate the experiment. Unfortunately, important experimental details concerning the experiment were not available generally in 1989, and as a result, the large majority of these replication efforts failed. Subsequently, work at SRI and at other laboratories identified a number of experimental requirements for the Fleischmann-Pons experiment need to be satisfied for excess heat to be seen. These include: (a) Pd cathodes need to be highly loaded for 2-5 weeks prior to seeing excess heat. (b) The D/Pd loading needs to exceed 0.95 at some point during this 2-5 week period. (c) The D/Pd loading needs to exceed about 0.84 at the time for an excess heat event to be seen. (d) Excess heat is correlated in the Fleischmann-Pons experiment with interfacial deuterium flux. If we restrict ourselves to this subset of the SRI criteria, we find that none of the negative experiments published in 1989 and 1990 were done in regime where excess heat would have been expected. For example, the cathode loading in the experiments done at MIT did not reach 0.80. No cathode which loaded so poorly was observed to produce excess heat in any Fleischmann-Pons experiment in the SRI experiments. Therefore, D/Pd loading is very important, and monitoring it is of great utility.
9. I note that it becomes exponentially more difficult to achieve high D/Pd loadings above a loading of 0.70 near room temperature (due to the rapid increase in deuterium chemical potential). Hence, the achievement of a loading of 0.95 in the majority of replication experiments in 1989 and 1990, where no special effort was made to achieve high loading, and where the loading was not even measured in most of these experiments cited by the USPTO, would not be expected. The existence of such a requirement was not appreciated in 1989, except by Fleischmann, Pons, and a small number of other researchers.

10. The USPTO continues the tradition of assigning significance to these negative experiments, which were not done in the relevant parameter regime of high D/Pd loading. Thus, rather than showing that the Fleischmann-Pons experiment could not be replicated, these insufficiently loaded experiments should be understood as producing the expected negative result (no excess power) in those regimes where we would expect no excess power to be seen.
11. Today, D/Pd loading is known to be very important. There have been numerous peer-reviewed published papers that show positive excess heat results in replications of the Fleischmann-Pons experiment. If the USPTO have asserted otherwise, they are simply mistaken.
12. Since the USPTO refuses to recognize the existence of the effect, patents cannot be obtained on the associated technology. Because of this, funding to develop the technology is generally unavailable, or very nearly so, which hinders its development. By following its misguided policy in this area, the patent office impedes the development of technology that would address the energy problem, that would impact the availability of fresh water, and that could provide a real solution to the climate change issues the world faces. The development of this technology could have a real impact on national security, as the instability which results from the current situation regarding the finite availability of oil in less than friendly regions could be mitigated with the new energy source this technology promises. The development of a new energy technology in this area would be expected to provide jobs, which are badly needed at this time.
13. According to the USPTO website, the mission is described as: The USPTO mission is to ensure that the intellectual property system contributes to a strong global economy, encourages investment in innovation, and fosters entrepre-

neurial spirit. The USPTO promotes industrial and technological progress in the United States and strengthens the national economy by:

"Administering the laws relating to patents and trademarks.

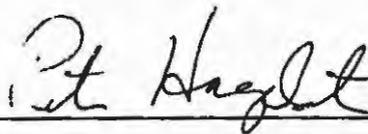
"Advising the Secretary of Commerce, the President of the United States, and the administration on patent, trademark, and copyright protection.

"Advising the Secretary of Commerce, the President of the United States, and the Administration on the trade-related aspects of intellectual property".

In the general area of the Fleischmann-Pons effect, the USPTO accomplishes exactly the opposite of its mission. The global economy is faltering, and this technology could make a difference, but is not allowed to do so because of the USPTO. The USPTO hinders industrial and technological progress, since patents generally are not allowed, because there is little or no investments (because intellectual property cannot be protected). In general, the USPTO prevents progress through its actions, contrary to its mission statement.

14. I declare that all statements herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: December 15, 2010



Peter L Hagelstein
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Research Article

Demonstration of Energy Gain from a Preloaded ZrO₂–PdD Nanostructured CF/LANR Quantum Electronic Device at MIT

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Abstract

A self-contained, preloaded CF/LANR quantum electronic component, a NANOR[®]-type LANR device containing active ZrO₂–PdD nanostructured material at its core, showed energy gain during, and after, the January, 2012 IAP MIT Course on CF/LANR. The Series VI two terminal device featured new composition, structure, and superior handling properties. Most importantly it was preloaded so that LANR activation is separated from loading. The calorimeter had parallel diagnostics, including heat flow measurement, and calibrations included an ohmic (thermal) control located next to the NANOR[®]-type device. The preloaded LANR device demonstrated energy gain which ranged generally from 5 to 16. It was 14.1 energy gain while the MIT IAP course was ongoing. During February and March, through a range of experiments, the NANOR[®] continued to produce excess energy, confirmed by daily calibrations. This open demonstration has confirmed the existence, reproducibility, and improved control of CF/LANR reactions, and as importantly, has shown a possibly superior preloaded nanostructured LANR material and driving device.

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Keywords: Dry, NANOR, Preloading, Reproducibility

1. Introduction

Clean, high efficiency energy production is very important today, and in the foreseeable future, from whatever source. Lattice assisted nuclear reactions (LANR, also known as cold fusion and LENR) use hydrogen-loaded alloys to create heat and other products [1]. The “excess heat” is energy derived from what is believed to be deuteron fusion in aqueous, non-preloaded, earlier systems, and so the deuterons are the fuel and are extremely slowly consumed. LANR will

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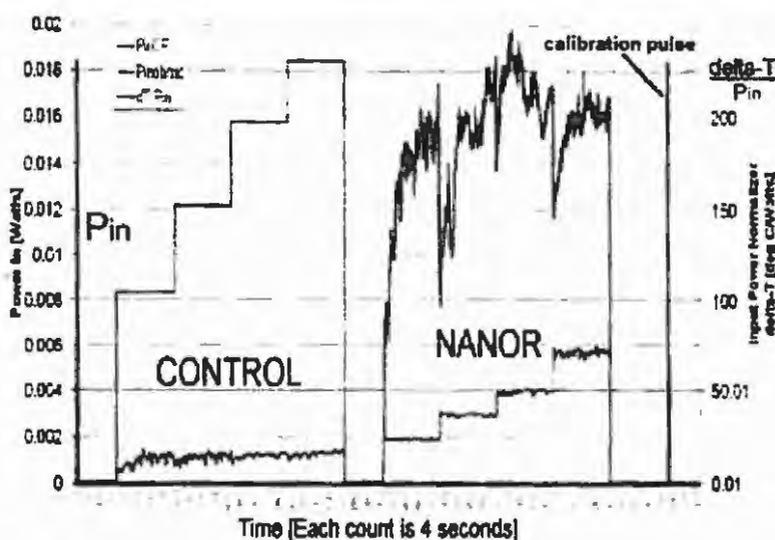


Figure 1. Input power and resulting output temperature rise (normalized to input electrical power) of a self-contained CF/LANR quantum electronic component Series 6–33; run EJan30B, a two terminal NANOR[®]-type device containing active preloaded ZrO₂-Pd nanostructured material at its core.

be an important source of energy for this planet, for artificial internal organs, for interstellar probes, and robotics, transportation, and electricity production. With LANR we also get to transfer the use of petrochemicals and gasoline into making useful pharmaceuticals and plastics and perhaps even nanomaterials. In the case of LANR, there can rarely occur, in a lattice under special conditions, the fusion of two heavy hydrogen nuclei to form a helium nucleus at near room temperature. The product helium-4, or simply helium, is *de novo* meaning that this helium-4 is created new and fresh, generated directly from two, driven by more, deuterons physically located within the loaded palladium, nickel or one of their nanostructured materials. These reactions were first reported as CMNS, LANR, LENR or cold fusion, and it involves a palladium-alloyed lattice where the process occurred irregularly at low efficiency. Most importantly, the product with LANR, helium, is environmentally safe and does not produce global contamination or warming. One such cold fusion device (PHUSOR[®]) was openly shown at MIT during August 2003 [2]. This paper reports a second open demonstration; confer Figs 1,3–5; and, therefore, it is important to compare this to the previous LANR demonstration and technology. For example, we previously demonstrated success in LANR aqueous systems, linked to high solution resistance (impedance) and shaped-metamaterial LANR devices, with power gains more than 200–500%; and short term power gains using codepositional high impedance devices DAP (Dual anode Phusor[®]-Type LANR device; Pd/D₂O, Pd(OD)₂/Pt–Au have reached energy outputs of up to ~8000% compared to input energy, where ohmic controls are defined as 100% [3–5].

The results of the previous open demonstrations of the PHUSOR[®]-type LANR devices including BOTH at MIT and later developed integrated larger systems involving paired Stirling engines driven by LANR to beyond 19 W of excess power [2]. These devices (cathode volume ~0.47 cm³, area ~6.4 cm²) yield significant excess heat after full loading, with a peak excess power production circa 1.5 W, and a peak power gain of ~2.4 or higher. Their output depends upon loading rate, loading achieved, and confinement time. The palladium Pd/D₂O/Pt devices demonstrate a critical threshold input electrical current density circa 1.5 ± 0.3 mA/cm², and a possible activation energy of ~60.7 kJ/mol. Open circuit voltage (V_{oc}) greater than 1.8–2.70 V is useful and heralds excess heat. The mean excess power gain (compared

to an ohmic joule control) during the week was 2.30 ± 0.84 for electrical input powers of 120–750 mW. The system developed 338 ± 67 mW of excess power compared to a joule (thermal) control which is defined as 100%.

However, successful LANR requires engineering of multiple factors including loading, adequate confinement time (sometimes weeks within the component container because the materials can be potential toxic if inhaled), loading rate, and prehistory (with careful avoidance of contamination and materials and operational protocols which quench performance). Specifically, nanostructured materials [6], metamaterials [7], and their controlled operation [8,9] improve success. At LANR's nanostructured material "core" is an isotope of hydrogen, usually deuterons, which are tightly packed ("highly loaded") into binary metals, alloys, or nanostructured compounds, containing palladium or nickel, loaded by an applied electric field or elevated gas pressure which supply deuterons from heavy water or gaseous deuterium.

ZrO₂–(PdNi)–D LANR/CF nanostructured materials generate excess heat [10], including with acoustic and electric fields [11–13], with additional effects from orthogonal applied DC magnetic field intensities [12]. They have been made into LANR/CF transistors [3] which exhibit energy gain and simultaneous non-thermal near infrared emission. There are complicated polarization/transconduction phenomena including an "avalanche (transconduction electrical breakdown) effect" which has a critical role in excess heat. Nanostructured materials are important in LANR produced in codeposition structures [14], observed in non-thermal near infrared emissions [15,16], and exhibiting LANR excess heat correlated with the size of the Pd–D nanostructures [12,13]. Relevant to LANR and the future of LANR devices, nanostructured materials offer great opportunity. These nanostructured LANR materials include nanoparticles, nanocrystals, quantum dots, nanocatalysts, nanowires, nanocrystals, nanoclusters, nanodendrimers and higher polymer aggregates, and metallic-organic hybrids. They are made from metals, semiconductors, oxides, ceramics, polymers, composite materials, glasses, alloys and combinations of the above. As a result of the small size, nanotechnology built using these new nanostructured materials have two amazing properties. First, nanostructured materials have incredibly large surface area to volume ratios. Second, many also have new unexpected quantum mechanical properties. Nanostructured materials enable quantum confinements, surface plasmon resonances, and superparamagnetism. Examples of material properties which unexpectedly change by nanostructured utilization include significantly decreased melting temperatures (gold), significantly increased electrical conductivity (silicon), increased flammability (aluminum), improved catalytic properties (platinum), and unexpected transparency of metals (copper). Solvated gold nanoparticles have colors which range from red to black. Palladium nanoparticles often have a vacancy in their center. Similarly, LANR nanostructures include vacancies within them. In the alloys, they must drift into the bulk from the surface. This diffusion is slightly facilitated by the loading itself. *de novo* Pd–D vacancies have been made in loaded Pd (and Ni) with electron beam irradiation [17]. Codeposition has been used to make palladium, nickel and alloyed loaded materials on top of electrodes, and used dual anode LANR systems to produce very high levels of such LANR nanostructured materials locally [13,14]. In addition, nanostructured materials have been used in LANR using palladium black [10] in a double structure (DS)-cathode. They reported more than 200 MJ of excess energy was continuously produced for over 3000 h at an average rate of 50–100 kJ/h. The DS-cathode is a Pd cathode with "an internal vacuum zone filled with a deuterium storage type powder" and an outer cylindrical vessel of Pd metal (wall thickness of 3 mm). Such bulk cathodes rely on diffusion, making it difficult to reach 100 at% concentration solid solution of D in Pd or the other nanostructured material. The D ions are postulated to move over the surfaces of the Pd black by the "spillover-effect", without the need to becoming D₂ molecules. We have reported successful production of excess heat using nanomaterial palladium, nickel, and newer alloyed compounds, such as ZrO₂PdNi, and in a LANR transistor configuration, driven by two applied electric field intensities, which demonstrate LANR heat associated with low level near-infrared emission, controlled by two optimal operating point manifolds.

2. Experimental

We report a new generation of LANR (CF) preloaded nanocomposite ZrO_2 -PdNiD CF/LANR quantum electronic devices which are active, and capable of energy gain. These feature two terminals and self-contained superior handling properties enabling portability and transportability. NANOR-type lattice assisted nuclear reaction (LANR) devices use hydrogen alloys to create heat and other reactions. Most importantly, the activation of the desired cold fusion reactions is, for the first time, separated from the loading. These proprietary prepared preloaded ZrO_2 -(PdNi) LANR/CF nanostructured materials are dry, and glued into electrically conductive, sealed configurations. The core is ZrO_2 -(PdNiD) [Zr (~66%), Ni (0–30%), and Pd (5–25%) by weight before additional D_2 and H_2 are added to achieve more than 130% D/Pd. These are potentially very useful. Their complex development has required control of their breakdown states and quenching tendencies. Series VI NANORs feature new composition, structure, and superior handling properties. Again, most importantly, they are preloaded so that LANR activation is separated from loading. The current driver system incorporates our proprietary third generation LANR (CF) Integrated Circuit which is microprocessor controlled and coupled to a Series V or VI preloaded CF/LANR nanocomposite ZrO_2 -PdD and ZrO_2 -PdNiD electronic devices to activate them. It is combined with a new type calorimeter and data processing which is used to evaluate and verify activity of the NANOR[®], controls, and others materials. This system has already been demonstrated using the more reproducible nanostructured CF/LANR quantum electronic devices at MIT in 2012.

The LANR preloaded, stabilized NANOR[®]s were driven by a high voltage circuit up to 3000 V rail voltage. The duty cycle was split with half going to a control portion consisting of a carefully controlled electrical DC pulse into an ohmic resistor which was used to thermally calibrate the calorimeter. We also employed a new series of LANR-directed light indicator outputs to define states which has been a matter of incredible utility and assistance almost every time the system and device has been used. The new controlled driving system uses pulse wave modulated microcomputer control of specialized very high voltage semiconductors linked to a current source driving system driving system coupled to the NANOR[®]-type LANR system. It provides an improved method of current control, enabling new activation, a new method of driving, an improved and better paradigm system and the ability to evolve paradigms. Furthermore, the system is excellent for preliminary tests for usefulness to detect LANR activity, and by serially examining multiple samples of the same CF/LANR material to look for changes from doping, contaminants, and quenching materials. The new controlled driving system can be used for open demonstrations as discussed above, and to more closely examine LANR and other systems for their activity, linearity, time-invariance, and even the impact of additives. For example, a very successful investigation of silver doping was made. This system can easily detect the impact of impurities, dopants, contaminants, quenching agents, accelerants, and other factors. Basically, there are two levels of operation for NANOR[®] LANR systems, low and high power. High power is useful for applications requiring larger amounts of power such as transportation, heating, and artificial organs. In this case, however, low power is used for several reasons including to facilitate the rapid time constant, and because this is for demonstration and teaching purposes.

Data is taken from voltage, current, temperatures at multiple sites, and even as a 4-terminal measurement of the NANOR's internal electrical conductivity. Data acquisition has all temperature and electric measurements sampled at data rates of 0.20–1 Hz, with 24+ bit resolution (e.g. Measurement Computing (MA) USB-2416, or a Omega OMB-DaqTemp or equivalent; voltage accuracy 0.015 ± 0.005 V, temperature accuracy $<0.6^\circ\text{C}$). All connections are isolated when possible, including where possible with Keithley electrometers, or their equivalent, for computer isolation. All leads are covered with dry, electrically insulating tubes, such as medical grade silicone, Teflon, and similar materials, used to electrically isolate wires. To minimize quantization noise, if necessary, 1 minute moving averages may be used for some signals. The noise power of the calorimeter is in the range of ~1–30 mW. The noise power of the Keithley current sources is generally ~10 nW. Input power is defined as $V * I$. There is no thermo-neutral correction in denominator. Therefore, the observed power is a lower limit. The instantaneous power gain (power amplification factor (non-dimensional)) is defined as P_{out}/P_{in} . The energy is calibrated by at least one electrical joule control (ohmic

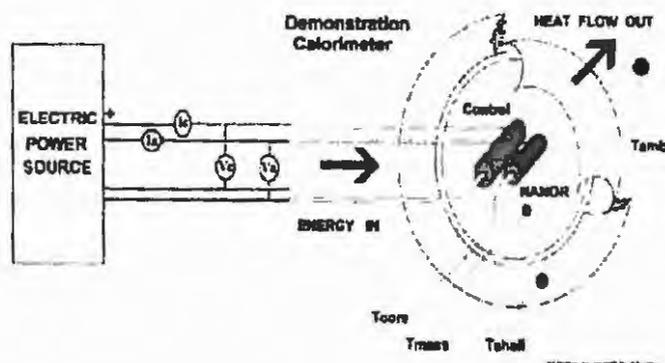


Figure 2. Electric driver and calorimeter showing parallel diagnostics consisting of heat flow measurement and temperature, and the ohmic (thermal) control. The electric power supply provided a high voltage DC rail voltage with the electronics controlling the applied voltage across the component.

resistor) used frequently, and with time integration for additional validation. The excess energy, when present, is defined as $(P_{out} - P_{in}) * \text{time}$. The amount of output energy is determined from the heat released producing a temperature rise, which is then compared to the input energy.

3. Experimental – Methods

Figure 2 is a three-dimensional (3D) schematic perspective view of the NANOR[®] and control and sensors located inside, and monitored by, several systems and a calorimeter. The distances shown, and relative sizes of objects, in the figure are not actual, simply schematic to help demonstrate what is occurring. At the center are the NANOR[®] and the ohmic thermal control. Additional temperature measurements are used for further accuracy and verification. Physically located between them, is one of the Calorimeter's three central core temperature probes. To ensure thermal contact, a thermally conductive, electrically resistive material can be used. Thermal compounds can include Wakefield Thermal compound (Pelham, NH). Some of the heat flow was measured by an Omega HFS Thin Film Heat flux sensor. In all cases, a thin layer of electrically insulating, but thermally conductive material is placed above and below these three elements of the system. Very thin insulating ceramics can be used, such as Wesgo AL-500 and Molecular Dielectrics, Inc (Clifton, NJ) MYKROY J11. There are also specialized additional thermal masses which are for the most part completely and adiabatically isolated from the ambient environment by a series of five insulating barriers. One of these barriers enable the leads from the NANOR[®], ohmic control, and temperature sensors (and other diagnostics such as heat flow sensors) to leave the calorimeter through specially modified firebricks.

Using a low power type system for open demonstrations, the output of this system was presented at MIT from January 30, 2012 through mid May 2012. The input powers were below 100 mW [19], because the set-up was designed to run at low power input levels to increase the safety at the educational institution for its multi month-long stay at MIT. A range of experiments were conducted examining the impact of various driving sequences, and the NANOR[®] continued to produce excess energy. There were daily calibrations using input current and voltage standards.

The 2012 Open LANR/CF Demonstration at MIT had parallel diagnostics including calorimetry, input-power-normalized ΔT , and focused heat flow measurement, and several calibrations. One of the calibrations included an ohmic (thermal) control located next to the NANOR, used to ascertain activity. To enable demonstrations at MIT for the NANOR[®]-type LANR system, including in the MIT IAP class where multiple experiments had to be shown to classes, or otherwise run over times of 2 h, a specialized heat flow semiquantitative analyzer was specially developed. The heat which this preloaded NANOR[®]-type LANR device demonstrated was monitored three ways by three (3) independent systems for semiquantitative measurement of the energy produced. Furthermore, the output of the NANOR is compared to an ohmic control. First, the energy produced is instantaneously and kinematically determined by the ratio of the input power normalized temperature increase, called by the symbol ' $\Delta T/P_{in}$ ' referring to the increase of temperature (ΔT), divided by the input electrical power (P_{in}). Second, it is also instantaneously and kinematically evaluated over a wide area by the ratio of the input power normalized heat flow leaving it, called by the symbol ' HF/P_{in} ' referring to the heat flow (HF) divided by the input electrical power (P_{in}). Third, it is examined by calorimetry, calibrated by the thermal ohmic control, and confirmed by long-term time integration. These three methods of verification are pooled to derive very useful information, semiquantitatively ascertain energy produced, and infer activity.

4. Results

The self-contained CF/LANR quantum electronic component and a two-terminal NANOR[®], containing active ZrO₂-PdD nanostructured material at its core, showed energy gain during, and after, the January, 2012 IAP MIT Course on CF/LANR. The results are shown in Figs. 1, 3–5. In this case, the mini-sized NANOR is a sixth generation CF/LANR device, and it is smaller than 2 cm, with less than 1 g of active material. However, this is actually a matter which is not *de minimus* because the LANR excess power density was more than 19,500 W/kg of nanostructured material. The preloaded NANOR-type LANR device demonstrated an average energy gain (COP) of $\sim 14 \times$ ($\sim 1412\%$) the input for a duration of several hours that it was observed during the MIT IAP course on the first day, and levels of that order continued. Over several weeks, CF/LANR quantum device demonstrated more reproducible, controllable, energy gain which ranged generally from 5 to 16 (14.1 while the course was ongoing).

In the case of this NANOR (the sixth generation of these microminiaturized CF/LANR devices), the activation of this cold fusion reaction is, for the first time, separated from its loading. In every other system known, Fleischmann and Pons, Arata, Miles, and the others, the loading was tied to activation. By contrast, in the case of the sixth generation NANOR[®]s, unlike the others, the preloaded devices can be simply electrically driven.

This is a high efficiency heat producing system, and within it, a unique calorimeter and a unique driving system whose design, driving configuration and implementations, in conjunction with the NANOR have made portability of LANR to MIT, and elsewhere, possible. Furthermore, the proprietary microprocessor controlled system has also led to an evolving series of improved driving paradigms to qualitatively explore and then exploit loaded nanostructured, nanocomposite, and other materials including semiquantitatively examining them for usefulness, heat-production activity, linearity, time-invariance, and even the impact of additives and contaminants.

The NANOR[®]-type LANR device was able to generate large amounts of heat ($> 100\%$ compared to the expected dissipation by $V * I * \text{time}$). This excess energy clearly heralds a high efficiency of driving energy use. The entire system was put onto three electronic boards enable an entire new generation of activated CF/LANR nanocomposite ZrO₂-PdNiD electronic devices. This second Open Demonstration of LANR devices featuring the preloaded NANOR turns out to have been more important than initially realized. First, this demonstration confirmed the existence, reproducibility, and now improved control, of CF/LANR reactions. For the entire months of February through April 2012, the NANOR[®] continued to produce excess energy, with daily calibrations against an ohmic thermal control; thus, it also confirmed the existence of CF/LANR daily during that time. By comparison, and also worth noting, the historic 2003 open demonstration of CF/LANR at MIT needed two full tables for the setup, whereas the 2012 NANOR

demonstration at MIT needed only a single standard sized desk top. And most of that space was taken up by the computer and confirming meters (five of them), rather the device itself. In addition, the new calorimeter was cyclable in hours rather than requiring an entire day, making it applicable to the MIT course. In addition, compared to the 2003 LANR Open Demonstration at MIT, this second open demonstration featured a more sophisticated calorimeter shown at the MIT RLE laboratory. It had additional monitoring diagnostics for improved verification, such as the measurement of heat flow, to thereby provide for three independent ways of monitoring excess heat semiquantitatively compared to a thermal ohmic control.

Second, it has shown a possibly superior nanostructured material and configuration. The NANOR[®]-type preloaded LANR device openly demonstrated features include its convenient size (much smaller) and its superior handling properties which enable unique portability, and transportability. Like its 2003 (ICCF-10) predecessor demonstration, this preloaded NANOR-type LANR device also showed excess energy and also obvious improvements of size, response time, diagnostics, and total output energy.

Third, it had a much higher energy gain compared to the 2003 demonstration unit (Energy gain 14.1 in 2012 vs an energy gain ~ 2.7 in 2003). In fact, the current NANOR Series VI NANORs have had even higher gains (to beyond 30).

Fourth, another unique quality is the graphs were generated by an open demonstration proving also precise, safer containment.

Fifth, the Internet blogs and visitors to the open demonstration have indicated that the public wants cold fusion by whatever name, and therefore, these activated preloaded CF/LANR nanocomposite materials and LANR electronic devices do have usefulness and importance.

These preloaded NANOR[®]-type LANR devices have shown significant improvement over their predecessors, including the highly successful metamaterial PHUSOR[®]-type of LANR device. At their core is the proprietary preloaded nanostructure material specially prepared by several new processing steps. Could these dry, preloaded, ready-to-be-activated, NANOR[®]-type LANR devices/systems/materials, including in preassembled IC devices and systems, be the future of clean efficient energy production [20]?

Figures 1 and 3–5 show this entirely new, more reproducible, much more powerful configuration of clean, efficient energy production from several points of view. The figures include raw data and derived information from the runs which show conclusively LANR excess energy heralded by calorimetry and by input power normalized incremental temperature (ΔT) changes. These graphs shows a small portion of the collected data and derived information which was actually collected and analyzed by the class, and later in a four-month interval. Confirmatory measurement of the operability and utility of the system include the first day of the 3 months open demonstration of the NANOR[®]-type LANR device at MIT during the 2012 IAP course on CF/LANR in the Department of Electrical Engineering.

Figure 3 is a set of curves which plot the differential incremental increase in temperature ($^{\circ}\text{C}$) for case with no input ("Background"), and for the case of an ohmic thermal control at the same location, and for the NANOR[®]-type LANR device. The graph presents several curves which plot the temperature rise in response to four different levels of electrical input power, and the response of an ohmic control to same electrical input power. The x -axis represents time, and each count represents 4 s. The y -axis on the left-hand side represents electrical input power in watts. The y -axis on the right-hand side represents the amount of temperature rise (differential temperature increase) in response to the electrical input power ($^{\circ}\text{C}$). The input to the thermal ohmic control is shown, followed by the preloaded NANOR[®]-type device, as are the thermal output (heat output generated) for both the ohmic control and the preloaded NANOR[®]-type device. The graph shows first the response of the ohmic control, and then the response of the NANOR, then a second ohmic control. Each of the outputs are read off of the right-hand side. Calibration pulses, used for accuracy and precisions checks of voltages and currents, are also shown.

Compare the output for NANOR[®]-type LANR device to the thermal (ohmic) control. Figure 3 clearly demonstrates the larger differential incremental increase in temperature ($^{\circ}\text{C}$) for the NANOR[®] compared to the ohmic. Attention

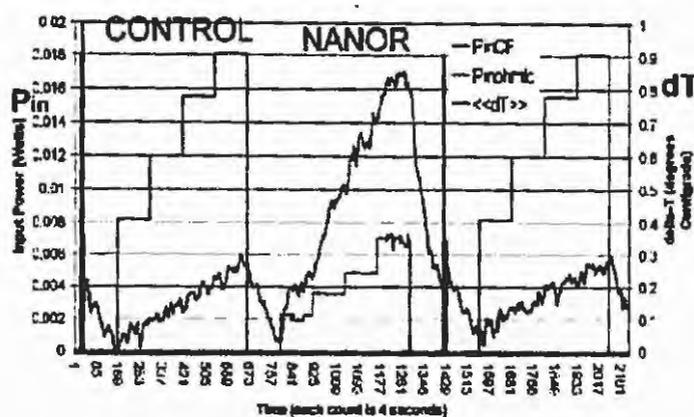


Figure 3. Input power and incremental output temperature rise of a self-contained CF/LANR quantum electronic Series VI NANOR[®] device. These curves plot the raw data as incremental temperature rise and the applied input electrical power.

is directed to the fact that the active preloaded LANR quantum electronic device clearly shows a larger, significant improvement in differential thermal output compared to a standard ohmic control (a carbon composition resistor). That amount of differential temperature increase for the preloaded NANOR[®]-type device heralds great utility for the energy output as a heat source.

Figure 1 is set of curves which plot the temperature rise (ΔT (in $^{\circ}\text{C}$)) of the preloaded NANOR[®]-type LANR device and the ohmic control normalized to four levels of input electrical power. Each is shown with as a thermal output response to its electrical input. The several regions present the differential temperature rise normalized to input electrical power for the preloaded NANOR, for the case with no input power ("Background"), and for the case of input to the ohmic thermal control, located at the core. The x-axis represents time, and each count represents 4 s. The y-axis on the left-hand side represents electrical input power in watts. Each of the outputs are read off of the right-hand side. The y-axis on the right-side represents the amount of temperature rise (differential temperature increase) normalized (that is, divided by) to the electrical input power. The units of this axis are in $^{\circ}\text{C}/\text{W}$. Calibration pulses, used for accuracy and precisions checks of voltages and currents, are also shown.

Figure 1 heralds the excess energy achieved by the NANOR type of LANR device. Compare the ΔT output normalized to input power for preloaded NANOR[®]-type LANR device to the thermal (ohmic) control. It can be seen that the input power normalized delta measurements suggest strongly the presence of excess heat. Observe that despite lower input electrical power to the NANOR, the temperature rise normalized to input electrical power observed in the core was higher than expected, as compared to the ohmic control. Attention is directed to the fact that the active preloaded LANR quantum electronic device again clearly shows significant improvement in thermal output, here input-power-normalized compared to a standard ohmic control (a carbon composition resistor).

Figure 4 is set of curves which plot the heat flow, normalized to input electrical power, leaving the system while driving the preloaded NANOR[®]-type LANR device and the ohmic control at four different electrical input powers. The heat flow is in response to the electrical input. The figure presents the output heat flow for the preloaded NANOR, for the case with no input, and for the ohmic thermal control, located at the calorimeter's core. The x-axis represents time, and each count represents 4 s. The y-axis on the left-hand side represents the electrical input power in watts. The y-axis on the right-hand side represents the Heat Flow output normalized (that is, divided by) to the electrical input power. Calibration pulses, used for accuracy and precisions checks of voltages and currents, are also shown.

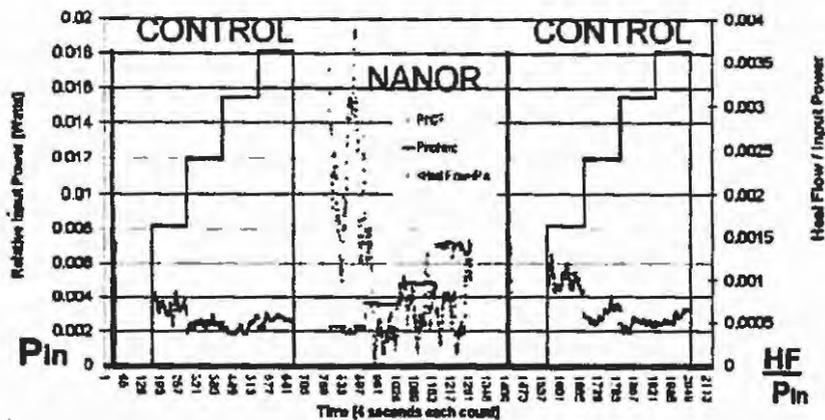


Figure 4. Input power and output heat flow normalized to input electrical power of a self-contained CF/LANR quantum electronic component NANOR 6-33.

In Fig. 4, compare the output heat flow normalized to input power for NANOR[®]-type LANR device to that for the thermal (ohmic) control. The long term heat flow measurements (using calibrated devices) confirm the presence of excess energy, and validate the other measurements. It can be seen that despite lower input electrical power to the NANOR, the heat flow out in response, normalized to input electrical power observed in the core, was higher than expected, as compared to the ohmic control – especially at lower input power levels. The response of the NANOR[®]-type LANR device is consistent with very efficient energy gain, with the energy output as heat. The changes of the output with input power is consistent with the optimal operating point manifold of the LANR material. Therefore, the figure heralds the great efficiency of, and the excess energy coming from, the preloaded NANOR[®]-type of LANR device. Attention is directed to the fact that the active preloaded LANR quantum electronic device clearly again shows significant improvement in energy generated compared to a standard ohmic control (a carbon composition resistor) by this method, too, using heat flow. This information corroborates the marked and substantive incremental increase in energy output as heat for the preloaded NANOR[®]-type of LANR device.

Figure 5 shows curves which plot the electrical input power, at several input power levels, and the calorimetric responses of both the preloaded NANOR[®]-type device and the ohmic control. The x-axis represents time, and each count represents 4 s. The y-axis on the left-hand side represents electrical input power in watts. The y-axis on the right-hand side represents the amount of energy released. The units of this axis are in joules. The figure shows the input, and the calorimetry, of preloaded NANOR along with that for the ohmic thermal control used to calibrate the system. Those calibration pulses, used for accuracy and precision checks of voltages and currents and time, are also shown. The inputs to the thermal ohmic control, followed by the preloaded NANOR[®]-type device, are shown, as are the calibrated calorimetric outputs for both.

Each of the outputs are read off of the right-hand side. The latter curves represent time integration to determine total energy. They thus rule out energy storage, chemical sources of the induced heat, and other sources of possible false positives. Compare the output for NANOR[®]-type LANR device to the thermal (ohmic) control. As can be seen, this semiquantitative calorimetry, itself calibrated by thermal waveform reconstruction, was consistent with excess heat being produced only during energy transfer to the NANOR[®]-type LANR device.

Notice that the active preloaded LANR quantum electronic device clearly shows significant improvement in thermal output compared to a standard ohmic control (a carbon composition resistor). The graph, taken from the MIT IAP January

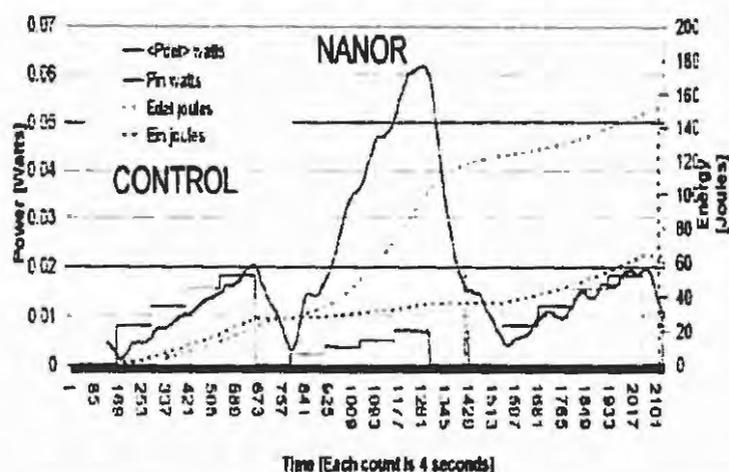


Figure 5. Input and Heat Output of a two terminal NANOR[®]-type device Series 6-33 device, showing the calorimetric response at several input powers, for the device and the ohmic control.

2012 class, is representative of the NANOR-type of CF/LANR technology, and its shows quite clearly demonstrated over unity thermal output power from the NANOR, at a level close to 78 mW.

5. Conclusion

In summary, the uniqueness of the preloaded LANR nanostructured material-device includes its high activity, its preloaded nature, its dryness, its precise containment, and its easy portability. It begins a new generation of CF/LANR nanostructured materials and devices. In the case of this NANOR (the sixth generation of these CF/LANR devices), the activation of this cold fusion reaction is, for the first time, separated from its loading. In every other system known, Fleischmann and Pons, Arata, Miles, and the others, the loading was tied to activation. As importantly, the semiquantitatively measured output energy IS a significant energy gain. This has always been a 'goal post' for cold fusion, one which so far remains beyond the realm for hot fusion on Earth. The present device and driving technology have provided high-efficiency pre-loaded energy-, heat-, and product-producing devices which can be electrically driven and has provided a method of improved activation and reproducibility for controlling lattice assisted reactions and their generated products using nanostructured, nanocomposite, and other materials.

Preloaded CF/LANR nanocomposite materials in CF/LANR Electronic Devices do have usefulness today and tomorrow. Today, they can be clearly examined with this system for demonstrations of their CF/LANR activity, linearity, time-invariance, and the impact of additives. For example, the present device, and controlling/driving system provided a reliable low power, high-efficiency, energy production device for demonstration and teaching purposes of size smaller than a centimeter, with an active site weight of less than 100 mg. The preloaded nanostructured LANR material and accompanying controller and driver have shown at MIT a successful (second) open demonstration of CF/LANR heat production and energy conversion device. This confirms LANR/CF. Also, compared to the first LANR/CF open demonstration at MIT, the new device and accompanying driver and other technologies have shown obvious improvements of size, response time, diagnostics, and even total output energy.

This open demonstration over months has demonstrated that microprocessor controlled integrated circuits using LANR quantum optical devices containing preloaded nanostructured LANR material can be used as an effective very

clean, energy production system, apparatus, and process. We have run the component over a year with evanescent loss which is attributed to fuel loss, or redistribution, or inactivation (perhaps by reaction with another material). Whether they can be refueled or simply replaced, is under investigation. In addition, elsewhere, this driving and monitoring system was useful to easily convert conventional monitoring and conventional thermometry into fine calorimetry. Calorimetry and input-power-normalized delta T were used to ascertain activity. For example, this system has been used to show the calorimetry of a nanostructured composite CF/LANR Device using twenty different levels of input. This method is similar to, but beyond, that suggested by Dr. Robert W. Bass [18]. After testing it, we have determined that it was highly useful, and now use it routinely, wherever possible.

Tomorrow, preloaded LANR nanostructured materials and devices will also be useful for integrated circuits and other applications using a pre-activated nanostructured and other materials. These include high power, effectively 'over-unity', self-contained, microprocessor-controlled, preloaded, energy production devices and systems enabling their remote activation for electronic, bioelectronics, space and avionic circuits, IC devices, and AI systems.

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- [20] Similar aqueous systems of Pd D indicate the fuel, D, is used to make ⁴He (Miles), and there are no biologically significant neutron, or ionizing radiation, output hazards known.

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Research Article

Development of a Cold Fusion Science and Engineering Course

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Abstract

For three consecutive years, an introductory non-credit short course was taught on the science and engineering of cold fusion (CF). It reviewed its origin, extent, basis and substantial experimental proof of the observed excess energy (XSE) from active cold fusion (lattice assisted nuclear reactions) systems. The range of CF technologies spanned from early aqueous CF/LANR systems to recent day nanomaterials. While academic officials are slow to recognize cold fusion and its viability, the fact is that the subject and its science have entered the academic domain, and students can learn that the phenomenon is real and reproducible.

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Keywords: CF academic course, CF curriculum, CF education, CF training, LANR academic course, LANR education, LENR academic course, LENR education

1. Introduction

Education plays a critical role in the development of any science and technology, and it is especially significant in an emergent, controversial field like cold fusion. What heightens its difficulty here, however, is that the scientists and others interested in learning more about the field are almost always under an intense barrage of unfair criticism and blistering attacks from competing interests and skeptics. Despite this major obstacle, just as it has been important to have occasional cold fusion open demonstrations, it is important to create (and expand) cold fusion education in the classroom.

This report describes how a complicated and new alternative energy subject-matter was tailored to a college course-work program, and was offered as an introduction to cold fusion during its Independent Activities Period (IAP), designed for students to engage in topics outside-of the-normal-curriculum.

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2. Experimental

The goal has been to increase the number of well-trained cold fusion scientists, researchers and theoreticians by introducing a range of material science, physics and engineering to them with the hope of expanding awareness, educational excellence, and the science and technology needed to develop and proceed with this energy-efficient technology. Enrollment was open with permission from the instructors, Prof. Peter Hagelstein, PhD, MIT Professor of Electrical Engineering and Dr. Mitchell Swartz, ScD, MD, of JET Energy Inc. IAP at MIT, for those not familiar with it, is a special four-week program where students can choose from a vast array of non-credit and for-credit short coursework offered only during the month of January of each year. CF-101 was a non-sign up, non-credit introductory course open to MIT and non-MIT students, alike, as well as the public. The CF/IAP classes generally extended over two weeks.

A brief summary of the content was published in *Current Science* [1], and this paper goes considerably further to enable and encourage others to adopt and expand the curriculum. Here is the scope of what was covered during January, 2013. Prof. Peter Hagelstein began with an overview of how cold fusion began, its science, the structure, materials and output of the Fleischmann/Pons (F/P) effect, and skeptics' arguments. He reviewed the origin, extent, and basis of the observed excess energy (XSE) from active CF/LANR systems. He spoke about the roles of palladium, palladium hydrides (palladium filled (aka "loaded" with an isotope of hydrogen), and the method/difficulties of metals actually loading with hydrogen. He then clearly detailed some of the exact reasons why F/P succeeded whereas so many "good scientists from good laboratories" could not initially replicate their experiments in the early 1990s. Generally, they were unable to achieve the requisite highly loaded palladium, which is unconditionally required for achieving active, deuterium fusion which is the desired cold fusion effect.

Prof. Hagelstein explained that the big issue was that the experiments were attempted at the "best" labs by very good scientists, and they were not able to confirm it; that the effect itself is unexpected, and in contradiction with what would be expected from condensed matter physics and from nuclear physics. One member of the class pointed out that even the Harwell data clearly demonstrated a 10–15% excess power during the portion of the run shown. Prof. Hagelstein explained that such a small amount was insufficient for them (as were the bursts of excess energy in only the heavy water side of their setup). Like the other famous groups, they too, could not report positive results. This report describes how a complicated and new alternative energy subject-matter was tailored to a college course-work



Figure 1. Students and interested researchers develop their science and engineering skills about cold fusion, isotopic loading of metals, and calorimetry during the "Introductory Cold Fusion IAP Course" offered at MIT in 2013 (photocredit: Gayle Verner).

program, and was offered as an introduction to cold fusion during its Independent Activities Period (IAP), designed for students to engage in topics outside-of the-normal-curriculum (Fig. 1).

To understand how success was achieved, Prof. Hagelstein then moved the discussion along to kinetic issues involving the loaded/loading palladium deuteride (PdD) lattice, including its dynamic structure and the roles of lattice expansion. He clarified how deuterium goes in via the Volmer reaction, and out via the Tafel reaction and through cracks. In “good” cathodes, the internal leaks are minimized, which can reduce the level of internal leaks by more than 1000. At ENEA, Frascati, Violante, and his team anneal to samples, so as to get grain sizes on the order of the foil thickness, which, thus, minimizes internal leaks. To further underscore the importance of adequate loading, Hagelstein also referred to the SRI experiments which showed that excess heat *only* appeared when the loading ratio was, at least in, or above, the 0.85–0.9 range. Also supporting the need for high loading, he discussed the results of the Energetics group from Israel, who have used the Dardik-discovered Superwave.

Prof. Hagelstein proposed conditions under which deuterons in the metal are stabilized (or not), and how $^4\text{He}^*$ might form for its nanosecond of existence in the metal. Since the electron density is too high, there is no site in the lattice where fusion can occur, except possibly at vacancies, where the electron density is lower. Because vacancies are actually stabilized with H or D addition, at a loading of 0.95 near room temperature, so vacancies then become thermodynamically preferred. Supporting that, since vacancies diffuse very slowly, they are also made on new surfaces, which is done by codeposition, he said. In the codeposition experiments, (going back decades) excess heat turns on within an hour after initiating codeposition. Later, he spoke of activation of CF/LANR and detailed the Dennis Letts’ laser “beat frequency” terahertz region experiments which activate the desired reactions.

On Wed., January 23, Prof. Hagelstein explained how the loaded palladium hydride lattice, with sufficient flux and activation energy, is able to highly overcome the Coulomb barrier and then “chop up” the 24 MeV energy of freshly made helium (the so-called excess energy) into smaller energy quanta which the phonons (lattice vibrations) can then deliver coherently, in tandem, to the lattice. This enables the excess heat production in F/P and (variant) CF/LANR experiments.

Loading of Pd with Deuterium As a Predictor of Success (after Hagelstein McKubre)

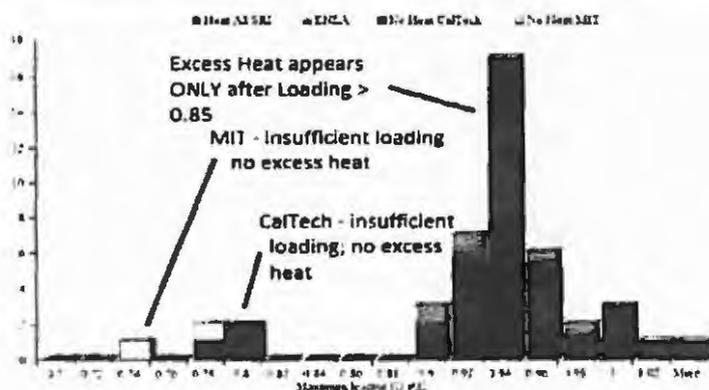


Figure 2. The success of cold fusion experiments has generally depended upon the loading achieved of the Group VIII metal. This is because in cold fusion, excess heat *only* appears when the loading ratio is very high. This graph shows that with increased loading (right-hand side of the data) there was historically a much greater likelihood of having seen cold fusion's excess heat.

Dislocations and cracks in the average cathode generate many pathways that include many internal leaks. These can become “superhighways” of hydrogen loss, can appear suddenly, and can end active samples, as they reduce stress internally. Generally, they were unable to achieve the requisite highly loaded palladium, which is unconditionally required for achieving active, deuterium fusion which is the desired cold fusion effect (Fig. 2).

On Thursday, Jan. 24th, Prof. Hagelstein continued about the several meticulous experiments which documented that helium (^4He) is made as the product of cold fusion from the deuterium which is loaded at very high levels into the palladium lattice. He showed this for three sets of experimenters including Dr. Mel Miles at the US Navy, and Dr. Len Case (working independently) from N.H., and at SRI in Calif., where it was also measured.

Prof. Hagelstein said that even the rate of helium production is also commensurate with observed excess power of cold fusion experiments, as was reported years ago in Italy by Gozzi. Furthermore, he said, regarding ^4He measurements that Bush and Miles demonstrated it was there; Gozzi showed that it was correlated in time with the excess power; SRI provided important confirmations, but beyond that they made the best measurement in his view of the Q -value. The issue is that some of the He is retained in the PdD (which was obvious from the Gozzi experiment).

One class attendee asked why there were not more of these experiments done. Prof. Hagelstein quickly pointed out that helium measurements are difficult because of both atmospheric contamination and confusion with materials of similar mass (that is D_2), and that meticulous efforts are required to shield the experiments from the atmosphere (by metal flasks, for example) and that expensive equipment is required to make the discriminating measurements required.

As a result, this type of work is very hard to do, he said, and expensive, and simply put, there has not been enough funding.

He also talked about the problem of helium occupancy at important choke-points in the lattice which must be empty as required for active, excess heat-producing, cold fusion systems. He proposed that the big advantage that the NANOR[®]-type CF/LANR components (JET Energy's) have is that the helium does not have to diffuse very far, so that the power level can be much higher.

Prof. Hagelstein discussed the activation energy required to get the desired reactions. He went through the data of several experimenters in the field including Dennis Cravens, who demonstrated observation of heavy water cells increasing output with a temperature rise. Hagelstein then followed that up with corroboration from other experimenters, including early recognition of this effect, an increase in excess power in time following a brief temperature rise (usually due to a calibrating pulse), as was seen by Fleischmann, Storms and Swartz.

Regarding activation energy, Prof. Hagelstein discussed the Dennis Letts laser experiment which activates specifically required, key phonon modes in the lattice – compressional optical phonon modes when the beat frequency is around 8.5 THz, and compressional optical phonon modes when the beat frequency is ~16 THz.

Prof. Hagelstein introduced the cold fusion/LANR Hamiltonian and the role of orbitals of hydrogen. Next, he related to the Hamiltonian he developed to also include the roles of deuteron flux through, and loading into, the palladium citing work by Mitchell Swartz and Akito Takahashi. He then explained how Corkum's mechanism led him to further understand his own, developing spin boson model which was derived from the work of Cohen-Tannoudji, and which explained how the 24 MeV from the $^4\text{He}^*$ is chopped up into tiny amounts, and then delivered to the loaded palladium lattice. This is where there is then the appearance of the “excess heat” as the excited helium ($^4\text{He}^*$) returns to its own ground state (^4He) as the energy is converted to THz phonons, and then thermalized to produce that heat.

Hagelstein's Take Away Message is that the lattice is key, and the physicist's theories are really not inconsistent with cold fusion, after all. He demonstrated exactly where it was insufficient to explain CF/LANR in the absence of his later discovery of the role of destructive interference and other loss and dephasing issues. Those loss mechanisms occur in the real loaded lattice.

On Friday, Prof. Hagelstein focused on the mathematical models and physical models for coherent energy exchange under conditions of fractionation, and on the Karabut collimated X-rays, which appears to show this effect, and expanded his CF/LANR Hamiltonian to now include coupling parameters.

Prof. Hagelstein continued with relativistic physics. Examination of the very strong coupling between the center of mass momentum and internal nuclear degrees of freedom is normally eliminated by a generalized Foldy–Wouthuysen rotation. However, under conditions of destructive interference such as in the lattice filled with lossy bosons, it does not appear appropriate. The Take Away Message was that his corrected condensed matter nuclear science (CMNS) Hamiltonian with all the additions is finally becoming very close to describing accurately what is actually being observed in CF/LANR

After a weekend break, lectures resumed on Mon., Jan. 28, led by Dr. Mitchell Swartz. He continued the talk regarding substantial experimental proof for cold fusion (lattice assisted nuclear reactions). Dr. Swartz presented what many consider the well-researched, evidence for existence (and development) of cold fusion in an understandable four plus hours (two each day) of scientific detail, not only reviewing decades of CF/LANR experiments but also presenting many how-to's of the successful processes.

He then shifted to hot fusion which unfortunately has a long history of technical and engineering failures. By contrast to hot fusion, cold fusion does not make any significant amount of dangerous radiation, he said, nor does it make other materials radioactive. It has zero carbon footprint. It could change everything.

He then discussed yet another reason why CF/LANR is so important – its energy density. He directed the class to the hard facts that the helium (^4He) production is in quantitative agreement with the XSE, as Mel Miles, Case, and SRI had measured; and that the rate of He4 production is commensurate with the power, as the Gozzi experiment had demonstrated.

Dr. Swartz continued, talking about the materials involved in CF/LANR. He taught how loading is achieved with either an applied electric field intensity acting upon water, separating out the deuterium, which with palladium, comes from the surrounding heavy water.

In the next session, after Dr. Swartz surveyed the methods of calibration of heat-producing reactions and systems, he detailed how there are now available many types of controls, time-integration, thermal waveform reconstruction, noise measurement and additional techniques, which are used, and is needed, for verification.

He then spoke at great length of the importance of the role of deuteron flow (flux) and explained the differences between flow calorimetry which can be inaccurate under some conditions where it is not calibrated, and the preferred methods of measuring excess energy. Having discussed the materials, and methods of measuring excess energy accurately, he segued to many examples of actual excess heat generated by a variety of CF/LANR systems. He showed graphs that were derived, using aqueous nickel and palladium systems.

Dr. Swartz returned to the concept of deuteron flux. Then using the Navier–Stokes equation, he developed the flow equations for both protons and deuteron flow in “conventional” cold fusion and in its variant, codeposition, where there is also flux of the palladium ions into the cathode which builds up a loaded compartment of active material. The concept of deuteron flux then led to metamaterials, a major improvement of CF systems. He focused on the salient advantages of the LANR metamaterials with the PHUSOR[®]-type system, stating that it is one prime, extremely useful, example with high output.

Dr. Swartz then shared another of his discoveries – Optimal Operating Point (OOP's) manifolds that organize CF/LANR output by the amount of input power. He explained how he discovered the OOP experimentally and showed how in all CF/LANR systems, no matter what the product (helium4, heat, or tritium production), and no matter what the system (palladium with heavy water, nickel with ordinary water, and nanomaterials) all of these when plotted as a function of input power demonstrate a series of dots which assemble and show a distinct pattern.

He went through the different regions, and showed where the reactions turn on and off, and how by plotting out the experiments this way, one could show consistency and reproducibility, time and time again. He demonstrated that OOP operation has shown the ability to determine the products of CF/LANR, and why OOP manifolds demonstrate that CF is a reproducible phenomenon, applicable to science and engineering. He also said that he had found OOPs in other colleague's experiments where they had not, and showed that their data also fit these curves.

Returning to the experimental results and engineering methods developed to control cold fusion, he then surveyed “heat after death” and its control for several useful applications, including the use of CF/LANR systems to drive motors. The important Take Home Point, he said, was that there is an extraordinary amount of data and information from it that has been collected over the years.

Emissions and energy derived from CF systems is how Dr. Swartz led the lecture on Tues., Jan. 29, 2013. He continued with the discussion of experimental results, now beginning with the near infrared emissions from active LANR devices, and the use of CF/LANR engines to generate electricity.

He finally focused the class from aqueous cold fusion to the nanomaterials in CF/LANR, now holding worldwide intrigue. Of particular interest was his discovery of a new type of dry and preloaded nanomaterials, a CF/LANR material which is producing phenomenal excess heat output.

After discussing these novel characteristics and electrical breakdown (avalanche) issues, which electric drive regions actually generate excess energy, he presented the development of several types of the NANOR[®]-type CF electronic components. He concluded with introduction to advanced driving circuits that were shown to have excess energy documented by temperature rise, heat flow, and calorimetry; heralding their revolutionary potential to change the energy landscape in circuits, distributed electrical power systems, artificial internal organs, propulsion systems, space travel, and more.

3. Results

According to the participants, the course was a success. At the beginning of the two week course, Room 4-153 in the Electrical Engineering building was nearly packed with a blend of about 35–40 students, as well as entrepreneurs, engineers, physicists, and “curious” members of the community, as the class size ebbed and flowed throughout the six-day event. Attendees came from as far away as Spain, China, Germany, and Switzerland. But they also traveled from California, Pennsylvania, New York, and throughout Massachusetts. Many said the course was “great” and reported also they were glad they came. If others disapproved, no one said so publicly.

4. Conclusion

While MIT officials still reportedly do not recognize cold fusion or its viability, the fact that it has entered the academic domain, albeit through the less-structured IAP agenda, is certainly noteworthy, both for those scientists working for its public acknowledgement and for the appearance of a place to go and get an education in this field. Twenty-seven years later, one can now walk into an MIT classroom, listen to academic lectures on the subject, and learn that the phenomenon is real and reproducible. And while it is still controversial, cold fusion seems to have found a fit, albeit tight, in the academic world.

References

- [1] G. Verner, M. Swartz and P.L. Hagelstein, Summary report: ‘Introduction to Cold Fusion’-IAP course at the Massachusetts Institute of Technology, *Current Science* 108(4) (2015) 653. <http://www.currentscience.ac.in/Volumes/108/04/0653.pdf>.

Summary report: 'Introduction to Cold Fusion' – IAP course at the Massachusetts Institute of Technology, USA

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For three years running now, the Massachusetts Institute of Technology (MIT), USA, has offered the introductory cold fusion course during its Independent Activities Period (IAP), designed for students to engage in topics outside-of-the-normal-curriculum; enrollment is open with permission from the instructor, and there is no advance registration required. IAP at MIT, for those not familiar with it, is a special four-week programme where students can choose from a vast array of non-credit and for-credit short coursework offered only during January of each year. CF-101 is a non-sign up, non-credit introductory course, open to MIT and non-MIT students alike, as well as the public. Peter Hagelstein, Professor of electrical engineering at MIT has been teaching the course with Mitchell Swartz, from JET Energy, Inc. In some years the CF/IAP classes extended over two weeks; at other times over several days.

Keywords: Cold fusion, course work, independent activities period.

WHILE the Massachusetts Institute of Technology (MIT), USA, officials still reportedly do not recognize cold fusion or its viability, the fact that it has entered the academic domain, albeit through the less-structured IAP agenda, is certainly noteworthy, both for those scientists working for its public acknowledgement and for the appearance of a place to go and get an education in this field. Twenty-five years later, one can now walk into an MIT classroom, listen to an academic lecture on the subject, and learn that the phenomenon is real and reproducible.

Following is a brief summary of what is typically covered in the course:

- Excess power production in the Fleischmann–Pons experiment.
- Why CF/LANR is so important, including its energy density.
- Reasons for lack of confirmation in early negative experiments.
- Analysis and errors of Huizenga's 'three miracles'.
- Experimental evidence for the existence (and development) of cold fusion.
- Physical chemistry and electrochemistry of PdD.
- Metallurgic structures of loaded palladium and nickel hydride lattice.
- Loading requirements for CF/LANR activity and excess power production.
- Method of, and difficulties regarding, loading metals with hydrogen isotopes.
- Unwanted roles of dislocations and cracks in quenching desired reactions.
- Codeposition experiments enabling improved loading rates.
- Methods of calibration of heat-producing reactions and systems.
- Excess power in the aqueous nickel and palladium hydride systems.
- Piantelli experiments.
- Activation energies required to get the desired reactions.
- Survey of 'heat after death' reactions and their control.
- Emissions as excess energy is obtained from CF systems.
- One- and two-laser irradiation experiments.
- Nanomaterials in CF/LANR.
- Electrical transconduction and breakdown (avalanche) issues.
- Overview of theoretical approaches.
- The nuclear ash problem and He-4 observations.
- Helium (⁴He) production rates in quantitative agreement with the XSE.
- Rate of ⁴He production is commensurate with the observed excess power.
- Nuclear screening in PdD.
- PdD as an energetic particle detector.
- Constraints on the alpha energy from experiment.
- Coherent energy exchange between mismatched quantum systems.
- Coherent X-rays in the Karabut experiment and interpretation.

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SPECIAL SECTION: LOW ENERGY NUCLEAR REACTIONS

- Role of electron density in the lattice and at vacancies.
- Vacancy stabilization by H or D addition.
- Importance of the role of deuteron flow (flux).
- Impact of helium occupancy at important choke-points in the lattice.
- Division of the 24 MeV energy of freshly made helium into smaller energy quanta.
- The role of phonons (lattice vibrations) and critical phonon modes in the lattice.
- Cold fusion/LANR Hamiltonian and the role of orbitals of hydrogen.
- Spin boson model and the role of destructive interference, loss and dephasing issues.
- Control of loading achieved by an applied electric field intensity.
- Optimal operating point manifolds to control, and determination of the products of CF/LANR.
- The future of CF/LANR.
- Metamaterials, a major improvement of CF systems.
- CF/LANR engines to generate electricity.
- Prospects for a new small-scale clean nuclear energy technology.

Some of these lectures are available on YouTube – <http://www.youtube.com/watch?v=gMx1mpcokBk> and <http://www.exposingthetruth.co/mit-scientists-discover-secret-cold-fusion/>

In addition, the full set of lectures of the January 2014 course is available at: <http://coldfusionnow.org/interviews/2014-cflanr-colloquium-at-mit-full-coverage/>

At the beginning of the January 2013 course, for example, Room 4-153 in the Electrical Engineering building, was nearly packed with a blend of about 35–40 students, entrepreneurs, engineers, physicists, and ‘curious’ members of the community, as the class size ebbed and flowed throughout the six-day event. Attendees came from as far away as Spain, China, Germany and Switzerland. But they also travelled from California, Pennsylvania, New York and throughout Massachusetts. Many thought the course was ‘great’ and said they were glad they came. If others disapproved, no one said so publicly.

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Research Article

Optical Detection of Phonon Gain Distinguishes an Active Cold Fusion/LANR component

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Abstract

Successful cold fusion is heralded by a large, if not quite abnormal, increase in the anti-Stokes to Stokes (aS/S) ratio in coherent multi-wavelength optical reflection volume-enhanced electric-driven spectroscopy (CMORE-spectroscopy). This distinguishing phonon gain is not seen in the “off” state or the avalanche (undesirable) mode. It heralds seven acoustic phonons assisting nuclear reactions and a core peak calculated Stokes temperature of circa 1645 K.

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Keywords: Avalanche mode, CMORE spectroscopy, Excess heat mode, NANOR, Phonon gain

1. Introduction

We previously used dry preloaded NANOR[®]-type CF/LANR (lattice assisted nuclear reaction) components [1] to investigate material science [2–8] and radiation physics [5,6] of active cold fusion systems. Several of these reports have demonstrated that several electrical transconduction states exist, but that only one is active, desired, and capable of producing “excess heat” [7]. This report extends those results and describes a spectroscopic measurement of anti-Stokes to Stokes (aS/S) peak ratios. These measurements demonstrate that the best “excess heat” results occur (with the CF/LANR nanomaterial in the active, desirable mode) with an aS/S peak ratio greater than 1 (Fig. 1).

Using several ohmic (thermal) and other controls, the aS/S ratio was (and thus acoustic phonons were) found to follow normal Boltzmann statistics when the materials were examined. This included an identical NANOR[®]-type component which was not loaded, and a similar loaded component in both the “off” condition and electrical avalanche region where the desired cold fusion reactions do not occur. However, that was not true when the cold fusion components are activated in the desired mode which elicits excess heat (Fig. 1). By contrast, the monitored Series 7 NANOR[®]-type component in “excess heat” (XSH)-mode elicited a completely unique pattern, immediately prior to the appearance of excess heat accumulation. This heralds an aS/S ratio level far above normal, suggesting increased phonon density, consistent with phonon gain. These changes were only seen in the presence of the desired

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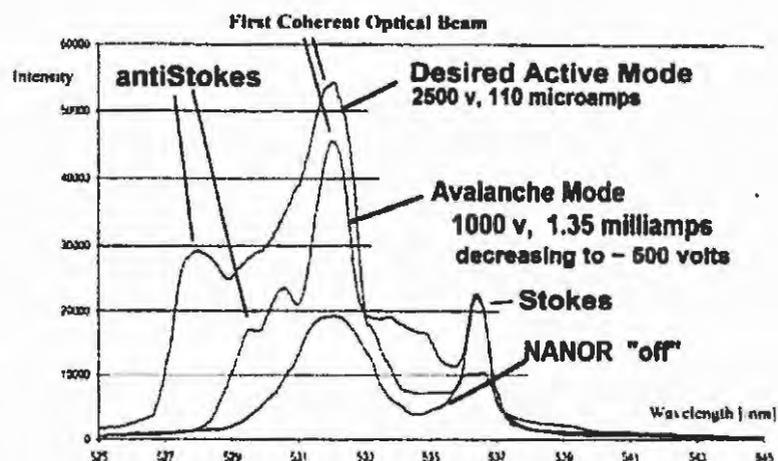


Figure 1. Three different electronic states optical signatures for the same preloaded ZrO_2PdD NANOR[®]-type CF/LANR component in three different electrical drive modes. Shown are spectra of the same NANOR[®]-type CF/LANR component in three different electronic states, resolved by dual wavelength coherent electric-driven volume-enhanced reflection spectroscopy. The three modes (responses) are the undriven "off"-state, the unwanted electrical avalanche mode [7], and the optimal operational state, the "Desired Active Mode", where "excess" energy is being released.

electronic state of cold fusion (lattice assisted nuclear reaction; CF/LANR) electrical conduction and activity in the NANOR[®]-type CF/LANR component.

In Fig. 1, the curves are from dual wavelength coherent electric-driven volume-enhanced reflection spectroscopy of the core CF/LANR nanomaterial inside NANOR[®] 7-6. The plots show reflected optical intensity as a function of wavelength, initially from two incident coherent optical beams but then reflected by backscatter along with the initial optical beams from the core. They reveal three different types of reflection spectra from the same sample, observed by the same diagnostic.

This paper also briefly discusses the response of the NANOR[®]-type CF component, loaded but not electrically driven, to a magnetic field intensity. The activity is quite complicated in the presence of it being electrically driven, and is discussed elsewhere [4,8].

There are important implications to these new findings. First, other successful cold fusion systems may also indicate their activity by a large, abnormal increase in the anti-Stokes to Stokes (aS/S) ratio. Second, these findings confirm the role of phonons in CF/LANR (previously observed indirectly [9]), and thought to be mainly optical phonons [10]. Third, acoustic phonons result from, or are required for, a cold fusion process producing energy gain in its "excess heat" (XSH) mode in this system.

2. Background – No Additional Applied Magnetic Fields

2.1. Cold fusion requires considerable engineering

The LANR method which Fleischmann and Pons first taught in March 1989 had problems, including inefficiency and non-reproducibility. This created havoc for those inexperienced in metallurgy, electrochemistry, and physics [11–14]. LANR success is rewarded by "excess heat", which means that the energy producing reactions have generated *de novo* helium into the lattice (10^{12} for every watt-second [15]) and there were adequate conditions to enable energy transfer to the lattice and then to appear as excess heat [10,16]. There may also be other reactions.

One major problem to achieve successful cold fusion has been the difficulty in achieving high D/Pd loadings above 0.70 near room temperature, and then maintaining that, sometimes for weeks.

Simply put, the rapid increase in deuterium chemical potential acts to limit further loading, but success requires high loading of >85% for PdD_x hydrides. In most initial efforts, loading was not even considered. Other problems have included the control of vacancies, adequate incubation time, concomitant flux, inadvertent quenching conditions, and lack of critical control of input power.

Many “negative” results are due to a failure to operate the system at the optimal operating point, which is an optimum peak in the excess heat and power gain curves as a function of input electrical power [12,14]. The optimal operating point reflects the relatively narrow peak (maximum) of the biphasic production rate curve for the products obtained by the desired reactions (heat, helium-4) as a function of input electrical power. The problems with loading, and later with optimal operating point manifolds (OOPs) are why initial efforts to replicate successful LANR were so difficult and failed to show excess heat.

2.2. Dry NANOR^R-type CF/LANR preloaded components

NANOR^R-type devices have been described in the literature [1–7]. The central core generating the excess heat in the desired state involves ZrO₂PdNiD, ZrO₂PdD, and ZrO₂NiD and similar materials [3,18]. A NANOR^R-type component is a hermetically sealed cold fusion/lattice assisted nuclear reactions (CF/LANR) nanomaterial, preloaded with D and arranged as a two-terminal electrical component. They are designed to avoid leakage, enabling stabilization and activation of these materials.

2.3. Determination of activity

The LANR preloaded, stabilized NANOR^R-type components are driven by a high voltage circuit up to 3000 V rail voltage. This is the high voltage that can be delivered in any run to either the NANOR or the ohmic control used to thermally calibrate the calorimeter.

Input power is defined as $V \cdot I$. There is no thermoneutral correction in denominator. Therefore, the observed power is a lower limit. The instantaneous power gain (power amplification factor (non-dimensional)) is defined as $P_{\text{output}}/P_{\text{input}}$.

The energy is calibrated by at least one electrical joule control (ohmic resistor) used frequently, and with time integration for additional validation. The excess energy, when present, is defined as $(P_{\text{output}} - P_{\text{input}}) \cdot \text{time}$.

Data acquisition is taken from voltage, current, and temperature sensors at multiple sites of the solution, and outside of the cell, and even as a 4-terminal measurement of the NANOR^R's internal electrical conductivity. Data acquisition sampling is at data rates of 0.20–1 Hz, with 16–24⁺ bit resolution; voltage accuracy $0.015^{\pm 0.005}$ V, temperature accuracy <0.6°C). The noise power of the calorimeters have been in the range of a milliwatts (for demonstration systems) to tens of microwatts (for present R&D). The noise power of the Keithley current sources driving the reactions is generally 10 nW or less.

After driving the component and the control in each run, the power and energy gain for both the component and the ohmic control were separately determined both by approximations such as input-power-normalized delta-T incremental (dT/P_{in}), and input-power-normalized heat flow ($\text{delta-HF}/P_{\text{in}}$), and also directly by semiquantitative calorimetry. In the latter, the amount of output energy is determined from the released heat produced during the temperature rise, and then comparing that to the input energy.

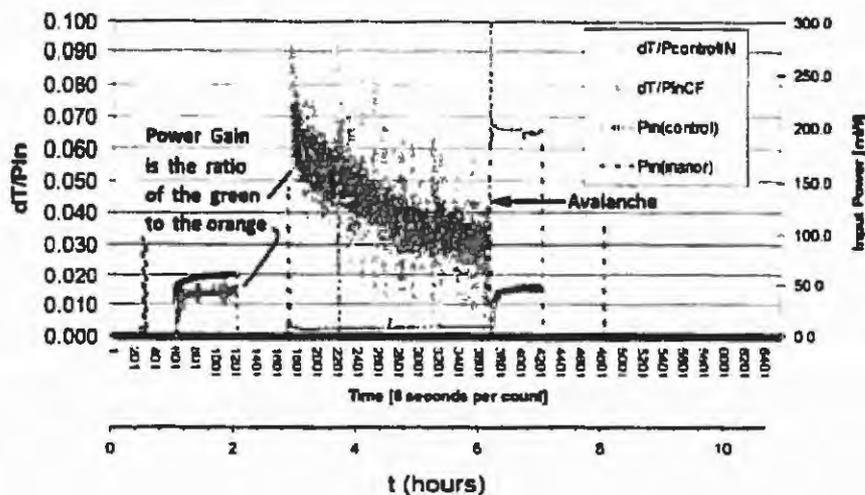


Figure 2. Demonstration of excess power gain and then sudden loss of activity after electrical avalanche for a NANOR[®]-type LANR component – The electrical input power and delta- T/P in (representative of the measured instantaneous power gain) from the ohmic control and then the nanostructured two-terminal NANOR[®]-type LANR component. Shown for the component are both sides of the electrical breakdown (avalanche) state; before where there is clear excess power gain (excess heat over time) and a return to ohmic-like behavior at, and after, the electrical avalanche.

2.4. CF/LANR activity quenched by electrical avalanche breakdown

There are two electrically driven states for a driven NANOR^R-type LANR component. As described in a series of peer-reviewed publications [7], certain materials of this nature when examined electrically have distinct electrical behavior, with distinct outputs in each of the electrical driven states. To simplify, in addition to the undriven “off” state, there is the undesirable “avalanche” state, which associated with increasing electrical currents for decreasing applied electrical potentials over time. By contrast, the “desired” state produces very large amounts of heat beyond the normal electrical dissipation expected - excess heat. In that case, the electrical impedance is maintained.

Figure 2 presents the graphical output of a reproducible nanostructured NANOR^R-type two-terminal CF electrical component, driven in both of its two different electrically driven states; and in its “off” state and also while “off” with an electrical ohmic control being driven. Vertical axes plot the electrical input power and the heat generated, as a function of time.

Figure 2 demonstrates that inactive states exist for “working” CF/LANR components. It shows the measured heat production from the nanostructured two-terminal NANOR^R-type LANR component on both sides of the electrical breakdown (avalanche) state; active and quenched. This transformation of active CF/LANR components from active to quenched (inactive states; and there are more than one) is critical to successfully control the desired reactions, and to maximize output, and to avoid damage to some nanomaterials. In the figure, the first curve, extending from count circa 601 to 1201 (where each count is 6 s) is for the ohmic control. The second curve, extending from count circa 1701 to 3701 (where each count is 6 s) is for two-terminal nanostructure component. The electrical input is slowly increased to both the ohmic control and to the component, while each is activated, respectively.

However, only the two-terminal nanostructure component at about count 3701 suddenly undergoes paroxysmal electrical avalanche so that there is simply much more electrical input power as shown in the third curve. It lasts until about count 4201 when the input electrical power is turned off. The first vertical axis, on the left-hand side, represents the heat generated through the parameter dT/P_{in} which is the change in temperature elicited, divided by the electrical

from excessive applied voltage. The ambient temperature was 26.7°C. Figure 6 shows the observed optical signature during its avalanche “state”.

In Fig. 6, the peak of the first laser is at 532 nm; this is the Rayleigh scattering peak. To its right side is a smaller, Stokes-shifted, peak. This is almost balanced by a second, slightly smaller, anti-Stokes peak on the opposite, left side of the largest peak.

Intensity is shown as a function of wavelength, as returned by backscatter along with the reflected optical beams. There is a second peak far to the right, near 635 nm, from the orange laser. In this figure, the second beam was aligned to interact with the reaction volume. Thus, there is more than one single peak. There is a second group of two peaks, located far to the right, near 635 nm, which arise from the orange laser overlap interactions. Usually, the second laser is kept from interacting, and is used as a calibration signal. Here, a rich material science field of energy hopping and conversion are seen, which will be resolved in future efforts.

4.4. ZrO₂PdD-loaded, driven (desired, excess heat state)

The NANOR^R-type LANR component is representative of driven CF/LANR systems, in that they are associated with two distinct outputs; one is rather conventional like an ohmic resistor, however, the other state is the electrical “desired” state. That desired mode is characterized by excess heat generation here, and in some experiments involving aqueous D₂O/Pd systems has shown to be linked, in a commensurate way, with the formation of *de novo* ⁴He [15].

The functional, desired excess heat state of a correctly driven NANOR^R-type component (ZrO₂PdD) in its “XSH” mode is non-thermally optically revealed in Fig. 7. The figure shows that the desired CF/LANR activity is indicated by a unique signature using dual wavelength electric-driven volume-enhanced reflection spectroscopy.

This signature advertises behavior which is called “desired mode” or “excess heat production mode” and only results from proper drive voltage, maintaining high impedance, and avoiding quenching materials and quenching states, as discussed elsewhere [1,3,7] and demonstrated conclusively in this report.

For Fig. 7, the nanomaterial NANOR^R-type CF/LANR component was properly, correctly electrically driven at 2500 V which produced an electrical current of about 0.11 mA. The sample maintained its high impedance (compared to that seen during avalanche mode) during the very short run and there was no electrical avalanche quenching the desired reactions.

In Fig. 7, the peak of the first laser is at 532 nm; this is the Rayleigh scattering peak. To its right side is a smaller, Stokes-shifted, peak. This is over-balanced by a second, much larger, anti-Stokes peak on the opposite, left side of the largest peak. Note closely that in the best, most preferred, heat producing mode, the so-called “desired state”, there is a much larger-than-expected anti-Stokes peak. This is the unique reflected optical output from the desired “excess heat” state where large amounts of energy are being released. Intensity is shown as a function of wavelength, as returned by backscatter along with the reflected optical beams. There is a second peak far to the right, near 635 nm, from the orange laser. The second beam was aligned to not interact with the reaction volume and was only used for calibration. Thus, there is a single peak.

In Fig. 7, the XSH mode can be seen by a unique reflected optical backscatter along with the reflected optical beams from the component in its desired “excess heat” state. Intensity is shown as a function of wavelength, as returned by backscatter along with the reflected optical beams. This is the observed optical output in the desired correctly driven active “state” as observed by the diagnostic. Shown is the output as intensity as a function of wavelength, as returned by backscatter along with the reflected optical beams from the volume-enhanced interactions (*vide infra*). In this run, the second beam did not interact with the reaction volume and was used for calibration. The nanomaterial NANOR^R-type CF/LANR component was properly, correctly electrically driven at 2500 V which produced 0.11 mA, and it maintained its high impedance, without electrical avalanche, during the relatively short run.

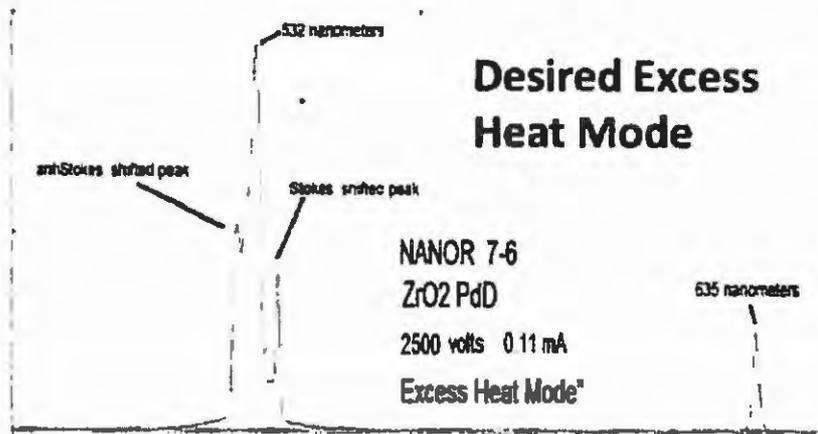


Figure 7. Dual wavelength electric-driven volume-enhanced reflection spectroscopy of a preloaded ZrO_2PdD NANOR[®]-type component in its correctly driven mode.

4.5. ZrO_2PdD – Optical phonons

In a solid lattice, alloyed with deuterons, there are multiple modes of vibration. The acoustical phonons are those where the palladium and deuterons move in phase in the long wavelength limit, located in reciprocal space at the center of the Brillouin zone. By contrast, optical phonons have from out-of-phase vibrations between neighboring atoms. They are called “optical” because in ionic crystals they can be excited by EM radiation, with the positive ions moving one way while their negatively charged neighbors move the other way. In k (momentum)-space, the phonons appear and manifolds in two branches. The lower manifold contains the acoustical branch, and the higher manifold contains the optical branch. There is an energy gap between them when a single metal is alloyed with hydrogen or deuterium.

To better observe the optical phonons, Fig. 8 is Fig. 7 redrawn, but with a logarithmic vertical axis to enable other peaks, of less intensity, the optical phonons, to stand out. CMORE-spectroscopy resolves and measures all phonon bands, which can be seen at optical frequencies (generally 5–30 THz) and acoustic frequencies (generally 5–15 GHz). The optical phonon bands are not yet well resolved in these first CMORE systems, but the need to do so clearly remains, and explorations should be fruitful.

In Fig. 8, the electrical driving mode of the two-terminal NANOR[®]-type CF/LANR component is the desired “XSH mode” and only results from proper drive voltage, maintaining high impedance, avoiding quenching materials and quenching states. Importantly, the phonon peaks visualized and measured in the present diagnostic, are both direct evidence of possible optical phonons being involved, and also corroborating the indirect evidence of Cravens et al. [9].

The XSH mode can be visualized by a unique reflected optical backscatter signature. The observed logarithmic optical output in the desired “excess heat” state is returned by backscatter along with the reflected optical beams. Intensity is shown as a function of frequency here to make comparison to the important work of Cravens et al. [9] easier.

7.10. CAM theory corroborated

The rise in Stokes temperature to circa 1645 K supports that catastrophic solubility effects do occur in PdD driven by local temperatures, and is consistent with, and supports, the Catastrophic Active Medium (CAM) theory [30]. The CAM model of CF considers the deuteron solubility in, and the solubility–temperature relationship of, palladium. The CAM hypothesis treats the metal as an active medium capable of rapid desorption of deuterons with recruitment potential of even more deuterons. The CAM theory describes a quasiparticle related to the sudden catastrophic desaturation of highly loaded Pd involving phonons and moving deuterons into vacancies. The model includes two possible positive feedback loops to account for both the bursts and a plethora of termination sequelae, which declare themselves in several material changes. The results of this model was confirmed by Martin Fleischman just after ICCF-4.

7.11. Implications for development and improvement of LANR systems

The present diagnostic generates spectra in real time which are able to illuminate, visualize, and help identify at least three states for a CF/LANR material or component which is potentially active. The system can determine which state the material or component is in, in real time, even as it is electrically driven, and may be able to determine time constants for changes between levels. Most importantly, it can saliently detect the desired reactions just as products begin to appear and accumulate (e.g. heat). Therefore, it has great use because it reveals both the desired, and undesired, reactions and states and may enable better control, and possible detection of other states of operation – and therefore reactions and products.

7.12. Implications for education

The system enables education of CF/LANR systems. Previous CF/LANR systems have not fully convinced educators and scientists of the importance of hydrogen loaded systems. However, this new diagnostic has additional use as a scientific and educational tool for visualizing different states. The advantage may be the immediate telegraphing of the state, rather than having impatient skeptics await the appearance of excess heat.

7.13. Implications for CF/LANR systems

The use of CMORE-spectroscopy has implications for examining substates in material science and metallurgy, cold fusion physics, and in the electrical engineering of CF/LANR systems. This novel electric-driven coherent high intensity volume-enhanced spectroscopy involves the backscatter of two+ wavelengths from a hydrogen loaded nanomaterial. It is capable of semiquantitative calorimetry (discussed elsewhere [1–3]) and is now demonstrated capable of spectroscopically opening new types of controllable-in-real-time materials science, metallurgy, material engineering, electrical engineering, and electrophysics. Other spectroscopies only identify materials, while the present diagnostic reveals the electrical state of the component while continuing the means to electrically drive, control, and monitor that component and state as desired.

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PHUSOR^R-technology, and the technology described here are protected by U.S. Patents D596724, D413659 and several other patents pending.

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Research Article

Increased PdD anti-Stokes Peaks are Correlated with Excess Heat Mode

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Abstract

Volume-enhanced Coherent Multi-wavelength Optical Reflection Electric-driven (CMORE) spectroscopy successfully differentiates active states in LANR nanomaterials. All the anti-Stokes peaks are relatively missing in the undriven mode for all of the nanostructured materials. Weak anti-Stokes peaks are elicited from Pd (and Ni and their alloy) nanostructured material in ZrO_2 . But when NANOR[®]-type components are electrically driven, there is diversity in outcome. When driven in the avalanche mode, the anti-Stokes peaks differ considerably from those which appear during the excess heat (XSH)-producing or desired mode. The anti-Stokes peak(s) differ in energy, amount, and in what stimulates their appearance. However, normal anti-Stokes peaks return when the electrical drive creates “avalanche mode” characterized by higher electrical current at decreasing voltage. The avalanche anti-Stokes peaks are many, and they are lower energy than the XSH mode produced anti-Stokes peak (described main text). By contrast, successful cold fusion is heralded by a large increase in the anti-Stokes to Stokes (aS/S) ratio, and the generated anti-Stokes peak for the desired and XSH-producing state is very different from the avalanche-generated multiple anti-Stokes peaks. That XSH-related peak is singular and at higher energy. This distinguishing, higher energy, single, anti-Stokes peak is also not seen in the “off” state or the avalanche (undesirable) mode. Our analysis finds that the excess-heat produced anti-Stokes peak is matched to the Stokes line of PdD. We also find that the several lower energy anti-Stokes in avalanche mode (unsuccessful regarding CF/LANR) are matched to the many Stokes peaks for zirconia. In the desired electric-driven XSH-producing mode, the two-terminal deuterated NANOR[®]-type CF/LANR component has a measured Boltzmann Stokes ratio 1.3 ± 0.15 . Analysis of the phonon gain heralds 7 ± 0.15 acoustic phonons assisting nuclear reactions and a core peak calculated Stokes temperature of circa 1645 K. Therefore, these findings confirm a role for PdD acoustic phonons in successful CF/LANR.

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Keywords: Avalanche mode, CMORE spectroscopy, Excess heat mode, NANOR[®]-type LANR component, Phonon gain

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1. Background

1.1. Dry NANOR[®]-type CF/LANR preloaded components

Dry preloaded NANOR[®]-type LANR (lattice assisted nuclear reaction) components have been described in the literature [1–9]. NANOR[®]-type components have been used to investigate material science [2–9] and radiation physics [5,6] of their active LANR systems. These reports were expanded to demonstrate that several electrical transconduction states exist, but that only one is active, desired, and capable of producing excess heat (XSH) [7,8]. Later, it was demonstrated that CMORE spectroscopy [8], based on Raman spectroscopy, would be quite useful in distinguishing active LANR states because they are electrically driving them at their peak optimal operating point. This report expands that and shows (cf. Fig. 1) that for successful LANR, the anti-Stokes component matches the Stokes component for PdD. By contrast, non-active, unsuccessful, electrical avalanches have never produced XSH, and have anti-Stokes components that match the ZrO₂ Stokes components and not the PdD.

1.2. Successful LANR requires considerable engineering

LANR success is rewarded by XSH, which means that the energy producing reactions have generated *de novo* helium into the lattice ($\sim 10^{12}$ for every watt-second [10]), and there were adequate conditions to enable energy transfer to the lattice and then to appear as XSH [1,12]. There may also be other reactions.

However, the LANR method which Fleischmann and Pons first taught in March 1989 (aqueous, low impedance, Pd/D₂O/Pt) had problems, including inefficiency and non-reproducibility.

This created havoc for those inexperienced in metallurgy, electrochemistry, and physics [13]. One major problem to achieve successful cold fusion has been the difficulty in achieving high D/Pd loadings above 0.70 near room

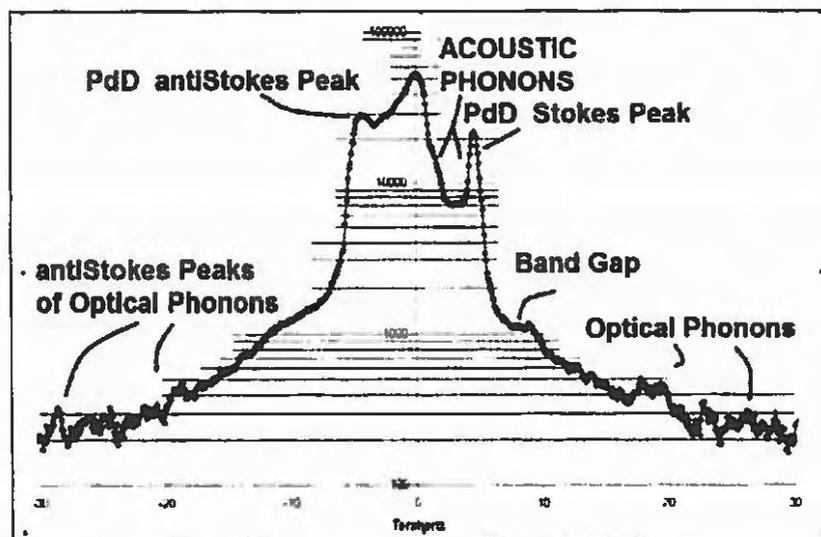


Figure 1. Log intensity Raman spectrum obtained during XSH mode (desired, non-avalanche). This is a logarithmic presentation of coherent dual wavelength electric-driven volume-enhanced reflection spectroscopy of a preloaded, correctly driven, ZrO₂PdD NANOR[®]-type component. The x-axis here presents the frequency difference from the main laser frequency. Identified are the Stokes and anti-Stokes peaks of PdD, and the band gap between acoustic and optical phonons; with the appearance of the optical phonon modes at their reported locations. The ZrO₂ Stokes peaks and anti-Stokes peaks are not labeled, but are in Fig. 6.

temperature, and then maintaining that, sometimes for weeks. Simply put, the rapid increase in deuterium chemical potential acts to limit further loading, but success requires high loading of $>85\%$ for PdD_x hydrides. In most initial efforts, loading was not even considered. Other problems have included the control of vacancies, adequate incubation time, concomitant flux, inadvertent quenching conditions, and lack of critical control of input power. Many “negative” results are due to a failure to operate the system at the optimal operating point, which is an optimum peak in the XSH and power gain curves as a function of input electrical power [13–16]. The problems with loading, and later with optimal operating point manifolds (OOPs) are why initial efforts to replicate successful LANR were so difficult and failed to show XSH [13].

1.3. Raman spectroscopy

Raman spectroscopy is a powerful tool to study vibrations within molecules, materials, and nanostructured materials to obtain knowledge of the momenta and energies from the returned optical spectrum. When used to examine materials on metal surfaces, there is a large enhancement of the electric field from the illuminating irradiation, which results in surface enhanced Raman spectroscopy (SERS). When used to examine vibrations of a lattice, the term Brillouin scattering spectroscopy is used. Raman spectroscopy was previously used to examine PdH [17–19].

2. Experimental

2.1. Materials

A NANOR[®]-type component is a hermetically sealed CF/LANR (cold fusion/lattice assisted nuclear reactions) nanomaterial, preloaded with D and arranged as a two-terminal electrical component. They are designed to avoid leakage, enabling stabilization and activation of these materials. The central core generating the XSH in the desired state involves ZrO_2PdNiD , ZrO_2PdD , and ZrO_2NiD and similar materials [3,20,21].

2.2. Methods

2.2.1. Signal pickup by CMORE spectroscopy

The black granular nanomaterials fortunately give very large signals. The volume enhancement is probably from the black nanostructured CF/LANR materials which are black, electrically insulating, and therefore will accept light deeply into the material, unlike a conductive metal electrode. A previous paper has given the experimental details of CMORE-spectroscopy [8], which uses two wavelengths of illumination from two lasers.

This was to co-illuminate the target, located below the irradiated surface, and into the volume of a sample of interest. The high intensity coherent illumination was used to elicit Rayleigh, Brillouin, and Raman bands, and then to identify the possible roles of acoustic and optical phonons during CF/LANR, and possibly distinguish the desired active, XSH-producing, state from the “off”-state, and the undesired inactive avalanche state (Fig. 2). A second lower power intensity irradiation at a second wavelength enables wavelength calibration and thus semiquantitative measurements. In this study, a 532 nm laser was used to elicit the Raman spectra, and a weaker 635 nm laser was used for calibration. The green laser (532 nm peak) had a power output level of about 150 mW. The red orange laser (635 nm peak) had a power output level of about 2 mW for energy calibration. Laser polarization is usually important to the degree that the nanomaterial is electrically conductive. However, LANR nanomaterials which are electrically insulating (megohms to gigohms or more), and are porous, black like bituminous coal, are different. There the light enters and has a volume interaction.

The sample illuminated was the core of a NANOR[®]-type LANR component capable of being electrically driven. Optics for collimation, control of beam direction, band pass filters, beam splitters, were used to obtain optical beam

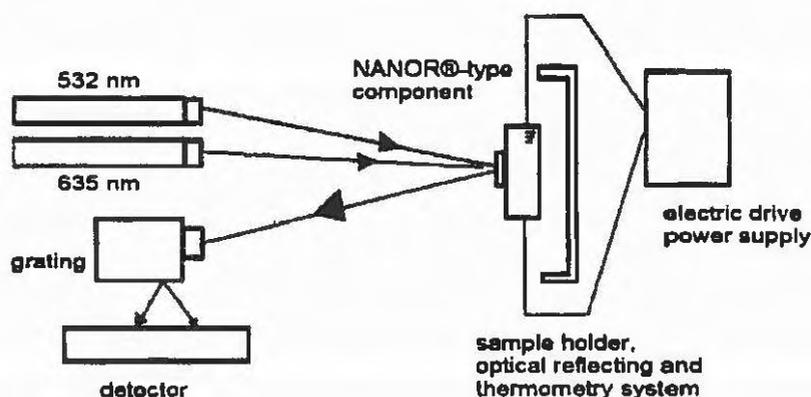


Figure 2. Schematic of coherent multi-wavelength optical reflection electric-driven spectroscopy (CMORE) experiments.

overlap on the sample's surface, facilitating interaction with the sample while being electrically driven. The important result is that illumination yields many photons which enter the black material. The multifaceted craterous surface leads to a very significant volumetric photon-sample interaction [8]. As a result of the interaction, what was initially just two initial frequencies coming from the two lasers, finally becomes a more complicated spectrum, decorated with the addition of photons of energy both above and below the two frequencies of said lasers.

2.2.2. Determination of Stokes states

The Boltzmann anti-Stokes to Stokes (aS/S) ratio was measured by a method enabling the simultaneous electrical driving of a ZrO₂PdD CF/LANR system in several states while simultaneously visualizing both acoustic and optical phonons using dual wavelength coherent stimulated volume-enhanced Rayleigh-Brillouin-Raman spectroscopy. When the emitted photons have less energy than the initial absorbed photon, then this energy difference is the Stokes shift. The energy goes into the lattice, and the difference is in the "red-shift" direction. On the other hand, if the emitted photon has more energy, the energy difference is called an anti-Stokes shift. That extra energy is derived from energetic phonons in a crystal lattice that give up their energy to create the "blue-shift" from the initial two frequencies. To resolve the spectra [8], the reflected (exit) beam leaves the illuminated sample through an optical slit and then passes through a diffraction grating where it is resolved into different energies (or in equivalent systems into wavelengths or frequencies). The intensity is measured by a detector such as a CCD or other sensitive photodetector. Analysis is made by integrating the incoming detected optical information which has been sorted by the grating. The final plots show the total energy of the reflected beams in a distribution of amplitude (intensity) as a function of wavelength.

2.2.3. Determination of sample activity by calorimetry

The LANR preloaded, stabilized NANOR[®]-type components are driven by a high voltage circuit up to a peak of 3000 V. This voltage is delivered in any run to either the NANOR or the ohmic control and used to thermally calibrate the calorimeter. Input power is defined as $V \cdot I$. There is no thermoneutral correction in denominator. Therefore, the observed power is a lower limit. The instantaneous power gain (power amplification factor (non-dimensional)) is defined as $P_{\text{output}}/P_{\text{input}}$. The energy is calibrated by at least one electrical joule control (ohmic resistor) used frequently, and with time integration for additional validation. The excess energy, when present, is

defined as $(P_{\text{output}} - P_{\text{input}})$ time. Data acquisition is taken from voltage, current, and temperature sensors at multiple sites. Data acquisition sampling is at data rates of 0.20–1 Hz, with 16–24⁺ bit resolution; voltage accuracy 0.015 ± 0.005 V, temperature accuracy $< 0.6^\circ\text{C}$). The noise power of the Keithley current sources driving the reactions is generally ~ 10 nW or less [15].

2.2.4. Electrical driving components

The sample or component was electrically driven, or not, while it was irradiated by the two lasers while physically maintained in position. The NANOR[®]-type component was electrically activated and controlled, and was designed to include and use several controls: several metals and material controls such as ZrO_2Pd and ZrO_2Ni , pn-junctions (as an energy conversion control), a thermal ohmic control, a non-functional unloaded NANOR[®]-type component control, an inactive undriven component as a control, an inactive driven avalanche-mode component as a control, and a component driven in the desired active mode.

The electrical power supply is capable of delivering an electric current (Norton equivalent) or electric voltage (Thevenin equivalent) through the two wires which connect to the sample. The system has several electrical states, the simplest of which are “off”, meaning that the sample is not electrically driven by the electrical power supply, and “on” where there may be a range of electrical driving levels of electrical power (watts). Within the holding container there are temperature detectors, and a heat flow detector, linked to a temperature measurement and analytic unit. This enables thermometry to measure any possible incremental temperature change, and therefore analysis of possible heat output from the sample.

After driving the component and the control in each run, the power and energy gain for both the component and the ohmic control were separately determined both by approximations such as input-power-normalized ΔT (dT/P_{in}), and input-power-normalized heat flow (HF/P_{in}), and also directly by semiquantitative calorimetry. In the latter, the amount of output energy is determined from the released heat produced during the temperature rise, and then comparing that to the input energy.

2.2.5. Control – Rhodamine B deposited upon filter paper

In order to test the system, and here to show the optical purity of the two lasers as well, dual wavelength reflection spectroscopy was performed on rhodamine B, as a control. The generated spectrum acts as a control to demonstrate the impact of the system on a rhodamine B aqueous solution of which the Stokes, anti-Stokes, and fluorescence bands are well known. Figure 3 presents the chemical structure, what a solution of the rhodamine B does to two incoming laser beams, and the resultant spectrum by this system. This control experiment used a 7.6 mmol rhodamine B solution irradiated by the two laser wavelengths (532 and 635 nm). They are labeled in the figure, and the Stokes, anti-Stokes and fluorescence bands are clearly seen, demonstrating the effectiveness of the CMORE-spectroscopic system. The second laser peak permits semiquantitative wavelength (and thus energy) calibration.

3. Results

3.1. Stokes peaks of ZrO_2

ZrO_2 has several Raman peaks between 5.7 and 19 THz. These can be seen in Fig. 4a which is a Raman spectrum of monoclinic ZrO_2 [22]. Pure zirconia's CMORE signature (ZrO_2 without any other added material) is consistent with this and is shown in Fig. 4b where the two laser initiation wavelengths of 532 and 635 nm are obvious. However, note that the first peak has an extended array of Stokes peaks observed falling to its right, in an intensity-decreasing sequence. This optical signature of pure zirconia is unusual among all the materials so far examined. ZrO_2 has a thick

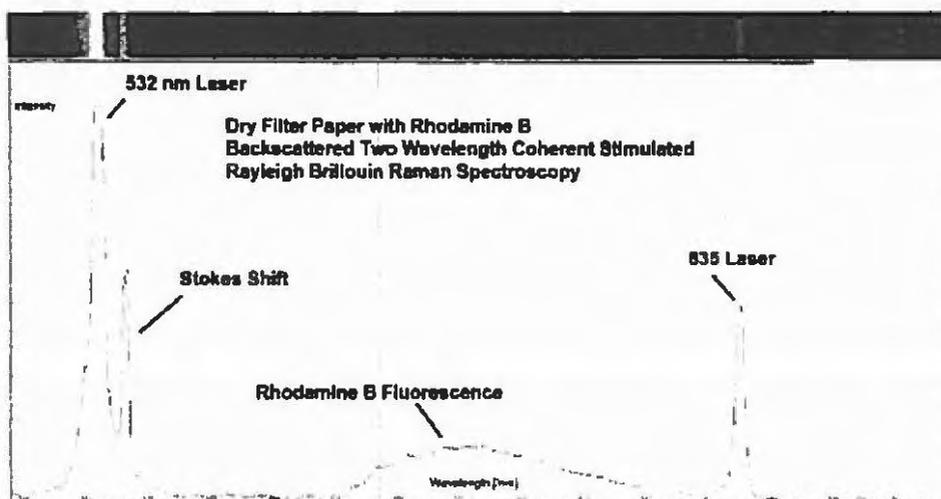


Figure 3. Spectrum from rhodamine B on filter paper. Dual wavelength reflection spectroscopy of a rhodamine B control. This CMORE-spectroscopic spectrum is a control experiment of rhodamine B (7.6 mmol aqueous solution). The vertical axis is non-linear and represents the intensity of the returned backscatter along with the reflected optical information, plotted as intensity as a function of wavelength. The horizontal axis plots the decreasing frequency to the right. The Stokes, anti-Stokes and fluorescence bands are seen in their well-known locations, and the two laser initiation wavelengths (532 and 635 nm) are seen and labeled. The actual image is located above the graph.

richness of Stokes peaks, and the anti-Stokes peaks are missing in ZrO_2 nanostructured materials observed by CMORE spectroscopy, as has been reported [8]. Given that Stokes peaks herald loss of energy of incident surface irradiation, it certainly seems possible that ZrO_2 is a molecular system able to dissipate energy through phonons (Fig. 4b). Why is there a significant loss of anti-Stokes peaks in the CF/LANR nanomaterials by this spectroscopy? Is it the same reason it is coal black?

3.2. Stokes peaks of ZrO_2 PdD – loaded and undriven (null, “off state”)

Cryogenic Raman spectroscopy of PdD shows a band gap between acoustic and optical phonons, near 9 THz in those studies [23]. The PdD Phonon density of states [23] is shown in Fig. 5a. It reveals a peak before 6 THz and a band gap between 7 and 8 THz.

As a further control, the dual wavelength CMORE reflection spectroscopy was used to examine an undriven Nanor[®]-type component. Figure 5b is the CMORE spectrum from a loaded, electrically undriven Nanor[®]-type Component (ZrO_2 -PdD) no driving electric current - electrically “Off”. Functionally, that makes the observed optical output to be that of the raw material, ZrO_2 PdD with no additional electrical drive or activation. It can be seen that the Stokes peak derived by the CMORE spectrum of ZrO_2 -PdD shows the peak before 5.4 THz, consistent with the Rowe data, as are the other two peaks in the optical phonon region.

3.3. Stokes peaks of driven ZrO_2 PdD in the electrical avalanche state. All CF/LANR activities are quenched by electrical avalanche breakdown

To simplify, in addition to the undriven “off” state, there are two electrically driven states for a NANOR[®]-type LANR component. Therefore, three (3) electrical driving states exist [7]. First, there is the undesirable “avalanche” state, associated with increasing electrical currents at falling electrical potentials. Second, by contrast, the desired “XSH”

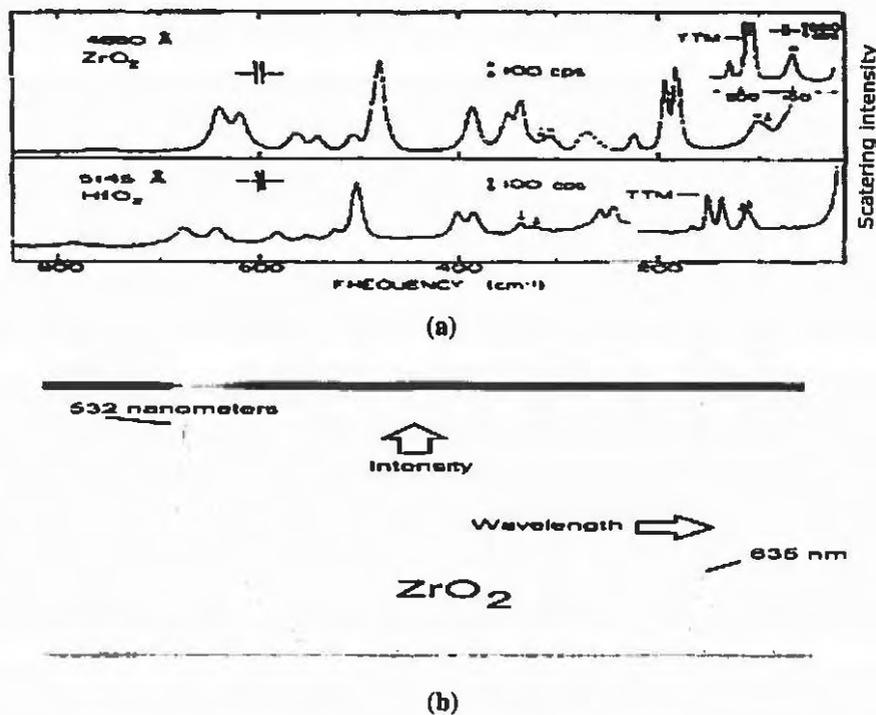


Figure 4. Raman and dual wavelength reflection CMORE spectroscopy of ZrO_2 . (a) (upper) Raman spectrum from monoclinic ZrO_2 [22]. This is plotted in reverse along the x-axis compared to other figures shown. (b) (lower) CMORE-spectroscopic spectrum of ZrO_2 (zirconia without any other added material). Here, as in the rest of the figures, the horizontal axis plots the increasing wavelength to the right. The extended, and unique, multi-peak Stokes sequence of zirconia is seen along with the two laser initiation wavelengths (532 and 635 nm).

state produces very large amounts of heat beyond the normal electrical dissipation expected - XSH. In that case, high electrical impedance is maintained.

Figure 5c shows the avalanche behavior by presenting the dual wavelength electric-driven volume-enhanced reflection spectroscopic signature of a loaded (over)-driven NANOR[®]-type component (ZrO_2PdD) in its avalanche mode. The loaded nanomaterial, ZrO_2PdD , in a modified two terminal, dry, NANOR[®]-type LANR electrical component was electrically driven at 1000 V initially (direct current) which enabled a current of about 1.35 mA. Thereafter, the voltage decreased with time to about 500 V. This behavior is what is termed "avalanche mode" and usually results from excessive applied voltage. The ambient temperature was 26.7°C.

3.4. Stokes peaks of driven ZrO_2PdD in the desired XSH state

CMORE (Dual Wavelength Electric-Driven Volume-Enhanced Reflection) spectroscopy is capable of rapidly differentiating the different, and active, states in LANR nanomaterials. The functional, desired XSH state of a correctly driven NANOR[®]-type component (ZrO_2PdD) in its XSH mode is indicated by a unique signature using dual wavelength electric-driven volume-enhanced reflection spectroscopy. In Figs. 1, 5c and 6, the XSH mode can be seen by a unique reflected optical backscatter along with the reflected optical beams from the component in its desired XSH state.

Figure 5c shows the response of the loaded, deuterated material, ZrO_2PdD , in a NANOR[®]-type component to the dual wavelength reflection spectroscopy driven in all three electrical states. In this figure, the curves are superimposed.

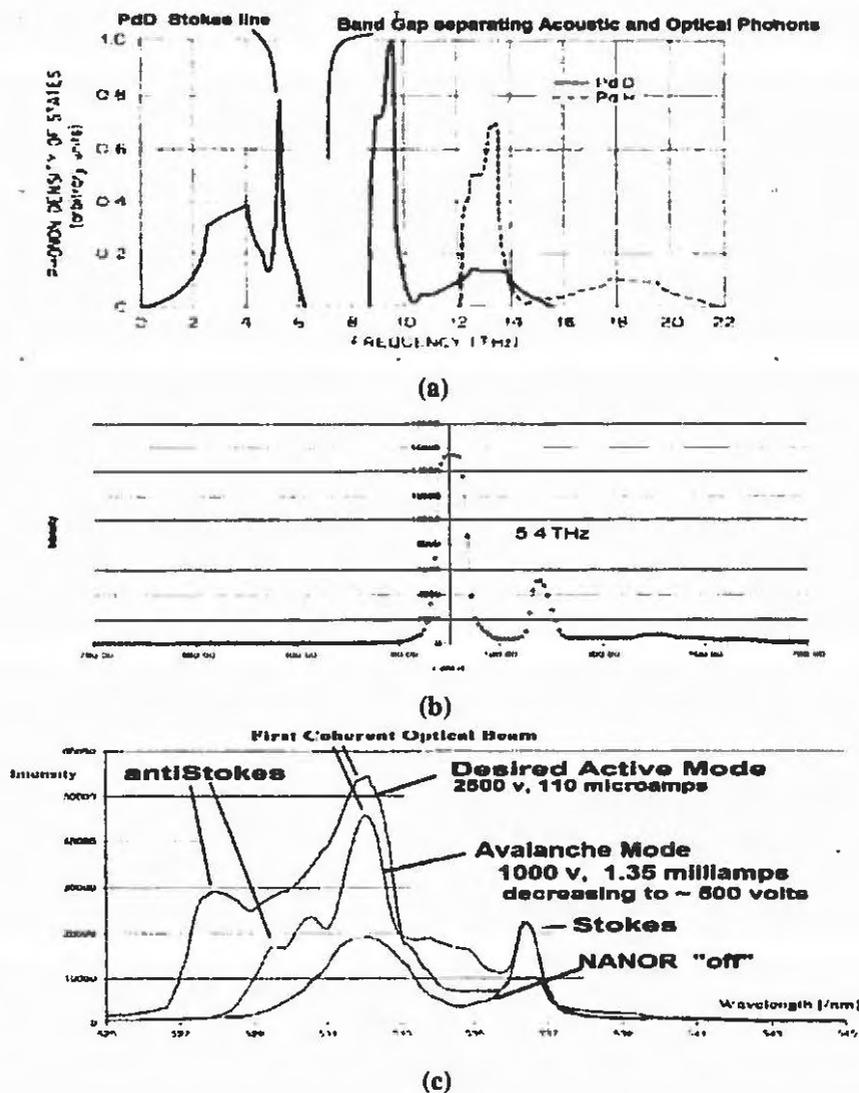


Figure 5. Comparison of PdD phonon density of states to CMORE spectra of ZrO_2 -Pd and PdD. (a) (top) The PdD Phonon density of states [23] shows a peak before 6 THz and at 7–8 THz a gap. The band gap (hole) can be seen between the acoustic and optical phonons. The PdD Stokes line and band gap are marked. (b) (middle) CMORE spectrum of ZrO_2 -Pd shows the peak before 5.4 THz, consistent with the Rowe data. The vertical axis represents the intensity of the returned backscatter plotted as intensity as a function of wavelength. The horizontal axis plots the decreasing frequency to the right. The output of the first laser is shown as the peak on the left side, located at 532 nm. (c) (bottom) Dual Wavelength electric-driven volume-enhanced reflection spectroscopy of a preloaded ZrO_2 Pd NANOR[®]-type component in three electrical states (drive modes). Shown are spectra of the same NANOR[®]-type CF/LANR component in three different electronic states, resolved by dual wavelength coherent electric-driven volume-enhanced reflection spectroscopy. The three modes (responses) are the undriven "off"-state, the unwanted electrical avalanche mode [7], and the optimal operational state, the "Desired Active Mode" where excess energy is being released.

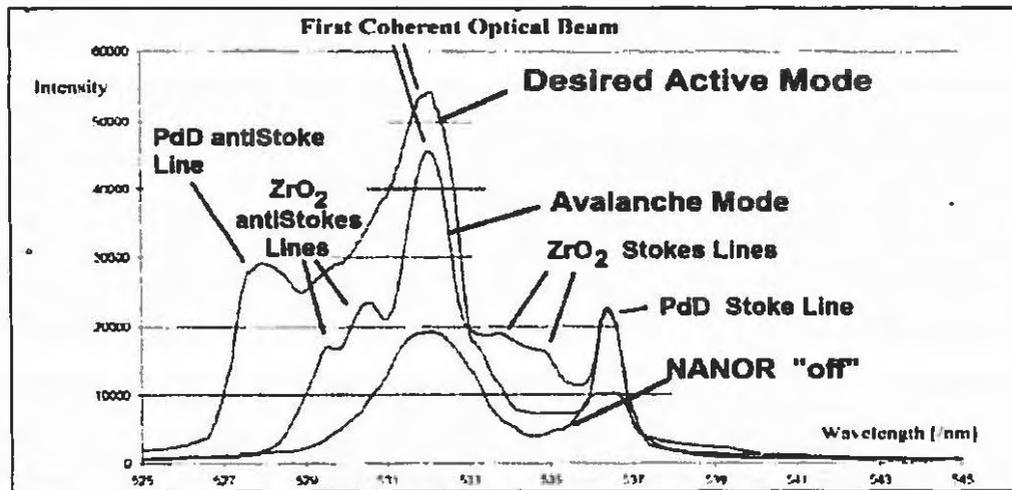


Figure 6. Assignment of anti-Stokes peaks to zirconia and PdD. These are the overlaid spectra of the three Different Electronic States Optical Signatures for the same preloaded ZrO_2PdD NANOR[®]-type CF/LANR component in three different electrical drive modes. Shown are spectra of the same NANOR[®]-type CF/LANR component (NANOR[®] 7-6) in three different electronic states, resolved by dual wavelength coherent electric-driven volume-enhanced reflection spectroscopy. The three modes (responses) are the undriven off-state, the unwanted electrical avalanche mode [7], and the optimal operational state, the desired active mode, where excess energy is being released. The plots show reflected optical intensity as a function of wavelength, initially from two incident coherent optical beams but then reflected by backscatter along with the initial optical beams from the core.

The nanomaterial NANOR[®]-type CF/LANR component was properly, correctly electrically driven at 2500 V which produced an electrical current of about 0.11 mA. The sample maintained its high impedance (compared to that seen during avalanche mode) during the very short run, and there was no electrical avalanche quenching the desired reactions. Shown is the output as intensity as a function of wavelength, as returned by backscatter along with the reflected optical beams from the volume-enhanced interactions. Note closely that in the best, most preferred, heat producing mode, the so-called “desired state”, there is a much larger-than-expected anti-Stokes peak. This is the unique reflected optical output from the desired “XSH” state where large amounts of energy are being released. Intensity is shown as a function of wavelength, as returned by backscatter along with the reflected optical beams. This is the observed optical output in the desired correctly driven active “state” as observed by the diagnostic.

Figures 1, 5c, and 6 show the dramatic increase of the anti-Stokes component for an activated NANOR[®]-type CF/LANR component. For the activated NANOR[®]-type CF/LANR component, there was a major, dramatic increase of the anti-Stokes component and the aS/S ratio both greater than expected. It has been discovered that there exist increased levels of anti-Stokes-type peaks for all nanostructured materials undergoing electrical drive, however, the aS/S ratio goes above one only in active, desired mode. In fact, not only is the anti-Stokes peak of the “desired state” much higher in amplitude than expected for an initial Boltzmann statistic calculation, it is beyond any known calculated temperature, and beyond what could accrue due to curve shift to a very slight amount. These measurements demonstrate that the best XSH results occur (with the CF/LANR nanomaterial in the active, desirable mode) with an aS/S peak ratio greater than 1 (Figs. 1, 5c, and 6).

There are many critically new findings: Importantly, the unusual aS/S ratio exists ONLY with active NANOR[®]-type LANR component in XSH producing mode, characterized by a larger electrical impedance which precedes electrical breakdown. Thus, the CMORE spectroscopic signature heralds the “desired mode” or XSH production mode and

only results from proper drive voltage, maintaining high impedance, and avoiding quenching materials and quenching states, as discussed elsewhere [1,3,7,13,15] and demonstrated conclusively again in this report.

Furthermore, the avalanche mode-induced anti-Stokes peaks differ considerably from those observed in the XSH mode. All the anti-Stokes peaks are relatively missing in the undriven mode. But when electrically driven, there is diversity. When nanostructured NANOR[®]-type components are driven in avalanche mode, the anti-Stokes peaks differ considerably from those which appear during the XSH producing “desired mode”. They differ in energy, and amount, and what stimulates their appearance.

The avalanche anti-Stokes peaks are many, but are lower energy than the XSH mode produced anti-Stokes peak. These match the many Stokes peaks of zirconia. By contrast, the XSH-generated anti-Stokes peak is an alternative to the avalanche-generated many peaks. That peak is singular and at one higher energy which matched the Stokes line of PdD. Thus, there appear to be two electrical heat-generating mechanisms which both dissipate energy (both applied and possibly generated internally), and they are distinguished by two entirely different end products, amounts of output heat production, and CMORE signatures.

In the unwanted mode, the anti-Stokes peaks of the electrical avalanche indicate conventional dissipation including undesirable electronic and lattice vibrations. In contrast, in the desired XSH-producing mode, the phonon gain heralded by the large anti-Stokes peaks link to unlocking the excited ⁴He* and coupling the energy released to the lattice as whole.

3.5. ZrO₂PdD – Optical phonons

In a solid lattice, alloyed with deuterons, there are multiple modes of vibration. The acoustical phonons are those where the palladium and deuterons move in phase in the long wavelength limit, located in reciprocal space at the center of the Brillouin zone. By contrast, optical phonons have out-of-phase vibrations between neighboring atoms. They are called “optical” because in ionic crystals they can be excited by the electromagnetic radiation, with the positive ions moving one way while their negatively charged neighbors move the other way. In *k* (momentum)-space, the phonons appear as manifolds in two branches. The lower manifold contains the acoustical branch, and the higher manifold contains the optical branch. There is an energy gap between them when a single metal is alloyed with hydrogen or deuterium.

To better observe the optical phonons, a logarithmic vertical axis is used to enable other peaks of less intensity, like the optical phonons, to stand out. CMORE-spectroscopy resolves and measures all phonon bands, which can be seen at optical and acoustic frequencies.

In Figs. 1, 5c, and 6, the electrical driving mode of the two-terminal NANOR[®]-type CF/LANR component is the desired XSH mode and only results from proper drive voltage, maintaining high impedance, avoiding quenching materials and quenching states. Importantly, the phonon peaks visualized and measured in the present diagnostic, are both direct Evidence of possible optical phonons being involved, and also corroborating the indirect Evidence of Cravens, Letts, and Hagelstein [24]. The optical phonon bands are not yet well resolved in these first CMORE systems, but the need to do so clearly remains, and explorations should be fruitful.

3.6. Acoustic phonons from Pd enable XSH mode

CMORE spectroscopy has revealed a greater-than-normal intensity of anti-Stokes peaks (Figs. 1, 5c, and 6), and therefore acoustic phonon density, only during XSH mode compared to both the “off” state and compared to the avalanche mode. CF/LANR activity is now absolutely linked with acoustic phonons – and only the PdD lattice enables them. There are some other important findings.

Volume-enhanced electrically driven multiwavelength optical (CMORE) spectroscopy images acoustic and optical phonon prevalence and their diversity. Although optical phonons had previously been considered key to the energy

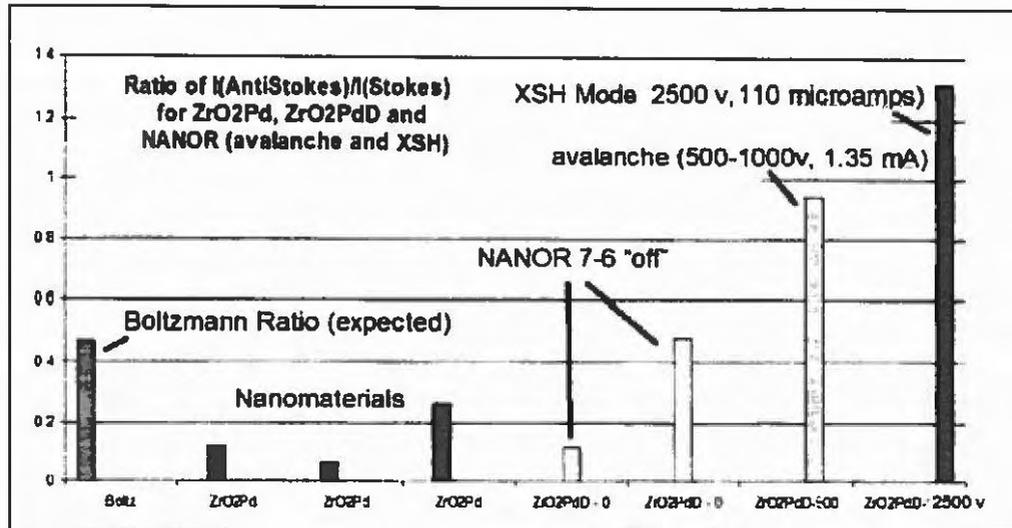


Figure 7. Results: Boltzmann ratios exceed expectations for XSH mode compared to a series of materials, and a NANOR[®]-type LANR component in non-XSH modes. Histogram of measured Boltzmann ratios and what is expected shown are the experimental Boltzmann ratios measured for a series of materials, and a NANOR[®]-type LANR component in its three modes.

transfer of $^4\text{He}^*$ formed *de novo*, the present diagnostic system has determined a role for acoustic phonons in active CF/LANR systems.

The present diagnostic has revealed new direct evidence of acoustic PdD phonons in successful CF/LANR, using a NANOR[®]-type CF/LANR component driven correctly in its XSH mode.

Previously, cold fusion investigators have not been able to directly see phonons in their hydrogen loaded systems, although they have been inferred indirectly through beat frequency two wavelength systems [24], and thought to be mainly optical phonons [11]. Our findings confirm an important role for phonons in successful CF/LANR. They go further because this new diagnostic enables direct visualization of the actual phonon states of the hydrogen loaded material, even while it is being electrically driven. These findings confirm the role for zirconia anti-Stokes in avalanche mode (unsuccessful CF/LANR), and also herald the presence of PdD anti-Stokes peaks during successful CF/LANR. Most importantly and specifically, we have now discovered that PdD acoustic phonons result from, or are required for, successful CF/LANR.

This diagnostic has detected the existence and visualized a large single anti-Stokes peak, heralding phonon gain, which is ONLY associated with active CF/LANR XSH-production. Also, attention is directed to the fact that in the desired electric-driven XSH-producing mode, characterized by very high electrical impedance, the two-terminal deuterided NANOR[®]-type CF/LANR component has a measured Boltzmann–Stokes ratio 1.3.

There are several important implications. First, acoustic phonon gain either results from, or is required for, a cold fusion process which produces energy gain in its XSH mode. Successful cold fusion creates an aS/S ratio >1 during XSH.

Second, in retrospect, this discovery may also be consistent with the fact that only acoustic phonons are used to calculate the thermal conductivity of a material. Third, how do the XSH-generated acoustic phonons enable the creation of, or de-excitation loss of, $^4\text{He}^*$ (which is the precursor to *de novo* ^4He seen with the XSH in aqueous systems [10,13,14])?

4. Interpretation

4.1. Summary of Boltzmann ratio results

In physics, the calculated Boltzmann statistic ratio (also known as the Boltzmann factor) is derived from the frequency and the temperature. Numerically, it is calculated from the exponential of the ratio of two energies. Those energies are the energy of the difference in energies and the thermal energy (which is the Boltzmann constant times the thermodynamic temperature in Kelvin). This is done because the ratio thus reflects the magnitude of the expected populations of the two states.

The results of measuring $R_{aS/S}$ in several types of CF/LANR nanomaterials and during different types of electrical activation can be simply summarized in Fig. 7. Figure 7 is a histogram that presents both the Boltzmann statistic ratio and the Boltzmann aS/S Intensity ratios which were experimentally measured by the CMORE-spectroscopy for a series of materials, and a NANOR[®]-type LANR component in its three electrical modes (states). In Fig 7, the horizontal axis shows and identifies eight different categories of said ZrO₂Pd, ZrO₂PdD nanomaterial, and three electrical drive states, and what is expected normally. The vertical axis shows the amplitude of the theoretical Boltzmann statistic ratio and the experimental Boltzmann aS/S Intensity ratios.

Figure 7 shows by, histogram of the experimentally measured Boltzmann ratios, and the first column in the histogram shows exactly what is expected by calculation. To the right of that "expectation" column (expected), are shown the experimental Boltzmann ratios actually measured for a series of nanomaterials, and then a NANOR[®]-type LANR component in its three electrically driven modes.

Then, the next columns involve electrical activation: first electrical avalanche, and then the XSH producing (desired) mode. When values are inserted into the conventional formulae, the expected Boltzmann statistic ratio is a number between 0.4 and 0.6, as can be seen in the first column of Fig. 7. The other columns were derived experimentally for this report. The Boltzmann aS/S Intensity Ratio is derived from the actual measured relative intensities of the anti-Stokes peak divided by the intensity of the Stokes peak. Here, those values were determined by CMORE-spectroscopy. Then, the ratio is derived from the intensity of the anti-Stokes peak divided by the intensity of the Stokes peak. The histogram shows the collected information. It was obtained from the data obtained using measured Boltzmann ratios for a variety of related samples; including the relevant ZrO₂Pd nanomaterial, before heavy hydrogen is added, and after the loading deuterons to a very high level [3], and then with the two-terminal component in several electrical drive states.

4.2. Implications of the aS/S ratio >1 during XSH

Why is the anti-Stokes/Stokes ratio so high with XSH mode in ZrO₂PdD? There are important implications of an XSH-related aS/S ratio greater than one, from/during the desired cold fusion/LANR state. First, it can indicate, and so far is ONLY associated with, the desired electronic state of cold fusion (lattice assisted nuclear reaction; CF/LANR) activity in a NANOR-type CF/LANR component.

Second, that ratio is significant evidence of acoustic phonon gain, which itself is present only while the preloaded NANOR-type component is driven electrically. The highest levels indicate that the active CF/LANR system, confirmed by the CMORE-spectroscopy, is driven properly. Third, that ratio is far outside of the range expected normally by temperature alone. It passes through a region which is beyond any known calculated temperature [8]. It is a level greater than could be accounted for by a prosaic curve shift secondary to temperature.

4.3. Calculation of effective temperature during XSH

The fact that the Boltzmann Stokes ratio is 1.3 reveals more about successful cold fusion. Because the Stokes and anti Stokes energies are derivable, the effective Stokes temperature can be computed from the experimental data to

reveal the core temperature during the XSH mode. The next equation derives the calculated Boltzmann Stokes Ratio and the calculated Boltzmann Statistic ratio.

The equation involves temperature, and is

$$R_{aS/S}(\text{calculated}) = \text{Intensity}(\text{anti-Stokes})/\text{Intensity}(\text{Stokes}) = \exp(-E_{\text{diff}}/k_B T), \quad (1)$$

where E_{di} is the energy difference between the two states is 5.96×10^{-21} J and k_B is Boltzmann's constant.

The calculated temperature at core is, therefore, 1645 K (1372°C). Temperature results from the number of states available to a system and it will be important to map this finding by depth to determine its relevance as a real, physical value [8].

Table 1. Variables used in calculation

R_a	the Stokes ratio = Intensity(anti-Stokes)/Intensity(Stokes)
k_B	Boltzmann's constant = 1.38066×10^{-23} J/K
T	temperature in degrees, Kelvin
E_{diff}	= ΔE an energy difference

4.4. Calculation of phonon number during XSH

How does the desired XSH mode actually create the anti-Stokes components at levels higher than observed for all other material precursor and avalanche mode? The Stokes and anti-Stokes energies are derivable, and therefore the number of phonons involved during XSH can be computed. As discussed in solid state texts [25,26], with an acoustic frequency of 4.9 ± 0.1 THz, there are 7 ± 0.15 phonons involved. One important point is that this is much lower than has ever been expected before in most theoretic analyses of energy transfer. Another possible point is that this number may be related to previously considerations of the palladium lattice Pd vacancy which is surrounded by six deuterons [8,27].

4.5. Spin Bose model might include acoustic phonons

Hagelstein incorporates the optical phonons in his theory. It explains the massive energy cooperative transfer from the megavoltage energy of the $^4\text{He}^*$ to the lattice in a coherent de-excitation process which proceeds by way of lossy spin bosons involving phonons [11], and possibly magnons [4,9]. This study heralds that acoustic phonons have an indelible role.

4.6. Phuson theory corroborated

The proof that phonons are involved as a cohort for the XSH in active cold fusion (LANR) systems supports the PHUSON theory [12] of coherent energy transfer to the lattice. The PHUSON is the quantum of that energy transfer, in a process which is consistent with conventional physics, and where the energy then appears as XSH [1,13]. The PHUSON theory explains why there is a relative absence of strong neutron and gamma ray emissions in CF (LANR). The gamma emission branch from the excited state of $^4\text{He}^*$ is actually spin-forbidden for both hot and cold fusion [12]. However, at higher hot fusion temperatures the restriction is slightly lifted. This is consistent to what is seen for both hot and cold fusion. Thus, the PHUSON theory correctly describes the relative absence of neutron emissions in CF (LANR). The only nuclear branches available are those whose band gaps are surmountable by the available activation energy (limited by the ambient temperature and incident radiation). The neutron emission branch is more than 1 MeV

above the first excited state ($^4\text{He}^*$). Hot fusion has large activation energies available (it is “hot” LANR/CF is not. In LANR, given the actual much smaller amount of thermal energy, $k_B T$, available for cold fusion ($\approx 1/25$ eV), absence of adequate activation energy decisively means that that branch is NOT available, as it is for hot fusion.

4.7. Explanation for the large signals

The major problem of the Raman effect is that it produces very weak signals because the photon conversion efficiencies are less than 10^{-18} . As Sir Chandrasekhara Raman stated, the effect has “excessive feebleness” [28]. These very small signals result because the proportionality constant $\chi(3)$, known as the “third-order susceptibility”, is only linearly proportional to the local oscillator density. However, that is not the case when irradiation is made using coherent lasers which yield a much larger signal because with coherent illumination there results phase-matching conditions and quadratic dependence on the number of local oscillators. Thus, even with the same selection rules, the coherent irradiation Raman effect yields a much greater signal intensity (circa 10^6 times greater) [29,30].

5. Conclusions

5.1. Implications for improvement of LANR systems

CMORE spectroscopy differentiates active states in LANR nanomaterials. The present diagnostic generates spectra in real time which are able to illuminate, visualize, and help identify at least three states for a CF/LANR material or component which is potentially active. The system can determine which state the material or component is in, in real time, even as it is electrically driven, and may be able to determine time constants for changes between levels. Most importantly, it can saliently detect the desired reactions just as products begin to appear and accumulate (e.g. heat). Therefore, it has great use because it reveals both the desired, and undesired, reactions and states and may enable better control, and possible detection of other states of operation – and therefore reactions and products.

Future studies should attempt to resolve loading of the PdD by determining the displacement of the anti-Stokes from the main peak and relating that to the Pd–Pd bond energies which decrease as loading proceeds and the lattice separation expands [31]. Other investigators may elect to use CMORE spectroscopy to resolve other peaks such as D–D.

Another advantage includes the immediate telegraphing of the state, rather than having impatient skeptics await the appearance of XSH. The use of CMORE-spectroscopy has implications for examining substates in material science and metallurgy, cold fusion physics, and in the electrical engineering of CF/LANR systems. Other spectroscopies only identify materials, while the present diagnostic reveals the electrical state of the component while continuing the means to electrically drive, control, and monitor that component and state as desired.

Volume-enhanced CMORE spectroscopy successfully differentiates active states in LANR nanomaterials. All the anti-Stokes peaks are relatively missing in the undriven mode for all of the nanostructured materials. Weak anti-Stokes peaks are elicited from Pd (and Ni and their alloy) nanostructured material in ZrO_2 . But when NANOR[®]-type components are electrically driven, there is diversity in outcome. When driven in the avalanche mode, the anti-Stokes peaks differ considerably from those which appear during the XSH-producing, or desired, mode. The anti-Stokes peak(s) differ in energy, and amount, and differ in what stimulates their appearance. Normal anti-Stokes peaks return when the electrical drive creates “avalanche mode”, characterized by higher electrical current at decreasing voltage. The avalanche anti-Stokes peaks are many, and they are lower energy than the XSH mode produced anti-Stokes peak. By contrast, successful cold fusion is heralded by a large increase in the aS/S ratio, and the generated anti-Stokes peak for the desired and XSH-producing state is very different from the avalanche-generated many anti-Stokes peaks. That XSH-related peak is singular and at higher energy. This distinguishing, higher energy, single, anti-Stokes peak (which also heralds phonon gain) is also not seen in the “off” state or the avalanche (undesirable) mode. Our analysis finds

that the excess-heat produced anti-Stokes peak is matched to the Stokes line of PdD. We also find that the several lower energy anti-Stokes in avalanche mode (unsuccessful regarding CF/LANR) are matched to the many Stokes peaks for zirconia. In the desired electric-driven XSH-producing mode, the two-terminal deuterided NANOR[®]-type CF/LANR component has a measured Boltzmann–Stokes ratio 1.3.

Analysis of the phonon gain heralds 7 ± 0.15 acoustic phonons assisting nuclear reactions and a core peak calculated Stokes temperature of circa 1645 K. Therefore, these findings confirm a role for PdD acoustic phonons, in the loaded lattice, during successful CF/LANR which produces XSH.

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Dry, preloaded NANOR[®]-type CF/LANR components

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Dry, preloaded NANOR[®]-type technology makes LANR reactions more accessible. These self-contained, two-terminal nanocomposite ZrO₂-PdNiD CF/LANR components have at their core ZrO₂-PdD nanostructured material. The excess energy gain compared to driving input energy is up to 20 times the input; characterized by reasonable reproducibility and controllability. The CF/LANR/CF activation is separated from its loading. Although small in size, the LANR excess power density is more than 19,500 W/kg of nanostructured material, with zero carbon footprint.

Keywords: Cold fusion, excess energy, nanomaterial, preloading.

Aqueous cold fusion augmented by nanomaterials

LATTICE assisted nuclear reactions [LANR, also known as cold fusion (CF) and LENR] use hydrogen-loaded alloys to generate heat and other products¹⁻³ by enabling deuterium fusion to form an excited *de novo* helium nucleus at near-room temperature under difficult-to-achieve conditions. The 'excess heat' observed is thought due to energy derived from coherent de-excitation of molecule D₂ to ground state ⁴He, with the large 24 MeV quantum fractionated into optical phonon vibrations near 65 meV. Usually, in the past, successful LANR required engineering of multiple factors including loading, adequate confinement time, loading rate and prehistory (with careful avoidance of contamination and materials and operational protocols which quench performance). Today, dry, preloaded NANOR[®]-type technology makes LANR more accessible.

Nanostructured materials are important in LANR and are also produced in codeposition structures, observed producing non-thermal near-infrared emissions when active, and exhibit typical CF/LANR excess heat correlated with the size of the Pd-D nanostructures². These self-contained, two-terminal nanocomposite ZrO₂-PdNiD CF/LANR components feature new composition, struc-

ture and superior handling properties enabling portability and transportability and are capable of significant reproducible energy gain^{4,5} (Figure 1). The NANOR[®] components are smaller than 2 cm in length, and with 30–200 mg of active LANR material. Their 'core' contains active ZrO₂-PdD nanostructured material⁶, loaded with additional D to loadings (ratio of D to Pd) of more than 130%, but shallow traps are not ruled out because palladium nanoparticles often have a vacancy in their centre⁷ and vacancies within them. Bulk PdD is one of the most studied metal deuterides, with deuterium in the octahedral sites at high D/Pd loading near unity. Nano-scale Pd occurs in the Fm3m space group, while bulk Pd is FCC; the miscibility gap for nano PdD is narrower than for bulk PdD; and the solubility is a bit lower for the nano PdD. In some crystals, Pd²⁺ ion is observed and is paramagnetic. The ZrO₂-(PdNi)D is prepared in a complicated process that begins by oxidizing a mixture of zirconium oxide surrounding metallic palladium, nickel or Pd-Ni islands. The sudden glassy freezing of the molten alloy produces an amorphous, metallic, tinsel, ribbon foil of size ~0.5 mm × 2 to 20 mm × ~0.1 mm thick; silver-coloured, shiny bright and smooth². After serial baking^{2,4} there is separation of the alloy into 7–10 nm sized, now ferromagnetic, nanostructured islands located and dispersed within the electrically insulating zirconia dielectric. The material feels like crushed bituminous coal with complex electrical and magnetic properties.

For these NANOR[®]-type LANR components, the fuel for the nanostructured material in the core is deuterium; and the product is believed to be *de novo* ⁴He based upon previous aqueous studies³. These reactions are driven and activated by an applied electrical current. Most importantly, they are pre-loaded so that LANR activation is separated from the loading. In every other system known, Fleischmann and Pons, Arata, Miles, etc. the loading has been tied to activation at room temperature. It is a long, expensive, arduous effort to prepare these preloaded nanocomposite CF/LANR components, but by contrast, these can be simply electrically driven.

LANR (CF)-activated nanocomposite ZrO₂-PdNiD and ZrO₂-PdD CF/LANR quantum electronic components are capable of significant energy gain^{4,5}, with significant

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For verification, the energy gains were confirmed by three methods and by time integration. The calorimeter had parallel diagnostics, including heat-flow measurement, and calibrations included an ohmic (thermal) control located next to the NANOR[®]-type device.

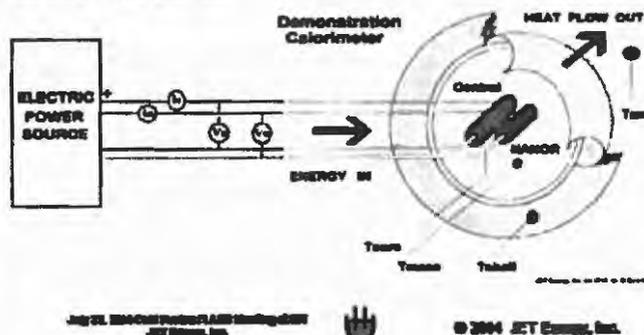


Figure 1. Nanostructured material (left) and its stereoconstellation with the ohmic (thermal) control in the excess heat experiments. The large central thermal mass is not shown here.

improvement over all of their predecessors in sustained activity, including the highly successful metamaterial PHUSOR[®]-type of LANR component. They have been carefully evaluated for energy gain, including during and after the January 2012 IAP MIT course on CF/LANR. The excess energy gain compared to driving input energy is up to 20 times (sometimes more).

The first publicly shown NANOR[®]-type LANR component appeared during and after the January 2012 IAP MIT course on CF/LANR. It demonstrated energy gain which ranged generally from 5 to 16. Energy gain was 14.1 while the MIT IAP course was ongoing; and other NANORs have demonstrated higher gain. The 2012 Open LANR/CF Demonstration at MIT had parallel diagnostics, including calorimetry, input-power-normalized ΔT , and focused heat flow measurement (such as Omega HFS Thin Film) and calibration with an ohmic (thermal) control located next to the NANOR[®]. The NANOR and the thermal control are at the centre of much larger thermal mass in the calorimeter, discussed in more detail elsewhere^{4,5}.

Electrical activation of NANOR[®]-type CF/LANR component

The LANR preloaded, stabilized NANORs were driven by a high DC voltage circuit up to 1000⁺ V rail voltage. The duty cycle was split with half going to a control portion consisting of a carefully controlled electrical DC pulse into an ohmic resistor which was used to thermally calibrate the calorimeter⁴. Data acquisition was taken from voltage, current and temperatures at multiple sites of the solution, and outside of the cell. Data acquisition sampling was done at data rates of 0.20 to 1 Hz, with 24+ bit resolution; voltage accuracy 0.015^{±0.005} V and temperature accuracy <0.6°C). The noise power of the calorimeter was in the range ~1–30 mW. The noise power of

the Keithley current sources is generally ~10 nW. Input power is defined as V^2/I . There is no thermoneutral correction in the denominator. Therefore, the observed incremental power gain is actually a lower limit.

The result is heat measurement of this preloaded NANOR[®]-type LANR device by three ways, ending in calorimetry, input-power-normalized ΔT (dT/P_{in}), and input power normalized heat^{4,5} (HF/P_{in}). These three methods of verification are pooled to derive useful information, including the energy produced ('excess energy') and sample activity.

The instantaneous power gain (power amplification factor (non-dimensional)) is defined as P_{out}/P_{in} . The energy is calibrated by at least one electrical joule control (ohmic resistor) used frequently, and with time integration for additional validation. The excess energy, when present, is defined as $[P_{output} - P_{input}] \times \text{time}$. The amount of output energy (and therefore, both power and energy gain) is determined from the heat released producing a temperature rise, which is then compared to the input energy. The output of the NANOR is compared to the output of the precisely driven ohmic control.

The NANOR[®]-type preloaded LANR component openly demonstrated energy gain (COP) which ranged generally from 5 to 16 (e.g. 14.1 (~1412%) while the MIT IAP course was ongoing⁵). It had a much higher energy gain compared to the 2003 demonstration unit (energy gain 14.1 in 2012 vs ~2.7 in 2003).

The input powers were below 100 mW^{4,5}, because the set-up was designed to run at low power input levels to increase safety for its multi month-long stay at MIT. There were daily calibrations using input current and voltage standards. In this case, low power was used for several reasons, including to facilitate the rapid time constant and because this is for demonstration and teaching purposes. More recently, these NANOR[®]-type components have been driven up to the 2 W level.

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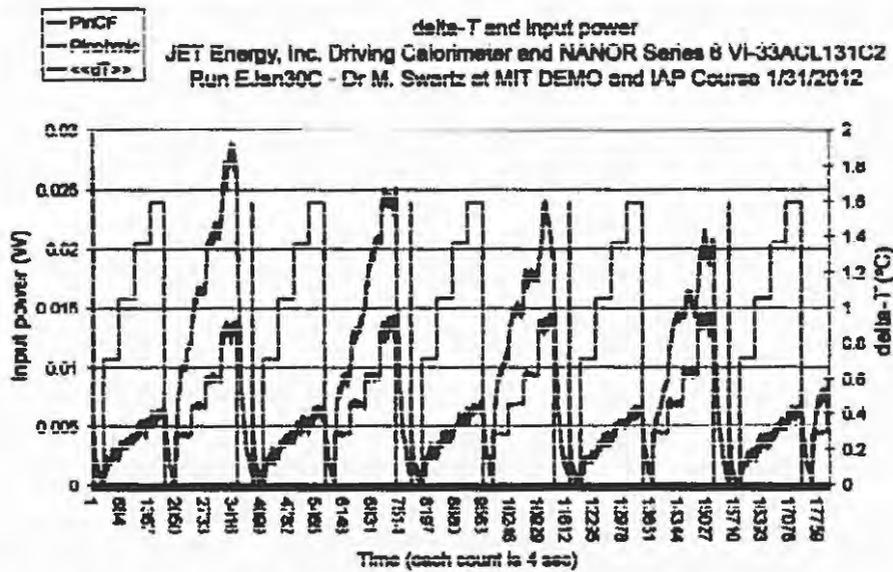


Figure 2. Input power and incremental output temperature rise of a self-contained CF/LANR quantum electronic series VI NANOR[®] device. These curves plot the raw data as incremental temperature rise and the applied input electrical power as the power is switched between an ohmic (thermal) control and the CF/LANR component, alternatively. There is a pair of calibration pulses between each set.

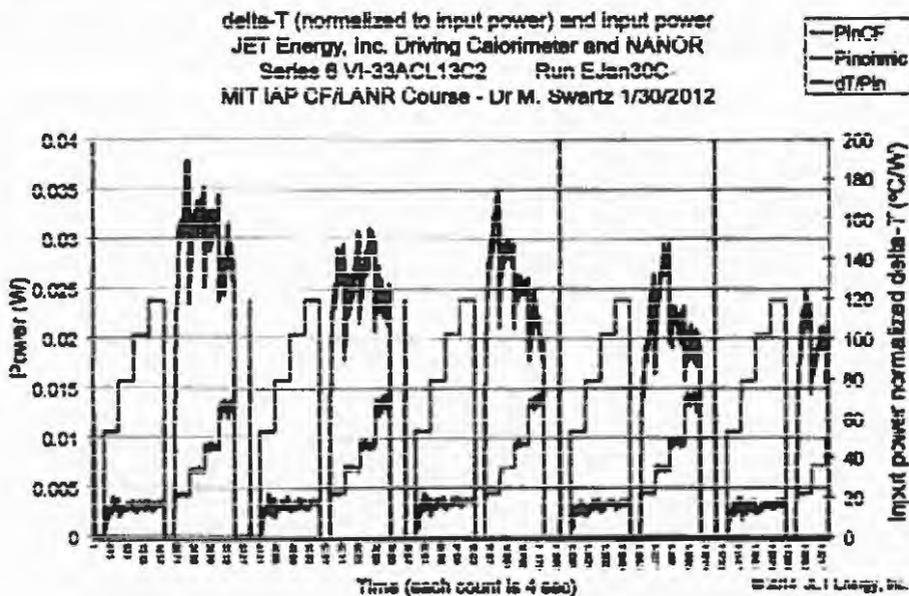


Figure 3. Plot showing temperature rise (ΔT , °C) of the ohmic control and the preloaded NANOR[®]-type LANR device, both normalized to input electrical power. Shown are the input power (left-hand axis) and resulting output temperature rise normalized to input electrical power (right-hand axis). Next to the control resistor is the self-contained CF/LANR quantum electronic component, a series VI two-terminal NANOR[®]-type device containing active preloaded $ZrO_2/PdNiD$ nanostructured material at its core.

Figures 2–5 show this entirely new, more reproducible, much more powerful configuration of clean, efficient energy production from several points of view. The figures include raw data (Figure 2) and derived information from the runs which shows conclusively LANR excess energy. This is heralded by input power normalized incremental temperature (ΔT) changes and heat flow (Figures 3 and 4) and by calorimetry (Figure 5). These graphs shows

a small portion of the collected data and derived information which was actually collected and analysed by the class, and later in a four-month interval at MIT and many more months of study. They show the data collected from NANOR VI-33ACL131C2 with the incremental power gain determination by dT/P_{in} as 1096%, by HF/P_{in} as 1103%, and by calorimetry as 993%. The time integrated energy gain was slightly less at 7.92. This indicates that

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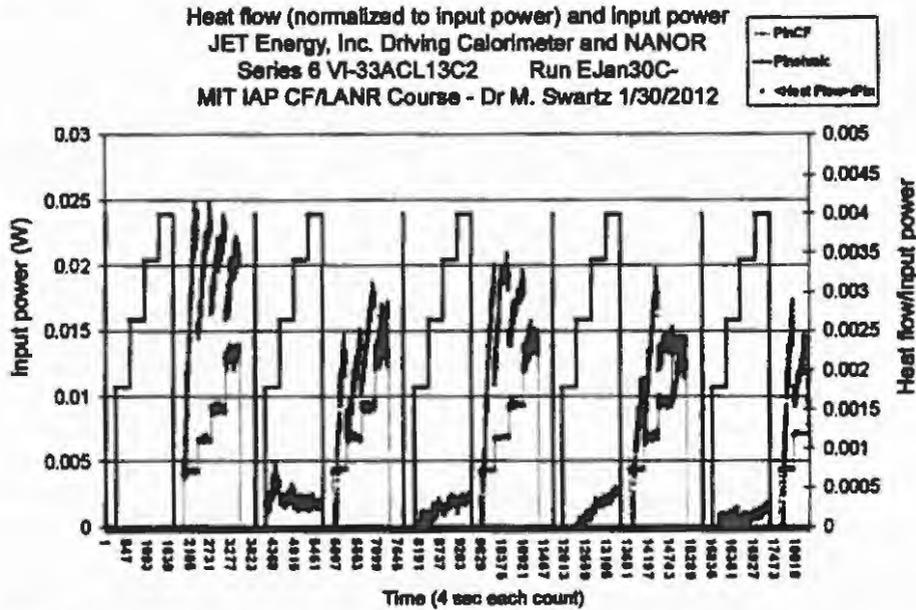


Figure 4. Input power and output heat flow normalized to input electrical power of a self-contained CF/LANR quantum electronic component.

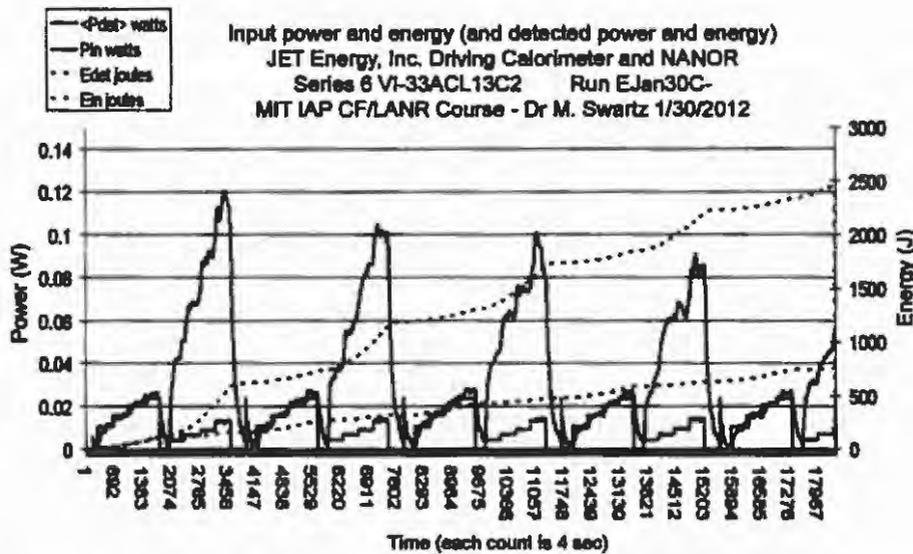


Figure 5. Input and heat output of a two-terminal NANOR[®]-type device series 6-33 device, showing the calorimetric response at several input powers, for the ohmic control and the component. Four complete cycles are shown.

the curves (Figures 2-5) herald documented excess energy of 1594.9 J.

Figure 2 demonstrates the excess heat from this component versus an ohmic control. Shown is the input power and incremental output temperature rise of a self-contained CF/LANR quantum electronic series VI NANOR[®] component. These curves plot the raw data as incremental temperature rise and the applied input electrical power as the power is switched between an ohmic (thermal) control and the CF/LANR component, alternatively. There is a pair of calibration pulses between each set. Figure 2 is a set of

curves which plot the differential incremental increase in temperature (°C) for the case with no input ('background'), and for the case of an ohmic thermal control at the same location and the NANOR[®]-type LANR component. The graph in Figure 2 presents several curves which plot the temperature rise in response to four different levels of electrical input power, and the response of an ohmic control to same electrical input power. The x-axis represents time, and each count represents 4 sec. The y-axis on the left side represents electrical input power (in watts). The y-axis on the right side represents the temperature rise (differential

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temperature increase) in response to the electrical input power ($^{\circ}\text{C}$). The input to the thermal ohmic control is shown, followed by the preloaded NANOR[®]-type component, as are the thermal output (heat output generated) for both the ohmic control and the preloaded NANOR[®]-type component. Four complete cycles are shown.

The graph in Figure 2, as in each of the other figures, shows first the response of the ohmic control, and then the response of the NANOR, the second ohmic control, and so on. Each of the outputs is read off from the right hand side. A pair of short calibration pulses is used for accuracy and precision checks of voltages and currents which are also shown between each set of measurements.

Compare the output for NANOR[®]-type LANR component to the thermal (ohmic) control. Figure 2 clearly demonstrates the larger differential incremental increase in temperature ($^{\circ}\text{C}$) for the NANOR[®] compared to the ohmic control. Attention is directed to the fact that the active preloaded LANR quantum electronic component clearly shows a larger, significant improvement in differential thermal output compared to a standard ohmic control (a carbon composition resistor). That amount of differential temperature increase for the preloaded NANOR[®]-type component heralds great utility for the energy output as a heat source.

Figure 3 is a set of curves which plot the temperature rise (ΔT) of the preloaded NANOR[®]-type LANR component and the ohmic control normalized to input electrical power. These curves plot the temperature rise normalized to input electrical power as a function of time, so that the ratios can be used to estimate incremental power gain.

Figure 3 presents the differential temperature rise normalized to input electrical power for the preloaded NANOR[®], for the case with no input power ('background'), and for input to the ohmic thermal control, located at the core. The x -axis represents time, and each count represents 4 sec. The y -axis on the left side represents electrical input power (in watts). Each of the outputs is read off from the right-hand side. The y -axis on the right side represents the temperature rise (differential temperature increase) normalized (that is, divided by) to the electrical input power. The units of this axis are in $^{\circ}\text{C}/\text{W}$. Calibration pulses, used for accuracy and precision checks of voltages and currents, are also shown.

The NANOR[®] component and the ohmic control received four levels of input electrical power. Each is shown with its thermal output response to its electrical input. Almost five complete cycles are shown with their thermal output response to electrical input. Compare the ΔT output normalized to input power for preloaded NANOR[®]-type LANR component to the thermal (ohmic) control. Observe that despite lower input electrical power to the NANOR[®], the temperature rise normalized to input electrical power observed in the core is higher than expected, compared to the ohmic control. Note that the active

preloaded LANR quantum electronic component again clearly shows significant improvement in thermal output, here input-power-normalized compared to a standard ohmic control (a carbon composition resistor). Figure 3 heralds the excess energy achieved by the series VI NANOR[®] type of LANR component. It can be seen that the input power normalized delta measurements suggest strongly the presence of excess heat; a matter of great utility.

Figure 4 shows the input power and output heat flow normalized to input electrical power of a self-contained CF/LANR quantum electronic component NANOR 6-33. Figure 4 is a set of curves which plot the heat flow, normalized to input electrical power, leaving the system while driving the preloaded NANOR[®]-type LANR component and the ohmic control at four different electrical input powers. The heat flow is in response to the electrical input. It is an entirely different sensor from those used to determine dT/P_m or calorimetry. Figure 4 presents the output heat flow for the preloaded NANOR, for the case with no input, and for the ohmic thermal control, located at the core of the calorimeter. Four complete cycles of control of CF/LANR are shown. The x -axis represents time, and each count represents 4 sec. The y -axis on the left-hand side represents the electrical input power (in watts). The y -axis on the right side represents the heat flow output normalized (that is, divided by) to the electrical input power. Calibration pulses, used for accuracy and precision checks of voltages and currents, are also shown.

In Figure 4, compare the output heat flow normalized to input power for NANOR[®]-type LANR component with that for the thermal (ohmic) control. The long-term heat-flow measurements (using calibrated components) confirm the presence of excess energy, and validate the other measurements. It can be seen that despite lower input electrical power to the NANOR, the heat flow leaving the volume in which was contained, when normalized to the input electrical power, was higher than expected compared to the ohmic control. This was largest at lower input power levels. The response of the NANOR[®]-type LANR component is consistent with efficient energy gain, with the energy output as heat. The changes of the output with input power are consistent with the optimal operating point manifold of the LANR material. Therefore, the figure heralds the great efficiency of, and the excess energy coming from, the preloaded NANOR[®]-type of LANR component. Attention is directed to the fact that the active preloaded LANR quantum electronic component again clearly shows significant improvement in energy generated compared to a standard ohmic control (a carbon composition resistor) by this method too using heat flow. This information corroborates the marked and substantive incremental increase in energy output as heat for the preloaded NANOR[®]-type of LANR component.

Figure 5 depicts the electrical power input and thermal power output of a two-terminal NANOR[®]-type series

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6-33 component, showing the calorimetric response at several input powers, for the ohmic control and the component. Four complete cycles are shown. The figure shows curves which plot the electrical input power, at four different input electrical power levels, and the calorimetric responses of both the ohmic control and the preloaded NANOR[®]-type component. Four complete cycles are shown. The x-axis represents time, and each count represents 4 sec. The y-axis on the left side represents electrical input power (in watts). The y-axis on the right side represents the amount of energy released. The units of this axis are in joules. The figure shows the input, and the calorimetry, of preloaded NANOR along with those for the ohmic thermal control used to calibrate the system. The calibration pulses, used for accuracy and precision checks of voltages and currents and time are also shown. The inputs to the thermal ohmic control, followed by the preloaded NANOR[®]-type component, are shown, as are the calibrated calorimetric outputs for both.

Each of the power and energy outputs is read off from the left- and the right-hand sides respectively. The latter curves (on the right-hand side axis) represent time integration to determine total energy. They thus rule out energy storage, chemical sources of the induced heat, possible phase changes and other sources of possible false positives. Compare the output for NANOR[®]-type LANR component to the thermal (ohmic) control. As can be seen, this semi-quantitative calorimetry, itself calibrated by thermal waveform reconstruction, is consistent with excess heat being produced only during energy transfer to the NANOR[®]-type LANR component.

Notice that the active preloaded LANR quantum electronic component clearly shows significant improvement in thermal output compared to a standard ohmic control (a carbon composition resistor). The graph, taken after the MIT IAP January 2012 class, is representative of the NANOR-type of CF/LANR technology, and shows nearly reproducible over unity thermal output power from the demonstration-power-level NANOR-type cold fusion (LANR) component.

Conclusion – utility and performance of NANOR[®]-type CF/LANR components

Dry, preloaded ZrO₂-PdNiD NANOR[®]-type CF/LANR components are capable of significant energy gain over long periods of time with reasonable reproducibility and controllability. The CF/LANR/CF activation is separated from its loading.

One such preloaded NANOR[®]-type CF/LANR component (a series VI type) was openly demonstrated at MIT, during and after, the IAP course on 30 and 31 January 2012. It demonstrated reproducible and controllable energy gain which ranged generally from 5 to 16+ (energy

gain of ~14.1 during the course demonstration; higher later) with energy and incremental power gains confirmed by three methods and time integration. It had an improved controlling/driving system which provided a reliable low power, high-efficiency, energy production component for demonstration and teaching purposes of size smaller than a centimetre, with an active site weight of less than 50 mg. Although small in size, this is actually not *de minimus* because the LANR excess power density is more than 19,500 W/kg of nanostructured material^{4,5}. The carbon footprint is zero, and the next generation will have higher power and ultimately produce electricity.

Possible future of clean, high performance energy production components

It is clear that these preloaded nanostructured NANOR[®]-type CF/LANR quantum electronic components are useful. They have shown significant improvement over their predecessors, including the highly successful metamaterial PHUSOR[®]-type of LANR component. This can be used as an effective, clean, highly efficient, energy production system, apparatus and process. Could these dry, preloaded, ready-to-be-activated, NANOR[®]-type LANR components/systems/materials, including in preassembled IC components and systems, be the future of clean and efficient energy production?

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Research Article

Impact of Electrical Avalanche through a $\text{ZrO}_2\text{-NiD}$ Nanostructured CF/LANR Component on its Incremental Excess Power Gain

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Abstract

Cold fusion nanomaterials, in general, and NANOR^R-type LANR components (derived from them), in particular, have two distinct regions of performance on each side of the electrical avalanche. This had led to the identification of three (3) distinct regions of their electrical operation. We now report that the optimal power gain of NANOR^R-type cold fusion components is found far below the breakdown voltage and that the power gain decreases continuously as the electrical avalanche threshold is approached. Beyond the region of electrical avalanche, the previously active preloaded LANR quantum electronic components then give a thermal output similar to a standard ohmic control (a carbon composition resistor). Therefore, use of this technique of driving an active CF/LANR nanomaterial component into, and beyond, their avalanche threshold, provides verification of the excess heat an additional way, which confirms that the calorimetry was calibrated. Also, this investigation indicates where, on the input power axis, to drive them for a maximum effective use. We also report that deuterium can fuel nanomaterial $\text{ZrO}_2\text{-Ni}$ systems, consistent with the previously report involving aqueous CF/LANR systems by Swartz et al. (ICCF-9).

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Keywords: Deuterated nickel, Nanomaterials, Nanostructured ZrO_2 , $\text{ZrO}_2\text{-NiD}$

1. Introduction

Active cold fusion dry nanomaterials, both unloaded and preloaded with D or H, have three regions of electrical operation, as discussed below in detail. We report the continuous measurement (and loss) of excess heat production from an active CF/LANR component during and after its electrical breakdown, namely the, avalanche state. This transformation of active CF/LANR components from active to inactive state will be shown to be not only critical to successfully understanding and controlling these energy producing reactions, but also, providing a significant and giant step forward.

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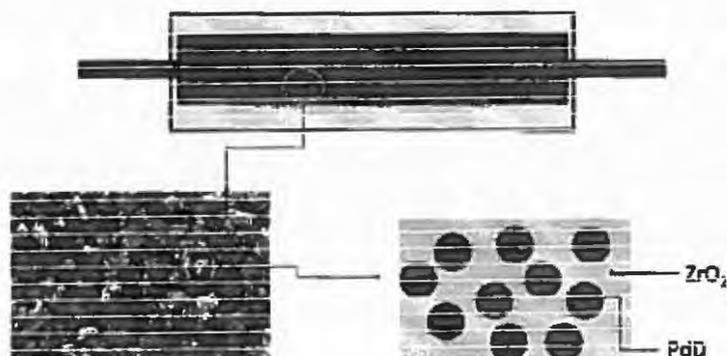


Figure 1. A schematic and actual view of an early NANOR[®]-type component. (Top) Shown is the two terminal component with the cylindrical shaped core. (Bottom left) A scanning micrograph shows the nanomaterial in the core. (Bottom right) A schematic illustration of the electrically insulating zirconia within which lie islands of deuterated alloy.

2. Background. A new generation of CF components

Dry ZrO_2 -PdNiD NANOR[®]-type cold fusion or lattice assisted nuclear reaction (CF/LANR) components containing activated nanocomposite ZrO_2 -PdNiD and ZrO_2 -PdD which are preloaded with deuterons (thereby avoiding requisite loading each time) are capable of producing excess heat with significant energy gain [1,2] over long periods of time with reasonable reproducibility and control. These self-contained, two-terminal nanocomposite ZrO_2 -PdNiD CF/LANR components feature new composition, structure, and superior handling properties (enabling portability and transportability) compared to aqueous and/or gas-loaded cold fusion (LANR) systems. They represent a new generation of LANR (CF) quantum electronic devices which are active and demonstrate significant improvement over all of their predecessors both regarding in sustained activity, improved reproducibility, and a large incremental power gain (P_{output}/P_{input}).

The initial NANOR[®] components are smaller than 2 cm length, and with 30–200 mg of active LANR material. For these NANOR[®]-type LANR components, the fuel for the nanostructured material is deuterium which is contained in the core volume (or chamber), a hermetically sealed enclosure.

The enclosure is tightly fit because both contamination is a potential problem and because of the potential toxicity, from the nanomaterial. Early NANOR[®]-type CF/LANR components were made of nano-scale regions of PdD, PdNiD or NiD in ZrO_2 [3,4]

Later, NANOR[®]-type LANR devices were loaded with additional D for greater loadings (ratio of D to Pd) which are estimated at 100–130% or more, although additional shallow traps are not ruled out. Thus, the deuterons are tightly packed (“highly loaded”) within the nanostructured lattices [4]. Although the correct terminology is ZrO_2 -PdNiD_{1.3}, for simplicity this subscript is left off.

Lattice assisted nuclear reactions (LANR or cold fusion) use such highly loaded hydrogen alloys to create heat and other products [5]. They do this by enabling deuterium fusion to form an excited *de novo* helium nucleus ($^4He^*$) at near room temperature, under difficult to achieve conditions. The product is believed to be *de novo* 4He based on previous CF/LANR studies in aqueous systems, such as by Miles [5]. The “excess heat” observed is energy derived from the subsequent coherent de-excitation of the $^4He^*$ to its ground state via an internal conversion using the lattice

phonons. Here, the excess heat is stimulated by the applied electric current; and the deuterium loading is separated from the excess heat operation.

Usually, in the past, successful LANR required engineering of multiple factors including loading, adequate confinement time, loading rate, and prehistory (with careful avoidance of contamination and materials and operational protocols which quench performance). Today, dry, preloaded NANOR[®]-type technology makes LANR reactions more accessible. What is different here is that most importantly, the components are pre-loaded so that LANR activation of the desired cold fusion reactions is, for the first time, separated from loading. In every other system known, Fleischmann and Pons, Arata, Miles, and the others, the loading has been tied to activation at room temperature [6].

2.1. States of CF/LANR electrical drive

It is a long, expensive, arduous effort to prepare these preloaded nanocomposite CF/LANR components, but by contrast, in these pre-loaded NANOR[®]-type CF/LANR components, the desired reactions are driven, and activated, by an applied electrical current. The development of more reproducible nanostructured CF/LANR components has not been easy, and has directly been linked to improved materials, with complete avoidance of low-threshold electrical breakdown states with their electrical avalanches and their CF/LANR quenching tendencies [1,2,4].

However, until now we have never completely measured the heat production from the active component on both sides the electrical breakdown (avalanche) state. This is important because although we have reported both the observed excess heat on one side of the electrical avalanche and the quenching of that excess heat on the other side, until now we have never observed both with continuity (observable in Fig. 1). This transformation of active CF/LANR components from active to inactive states has been critical to successfully controlling CF/LANR, and is critical to understanding how to engineer these systems.

2.2. Preliminary early results, including five month open demonstration at MIT

Early NANOR[®]-type components have been deliberately engineered to be small and low power (Excess power gain, P_{ex} , of hundreds of milliwatts) to enable them to be carefully evaluated for energy gain, including during, and after, the January, 2012 IAP MIT Course on CF/LANR. This public demonstration ran from Jan. 30, 2012 through mid-May 2012 [2]. A Series 6 NANOR[®]-type CF/LANR component provided long term CF/LANR activity and was monitored by parallel diagnostics including calorimetry, input-power-normalized ΔT , and focused heat flow measurement (such as Omega HFS Thin Film) and calibration with an ohmic (thermal) control located next to the NANOR[®]. The NANOR and the thermal control were at the center of much larger thermal mass in the calorimeter discussed in more detail in [1,2].

The NANOR[®]-type preloaded LANR device openly demonstrated clear cut energy gain. Over weeks, the NANOR[®]-type preloaded LANR component openly demonstrated energy gain (COP) which ranged generally from 5 to 16 (e.g. 14.1 (~1412%)) while the MIT IAP course was ongoing, [11] confirmed by three methods and time integration. It was driven for more than a year with careful evaluation for energy gain under a variety of conditions. The excess energy gain compared to driving input energy exceeded 20 times (sometimes more). This NANOR[®]-type preloaded LANR system had a much higher energy gain compared to the 2003 CF/LANR demonstration unit using an aqueous high impedance system with a Phusor[®] type electrode (energy gain 14.1 in 2012 vs an energy gain 2.7 in 2003). It also had an improved controlling/driving system which provided a reliable low power, high-efficiency, energy production component for demonstration and teaching purposes of size smaller than a centimeter, with an active site weight of less than 50 mg. Although small in size, this NANOR[®]-type preloaded LANR device is actually not *de minimus* because the LANR excess power density is more than 19,500 W/kg of nanostructured material [1] and the carbon footprint is zero.

3. Experimental

3.1. Materials - Impact of E-field on nanomaterial

Nanostructured materials are important in LANR and are also produced in codeposition structures, observed producing non-thermal near infrared emissions when active, and exhibit typical CF/LANR excess heat correlated with the size of the Pd–D nanostructures [4,5]. However, the development of more reproducible nanostructured CF/LANR components has not been easy, and has directly been linked to improved materials, with complete avoidance of low-threshold electrical breakdown states with their CF/LANR quenching tendencies. The problem is that there exist three operating regions and one involves electrical breakdown (electrical avalanche transconduction).

Avalanche behavior with three regions were first observed with ZrO₂–NiH NANOR^R-type component [4]. Control of these breakdown states and quenching tendencies has been critical and has also required surmounting the extremely high electrical resistances (as high as hundreds of gigohms) of these nanomaterials [1,3] and their complicated polarization/transconduction phenomena including an electrical current “avalanche (transconduction electrical breakdown) effect” which has a critical negative role on excess heat generation because it quenches the desired reactions even as the input power increases. The very high DC electrical impedances can suddenly drop, as the voltage across the sample (transsample voltage) is increased to as low as 24 V. It can be shown theoretically that this sudden reduction can be attributed to an “avalanche effect” that is typical of the current–voltage behavior that occurs in Zener diode, but perhaps better understood as follows.

The nanostructured material is a composite distribution of nanostructured ferromagnetic “islands” separated among a vast dielectric zirconia “ocean”. The dielectric zirconia embeds uncountable numbers of nanostructured metal ternary alloy islands. The high resistance occurs because the zirconia dielectric matrix is insulating at low voltage and it keeps the nanoscale metal islands electrically separated and prevents the aggregation of the islands. Each nanostructured island acts as a short circuit elements during electrical discharge. One hypothesis of the excess heat is that these “islands” allow deuterons to form a hyperdense state in each island, where the deuterons thereafter are able to be sufficiently close together to fuse and form ⁴He*, by some pathway not known involving paired deuterons or possibly more.

There have been important implications from the fact that NANOR^R-type component current and voltage characteristic shows a breakdown effect. For example, some electronics destroyed when voltage exceeded NANOR^R-type component breakdown voltage [7]. Therefore, an effort was made to develop more robust electronics capable of driving the NANOR^R-type component through breakdown and on both sides

3.2. Methods - Electrical activation of NANOR^R-type CF/LANR component

The LANR preloaded, stabilized NANORs were driven by a high DC voltage circuit up to 1000+ V rail voltage. The duty cycle was split into a rest period with no input to anything, followed by a period with input power going to a control portion, and then to the CF/LANR component. That was followed by another rest period and control portion. The input power was delivered by a carefully controlled electrical DC pulse. The control was an ohmic resistor which was used to thermally calibrate the calorimeter by providing a series of well known input power, and by using a precise amount of time, energy-measured pulses [1,2]. Data acquisition was taken from voltage, current, temperatures at multiple sites of the core, around the heat flow sensor, and outside of the calorimeter. Data acquisition sampling was at data rates of 0.20–1 Hz, with 24+ bit resolution; voltage accuracy 0.015^{+/-0.005} V, temperature accuracy < 0.6°C). The noise floor (power) of the calorimeter is in the range of 1–30 mW. The noise power of the Keithley current sources is generally 10 nW. The implication of this is that the excess power generated (if it is present) must exceed the noise floor of the calorimeter in order to be observable. It also means that the driving of the calorimeter below that noise floor can on occasion result in false positives without further techniques to rule this out [8].

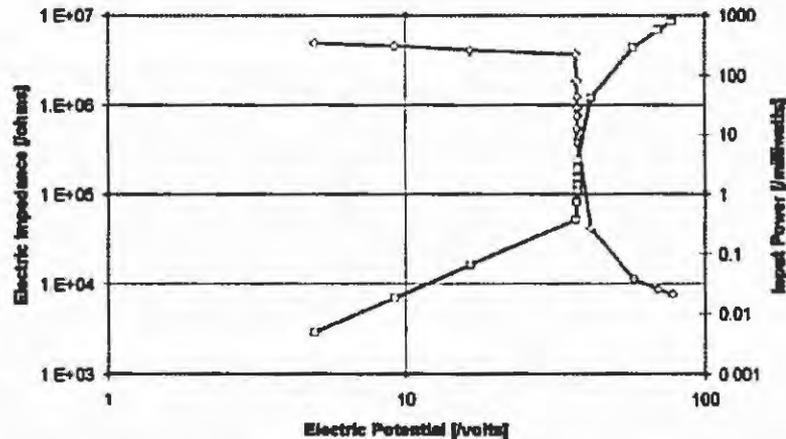


Figure 2. Impedance and Electrical current as a function of applied electric potential (volts). This figure shows the response, and particularly the Avalanche behavior with three regions, as first observed with ZrO_2 -NiH NANOR[®]-type component. Three regions are seen; consisting of the initial plateau of electrical impedance, then the rapid fall off, and finally a sloped region at higher voltage [4,1].

Input power is defined as $V \cdot I$. There is no thermoneutral correction in denominator. Therefore, the observed incremental power gain is actually a lower limit. The result is heat measurement of this preloaded NANOR^R-type LANR three (3) ways ending in calorimetry, input-power-normalized ΔT (dT/P_{in}), and input power normalized heat (HF/P_{in}) [11]. These three methods of verification are pooled to derive very useful information, including the energy produced (“excess energy”) and sample activity. The instantaneous power gain (power amplification factor (non-dimensional)) is defined as P_{out}/P_{in} . As discussed above, the energy is calibrated by at least one electrical joule control (ohmic resistor) used frequently, and with time integration for additional energy validation. The excess energy, when present, is defined as $(P_{output} - P_{input}) \cdot \text{time}$. The amount of output energy (and therefore, both power, and energy, gain) is determined from the heat released producing a temperature rise, which is then compared to the input energy. The output of the component compared to the output of the precisely driven ohmic control.

4. Results

4.1. Interesting transconduction/XSH results and NiD can yields XSH

The new results are interesting. First, we continue to see improvements in loading and fabrication with each new generation of NANOR^R-type components with respect to excess power gain and excess heat (XSH) At the time this manuscript was initially submitted, the Series 7 NANOR^R-type components were the best so far with respect to incremental power gain; under select conditions very high (>1000) power gains observed. These components have demonstrated the first evidence of Mode B behavior [9], where an activation energy is not required beyond the input. Second, the new NANOR data reveals (as was shown for aqueous CF/LANR systems at ICCF-9) that deuterium can fuel ZrO_2 -Ni systems, too [10].

4.2. Imaging a CF/LANR component through the electrical avalanche

Third, as shown in detail below, it is now possible to take electrical and calorimetry data systematically in the different regions of the electrical avalanche, and on both sides of that avalanche. Figures 3–6 show the examination of

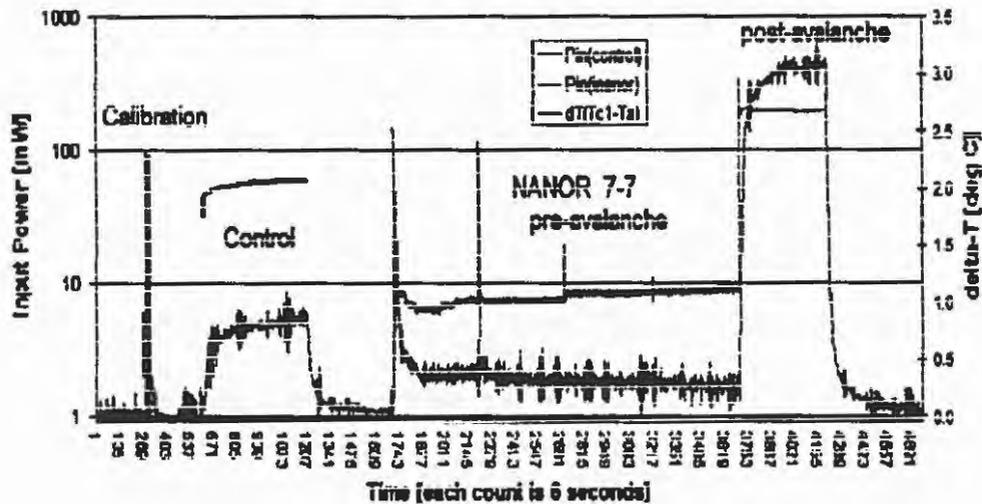


Figure 3. Temperature difference induced by a ZrO_2 NiD NANOR[®] type component and ohmic control, both electrically driven, showing both excess heat and avalanche behavior.

this ZrO_2 NiD NANOR[®] -type component looking for possible excess heat on both sides of the electrical avalanche, and from several points of view. The figures include both raw data (Fig. 3) and derived information from the runs (Figs. 4–6). They demonstrate conclusively that LANR excess energy can be achieved, and it is heralded by input power normalized incremental temperature (ΔT) changes shown in Fig. 4, and verified and confirmed by calorimetry (Fig. 5).

Figure 3 is a set of curves which plot the differential incremental increase in temperature ($^{\circ}C$) for the case with no input ("Background"), for the case of an ohmic thermal control (labeled 'control') at the same location, and for the NANOR[®] -type LANR component, both pre- and post-avalanche. The curves in Fig. 3 plot the raw data as the incremental temperature rise and the applied input electrical power. The applied electrical power is switched between an ohmic (thermal) control and the self-contained quantum electronic Series 7 NANOR[®] -type component CFLANR component. The graph presents these three curves and demonstrates the temperature rise in response to several different levels of electrical input power administered to both the ohmic control and then to the NANOR. For each of those electrical input powers, shown is the input power and then induced incremental output temperature rise.

There is shown an initial calibration pulses at the very beginning of the sequence, which is used for accuracy and precision checks of voltages and currents. The x-axis represents time, and each count represents 6 s. The y-axis on the left side represents electrical input power in watts. The y-axis on the right side represents the amount of temperature rise (differential temperature increase) in response to the electrical input power (degrees Centigrade). The graph shows first the response to the calibration pulse, then the response of the ohmic control, and then the response of the NANOR. A very large rise in power input and output (ΔT) result after the electrical avalanche at about count 3700.

Compare the output for NANOR[®] -type LANR component to the thermal (ohmic) control in Fig. 3. Two distinct regions of performance are seen on each side of the avalanche which is labeled in Fig. 4.

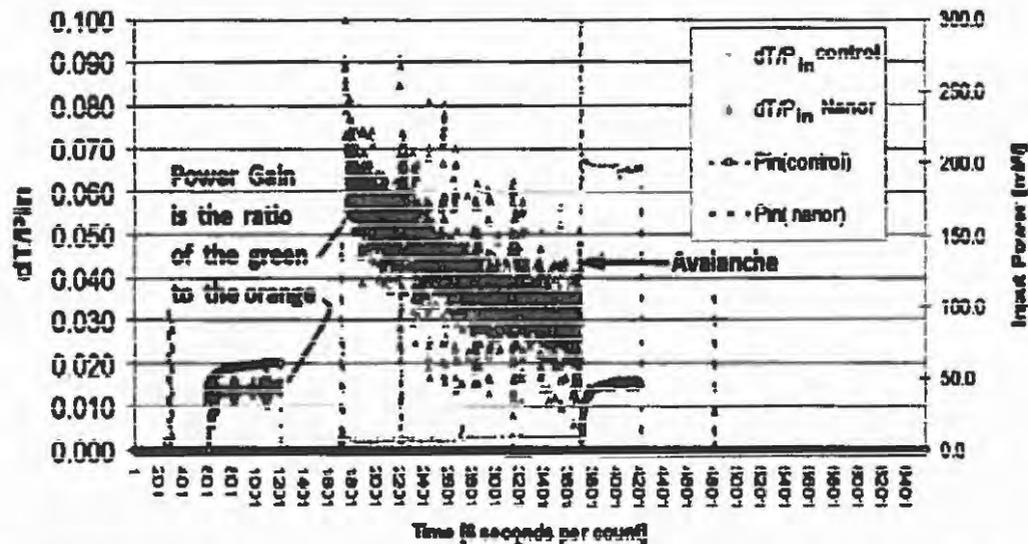


Figure 4. These curves show the dT/P_{in} ratios, which enable determination of the power gain, both in the excess heat region and after the avalanche behavior, for a $7rO_2$ -NiD NANOR[®]-type component. The region of the Avalanche is labeled.

4.3. On other side of the avalanche the power gain is essentially unity

To determine the effectiveness of the heat source, Fig. 4 is set of curves which presents the results of the same experiment, but which plots the temperature rise (ΔT in $^{\circ}C$) of the preloaded NANOR[®]-type LANR component and the ohmic control with both normalized to input electrical power. This derived value, $\Delta T/P_{in}$, is important because it enables semiquantitative determination of the incremental power gain.

Figure 4 shows the differential temperature rise normalized to input electrical power for the preloaded NANOR[®]-type LANR component, and for the case with no input power ("Background" but not labeled in the figure), and for the case of input to the ohmic thermal control, located at the core. The x-axis represents time, and each count represents 6 s. The y-axis on the left side represents electrical input power in watts. Each of the outputs are read off on the right-hand side. The y-axis on the right side represents the amount of temperature rise (differential temperature increase) normalized (that is, divided by) to the electrical input power. The units of this axis are in $^{\circ}C/W$. A calibration pulse, used for accuracy and precision check of voltage and current measurement, is again also shown at the beginning and end (not labeled) of the run.

Because these curves plot the temperature rise normalized to input electrical power as a function of time, the ratios can be used to estimate incremental power gain. That is done here by taking the ratio of the response of the NANOR (green) to the ohmic control (orange). Compare the ΔT output normalized to input power for preloaded NANOR[®]-type LANR component to the thermal (ohmic) control, $\Delta T/P_{in}$.

By comparing that ratio, note the active preloaded LANR quantum electronic component again clearly shows significant improvement in thermal output, here input-power-normalized compared to a standard ohmic control (a carbon composition resistor). Observe that despite lower input electrical power to the NANOR[®], the temperature rise normalized to input electrical power observed in the core was higher than expected, as compared to the ohmic control. The graph therefore shows quite clearly a demonstrated active over-unity thermal output power from the NANOR[®]-type cold fusion (LANR) component, before the electrical avalanche.

Attention is directed to the fact that Fig. 4 clearly demonstrates a larger, significant improvement in differential thermal output (incremental increase in temperature in °C) for the preloaded NANOR^R-type quantum electronic component compared to the standard ohmic control (a carbon composition resistor), before the electrical avalanche.

Figure 4 thus heralds the significant incremental power gain, and therefore excess energy achieved, by this Series 7 NANOR^R type of LANR component. The ratio discussed above indicates that the input power normalized delta-measurements suggests strongly the presence of excess heat. Quantitatively, the amount of this differential temperature increase divided by the input electrical power for the preloaded NANOR^R-type component compared to the control heralds great utility, and so to the degree that these components can be improved for total power out, this is a possible future efficient heat production source.

Figure 5 is a set of curves which present the results of the same experiment, but which plots the electrical power input and the thermal output power both for the two terminal NANOR^R-type component Series 7 component, the ohmic control, two control pulses, and the background (no electrical input to either components). The curves present the electrical input power at several different input electrical power levels. Evaluation of the calorimetric response of both the ohmic control and the NANOR^R-type component also includes presenting electrical energy input and the thermal heat (energy) output.

The figure shows the input, and the calorimetry, of preloaded NANOR along with that for the ohmic thermal control used to calibrate the system. Those calibration pulses, used for accuracy and precision checks of voltages and currents and time, are also shown. The input to the thermal ohmic control followed by the preloaded NANOR^R-type component is shown, as are the calibrated calorimetric outputs for both. The *x*-axis represents time, and each count represents six (6) seconds. The *y*-axis on the left side represents electrical input power in watts. The *y*-axis on the right side represents the amount of energy released. The units of this axis are in joules. Each of the power and energy outputs are read off of the left and the right-hand sides, respectively. The latter curves (on the right-hand side axis) represent time integration to determine total energy. They thus rule out energy storage, chemical sources of the induced heat, possible phase changes, and other sources of possible false positives.

Compare the output of the NANOR^R-type LANR component to the thermal (ohmic) control. As can be seen, this semiquantitative calorimetry, itself calibrated by thermal waveform reconstruction, was consistent with excess heat being produced only during energy transfer to the active NANOR^R-type LANR component. Notice that the active preloaded LANR quantum electronic component clearly shows significant improvement in thermal output compared to a standard ohmic control (a carbon composition resistor). The graph shows quite clearly demonstrated over unity thermal output power from the demonstration-power-level NANOR-type cold fusion (LANR) component, at least during the pre-avalanche period. It is clear that Fig. 5 demonstrates the excess heat from this component versus an ohmic control.

4.4. Optimum power gain found well below breakdown voltage

Figure 6 is a curve which presents the results of the same experiment, and which plots the incremental power gain of this two terminal NANOR^R-type component Series 7 component and the ohmic control. There is obvious that the incremental power gain for the CF/LANR component until the avalanche, at which time (count 3700) the component has no energy gain, but has a response similar to an ohmic resistor. This saliently demonstrates that outside of the CF/LANR active state, the component acts as any other ohmic resistor, and thus confirms that the calorimetry was calibrated, and verifies the excess heat yet an additional way.

4.5. Optimum power gain found well below breakdown voltage

In this experiment, we have for the first time obtained calorimetric data while scanning the applied electrical voltage in a series of levels, through the avalanche and then continuing on the other side of the avalanche (at even high applied

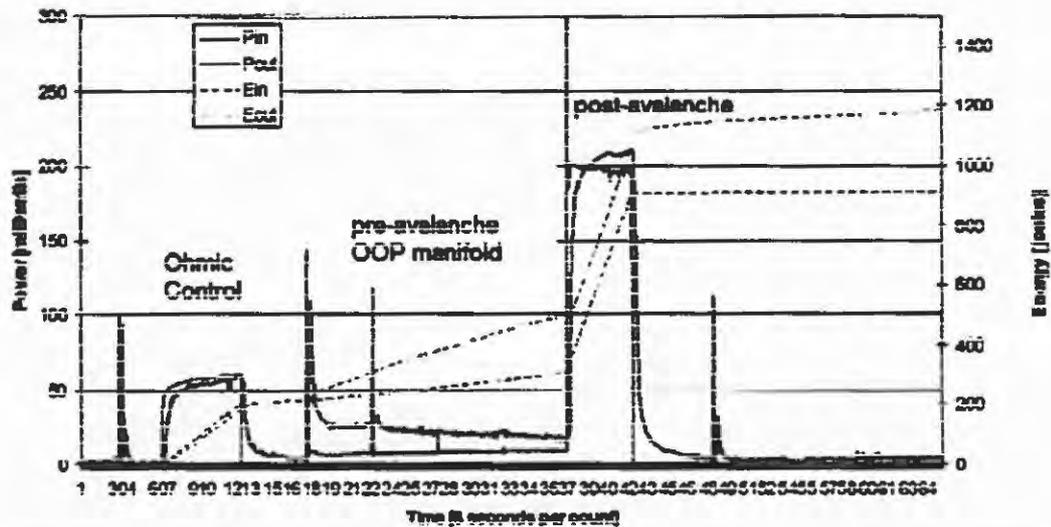


Figure 5. Four curves showing the input power and thermal power output, and their time integrals showing both excess heat and avalanche behavior, in a ZrO_2 -NiD NANOR[®]-type component.

voltages). Thus, we have semiquantitatively measured this drop in power gain on the way to the electrical avalanche, and the total loss of that power gain during the electrical avalanche which occurs even though higher voltage is applied.

Several things have been made clear from this experimentation. First, the optimal power gain of NANOR[®]-type cold fusion components is found far below the breakdown voltage. This investigation has revealed that the power gain decreases continuously as the electrical avalanche threshold is approached. Second, in fact, as the voltage which produces the electrical avalanche is approached, the power gain appears to monotonically decrease. Third, it is important to recognize the importance of our discovery of the fact that on the far side of the electrical avalanche, the power gain of the NANOR[®]-type component is essentially unity. Therefore, these discoveries have important implications. First, it indicates where to drive these systems for at maximum effective use. Second, it indicates a key (present) limitation of these over-unity CF/LANR components.

4.6. On other side of the avalanche, the NANOR[®]-type component acts "dead", providing yet an additional control

This investigation has revealed that, despite driving at higher input electrical power, on the other side of the electrical avalanche, these NANOR[®]-type components act as little more than electrical resistors which are conventional, not over-unity, and therefore are functionally "dead" with respect to producing excess heat. Although this appears limiting in some ways, this phenomena does provide yet an additional control to check calorimetry beyond the measurements involving simply using a simple ohmic, thermal control. Therefore, driving a component into this region thus adds an additional verification of the actual excess heat which is developed in these studies.

4.7. NiD can yield XSH

This result also demonstrates clear excess heat (XSH) can be obtained from a Ni-D nanomaterial system. This is consistent with the previously reported impact of D to the high impedance aqueous CF/LANR system [10].

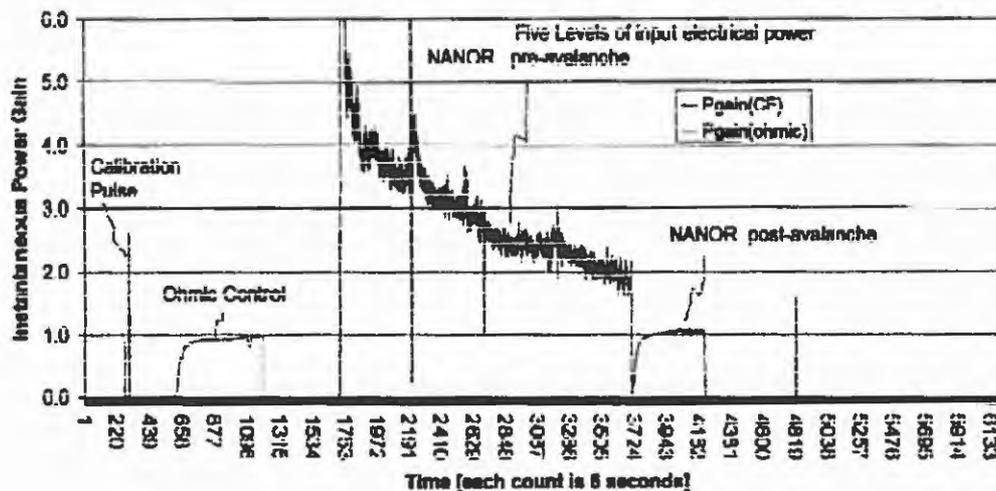


Figure 6. This graph presents the power gain of the ZrO_2 -NiD NANOR[®]-type component CF/LANR component as a function of time, and shows that the excess heat which is generated decreases with high input power, eventually reverting to normal, ordinary, resistor-like operation after the electrical avalanche.

Swartz et al. presented at ICCF-9, the addition of D does NOT poison the reaction in the aqueous Ni system (under low drive conditions) but actually increases the incremental power gain. Only in the long run and at higher input power does D damage the Ni system [10].

5. Conclusion

5.1. Future of clean, high performance energy production components

It is clear that these preloaded nanostructured NANOR[®]-type CF/LANR quantum electronic components are quite useful [1,11]. They have shown significant improvement over their predecessors, including the highly successful metamaterial PHUSOR[®]-type of LANR component. They comprise an effective very clean, highly efficient, energy production system which has worked successfully as a test bed for cold fusion experiments for years, and has enabled the way to higher instantaneous power gain, total energy gain, imaging [12], emissions [13], open demonstrations [2,11], and a better understanding of the impact of applied magnetic fields [7], electrical transconduction [1,4], and things that quench the desired reactions (as presented at ICCF17, ICCF18, and ICCF19). Therefore these dry, preloaded, ready-to-be-activated, NANOR[®]-type LANR components/systems/materials, if the input power levels can be increased, may be in the future of clean efficient energy production including in preassembled IC components and systems.

Acknowledgements

The authors would like to thank Jeff Tolleson, Alex Frank, Alan Weinberg, Richard Goldbaum, Allen Swartz, Brian Ahern, Jeff Driscoll, and Charles Entenmann for their suggestions and support. This effort was supported by JET Energy Inc. and New Energy Foundation. NANOR[®] and PHUSOR[®] are registered trademarks of JET Energy

Incorporated. NANOR[®]-technology, and PHUSOR[®]-technology are protected by U.S. Patents D596724, D413659 and several other patents pending.

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United States Court Of Appeals For The Federal Circuit

00 - 1107
(Serial No. 07/371,937)

IN RE MITCHELL R. SWARTZ

Appeal from the Board of Patent Appeals and Interferences
(No. 94-2921)

REPLY BRIEF

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June 15, 2000

Appx 221

1. Appellees' Brief has several errors of fact and law. This Reply Brief points to evidence in the record which disputes said fabrications presented in Appellees Brief. Only these errors are discussed herein. Pages are identified as Appellant's Brief (AB), Appendix(A), and Board Decision (D).

(3) BRIEF FACTUAL BACKGROUND

2. The invention at issue in this case is a method for monitoring a fuel located within ("loaded") a material, like a sponge fills with water. The method uses a vibration of the material. The invention [Appl. 07/371,937, A160-189] solves the long-standing problem of measuring the loading remotely and non-invasively - features of great utility. Claim 32 claims monitoring the material using at least one vibrational mode (natural frequency). The original disclosure taught the preferred embodiment, the vibrational cathode (A166-A167), monitoring subsystems (A168-A170), viscosity, damping, surface materials (A169), and coupling to a large mass. The equations of motion conform to known physics (A170-A173).

3. The claims of the present case are on pages A184. Proposed claims with the minor changes that the Examiner recommended pursuant to MPEP 707.07(j) and MPEP 706.03(d), but did not enter, are on pages A187-A190. The Board has presented nothing which differs or rebuts the teachings of the original specification and claims, the Declarations (A18,A44,A166-167,A18,A44), exhibits (A62-A80,A91,A109), or the fact that only two (2) sentences in the entire Decision (28 pages, A132-A159) pertain to the present invention.

(4) ERRORS OF FACT

Appellee's Errors About The Invention

4. Appellee's falsely state:

" Swartz's claims require cold fusion"

"the monitoring of the vibrations of the material must occur during the cold fusion process"

The Truth - Vibration Is Not "Fusion"

The case must read upon the original specification and claims. Instead, Appellee's Brief continues a deliberate inaccurate misreading of the claims, with substitution of the word "fusion" instead of "loading" and "vibration". "Fusion" cannot be confused with "vibration" or "loading" based on any honest reading of the definitions in any dictionary.

5. Appellee's falsely state:

"Throughout prosecution, Swartz argued that his claims require cold fusion. For example, Swartz stated that his invention "could be used to monitor said fusion reaction(s) occurring at either electrode."

The Truth - "Fusion" Is Not Required For The Method To Monitor Vibration

Fusion is not required for the present invention nor did Appellant claim such. Instead, the method to monitor a material is useful in several fields.

Consistent with this, Nagumo's second sentence, contradicting the first, reveals his lack of truth. Webster's dictionary clarifies this:

"require" - to demand as necessary or essential

"could" - an alternative to *can* suggesting less force or certainty, am able

6. Appellee's falsely state:

"...the specification does not give explicit definitions of the three critical terms, "isotopic fuel," "material," or "products from an isotopic fuel,"

"The only "material" disclosed in the specification is a palladium electrode"

The Truth - "Isotope", "Fuel", "Material," And "Products" Are Well-Understood

The words "material", "isotope", and "fuel" were defined. The fuel is hydrogen in one of its two isotopic forms, and the material is palladium or nickel. The words are well-known and were fully-discussed in the original specification and the other cited materials. Appellant's several cases before the Board can **"incorporate by reference subject matter disclosed in another patent application which is pending before the Patent Office and hence unavailable to the public"** [In re Jolles].

Furthermore, the Office properly used these words for more than a decade, consistent with Webster's dictionary. Furthermore, Mr. Nagumo argument is contradicted by his second sentence.

7. Appellee's falsely state:

"...the Board's decision is based on a thorough consideration of the evidence of record"

"The Board analyzed four references that Swartz submitted."

"he has failed to identify any document that would have made a difference"

The Truth - Board Failed To Consider Declarations

Appellee's Brief, like the Decision, ignores solid and clearly identified evidence in the record (A8,A12), including Declarations and almost four hundred references, which constitute a *bona fide* case. Said Declarations (A18, A44,A49,A62, A66,A72,A74,A77,A85) rebut false and inaccurate statements by the Office, and most importantly, included facts which demonstrate validation, operability, and utility of the Applicant's claimed subject matter as correctly taught

in the original specification and claims regarding said monitored vibrating electrode. Straus (A44-A48) and Swartz (A18-A43) contained factual statements directly addressing how the specification adequately described the subject matter recited in claim 32, and demonstrated that it operated as stated. They also herald that a person of ordinary skill in the art would have understood the inventor to have been in possession of the claimed invention at the time of filing. They set forth facts that should be admissible at trial.

8. Applicant came forward with this evidence from Declarants and affiants with "ordinary skill-in-the-art" including Rotegard(A75), Swartz(A18,A77), Bass(A62), Fox(A72), and Mallove(A66), Kurzweil(A80), Ahern(A78), and Miles(A79) as required [In re Oetiker], with statements supporting their introduction including full and explicit showing of good and sufficient reasons why they were not presented earlier. The Declarations were received (A12-A17). Some Declarations were "lost", misfiled, or otherwise not entered into the record (A82,A8).

9. Appellant's Declarations had relevant facts by probative witnesses who are authorities in their fields. By contrast, the Board has relied on "science" reporters, workers in fields competing for limited Federal funds, and those trying to sell their books on the the seque subject. The references cited in the Decision have not been sworn in, and are not directed to the present invention.

10. Appellant's declarations demonstrate that the method to monitor a vibrating material was correctly taught at the time Swartz filed his application. The Declarations have been substantively ignored (A8,A81,A91) despite two previous remand Orders requiring a reply to the Straus and Swartz Declarations (A81, A12-A17). Furthermore, Appellee's Brief takes the Declarations out-of-context

(Straus) and simply ignores that Office mislabeled them as "letters"(A1, analyzed A8-A11) and relegated them improperly to "opinion" [Mallove, A66; In re Alton].

Board Failed To Consider Evidence

11. Appellee's falsely state:

"most of the numerous technical references he supplied were published after his filing date."

"Swartz objects repeatedly to the alleged failure of the Board to consider certain documents, all of which were filed after the notice of appeal to the Board, and none of which had been before the examiner."

The Truth - Publications Confirmed Teachings Were Correct

Applicant supplied Exhibits, listed on appropriate forms, on September 27, 1991, June 1, 1992, March 1992, February 10, 1994, and April 24, 1994. The exhibits were used as evidence of the state-of-art which existed as of the filing date. They also rebut false statements by the Office (later Board). The post-filing references establish that, as of the filing date, one of skill-in-the-art could use a method to monitor a vibrating electrode without undue experimentation. Vibrational modes of a material are not "incredible" (A144) but can be elicited when using the teaching of the original specification and claims. Vibrations are not unproven "theory" (A153) as the Decision purports, but those skilled-in-the-art describe them out as a function of frequency and time. Said Exhibits reached the Office (A8-A11). Some were misplaced -and all substantively ignored (A1-A11, A109-A117) because they rebut all of Appellee's statements (A109) [In re Gazave; In re Chilowsky; In re Jolles].

12. Appellee's falsely state:

"All claims on appeal are indefinite."

The Truth - Claims Were Provided By The Examiner And Are Definite

Mr. Nagumo is not fully truthful because the Board failed to address this issue under Appeal (A85-A90, A124-131) and because the claims were suggested by

the Examiner pursuant to execution of MPEP 707.07(j) and MPEP 706.03(d) following a duly-served request [an issue pursuant 1.192c(6)(v), ignored by the Board].

Appellant gave substantive arguments for entry including specific and substantial arguments against the rejection. It is unfair for the Office to deny entry of Amendments (A187) suggested by the Examiner, when said amendments added neither new matter nor issues, and could not have been offered before the receipt of suggestions pursuant to MPEP 707.07(j) and 706.03(d), and which responded to, and adopted, each suggestion offered by the Examiner (A85-A90, A124-131, also A83-A84). As Dr. Valone has stated,

"the suggestion of the examiner to add language ... in order to overcome the rejection under 35 USC 112 second paragraph and then following with a refusal to enter the exact language suggested ... amounts to not dealing honestly with the appellant and not the type of behavior that is normally endorsed by the Patent Office"

13. It is outrageous and egregious to deny Appellant equal protection for good-faith execution of MPEP 707.07(j) and MPEP 706.03(d).

14. Appellee's falsely state:

"Swartz filed a second appeal brief on November 28, 1992...The examiner ... maintained the rejection"

The Truth - Appellant Did Respond

Mr. Nagumo is incorrect. A second "first" Appeal Brief was filed November 28, 1992, to correct a minor disputed typographical issue (A124-131). Applicant filed a Supplementary Appeal Brief on January 21, 1993 (A85-A90) correcting errors of the Office. Applicant filed a Supplemental Appeal Brief on September 30, 1993. A Reply Brief was filed on February 10, 1994. A Second Reply Brief was filed March 24, 1994. A Third Reply Brief was filed on October 13, 1998. These demonstrated how the original specification and claims were in full

compliance with 35U.S.C. §112 and §101 but none of these Briefs, or any substantively, are addressed.

The Appellee's Brief ignore that forty-three (43) pleadings, Declarations, and letters sent by the Appellant were not recorded, and Declarations have been incorrectly listed as "letters". It also ignores that six (6) pleadings of, or communications by, the Office were not sent to the Appellant. No explanation is given for the eighteen (18) Office's entries out-of-order temporally, indicating that the purported "Docket" was not made contemporaneously [Appendix A1-A7 (corrected A8-A11, proof A12-A17)] and in defiance of the Office's date stamps (A12) and in violation of 18U.S.C.2071. The Court must uphold federal law regarding honesty and integrity of records, hold Appellee's accountable for the inaccurate and non-contemporaneous records and capricious behavior.

15. Appellee's falsely state:

"The examiner refused entry of the amendments, ...because the amendments raised new issues, and the issue of new matter"

The Truth -There Were No New Issues

The Office unfairly denied entry of minor amendments suggested by the Examiner, even though they were minor and added neither new matter nor issues, and -- most importantly -- could not have been offered before the receipt of said suggestions pursuant to MPEP 707.07(j) and 706.03(d) [A124-A131].

Most importantly, it is false for the Office to state "deuterons" (an isotope of hydrogen) is new material when the entire original specification and claims involved deuterons and deuterium loaded into palladium in the preferred embodiment.

The suggestion of the examiner to add language to the claims in order to overcome the rejection under 35 USC 112 second paragraph and then following with a refusal to enter the exact language suggested because of a "new matter" or "new issue" accusation amounts to not dealing honestly with the appellant. Nor is

it the type of behavior that is normally endorsed by the Patent Office, consistent with the US Constitution, or complying with the "help our customers to get patents" motto of the Office.

16. Appellee's falsely state:

"Swartz did not argue the rejections of claims 32-43 separately"

The Truth - Claims Were Argued Separately

Applicant stated that all claims do not stand or fall together with claim 32 (A119-A123). Applicant not only discussed the content of the dependent claims, he also argued their merits separately from those of independent claim 32. [In re Kaslow].

APPELLEE'S ERRORS ABOUT THE OTHER ART

17. Appellee's falsely state:

"no references that satisfactorily rebut Lewis, Albagli, Ewing, Cooke, or Huizenga"

"... have failed to verify or reproduce cold fusion ..."

The Truth - Although Not Relevant To A Method Of Monitoring, Cold Fusion Exists

Appellee's arguments about cold fusion and "excess heat" (D12-26) remain irrelevant and immaterial because claim 32 is not about cold fusion, nuclear fusion, or "excess heat." Appellee rejects the present invention by misreading a monitored vibrating electrode for "cold fusion" and "excess heat". These arguments are, as Dr. Valone has stated,

"an effort at obfuscation based on the prevailing Patent Office management attitude toward any reference to 'cold fusion.'"

The specification of the present invention -a method to monitor a vibrating electrode - presented specific direction and guidance how to achieve the claimed results with relevant disclosures as to the claimed results. Rather than respond,

Appellee's Brief continues total reference to other art (FP). This is a deception with the Appellee's counsel arguing a different invention and different issue solely cut of a cloth not composed of the present specification and claims. Appellee's arguments are the segue to gratuitous criticism against Applicant - based upon the work and activities of others, specifically Dr. Fleischmann and Pons (FP). However, Applicant cited FP because their electrode, and the present invention, use palladium, and because Applicant thought that it was appropriate to cite all prior art.

18. Furthermore, Appellees irrelevant and immaterial comments are not accurate. Lewis, Albagli, Ewing, Cooke, and Huizenga have been totally rebutted [*vide infra*]. Specifically, the Declarations and Exhibits concerning the scientific field of low energy nuclear reactions are ignored including the reports Appellant submitted from DARPA, SRI, US Navy [China Lake, CA, and elsewhere], Los Alamos, U.S. Electric Power Research Institute, NASA, and the French Atomic Energy Agency and even the Board's own witnesses (A57-A61, A109-A117). Sixty seven references, 140 pounds of submitted materials (A118,A109) exceed by any test the amount of evidence required for proof of utility [In re Gazave; In re Chilowsky; In re Jolles].

The Harwell experiment (Cooke) cited did have excess heat, several times, and ONLY in the D₂O cell which was in electrical series with the H₂O cell which had NO such heat bursts [M. Melich, W.N. Hansen, "Some Lessons from 3 Years of Electrochemical Calorimetry", Proceedings of the "Fourth International Conference on Cold Fusion" Maui, sponsored by EPRI and the Office of Naval Research, December (1993). Instead of actually following up on the literature, with Appellee's Brief there is NO discussion of why the data showed excess heat bursts ONLY in the D₂O cell which was in electrical series with the H₂O cell (and

which showed no excess heat bursts), thereby confirming the Fleischmann Pons effect.

Appellee's Brief ignores nuclear emission and product data have been found consistent with a nuclear origin. Low energy xrays, detected by Dr. S. Szpak (USN), can be seen at

<http://world.std.com/~mica/cft61.gif> (lower right).

Other nuclear reaction signatures can be seen at

<http://world.std.com/~mica/cft43.gif> (lower right),

<http://world.std.com/~mica/cft53.gif> (lower right), and

<http://world.std.com/~mica/cft52.gif> (lower right).

Appellee's Brief ignores that Dr. Miles [USN] has challenged critics of this field to rebut the USNavy data.

"I challenge the critics to find any errors in the report of anomalous radiation by Szpak, Mosier-Boss and Smith in Physics Letters A, 1996, Vol.210, pp. 382-390. The measurements of helium were performed at three different laboratories that certainly knew how to distinguish helium from deuterium. In fact, each laboratory separated the deuterium from the helium prior to the gas entering the mass spectrometer. How does any critic propose to explain the fact that 30 out of 33 of our heat and helium studies yielded either excess helium when excess power was measured or no excess helium when no excess power was present. The probability of obtaining this result by random errors is about one in a million."

[Dr. Melvin H. Miles, 15 Dec 1998]

19. Appellee's Brief ignores the evidence in the record and the Office's own sterling witnesses [Drs. Rehn (US Navy) and Will]. So serious was Dr. Will's

comment, and his tritium contribution [*J. Electroanal. Chem.*, 360 (1993), 161-176], that his final report stated

"Over 100 groups from more than 12 countries have now reported on various types of evidence for the occurrence of nuclear reactions in deuterium-loaded metals or compounds. This includes evidence for excess heat, tritium, neutrons, x-rays or gamma rays, helium or charged particles."

[F. Will; Final Report National Cold Fusion Inst.(1991)],

Regarding the three volume contribution (of thickness 5 centimeters) which was edited by Dr. Will, and demeaned by Mr. Nagumo who falsely claimed:

"Will, (SA102-132), is not a scientific evaluation of cold fusion because it lacks the details necessary for appropriate review by the scientific community",

the PTO must admit that details have been given, and that progress in this field, cited by Appellee's own witnesses (Drs. Will and Rehn) [In re Ferens; In re Oberwener], continues.

As to the issue of "reproducibility", Appellees remain also incorrect. Meteorology, the studies of earthquakes and medicine and other fields have technologies and sciences but they are not totally (if at all) reproducible.

These exhibits and facts demonstrate the Board is wrong and absolutely and substantively rebut the Decision regarding this less relevant matter. Furthermore, Appellant has taught why said reactions are difficult to achieve -- due to inadequate loading (A18, AB-Figure 2) and failure to match input power levels (AB-Figure 3).

Therefore, the method of monitoring --as taught in the original specification and claims-- is of great utility. Nothing the Board has presented differs or rebuts either this fact or anything else in the original specification and claims (A99-A104).

20. Appellee's falsely state:

"Phase II was considerably more sophisticated,...with calorimetric sensitivities as much as ten million (10^7) higher than Fleischmann and Pons."

"neither Swartz '92 nor Noninski presents any data, let alone independent data of quality comparable to that of Albagli, to validate their criticisms."

The Truth - The Calorimetric Sensitivity Was Less

In fact, there were many rebuttals. The strongest evidence against PFC Phase-II is the original data of Albagli *et alia* (Figure 1). Also, heralding the disingenuousness of these statements, Appellees state, *"(Swartz and Noninski) provide alternative analyses of data presented by Albagli, who showed cold fusion does not work."*

21. This is the one of the few places in Appellee's Brief that there is any quantitation, yet it is wrong by a factor of more than ten million. Despite Mr. Nagumo's false statement to the Court, in the May 1992 PFC Appendix, the PFC claimed its "systematic" errors were 100 to 400 milliwatts [implying an insensitivity of >30 kilojoules]. For comparison, the claimed power (excess heat) for cold fusion was in the range of 40 milliwatts (mW).

To influence the Court, Mr. Nagumo willingly, knowingly, and odiously lies to the Court purporting that the PFC sensitivity was nanowatts, yet in fact, the PFC-II sensitivity, admitted by the PFC, was less than most skilled-in-the-art in calorimetry and was less than Dr. Fleischmann and Pons. Mr. Nagumo knowingly

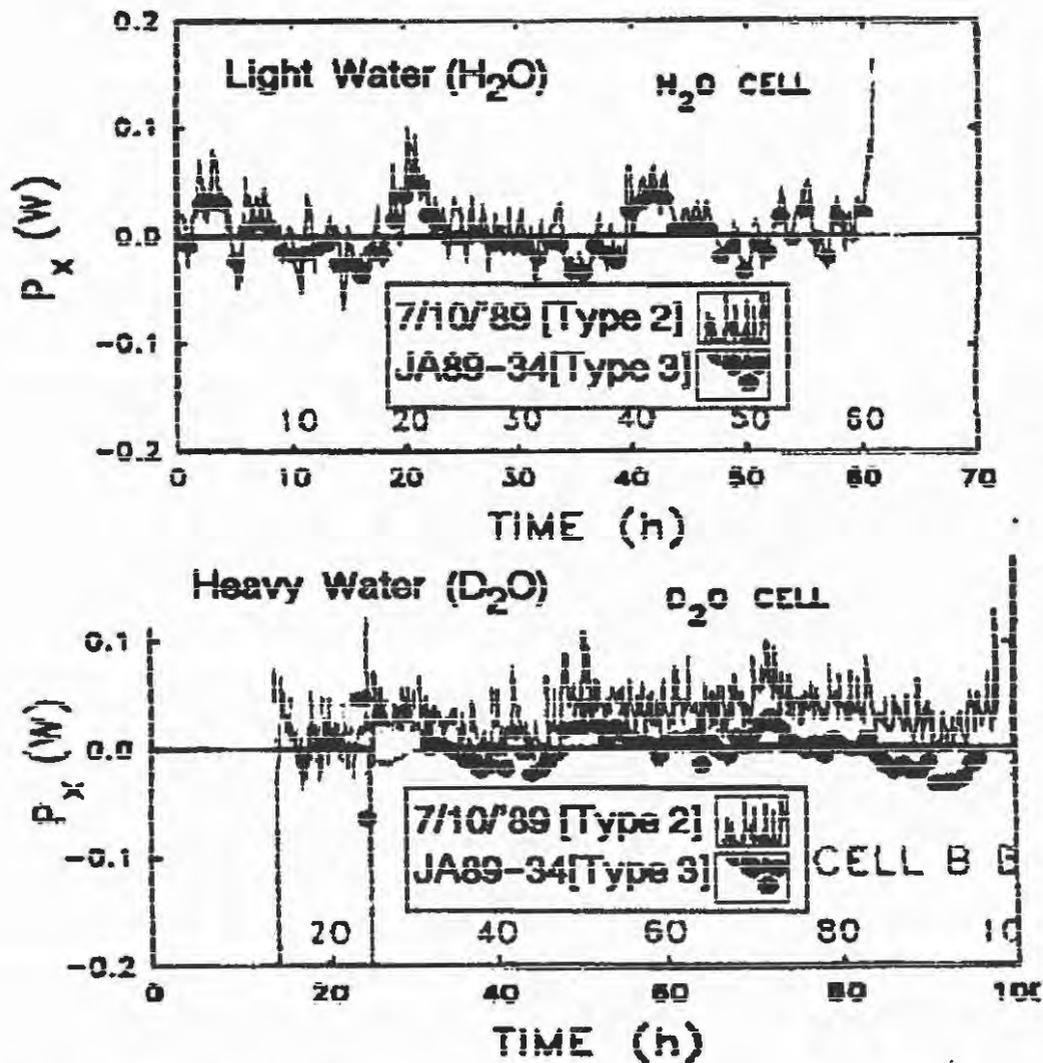


Figure 1 - These are matched sets of superimposed excess heat curves taken from the July 10, and 13, 1989 data of the MIT PFC Phase-II experiment [Albagli et al. (1989, 1990)] for light water (H_2O) and heavy water (D_2O). The upper two curves are the light water data (the control). The pair of curves below are for heavy water ("cell B").

For each paired set, shown are the actual original July 10, 1989 data (continuous thinner original curves in black) and the July 13th prepublication "averaged" data (blue dots; July 13, 1989 PFC Report JA-89-34).

and quantitatively misleads the Court here because the "*calorimetric sensitivities* (sic)" were not "*as much as ten million (10^7) higher than Fleischmann and Pons*", as Nagumo boasts, but were admitted by the PFC to be inadequate to have measured the expected signal ["too-insensitive-to-confirm"].

22. Attention is now directed to the fact that Mr. Nagumo cites known-fraudulent data. These materials have been in the hands of the Board and himself. Therefore, this is important at least three ways. First, the light water curve was published by the PFC essentially intact after a first baseline shift, whereas the heavy water curve was shifted twice, even though the cells were matched, and solvent loss would be expected to be greater for H_2O . What constitutes "data reduction" is sometimes but not always open to scientific or judicial debate.

The application of a low pass filter to an electrical signal or the cutting in half of a hologram properly constitute "data reduction", but the asymmetric shifting of one curve is probably not. The removal of the entire steady state signal is also not classical "data reduction." The paper should have clarified all "data" points and the methodology used and should have been more faithful to what was observed. Curve proliferation, volatile points, asymmetric curve shifts, and an impaired methodology have needlessly degraded the sensitivity, and believability, of the Phase-II calorimetry experiment to those that examine the data.

23. Second, the Phase-II methodology appears to have been flawed because it masks any constant [steady-state] excess enthalpy. When the original data is examined, the mean power excess was in the range of ~15-64 milliwatts, qualitatively similar to the value which had been expected for a "successful" experiment. The time of turn-on of excess heat is also close to what was the expected time.

24. Third, much current skepticism of the cold fusion phenomenon has been created by the PFC-II's report of "failure-to-reproduce", but it's later claim that it was "too-insensitive-to-confirm" should have been taken with similar seriousness. The flawed experiments, and the Patent Office's eternal, odious, and utter reliance on the altered curves is most dispicable because it was shown to the Office to be fraud years ago.

(7) ERRORS OF OMISSION

25. Appellees' Brief simply ignores the important matters listed at the top of Table 1 and substitutes the irrelevant matters listed at the bottom. Only by misreading the claims (Table 1, Table 2) describing 'a method to monitor a vibrating material' and by ignoring experimental evidence and inaccurately attacking other's art, does Appellee make the improper, illogical, and inaccurate, misstatement that the utility of this invention is "incredible" or that it purportedly requires 'cold fusion'.

TABLE 1 - APPELLEES ERRORS OF OMISSION
United States Court Of Appeals For The Federal Circuit
 00 - 1107

Appellees' Brief ignores:

<input checked="" type="checkbox"/>	The words "excess heat" do not even appear in the original specification or claims.
<input checked="" type="checkbox"/>	Declarations have been lost, ignored, and listed as "letters" (A1-A11).
<input checked="" type="checkbox"/>	The Board directed the Examiner to answer the Declarations (A81) pursuant to MPEP §1211.
<input checked="" type="checkbox"/>	Documents were not recorded on the official docket, which the office's date stamp indelibly proves that the office had received [violation of 18 U.S.C. 2071]
<input checked="" type="checkbox"/>	Fourty-three (43) of Appellant's pleadings/Declarations were not recorded (A82).
<input checked="" type="checkbox"/>	Six (6) pleadings of the Office were <u>not</u> sent to the Appellant
<input checked="" type="checkbox"/>	Eighteen (18) of the Office's entries are out of order temporally, non-contemporaneous "docket" [Appendix A1-A7 (corrected A8-A11, proof A12-A17)]
<input checked="" type="checkbox"/>	Energy is a major financial sector of the US economy, with great utility for energy-related inventions
<input checked="" type="checkbox"/>	Dr. Ahern has supplied A79, but is ignored, as were Patterson and Ahern patents

**TABLE 2 -
APPELLEE'S RATE OF WORD USE IN APPELLEE'S BRIEF
United States Court Of Appeals For The Federal Circuit
00 - 1107**

Word(s) Relevant to This Appeal	Number of times in Appellee's Brief	Relevance
spectrum	0	Method of Monitoring a Mode of Vibration
loading	4	Reason for Method of Monitoring
fast fourier transform	0	Method of Monitoring Modes of Vibration
Patterson	0	Received cold fusion Patent from Appellee
Ahern	0	Received cold fusion Patent from Appellee
US Navy	0	Laboratory Confirmed Cold fusion.
conference	2	International Meetings, with scientists publishing 4000 papers.
Constitution	0	Authority of Congress to Create Patent Office
docket	0	Appellee's has been chaotic, with errors; all simply ignored
Word(s) Much Relevant		
cold fusion	108	Seque to Attack on Appellant. Not in Claims or required for invention.
excess heat	10	Not even mentioned in the Application.
neutrons	6	Irrelevant to Invention; used in Seque Attack.
tritium	6	Irrelevant to Invention; used in Seque Attack.

(9) SUMMARY

50. The Decision should read on the original specification and claims, and respond to the Declarations (A18,A44,A49,A62,A66,A72, A74,A77,A85) and supporting Exhibits (A109-A117). Instead, it is directed events and the art of others rather than claims 32-43. Appellees have utterly failed to present a meritorious defense, responding instead with errors (*vide supra*) and more irrelevant material.

51. Applicant demonstrated a method to monitor a material loaded with an isotope of hydrogen, using a vibration. The original specification and claims 32-43 have taught the subject matter defined by each of the rejected claims, and have set forth the best mode contemplated, and thus there is compliance with 35U.S.C. §112 regarding operability. The claims distinctly point out and claim the subject matter which constitutes the invention, so there has been compliance with 35U.S.C. §112, second paragraph.

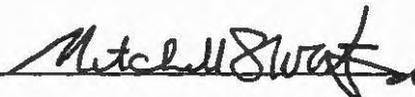
52. It was unfair for the Office to deny entry of Amendments (A187) suggested by the Examiner, when they added neither new matter nor issues, and could not have been offered before the receipt of suggestions pursuant to MPEP 707.07(j) and 706.03(d).

56. Claims 32-43 clearly define subject matter of considerable utility heralding conformity with the requirements of §101 of the Patent Act. Neither the Examiner nor the Decision has produced any evidence to the contrary. Furthermore, Appellee's Brief should be given little or no weight in light of Appellee's misstatements and irrelevant material.

53. There may be inadequacies and a lack of normal attorney eloquence in this Brief, but the Appellant *pro se* is entitled to less stringent standards [U.S. Rep, 404, 520-521 (1972)].

54. This honorable Court should reverse the Decision's affirmation of the Examiner's rejections of claims 32 through 43 which stand rejected under 35U.S.C. §112 and U.S.C. §101 of the Patent Act; and order entry pursuant MPEP 707.07(j) and 706.03(d), and order any other relief as the Court deems just, proper, fair and equitable.

Respectfully submitted,
June 15, 2000



Dr. Mitchell Swartz, Appellant, *pro se*

P.O. Box 81135

Wellesley Hills, MA 02481

(10) CERTIFICATE OF SERVICE (Rule 25 (D))

Appellant certifies that he has complied with Rule 25 (d). Appellant mailed two (2) copies of the above first class prepaid to Appellee's counsel, Attorney Mark Nagumo, Associate Solicitor, 2121 Crystal Drive, P.O. Box 15667, Arlington, Virginia, 22215, this June 16, 2000.


Mitchell R. Swartz

(11) CERTIFICATE OF COMPLIANCE (Rule 32 (A) 7)

Appellant certifies that he has complied with Rule 32 (A) 7, and that there are 6,948 words in the Reply Brief.


Mitchell R. Swartz

(12) CERTIFICATE OF MAILING

To Whom it Does Concern:

Appellant hereby certifies that this Reply Brief (twelve copies as directed), has been deposited with the United States Postal Service by First Class Mail, postage prepaid, in an envelope addressed to

"Clerk, U.S. Court of Appeals for the Federal Circuit
717 Madison Pl., NW

Washington, DC 20439" on the date below. Thank you. June 16, 2000



**United States Court Of Appeals
For the Federal Circuit**

02 - 1240
(Serial No.: 08-406,457)

IN RE MITCHELL R. SWARTZ

Appeal from the Board of Patent Appeals and Interferences
(No. 98-2593)

REPLY BRIEF

Dr. Mitchell Swartz, pro se
P.O Box 81135
Wellesley Hills, MA 02481

July 15, 2002

Appx 241

(7) Statement Of The Case Involving Reply Brief

1. The Appellee's Brief contains both contradictory statements and some important relevant admissions. This Reply Brief addresses the Appellees new arguments and misstatements.

References herein to the Appellant's Appendix are labeled as "A" (e.g. A45).

(8) Statement Of Facts With References (Rule 28(E))

FALSE STATEMENTS REGARDING THE '457 SPECIFICATION

Have The Appellees Addressed The Decision's Failure To Describe The Written Description Of '457?

2. The Decision and Appellee's Brief ignore the present invention ('457) which teaches a novel calorimeter (heat-measuring instrument) used to examine metal samples or thermal controls regarding the heat which they produce off when electricity is driven through them [A183 in '457, A72 in Swartz(97), A178; also A193-195, and A261-268].

Despite the standards of review, nothing in the Decision, and only one sentence in the Appellee's Brief substantively and accurately discusses the present invention.

"Among other things, the specification describes a multi-ring calorimeter that allegedly 'enables the possibility of an accurate and precise characterization of a sample of a material, including whether said sample is capable of excess heat and under which conditions.'(A159.)"

[Appellee's Brief]

Except for this brief admission, the Appellee's Brief ignores the present invention despite that the Office admitted to what the invention is (A193-195).

Have The Appellees Addressed The Fact That Temperature, Voltage, Etc. Were Specified And Discussed In The Original Specification?

3. The Appellees falsely state:

"... the Board found,... "there is no... disclosure... of a specific operative embodiment... , including ... size, . purity ...pressure, temperature, voltage,"

[Appellee's Brief]

The Truth - Operability Was Taught With Precision And Accuracy

This new argument is false because the flawed Decision merely rubber-stamped the Office's previous false statement. As discussed in the Appeal Brief on pages 16-17, both are contradicted absolutely by the record [Table 3 (A147)] because they were thoroughly discussed in the original specification. The Office is disingenuous about temperature, voltage, purity of signal (thermal noise), and calorimeter size including specific heat (CZ12), mass (MZ12), and effective thermal admittance [Y12].

Have The Appellees Addressed The Fact That The Measurement Of Heat Generation ('Activity') Is Attainable?

4. The Appellees falsely state:

"The only "thermal response" is that due to excess heat"

"'Activity,' as used in the specification, is correlated to the ability to achieve cold fusion."

[Appellee's Brief]

Truth - Heat Production ['Activity'] Is Measured

Appellees' new argument about activity and heat measurement is totally false. The Appellees Brief, like the Decision, simply ignores that '457 measures heat production of a sample ("activity") [A261-A268, A193-195]. In '457, the heat given off of metal samples or resistor controls, as each are driven by electrical current, is carefully monitored over time. "Activity" is defined in the present original specification as the ratio of the output heat power given off by the sample compared to the electrical input power delivered. Such heat-generating activity is used to characterize the metal samples. Figure 2 [A184 in the original specification and claims, and A76 in Swartz(97)] shows the heat output, or "activity", of several samples and controls.

Is Hydrogen The Only Fuel?

5. The Appellees falsely state:

"The only "isotopic fuel" identified in the specification is 'deuterons'"

The Truth - The Specification Specified Hydrogen, With Deuterons As Required By The Office

Appellees' new argument about deuterons being the "only" fuel is false. The specification is clear on this and shows the Office is disingenuous. Furthermore, the Office knows their claim is fictitious because they know that heat is created by loading palladium with hydrogen, and that there even was a cigarette-lighter invention since 1923 by Doebereiner.

Have The Appellees Been Truthful About The Graph?

6. The Appellees falsely state;

"... listing "volts, milliamperes" on Y-axis of graph, but failing to specify whether numerical values on Y-axis correspond to voltage or current"

[Appellee's Brief]

The Truth - The Axis Were Labeled

This new argument is false because the figure shows a key which shows curves for both current and voltage and both are numerically correct on the axis. The Office is disingenuous about the graph and the comments in the specification which clearly explained this.

Is Excess Heat Needed?

7. The Appellees falsely state:

"... the only product... in the specification were "cold fusion" reactions (A 123)"

[Appellee's Brief]

The Truth - The Invention Does Not Require Excess Heat Or Fusion

It is important to note that hidden in Appellee's Brief and the record are admissions proving Appellees are disingenuous again.

The invention tests ordinary materials and electrical resistors which never generate excess heat [A225-A231,A264-268,A335-339].

The invention works for the controls, and it works for all metals including those that do not ever generate cold fusion. The Office knows this because the data was sent to them with the original specification [A193-195].

It is only by calling the present invention "cold fusion" instead of a novel multiring calorimeter and method to measure heat producing activity, that the Office can purport that the heat measurement is "an 'unattainable result' and continue the unfounded attack on the Appellant by the deliberate misreading of specification and claims as their segue to much less relevant art ("FP" for Drs. Fleischmann and Pons). As shown in Table 4(A444), the appealed Decision discusses '457 precisely zero (0) times but refers to "cold fusion" eighty-six (86) times. ****1

****1 - Despite the attack on the Applicant for daring to study calorimetry which he has used successfully during surgical transplants of human organs and the irradiation of human tumors by ionizing radiation, the measurement of heat producing activity is attainable, and has been done in '457.

apparently do occur in deuterium-loaded Pd, Ti, and probably in other solids." [Office of Naval Research Asian Office, NAVSO P-3580, Vol. 18, Jan. 1993].

The Appellee's own witness, Dr. Will said, "Significant positive results have been obtained (by) 100 groups from more than 12 countries" [Final Report NCFI (1991)].

Have The Appellees Addressed The Fact That The Written Description Is Consistent With Enablement?

Have The Appellees Addressed Swartz(97) Demonstrating Enablement, Or The Fact That None Of The Eleven (11) Submitted Copies Of Swartz(97) Is Docketed?

18. The Appellees falsely state:

"The present record contains numerous scientific papers and nontechnical reports of attempts to reproduce cold fusion. (See, e.g., A103-11, listing references considered by the Board, and A19-27, listing references submitted by Swartz.)"

"...Swartz fails to explain how any of these documents [Fusion Technology 1997, and declarations] would have enabled a person with ordinary skill in the art to cause cold fusion to occur."

"The Board specifically reviewed Swartz's 1997 Fusion Technology article and found that apart from conclusory statements that the article proves Swartz to be correct, Swartz "has failed to explain how the article is relevant to the claimed subject matter here on appeal." (5A7.)"

[Appellee's Brief]

The Truth - Appellant Explained Peer-Reviewed Swartz (97) Proves Utility And Operability And Demonstrates Enablement

In the Office's failed and new arguments, the invention is misdescribed, as following facts are not discussed.

The Applicant came forward with solid substantial, and timely, evidence of operativeness and utility including Swartz(97) [A71, Swartz. M., 1997, Fusion Technology, 31, 63-74, hereafter "Swartz(97)"]; A71, but also see A83, A90).

Swartz(97) [data, figures, graphs, and equations] is identical to what was taught in the original specification and claims on the date of the original filing. The preprint was included with the original specification. Swartz(97) proves that the present invention was operable at the time it was filed, and demonstrates validation.

Swartz(97), listed on several Forms 1440 (A14,A10-A13), was accompanied by Declarations declaring the Office was wrong and introducing the evidence, and explained how the article was relevant because it represented additional peer-reviewed substantial evidence supporting that, as of the March 20, 1995 filing date, a person with ordinary skill in the art would have been able to produce the multiring calorimeter and measure sample activity [A230-231,A258-259,A295-296, A301-303,A314-315,A335-336].

Applicant submitted Swartz(97) to the Office eleven (11) times [A10-A13, Table 1 (A18)] in the expectation that it would be recorded, read and honestly considered and discussed. Instead, it was substantively ignored and repeatedly removed from the file [A197,A240,A323-325,A327-A330,A339]. Furthermore, Swartz(97) is not listed on the Office's first Docket (A3) or the revised second Docket (A6), nor is it listed --or substantively addressed-- in the Decision. In fact, the Office was Ordered to substantively respond to the key relevant issues (A145), but has not. One hypothesis is that this occurred because Swartz(97) is material and because comparison of it [A71] with the original specification [A148] demonstrates that the invention was correctly taught in the original specification and claims on the filing date of the application [validation].

the hydrogen into a metal sample using a vibration of that sample [A345-347,A357], "cold fusion", too.

The Office, in this court [In re Swartz 00-1108], falsely called that invention, a two-step system to drive hydrogen diffusion in metals [A372-373,A387-388], "cold fusion", too. Like this case, the original specifications and claims were ignored.

This unconstitutional prejudice will happen again unless this court ensures that it does not.

Did Appellees Respond To The Scientific Criticism Of Their Position?

22. The Appellees falsely state:

"... those of skill in the arts of physics and chemistry have failed to verify or reproduce cold fusion..."

"Nor do any of the declarations explain why the scientific reports supporting cold fusion should be given more weight than the negative reports."

[Appellee's Brief]

The Truth - Negative Reports Were Explained

The Truth - The Declarants Discussed This Invention

When the office fixated again on cold fusion, ~300 published scientific articles [over 140 pounds of Exhibits, Table 2, A19, A65, A70, A83, A92, A97, A392, A406, A415, A422, A428, A430, A430, A439, A442] including over 30 of the Applicant's own peer-reviewed papers (several published by the American Nuclear Society, Fusion Technology, such as A92, A90, A83,A392,A406,A439,A442) were submitted supporting Applicant [listed Table 2 (A19)] and demonstrating that the Office's notions are wrong. Important publications included Swartz(92), Swartz(94) and Swartz(99) [A92,A90,A83], Mallove pp246-248, Storms(90,93); Arata(90); Celani(90); Pons(90); Bockris(90); Szpak(91B); McKubre(91); Will(91,93,94),

The reasoning of the Supreme Court in United States v. Nixon (1974) that all are "equal under the law".

14th Amendment, requiring an impartial tribunal [28 U.S. Code Section 144, Mayberry v. Penna., 91 S.8.; Bloom v. Illinois, 88 Ct. 499 S.Ct. 1477; Duncan v. Louisiana, 88 S.Ct.1444] and equal protection. In the light of the unrebutted Declarations, "lost" submitted papers, and the corrupted docket, there are violations of the 14th Amendment's "equal protection" clause [Frontiero v. Richardson, 93 S.Ct. 1736, 411 U.S. 677; Weiss v. Weiss, 436 N.Y.S. 2d. 862, 52 N.Y. 2d. 170 (1981)] with serious implications [Gass v. Lopez, 95 S. Ct 729; Wood v. Strickland, 95 S Ct 9S2; U.S. v. Price, 86 S Ct 1152, 1157, Footnote 7; Griffin v. Breckenridge, 91 S Ct 179D; Gamez v. Toledo, 42 U.S.C.§1983, and Bivens v. Six Unknown Named Agents of Fed. Bureau of Narcotics].

(11) Short Conclusion Stating The Precise Relief Sought Summary Of The Arguments

29. The Applicant taught the subject matter defined by each of the rejected Claims 13-14, 21-22, and 24-39 (all pending claims) including how his apparatus and method works, set forth the best mode contemplated, distinctly pointed out and claimed the subject matter which constitutes the invention, wrote an adequate enabling disclosure, and thus complied and conformed with 35U.S.C.§112, first paragraph, of the Patent Act. The Claims clearly define subject matter of considerable utility because energy needs dominate the economy. Furthermore, measurement of heat producing activity of a sample has utility because many scientists of ordinary skill-in-the-art say it does.

30. The Decision has not discussed the invention as it was actually taught, but is cut of a cloth other than this invention which demonstrates that the Office's notions are quite weak, heralding the need for allowance of the present invention.

The Decision substantively ignored the unrebutted Declarants, skilled-in-the-art, who have disputed the Office and attest to conformation with 35U.S.C.§101.

The Decision substantively ignored Swartz(97) which demonstrates enablement at the time of the initial filing despite that validation only comes through peer-review. The preprint of Swartz(97) was included with the specification and is indelible proof that as of the filing date of this application, one of skill in the art could conduct this patent without undue experimentation (A136).

The Decision contains copious material misstatements, including those corrected by the Office's own witnesses.

The Decision ignores the standards of review and the Office's own rules.

WHEREFORE for the above reasons, including unrebutted Declarations and the peer-reviewed published paper [Swartz(97)], and because the Appellees are not entitled to dismiss this important patent application, relevant to energy measurement and US energy security, in their misdirected favor as a matter of law, the Appellant respectfully requests that the court reverse the examiner's rejections of claims 13-14, 21-22, and 24-39 (all claims) which stand rejected pursuant to 35 U.S.C. 112 and 35 U.S.C. 101 of the Patent Act as is just and reasonable, or remand the case back to the Office to address these matters of law and errors of fact cited herein.

Respectfully submitted,



Mitchell Swartz, Appellant, *pro se*
PO Box 81135
Wellesley Hills, MA 02481

IN THE MATTER OF ARBITRATION

Between

Patent Office Professional Association

FMCS Case No. 00-01666
Employee Termination

and

Robert T. Moore
Arbitrator

**US Department of Commerce,
Patent and Trademark Office**

DECISION AND AWARD
ON THE MERITS

Appearances:

For the Patent Office Professional Association (POPA or Union):

Raymond B. Johnson
David L. Robertson

POPA Representative
POPA Representative

For the US Patent and Trademark Office (Agency, Management or PTO):

William Way, Esq.

Associate Counsel, Office of
General Counsel, PTO

Issue Presented

The parties did not stipulate to an issue, and while the evidence raised important sub-issues which will be addressed, the principal issue is found to be:

Whether the Agency's removal of the grievant from federal service was "for such cause as will promote the efficiency of the service," as prescribed by 5 USC §7513 (a), and was otherwise in compliance with the laws, rules and regulations of the United States and provisions of the parties' Labor Agreement, and if not what should the remedy be?

Applicable Statutory and Labor Agreement Provisions

The statutory and Labor Agreement provisions of importance in this arbitration will be quoted where their relevance and their construction by the courts and the governing agencies charged with their enforcement are discussed.

Facts

General Background Facts: The US Patent and Trademark Office (PTO) is an agency within the US Department of Commerce responsible for granting patents and registering trademarks. The Patent side of the PTO is divided into Technical Centers which correspond to the nature of patent applications they examine. For example, a chemical-based patent application goes to one Technical Center while a mechanically-based application would go to another. Once in a Technical Center, the distinction between applications becomes yet more refined until a patent application is assigned to an "Art Unit," and then to an Examiner with specialized knowledge and experience in the primary "Class" and sub-class of the application.

The grievant was a Patent Examiner who began his PTO employment in July, 1996 at the GS 9 level. By education and training, he is an Electrical Engineer. At the time of his removal from service on August 30, 1999, he had advanced to GS 11. His responsibility had been to examine patent applications for devices and processes intended for various types of measuring and testing, which under the PTO Patent Classification System were designated as Art Unit 2858, Class 324 patent applications. Within this Class, the grievant's work was further limited to applications involving, as examples, an "internal combustion engine ignition system or device," or a "material property using thermoelectric phenomenon," or a device "using ionization effects."

Then, within each of these subclasses, such as the last, "a device or process for measuring or testing using ionization effects," the device or process would be further assigned to a sub-subclass such as "for monitoring pressure," with yet another breakdown into whether the monitoring was dependent on measuring fluctuations in the power emissions from (a) "a radioactive substance," (b) "thermionic emissions," (c) "a magnetic field," or still some other source. Altogether, the grievant was responsible for approximately 17 subclasses of Class 324 under each of which were as many as a score of very specific "method" and "purpose" subclasses based on the materials used, the means of making the measurements, or the objectives of the test.¹

¹ The identification of the grievant's assigned Art Unit or Group may be off the mark. The testimony and documented evidence is confusing when it comes to numerical, versus subject matter, unit designations. It appears that when some events in issue occurred, the Patent side of the PTO had an organizational structure based on "Work Groups," which at a point in time not firmly established in the

What is important is that no patent applications for which the grievant served as an examiner had anything to do with his non-official obsessions. Those obsessions are with alternative sources of energy relying on non-conventional theories which have generally gone unrecognized, or been flatly rejected, in the conventional scientific literature. The more controversial of the grievant's interests are in theories which defy the accepted laws of physics. Central among these, but certainly not his exclusive area of interest, was cold fusion.

The Cold Fusion Controversy: Up until 1989, the possibility of cold fusion was an acceptable scientific topic among physicists and others in the world of nuclear science. That acceptance received a setback in 1989 following the public announcement by two recognized and respected electro-chemists at the University of Utah that they had achieved fusion using a battery connected to palladium electrodes submerged in heavy water (water, the hydrogen component of which has been replaced by its isotope, deuterium). Since less energy was claimed to have been expended by the battery than the amount of energy produced, the realization of a device which could steadily (versus explosively) produce more energy (output) than the amount needed (input) in its production seemed to have been achieved.²

Scientists elsewhere immediately sought to duplicate this "table top" accomplishment of cold fusion, but with nary a replication. The simple formulation from Utah was a dud. The revolutionary announcement had been premature, and the importance of prior peer review was forever firmly associated with "scientific breakthroughs." It discredited all research into cold fusion and other non-conventional sources of energy, and pushed those who continued to pursue or support such ideas into the fringe or "kook" segments of physics and chemistry. More important, before the year 1989 was out, the US Department of Energy (DOE) pronounced cold fusion to be unworthy of further government financed research.

The grievant is a member of the fringe, though not personally experimenting with cold fusion or any other energy alternative. He is only an outside observer with strong

record, was changed to a structure based on "Technical Centers" and a whole new numbering system. Thus, the grievant is referred to in the record as being in Art Unit 2200 and at other points as being in 2858. That seems to reflect only a numerical change without a change in his duties or the nature of the patent applications he examined. To avoid confusion, the unit to which the grievant was assigned will be referred to as the "measurements group."

² If recollection serves, the claimed accomplishment was heralded in news media around the world for its promise of free energy. If true, it would unshackle the industrial nations from their dependence on fossil fuels and reverse the deforestation of the developing nations of sub-Sahara Africa and the Indian subcontinent. It appeared that the earth's environment would be saved and electricity would light every home in the poorest countries of the world. Its implications were just startling.

beliefs about the place cold fusion and other yet to be proven sources of energy have in the future mix of the world's electrical power production. However, he does not reject the Newtonian laws of physics as some in the fringe may appear to regularly do. Rather, it is his position that the presently ridiculed theories he champions, or at least believes are sufficiently promising to warrant more serious scientific inquiry, will eventually be found to be consistent with accepted axioms of physics and chemistry, but how that will be done, he insists, just has yet to be discovered. Still, this puts him at odds with most scientists in those two fields.

It also placed him at odds with the prevailing policy of the PTO. Currently, patent applications for alternative or non-conventional sources of nuclear fusion energy, including cold fusion, are routed to Examiner Harvey Behrend. This routing has been going on for more than 16 years pursuant to a June 5, 1989 memo to all Group Directors with the subject; Cold Fusion Applications. It reads:

Although the media attention relating to cold fusion has diminished, we are just now beginning to see a large number of applications relating to this subject. Although we are attempting to identify all of these applications in the pre-examination screening process, there is the possibility that a few applications may slip through without being identified. Please have your examiners be on the look out for any application that may relate to cold fusion. Some of the areas where a cold fusion application might be filed are:

Fuel Cells	class 429
Electrochemistry	class 204
Power plant	class 60
Radiant energy	class 250
Helium production	class 423

If one of your examiners should receive an application related to cold fusion, he or she should check to make sure the words "COLD FUSION" are stamped on the file wrapper. If not, the application should be referred to Licensing and Review [] for marking. Also, any action on one of these applications should be routed through the Group 220 Director's Office and the Office of the Assistant Commissioner for Patents prior to mailing.

The Agency's witnesses avoided directly answering the question of what explicit instructions were given Mr. Behrend and other examiners in the "fusion" group on how to handle applications for cold fusion patents. However, their testimony and demeanor when questioned were clear enough.

Figuratively speaking, Mr. Behrend has a "rejected" stamp he wields on patent applications which claim to achieve cold fusion. That is, whether well founded or not, the PTO has a bias against the concept and theories of cold fusion. Largely because they defy the Newtonian proposition that there is "no free energy" or "perpetual motion" within the bounds of physics, the PTO considers cold fusion to be "inoperable technology." The evidence of this will become more concrete shortly in connection with the grievant's pro-cold fusion activities.

As for those activities, the Agency did not claim in the Proposal to Remove that the grievant's belief in the possibility of "free energy" affected anything he did in accepting or rejecting patent applications assigned to him. Among other things, those applications had nothing to do non-conventional sources of power. All applications channeled to the measurement group depended on conventional sources of electrical, magnetic, and other energy.

The grievant's obsessions with alternative and scientifically controversial energy sources were no secret. And, they were an embarrassment to the PTO. Always as simply a private citizen in a Quixote crusade, he regularly resorted to the Internet and took advantage of public and private conferences and other gatherings where long term and future energy needs were on the agenda. By both means, he advocated greater public and private funding for research and experimentation in the fields of new or non-conventional energy, and sought recognition in the established scientific community of the legitimacy of those fields of research. Without that recognition, the prospects of either private sector investment or public funding were slim to the point of nonexistent. His principal soapbox was the Integrity Research Institute (IRI), a nonprofit organization which he formed and ran as its president with a handful of members and volunteers.

There were and are forces as adamantly opposed to accepting the viability of the principal areas of that research as the grievant is their advocate, especially when the subject is that of "cold fusion," a phrase often used here just as in the PTO memo, to embrace not only that idea, but the full spectrum of searches for free, or at least low cost, sources of energy. The main watchdog out to discredit the grievant and other, more prominent like-minded advocates, was Robert Park. He is the Communications Director of the American Physical Society, a respected association of mainline physicists. Mr. Park is also the author of the popular book, Voodoo Science, which with little mercy, debunks cold fusion and all other concepts of "free energy."

The Removal Proposal: The Removal Proposal was prepared by Sydney Rose, the PTO Labor Relations Specialists responsible for disciplinary matters. It was given to and signed by Margaret A. Focarino, the grievant's second or third line supervisor, on May 7, 1999 and charged the grievant as follows:

On March 9, 1999, you contacted the Department [of Commerce,] Office of Administrative Operations (OAO) by telephone. You spoke to Margaret House, Support Services Staff, and asked her about the procedures for reserving conference space for a private function. You were told that space was not usually reserved for private functions but that you could file a written request [with Telita Holloway?] which would be reviewed and considered. You called again and indicated that you come to the Department to meet with Telita Holloway that afternoon. At approximately 5:00 p.m. that afternoon, you met with Ms. Holloway and indicated that you were a PTO employee. For the next hour and a half, she showed you the Department's auditorium, lobby and various conference room. You never indicated to Ms. Holloway that you were considering reserving space at the Department for a private function to be run by the Integrity Research Institute. However, you reserved the auditorium, lobby and four conference rooms at the Department for April 29, 30 and May 1, 1999, on behalf of the PTO.

You posted information regarding a Conference on Future Energy on the Internet. The website indicated that [] the First International Conference on Future Energy (COFE) was 'in cooperation with the U.S. Dept. of Commerce.' The notice contained an electronic brochure form which indicated that the 'Integrity Research Institute under the auspices of the U.S. Department of Commerce at 14th and Constitution, Washington, DC, presents the first COFE in the main Auditorium. Lectures will extend from 9 AM to 5 PM daily and workshops on Saturday from 9 AM to 5 PM.' The posting indicated that the Saturday workshops would cost \$30.00 each, and there was a \$20.00 charge for videotapes and a \$30.00 charge for the book 'Proceedings of COFE'.

You posted a message on the Internet which indicated the following:

Interested in advanced energy technologies that won't produce global warming? Then don't miss attending the First International Conference on Future Energy, cosponsored by the U.S. Department of Commerce and Integrity Research Institute! . . .

The Conference was common knowledge in that Matthew Heyman, Public and Business Affairs, National Institute of Standards and Technology sent Richard Maulsby, PTO Public Affairs, an e-mail on March 22, 1999, in which he provided Mr. Maulsby with information about the conference and [the] promotional materials [] 'under the auspices of the U.S. Department of Commerce.'

of his misrepresentations that the DoC was a sponsor of the COFE, and that COFE was being presented under its auspices, as matters demanding discipline.

Up to now, the grievant and the Union have relied on the lack of any Agency evidence that he was the one that actually pressed the computer "enter" key that transmitted his handiwork into the ether of the world of the Internet. Unless he, with the guidance of his Union representatives, accepts responsibility for his misrepresentations and their dissemination, the prospects for his rehabilitation are dim.

On the other hand, only if the message of this Decision is lost on the grievant, he can prove himself a model of "rehabilitation," and return as a productive patent examiner. But, he must understand that message. The PTO is out to get him for his advocacy of cold fusion and will clobber him with a Removal Proposal which next time around, perhaps with guidance provided herein, it will be able to make stick. Screw up once more in publicly evidencing his advocacy of cold fusion which in its appearance implicates the DoC, PTO, or any other federal agency, the grievant should understand that his employment as a patent examiner is at an end.

Mitigating Circumstances. Guidelines for this factor traditionally call for consideration of "unusual job tensions, personality problems, mental impairment, harassment, or bad faith, malice or provocation on the part of others involved in the matter." Of these, "job tension" is a way of life for examiners, and while the PTO goal system might be viewed by outsiders as contributing to an "unusual" sweatshop atmosphere, there is no evidence that it had anything to do with the grievant's misconduct. There is evidence that the grievant has "personality problems" in his inability to accept responsibility for his actions and those of others which he sets in motion, but it is not a mitigating circumstance as much as it is an exasperating circumstance which the grievant must address, both to hold his PTO job as well as to be the effective voice of emerging technology he would like to be in his out-of-office activities.

There is also no evidence of a mental impairment which led to the grievant's misconduct. What there is evidence of is "harassment, or bad faith, malice or provocation on the part of others involved in the matter," and it came in bundles. The activities and motives of Bank and Zimmerman have been extensively recounted and explained, and with regard to the cancellation of grievant's State Department, Secretary's Open Forum presentation, deplorable. The malice shown by Bank in his solely economic driven campaign to block any of the nontraditional scientists from receiving recognition by any government agency as having an idea worthy of a slice of government R&D funding may be a point of pride within the APS. But to an outsider who champions free and open exploration of any scientific thought, no matter how far out on the fringe, his conduct is outrageous. The worth of a new idea is to be determined in the democratic and open arena of competing thoughts, and not blocked from the arena by the greedy

economic self-interest of those already in the limelight.

Seemingly lost on those with control over slicing the government pie who are persuaded by the relentless drumbeat of the Banks and Zimmermans, is that those questing for "free energy," whether through cold fusion or by way of some other "emerging technology," may be similar to the alchemists of centuries back who never turned base metals into gold, but were the forerunners of modern chemistry, got the Periodic Table of Elements off to a start, and among all things, discovered how to duplicate Asian porcelain which at the time was worth more than its weight in gold. So too, those in pursuit of "free energy" could well spinoff useful advances in knowledge while failing to achieve their "holy grail."

This gratuitous thought in passing leads to another. Clearly, the grievant was "bugged" by the PTO's 1989 Cold Fusion Memo, and because the bug is arguably justified, both the bug and the memo constitute mitigating circumstances. However, they they have little mitigating force. They are more like the PTO's goal system. The grievant must accept the Agency's policy as part of the "usual" job tensions of the PTO; for him, a like-it-or-leave situation.

Still, I was struck by the discomfort of Mr. Godici as he struggled to explain why the blanket exclusion of cold fusion remains in effect when during the intervening 16 years since its adoption, certainly some better understandings and approaches to cold fusion and its related technologies must have occurred which, ordinarily and but for the ban, would meet the new and useful criteria for a patent, or constitute what I'll call, a "non-obvious improvement of existing technology." Of course, this was not the exact question put to him, but it was the sum and substance of the "conversation" (more formally known as testimony) had about Mr. Behrend's role and his automatic REJECTED stamp.

None of Mr. Godici's answers was totally satisfactory, and the urge, not well restrained, to say, if not scream:

Hold it a minute! Isn't time to go back to the earlier days of the PTO when inventors had to produce working models of their devices? It can't it be an applicant's option, and while the days of obvious and easily visible confirmation of claim's have come and gone, the PTO has the National Institute of Standards and Technology to test and verify or reject claims of subtle, hard to grasp accomplishments. And, if the NIST lacks that capability, there are DoE and scores of DoD labs that in collaboration with the PTO could undertake the task.

This is not to suggest that the PTO open the floodgates to every kooky idea out

there, but rather that it loosen the apparently nondiscriminating, blanket nature of the 1989 memo, and that Mr. Behrend be allowed, or encouraged, to wield his stamp less frequently and more selectively.

Adequacy and Effectiveness of Alternative Sanctions. What has been said about the prospects for the grievant's rehabilitation largely addresses this factor, but there is an additional observation warranted here. For sure, the ultimate penalty of removal would deprive the Agency of a "fully satisfactory" performing examiner who regularly met his goals, and never let his private obsessions influence any official actions he took with regard to the patent applications assigned him for examination. That cannot be ignored, nor can the likelihood that the 30-day suspension, and the hardships of his last six years, many aspects of which cannot be undone solely with a 5 USC §5596 back pay recovery, will have and have had their chastening effects.

AWARD

For the above stated reasons, the grievant's removal was not for good cause nor in furtherance of the efficiency of the federal service, and must be mitigated. Thus:

1. The grievance is sustained in part and the removal of the grievant shall be mitigated and reduced to a 30 calendar day suspension without pay for the offense of Misrepresentation, with the 30 days already served, and the grievant immediately returned to his position as a patent examiner at an interim pay and with annual and sick leave accumulation levels no less the levels he held at the time of his removal. For no reason other than at the request of the grievant, shall his return to service be later than 30 days from the date of this Decision and Award, even if there are questions or disputes between the Agency and POPA which have not been resolved in accordance with the procedures set out below.
2. All reference to the removal shall be permanently expunged from the grievant's personnel file, to be replaced by a suspension of 30 calendar days without pay.
3. Because the grievant's removal was an unjustified or unwarranted personnel action which has resulted in the withdrawal of his pay, and any allowances or differentials, he is entitled to a recovery with interest, subject to such adjustments as the law allows for his interim earnings, of those withdrawals under 5 USC §5596, as well as to have all lost annual and sick leave restored. Subject to any determination to the contrary made in the course of the further proceedings provided for below, the grievant's 5 USC §5596 recovery shall be calculated on the basis of any and all promotions and grade step advancements to which he would have been entitled if his job performance and proficiency had continued at the same level for which he had been rated during the course of his employment with the PTO prior to his removal, all of which

shall be presumed.

RETAINED JURISDICTION

Jurisdiction of this arbitration is retained for the following purposes and in accordance with the schedules indicated:

1. Notification of the Grievant's Return to Service. Within 14 days of receipt of this Decision and Award, the Agency shall report the date of the grievant's return to service and the interim General Schedule (GS) pay grade and step level at which he resumes service. If the grievant has not been returned to service within 14 days of this Decision and Award, the Agency shall report the reason or reasons why not and the date set for his return and the interim GS pay and step level at which he will reenter federal service.

If the Union has any objection to the date and interim GS pay grade and step level set by the Agency, it and the Agency shall have 7 days from the date of the Agency's report to meet (which they are hereby ordered to do) and resolve their differences by agreement so that the grievant will be returned to service within 30 days of the date of entry of this Decision and Award.

Should those efforts fail or an agreement not yet be reached by the end of the 14 day period, the Union and the Agency shall separately file reports detailing their differences and advising whether I will have to intervene. If either report calls for my intervention, the party requesting that intervention shall arrange a conference call with the other party and me during which the disputed matters shall either be resolved on an interim or permanent basis, or after further proceedings are scheduled.

2. Determinations of Back Pay Recovery and Current Pay Grade and Job Title of the Grievant's Reinstatement, etc. Should the parties not have agreed to any aspect of the grievant's 5 USC §5596 recoveries within 60 days of the date of the Decision and Award, by the 61st day, they shall initiate a joint telephone conference call with me to set a hearing date on the open questions.

3. Protection of the Integrity of this Arbitration. It would appear that there were persons within the PTO who assisted the grievant in his efforts to obtain the use of the DoC facilities about whom the Agency was unaware before the hearing in this case. I expect nothing untoward to befall any of them, but that everyone involved in this case will place it behind them and get on with their lives and the collegial harmony for which the PTO is justly known.

If my expectations prove wrong, be assured I will take all such actions as I may

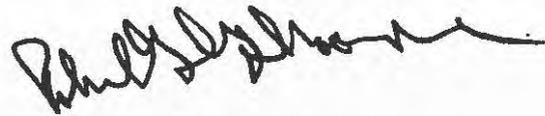
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POPA and PTO

posses the power and authority to correct my error

4. Correction of Typographic, Numerical, and Other Errors which will Not Change the Award.

DONE, this 30th day of July, 2005.



Robert T. Moore
Arbitrator

Appx 262



UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS

SEP 27 2012

David J. French
Second Counsel Services
Ottawa, Canada
David.French@SecondCounsel.com

Dear Mr. French,

Thank you for your email of September 10, 2012 addressed to the Under Secretary of Commerce for Intellectual Property and Director of the United States Patent and Trademark Office (USPTO), Mr. David Kappos, regarding your proposal for the USPTO to start a Public Relations Initiative on the subject of Cold Fusion. Your email has been forwarded to the Office of the Commissioner for Patents for response since it pertains to patent matters.

As you noted in the email, Cold Fusion or Low Energy Nuclear Reactions (LENR) is the subject of intense study and interest of many. Clearly, further investigation into this area could be useful and will hopefully one day will provide a major source of energy.

You note that the USPTO can require patent applicants to provide evidence that the invention works and that the disclosure is sufficient to enable others to make and or use the invention. The United States Code requires as much, and defines the requirements for patentability in 35 U.S.C sections 101, 102, 103 and 112. Particularly, the enablement requirement, which refers to the requirement of 35 U.S.C. 112, first paragraph that states the specification, must describe how to make and how to use the invention. The invention that is defined by the claim(s) of the particular application is the invention that one skilled in the art must be enabled to make and or use. (See MPEP 2164) This is the requirement of law in order to obtain a valid patent. These requirements are applied to all inventions whether they are ground breaking technology or incremental improvements.

We also thank you for your suggestion to have a message that "The USPTO is open for business in the field of Cold Fusion for properly prepared patent filings" before the Cold Fusion revolution arrives. This is already the case. Any non-provisional application, including those in the area of Cold Fusion, is eligible for patenting also long as it meets the requirements of 35 U.S.C. Sections 101, 102, 103 and 112.

Appx 263

I hope this letter addresses your concerns. If you have any further questions, please
contact Chris Kelley at (571) 272-8800.

Sincerely,



Anthony Caputa
Office of the Commissioner for Patents