

FUSIONfacts

A Monthly Newsletter Providing Factual Reports on Cold Fusion Developments

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Fusion Facts Now Reports on Both Cold Fusion and Other Enhanced Energy Devices.

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FUSION FACTS

SEPTEMBER 1995

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A. NUCLEAR SCIENTISTS WANTED!

COMMERCIALIZATION HAS BEGUN

The commercialization of cold fusion offers a tremendous opportunity and challenge to America's inventors, engineers, and scientists **who are skilled in nuclear science.** Laboratories in over 30 countries have replicated and advanced the new science of cold fusion. Several systems are now achieving 500% or more of output thermal power compared to input electrical power! Over 200 patents have been issued outside the U.S. and an estimated additional 100 patents are being processed internationally. Commercialization has begun in several countries, especially in Japan and the United States.

HOT FUSION FUNDS ARE SCARCE

The planned budget for various hot fusion projects has been severely reduced. This fact of economic life, plus the increasing successes of widely replicated experimental demonstrations of low energy nuclear reactions, provides new opportunities. It is now clearly understood, **by those skilled in the art,** that nuclear reactions in gas-plasma physics are dramatically different than nuclear reactions within or on the surface of metal lattices.

YOUR SKILLS ARE NEEDED

Four DOE-funded national laboratories replicated the Pons-Fleischmann Effect in 1989 and 1990. Although no official DOE funds have been available for cold fusion research since that time, other sources of funds were provided from both government and commercial sources. The demonstrated fact that both heavy-water and light-water electrochemical cells can be used, with proper protocols, to produce commercial levels of thermal power is an unexpected scientific and engineering achievement. Those scientists and engineers skilled in hot fusion are invited to seriously investigate the new science of cold fusion. The recent cutback in funds for hot fusion development has left many skilled nuclear scientists and engineers without financial support. With the commercial-

Welcome to our Hot Fusion Friends!

This issue of Fusion Facts is especially prepared for the Symposium on Fusion Engineering '95

This is our gift to you for your good work to help solve the world's energy problems.

ization of cold fusion, corporate America (which outspends the U.S. government by three to one in research dollars) will soon be clamoring to fund cold fusion research and development.

READ THESE INFORMATION SOURCES

Fusion Technology, the Journal of the American Nuclear Society (edited by George Miley) has been the one American journal that has published the most articles about cold nuclear fusion. You are especially invited to scan the papers from the Fourth International Conference on Cold Fusion in the proceedings published by *Fusion Technology* (December, 1994 issue, volume 26, Number 4T, part 2)

In addition, reviews and summaries of over 2,500 articles on cold fusion and allied subjects have been printed in *Fusion Facts*, a monthly newsletter published by Fusion Information Center of Salt Lake City, Utah. Other newsletters are *Cold Fusion Times*, edited by Mitchell Swartz and "*Cold Fusion*", edited by Wayne Green. An important new magazine, *Infinite Energy*, edited by Eugene Mallove is also an excellent source of latest information about this important subject. The following books are recommended: Cold Fusion Impact in the Enhanced Energy Age by Hal Fox (includes an updated diskette with over 2500 references); Fire From Ice by Eugene Mallove; Proceedings of the Conference on Low Energy Nuclear Reactions, edited by Hal Fox; and Cold Fusion Source Book, edited by Hal Fox. In addition, the proceedings of the five International Conferences on Cold Fusion contain most of the important papers on cold fusion.

B. COLD FUSION PROGRESS: 6 YEARS, 2,500 PAPERS LATER

By Hal Fox, Editor-in-Chief

Being a confirmed optimist and learning about the Pons-Fleischmann discovery that was announced March 23, 1989, I predicted two years to commercialization. Fleischmann said five to ten years. Being consistent, for several years I have stuck with my "two more years" response to questions about the commercialization of cold fusion. **Finally, in 1993 I was correct, because this year of 1995 is the year of commercialization of cold fusion.** Definition: A product is deemed to begin commercialization when a patent is issued, a product demonstrated, and license agreements are offered for sale.

Strangely enough, it is not the original Pons-Fleischmann heavy-water, palladium-cathode, lithium-electrolyte electrochemical cell that is being first commercialized. Instead the **Patterson Power Cell™** has been issued a patent. This invention uses tiny spheres that are plated with palladium and nickel. These spheres are conductive and can be packed into

a suitable enclosure to become a cathode in an electrochemical cell. If the final plating is palladium then they can be used with the heavy-water cells. If the final plating is nickel, they can be used in the light-water, alkali-metal-salt electrolyte, electrochemical cell. The protocols for the light-water cells are less demanding than for heavy-water cells. It was the light-water Patterson Power Cell™ that was demonstrated every day of the Monaco 5th International Conference on Cold Fusion (April 9-13, 1995). The demonstration cell proved to be quite robust and was operational within a few minutes after setting up and turning on. Attendees could make their own measurements and calculate the excess heat produced. The excess heat ranged from two to eight times the input electrical power, all without substantial emission of neutrons.

In addition to the Patterson Power Cell™, Jet Technology is prepared to offer working cold fusion electrochemical systems with the money-back guarantee that the cell will produce more than twice as much thermal power out compared to electrical power input. [See the names and addresses of cold fusion commercial companies elsewhere in this issue.]

From March 1989, until now, this editor has obtained, read, and reviewed over 2500 papers, reports, and articles on cold fusion and allied topics, **most of which, but not all, have been positive.** All of these reviews have been entered into the extensive database at the Fusion Information Center, published in this newsletter, and entered into the growing bibliography on cold fusion. This six and one-half year's work, to collect and review the world's literature on cold nuclear fusion, has been this editor's primary task. Not only have we learned about the new science of cold fusion but also we have learned a great deal about people and their responses to new science. We believe that we understand the nature of the ensuing controversy questioning the reality of cold fusion.

It is reasonable and acceptable science to make working hypotheses by building from the known into the unknown. Therefore, it is reasonable to hypothesize that **if nuclear reactions occur on or within a metal lattice, then it can be expected that the nuclear reactions will be similar to those observed in gas-plasma physics.** This was the assumption made at the time of the announcement of the discovery of cold fusion. In the first cold fusion paper [1] Fleischmann, Pons, and Hawkins stated that it was expected that the observed nuclear reactions involved deuterium. These authors listed the expected branches that such nuclear reaction could take (where neutrons, or tritium, or helium-4 could be observed). Pons and Fleischmann carefully pointed out that the amount of excess thermal power observed **could not be accounted for by the amount of neutrons nor tritium measured.**

It is understandable that other scientists (including many who were not skilled in electrochemistry) had replication

difficulties. (One of the biggest difficulties is that not all batches of palladium make suitable cathodes.) It is understandable that in the absence of neutrons, many scientists involved in gas-plasma physics did not believe that any nuclear reactions were taking place. A few scientists, especially those skilled in electrochemistry, had some early successes in replicating the Pons-Fleischmann Effect [2]. All of the successful researchers were, I believe, surprised by the low levels of neutrons produced and further surprised to find that the tritium produced was several orders of magnitude larger than the neutron emission. To those scientists familiar with gas-plasma physics, these results were indeed unexpected.

Science progresses when we are surprised, when we discover something not previously known, **provided that we are willing to accept the new experimental results.** However, if we insist that a new discovery cannot be correct, even if discovered and replicated by world-famous scientists (such as Pons, Fleischmann, and Bockris), or if we are not able to replicate the discovery, then we may be quite frustrated with the new discoveries. Couple these quandaries with a concept that your own source of funding could be threatened, then the combination of threats to both theory and to funding can and did cause vigorous condemnation of cold fusion. This same type of denial of new science is not new. Many of the major advances made by scientists have been met by ridicule from those who were convinced of the reality of their model of science. For example, Goddard was ridiculed for his rocket experiments, the Wright brothers for their flying machine, the Curie's for discovering instability in the known-to-be stable atoms, others for suggesting that atomic energy was possible, that missiles could fly across oceans, etc.

A new model of nuclear reactions on or within metal lattices is being developed. The current model based on gas-plasma physics is not applicable. That discovery is one of the most important discoveries of cold fusion. The concept that nuclear reactions can only take place at high energy levels is true for gas-plasma physics but not valid for nuclear reactions on or within some metal lattices. In fact there is no *a priori* reason to expect that metal lattice and gas-plasma physics should be similar. In a gas plasma we obtain nuclear reactions at high energies. In certain types of metal lattices under specific protocols, we find that low-energy nuclear reactions occur. With the vast amount of research in gas-plasma physics, we still do not entirely understand the observed events. We are still learning. With the relatively small amount of research conducted with nuclear reactions on or within certain metals, we are also still learning. However, the costs of these new cold fusion experiments are only a few hundred dollars compared to a few million in gas-plasma physics.

It is important to review what we have learned. Here is a partial list:

1. The branching ratios of deuterium fusion in a metal lattice are different from gas-plasma observations.
2. Nuclear reactions appear to be catalyzed by certain metals under certain conditions in an active electrochemical cell.
3. The ratio of deuterium to palladium in a Pons-Fleischmann cell must be greater than 0.85 before significant nuclear events are observed.
4. Excess heat is a byproduct of these nuclear reactions.
5. A careful development of the science of cold fusion has shown that excess heat supplied by a nuclear reaction can couple to the metal lattice and may not be observed by the emission of large gammas. In fact, some theories show that large-valued gamma radiation is denied by the physics of the experiment and that the energy **must be coupled to the lattice** [3].
6. Protons and deuterons, in an electrochemical cell, can fuse with large mass elements. There are new developments to indicate that protons and deuterons **are more likely to fuse with high-mass elements than with low-mass elements** [4].
7. The new science of cold fusion is rich with new phenomena. At least eight different ways of creating (and usually controlling) nuclear reactions on or within metal lattices have been discovered **and replicated in independent laboratories** [5].
8. Most important, **cold fusion has become a fruitful and relatively inexpensive way to learn more about nuclear reactions.**

AN OPPORTUNITY, NOT A THREAT

Because of a combination of economic and scientific reasons, the funding for the study of nuclear reactions in gas-plasma physics has been severely diminished. Some high-energy research scientists, with years of hot fusion experience, doubt that the commercialization of hot fusion will ever be a reality. These doubts about the value of the continuation of spending scarce research dollars on hot fusion research **coupled with the much cheaper commercialization of cold nuclear fusion** will lead to still larger cuts in the federal support of hot fusion research.

It is estimated that over \$20 billion (some say \$40 billion worldwide) has been spent on hot fusion research. It is estimated that \$200 million has been spent on cold fusion

research and development. **It is now apparent that within two years, there will be more research and development funds spent on cold fusion than on hot fusion. This change represents an enormous opportunity for those scientists, engineers, and technicians who have been working on hot fusion!** Corporate America, that spends about three times as much money on research and development as compared with the U.S. federal government will be funding the commercialization of cold fusion. There is a great dearth of people skilled in this type of research and development.

The greatest reservoir of talent for the immediate and future development of cold fusion devices and systems resides in those who have been working with hot fusion gas-plasma physics. **You who are becoming less-fully employed in hot fusion research and development have the combination of talent and experience that is now needed in the development and commercialization of cold fusion!** You are faced with new challenges and opportunities. The choice is up to you. Just because cold fusion has been scorned, due to a previous lack of understanding, is not reason to shun new career opportunities. Those who first prepare themselves to enter into this new field of nuclear physics will be among the scientific leaders of tomorrow.

Here are some suggestions to determine the validity of cold fusion and its future career opportunities:

1. First read the literature of cold fusion. The best American source is *Fusion Technology*, the journal of the American Nuclear Society. Another source for references are the current and back issues of this newsletter.

2. Retain healthy scientific skepticism, but don't become pathologically skeptical. Some of the world's most prestigious electrochemists are some of the cold fusion leaders - **they know!**

3. Visit laboratories who are successfully working with cold fusion devices. Here is an American list: Edmund Storms and others at Los Alamos National Laboratory; John Bockris at Texas A&M; Bush and Eagleton at California Polytechnical University at Pomona; Liaw and Liebert at Hawaii; Mitchell Swartz with Jet Technology, Weston Massachusetts; R.A. Oriani at University of Minnesota; John Dash, Portland State University and his students; Dennis Cravens of Cravens' Laboratory, Cloudcroft, New Mexico; James Patterson at Clean Energy Technologies, Dallas, Texas; and especially, visit with Fred Jaeger of ENECO or Hal Fox at Fusion Information Center (both with offices at the University of Utah Research Park).

4. Obtain and carefully follow the proven protocols developed for making a successful cold fusion cell. Begin with a light-

water cell, they are much easier to work with. **But don't make changes (even to the type of solder used) before you follow exactly the protocols for success.** Alternatively, you can purchase (with an excess heat or money back guarantee) working cells for \$10,000 to \$25,000.

5. Read the best of the theoretical literature. Here are some of those considered to be the best in the U.S. (listed alphabetically): Robert W. Bass, Robert T. Bush, Scott R. Chubb & Talbot A. Chubb, Peter Hagelstein, Yeong Kim, Mario Rabinowitz, et al. Remember that cold fusion is so rich with newly discovered phenomena that it is not expected that one theory or model will explain all observations.

6. Obtain a list of the cold fusion literature for reference. The most complete list known to this author is the bibliography compiled over the past six years by the Fusion Information Center and is available on diskette.

7. Make use of the world's leading center of information on cold fusion: Fusion Information Center with offices at the University of Utah Research Park. Available are over six years of collections, reviews, and publications of abstracts and reviews of cold fusion articles from over thirty countries. (This information is expected to be made available on CD-ROM media soon.)

New Energy News

keeps you up to date on the breadth of the new and renewable energy research spectrum worldwide. It also contains news of discoveries, publications, patents and conferences. Being current and accurate are our main goals.

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For membership, information or submissions information contact *New Energy News*, P.O. Box 58639, Salt Lake City, UT 84158-8639. Phone 801-583-6232, Fax 801-583-2963.

8. When you are convinced of the reality of cold fusion contact your national Senators and Representatives and urge their support to remove the barriers to cold fusion funding through the Department of Energy and to remove the barrier to cold fusion patents through the Office of Patents and Trademarks.

9. As soon as you have successes with the replication of cold fusion, write a suitable paper on your findings and submit the paper to appropriate journals. Remember that nearly all journals have refused to publish cold fusion articles except for *Fusion Technology*, *J. of Electroanalytical Chemistry*, *Nuovo Cimento*, and *Physics Letters A*.

10. Present the results of your experimental work at any and all technical conferences possible, **even if you are limited to a poster session**. Send the abstract to *Fusion Facts* newsletter for publication. Get your name and articles into print as soon as practical.

11. Design research and/or development proposals. Submit research proposals to the usual government agencies. Submit development proposals to U.S. industry. Be very practical in your development proposals and address the thermal energy needs of some of your local industries. Cite the forecasts that cold fusion will reduce energy costs to an estimated one-fourth of current energy costs.

12. Invest your own funds in local or national companies involved in the development of cold fusion. [See the latest list of commercial companies in this newsletter.]

13. If you are a member of an academic entity, combine your influence with others and urge the establishment of cold fusion departments or laboratories. Currently, there are few educational entities who offer classes in cold fusion and allied topics. Contact your local energy-intensive industries and ask for their support in return for early access to new information and trained experts that will be of strong economic importance to these industries.

14. As you study, develop, and learn, write popular scientific articles for your local newspapers, magazines, and newsletters. The true story and the importance of this century's greatest energy discovery is, as yet, mostly untold.

15. Join with like-minded scientists, engineers, inventors, and technicians and start your own companies for furthering the development of cold fusion. An example: the group of about ten scientists who founded ENECO began with a small investment (\$1,000 each) at one cent a share. Currently shares in ENECO are being offered at \$4.00 per share. In addition, many of the founders have received financial support for both patent applications and experiments.

There is not one hot-fusion scientist who, though skeptical of cold fusion, has not publicly said that he/she hoped that cold fusion was true. Regardless of you or your institution's former position with respect to the validity of cold fusion, you will be welcomed to this new science! The world's energy problem remains to be solved. Many of you have dedicated yourselves to this effort. Take advantage of one of the most important scientific opportunities that has ever occurred. **The world needs your continued (even if redirected) experience and knowledge!**

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- [1] M. Fleischmann, S. Pons, and M. Hawkins, "Electrochemically Induced Nuclear Fusion of Deuterium." *J. Electroanal. Chem.*, 261, pp 301-308, and erratum, 263, p187 (1989).
- [2] The Distinguished Professor of Chemistry, John O'M. Bockris was the first to report a replication of the Pons-Fleischmann Effect (PFE) and the production of tritium. Three groups of scientists at BARC in Trombay (near Bombay) in India soon replicated the PFE.
- [3] Robert W. Bass, "LINT: A Semi-Classical Quantized Theory of Lattice Induced Nuclear Transmutations," to be published in the 2nd edition of Cold Fusion Source Book, published by Fusion Information Center, Salt Lake City, Utah.
- [4] Yeong E. Kim and Alexander L. Zubarev, Department of Physics, Purdue University, "Optical Theorem and Effective Finite-Range Nuclear Interaction for Low-Energy Nuclear Fusion Reactions," Paper accepted for publication in *Nuovo Cimento*.
- [5] Hal Fox and Mitchell Swartz (JET Technology), "Progress in Cold Nuclear Fusion -- Metanalysis Using an Augmented Database," Presented at ICCF-5, Monaco, April 9-13, 1995.

C. WHAT HAPPENED WITH U.S. COLD FUSION PATENTS

Of over 300 patent applications submitted to the U.S. Office of Patents and Trademarks, only two have issued. Neither of these two patents claim cold fusion and only one of the two claim excess heat to be produced (and that by non-nuclear means). All other patent applications claiming cold fusion developments and/or excess thermal power have been denied by the patent examiners. The nine patent applications submitted in 1989 by Pons and Fleischmann are still being pursued after many cycles of comments and answers between the patent office and the patent attorneys. In contrast, over 150 cold fusion patents have issued in Japan and Western Europe.

One must question why the U.S. Office of Patents and Trademarks has denied to inventors the rights, bestowed on citizens (and non-citizens), to patent intellectual property. The reason often given by misled patent examiners is that cold fusion does not work. Then the examiners cite the *New York Times*, the *Washington Post*, and a negative cold fusion paper by scientists at MIT. Overlooked by the patent examiners are the over 600 positive papers about cold fusion.

This demeaning and unconstitutional action by patent examiners will soon be curtailed. A Congressional investigation of the Office of Patents and Trademarks is being urged by some Senators and Congressmen who are justifiably indignant at the way their constituents are being denied their constitutional rights. This obfuscating action by a few uncivil servants may result in the incarceration of some patent office employees or their supervisors. **It is boldly unthinkable that such patent office action can continue while cold fusion is being commercialized!**

D. FUSION TECHNOLOGY & COLD FUSION A READING LIST

Professor George Miley, Editor of *Fusion Technology* must be credited with having made scientifically correct decisions in his efforts to publish cold fusion papers. He has been one of the few editors who have been willing to allow the publication of new scientific findings in the exciting new science of cold fusion. Therefore, the back issues of *Fusion Technology* are a rich source of literature following the experimental and theoretical developments of cold fusion. You are encouraged to review these articles. Of special interest are some of the review articles that place this complex subject into proper perspective. Here are some important selections:

Akito Takahashi (Dept. of Nuc. Eng., Osaka Univ., Osaka, Japan), "Some Considerations on Multibody-fusion in Metal-deuterides," *Fusion Tech.*, ICCF-4 special, Dec. 1994, pp 451-454, 12 refs, 2 fig.

R. Bush and R. Eagleton (Phys. Dept., Cal Poly Univ., and ENECO), "Evidence for Electrolytically Induced Transmutation and Radioactivity Correlated with Excess Heat in Electrolytic Cells with Light Water Rubidium Salt Electrolytes," *Fusion Tech.*, ICCF-4 special, Dec. 1994, pp 344-354.

Scott R. Chubb and Talbot A. Chubb (Res. Sys., Inc., Arlington, VA), "The Role of Hydrogen Ion Band States in Cold Fusion," *Fusion Tech.*, ICCF-4 special, Dec. 1994, pp 414-426, 23 refs., 1 fig.

J. Dufour (SHELL Research Lab. Sci. Nucl. CNAM, Paris), J. Foos, and J.P. Millot (Dept. Sci. Nucl. Appliquées CNAM,

Paris), "Cold Fusion by Sparking in Hydrogen Isotopes; Energy Balances and Search for Fusion By-products," *Fusion Tech.*, ICCF-4 special, Dec. 1994, pp 375-379, 6 refs., 4 figs.

Peter L. Hagelstein (Res. Lab. Electr., MIT, Cambridge, MA), "Neutron Transfer Reactions and Lattice-Induced Nuclear Decay," *Fusion Tech.*, ICCF-4 special, Dec. 1994, pp 461-473, 28 refs, 10 fig.

Irina Savvatimova, Yan Kucherov, and Alexander Karabut (Sci. Indust. Assoc. "Luch", Podolsk, / ENECO, Inc., Salt Lake City, Utah), "Impurities in Cathode Material Before and After Deuterium Glow Discharge Experiments," *Fusion Tech.*, ICCF-4 special, Dec. 1994, pp 389-394, 3 refs, 5 tables, 4 fig.

Bor Yann Liaw and Yi Ding (HI Nat. Energy Inst., Sch. Ocean & Earth Sci., Univ. of HI), "Charging Hydrogen into Ni in Hydride-containing Molten Salts," *Fusion Tech.*, ICCF-4 special, Dec. 1994, pp 63-68, 18 refs, 4 figs, 1 table.

S. Pons, and M. Fleischmann (IMRA Europe, S.A., Valbonne, France), "Heat after Death," *Fusion Tech.*, Dec. 1994, ICCF-4 special, pp 87, 12 refs, 14 figs.

Edmund Storms (Los Alamos National Laboratory, retired, ENECO), "Some Characteristics of Heat Production Using the "Cold Fusion" Effect," *Fusion Tech.*, ICCF-4 special, Dec. 1994, pp 97-100, 10 refs, 6 figs.

Mitchell R. Swartz (JET Technology, Weston, MA), "A Method to Improve Algorithms Used to Detect Steady State Excess Enthalpy," *Fusion Tech.*, ICCF-4 special, Dec. 1994, pp 369-372, 16 refs, 3 fig.

Mitchell R. Swartz (JET Tech., Weston, MA), "Isotopic Fuel Loading Coupled to Reactions at an Electrode," *Fusion Tech.*, ICCF-4 special, Dec. 1994, pp 74-77, 13 refs, 3 figs.

Also of importance:

Y. Arata and Y.C. Zhong (Univ. of Osaka, Japan), "Utilization of 'Spillover-Deuterium' in Double Structure (DS) Palladium Cathodes," ICCF-5, April 9-13, 1995, Monte-Carlo, Monaco, Book of Abstracts, #601.

A.L. Samgin, A.N. Baraboshkin, I.V. Murigin, S.A. Tsvetkov, V.S. Andreev and S.V. Vakarin (Inst. High-Temp. Elec., Rus. Acad. Sci., Ekaterinburg), "The Influence of Conductivity on Neutron Generation Process in Proton Conducting Solid Electrolytes," Proceedings: ICCF-4, Vol. 3: Nuclear Measurements Papers, pp 5-1 to 5-7, 9 refs, 3 figs.

Robert W. Bass (Thousand Oaks, CA; Sci. Adv. Bd., ENECO, Inc., Salt Lake City, UT; Tech. Ad. Bd., Fusion Info. Ctr.,

SLC, UT), "A Comprehensive Definitive/Predictive Theory of Cold Fusion: Quantum resonant Transparency (QRT) of Coulomb Barriers and lattice-induced Nuclear Transmutations (LINT)," ICCF-5, April 9-13, 1995, Monte-Carlo, Monaco, Book of Abstracts, #419, poster session.

V.A. Romodanov, V.I. Savin, V.V. Elksnin (RI of SPA LUTCH, Podlsk, Moscow), and Ya.B. Skuratnik (SRPCI, Moscow), "Reproducibility of Tritium Generation from Nuclear Reaction in Condensed Media," Cold Fusion Source Book, Proceedings of Minsk International Symposium on Cold Fusion and Advanced Energy Sources, 24-26 May 1994, 4 mms pages, 3 tables.

Jean-Pierre Vigier (Univ. Paris VI - CNRS/URA, Paris), "New Hydrogen (Deuterium) Bohr Orbits in Quantum Chemistry and 'Cold Fusion' Processes," Proceedings: ICCF-4, vol 4: Theoretical Papers & Special Topics, pp 7-1 to 25, 23 refs, 7 figs.

Tadahiko Mizuno, Michio Enyo, Tadashi Akimoto and Kazuhisa Azumi (Hokkaido Univ., Sapporo, Japan), "Anomalous Heat Evolution from SrCeO₃-Type Proton Conductors During Absorption/Desorption of Deuterium in Alternate Electric Field," Proceedings: ICCF-4, vol 2: Calorimetry & Materials Papers, pp 14-1 to 4, 3 refs, 2 figs.

Russ George, Roger Stringham (E-Quest Sciences, Palo Alto, CA), "Cavitation Induced Micro-fusion as Evidenced by the Production of Heat, ³He, and ⁴He," ICCF-5, April 9-13, 1995, Monte-Carlo, Monaco, Book of Abstracts, #324.

E. NEWS FROM THE U.S.

CALIFORNIA - ADVANCED CONCEPTS REPORT

Courtesy of the Author

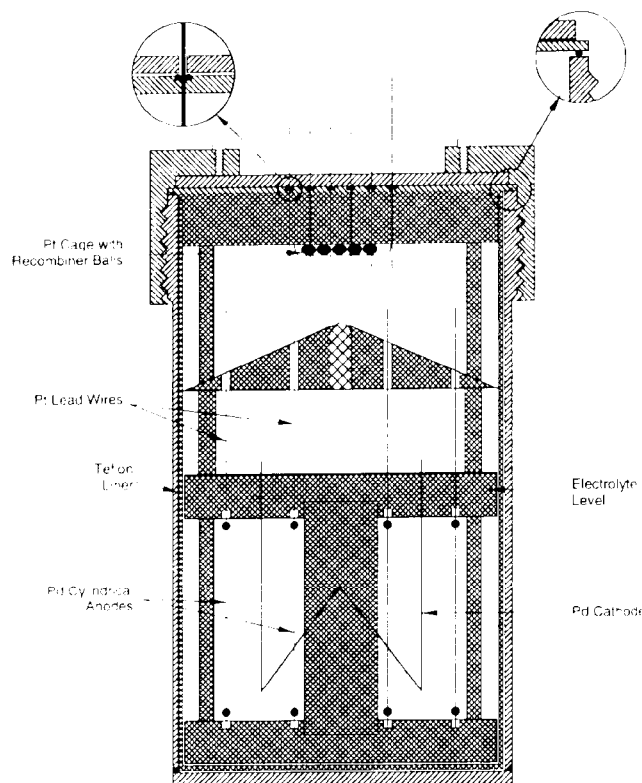
Michael C.H. McKubre, et al., "Development of Advanced Concepts for Nuclear Processes in Deuterated Metals," SRI International, Research Project final report, August 1994.

ABSTRACT

An experimental program sponsored by the Electric Power Research Institute (EPRI) was undertaken at SRI International to explore the central idea proposed by Fleischmann et al., that heat, and possibly nuclear products, could be created in palladium lattices under electrolytic conditions. Three types of experiments were performed to determine the factors that control the extent of deuterium (D) loading in the Pd lattice and to search for unusual calorimetric and nuclear effects.

The overall conclusions of the loading studies are that, by careful control of the electrode pretreatment, the electrolyte composition, and the current density, Pd can be loaded to an atomic ratio D/Pd = 1 and this loading may be sustained for periods of weeks.

Accurate, closed cell, state-of-the-art, mass flow calorimeters were designed, constructed, and calibrated. Extended calorimetric studies have confirmed the presence of a heat source that may be observed when certain criteria are met.



Electrochemical Cell Design

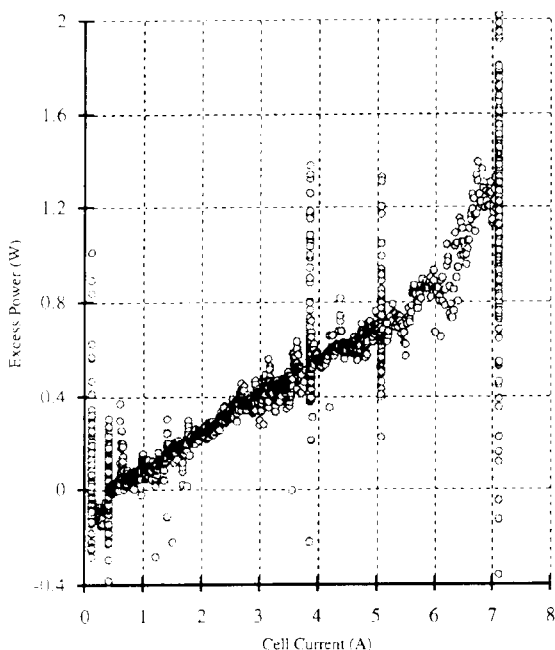
Rigorous attempts have been made to anticipate, exclude and define quantitative upper limits on artifacts and systematic error sources that may give the appearance of excess power. None of the artifactual sources considered can account for the excess power and heat observed. It is therefore concluded, tentatively, that the source of excess energy is an unexpected, and as yet unexplained, property of the D/Pd system. Further, the excess energy observed exceeds that of known chemical processes by two or more orders of magnitude.

Limited nuclear detection capability was included within this first project phase. Low-level detection was not attempted. These observations nevertheless indicate that any nuclear reaction quantitatively associated with the observed power and energy excess can only yield low-energy or stable products.

Tritium, neutrons, or gamma rays are not quantitatively correlated with the excess power production observed.

SUMMARY AND DISCUSSION

This section summarizes and discusses some aspects of the experimental results presented in this report. Since there is not yet a detailed mechanistic understanding of the origin of the excess-power-producing phenomenon, the observation of which is the result of central importance reported here, any discussion is necessarily largely phenomenological. However, we present some implications of the phenomenological model developed here in connection with the search for a possible nuclear origin for the excess power production observed.



Variation of Excess Power with Cell Current

The central postulate guiding the experimental program was that anomalous effects previously unobserved or currently unexplained in the deuterium-palladium system that occur at a very high D/Pd atomic ratio. Emphasis was placed on studying phenomena that provide a fundamental understanding of the mechanism by which D gains access to the Pd lattice and how very high atomic ratios (near, at, or perhaps beyond unity) can be achieved and maintained.

To characterize the electrochemical kinetic and thermodynamic processes that control the absorption of D into Pd, we measured the interfacial impedance and the Pd cathode voltage with respect to a reference electrode. Measurements of the Pd solid-phase resistivity were used to monitor on-line the degree of loading atomic ratios, specifically D/Pd, H/Pd, and H/D.

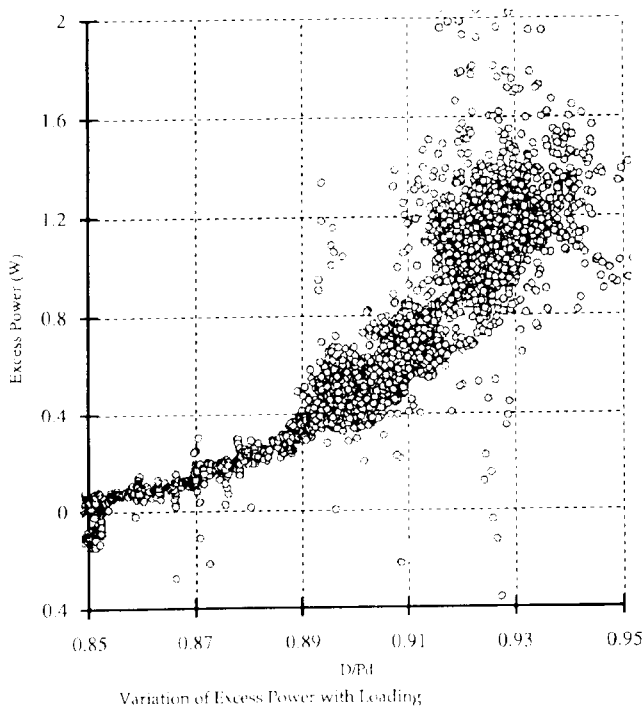
The overall conclusions of this study are that by careful control of the electrode pretreatment, the electrolyte composition, and the current density, we can load Pd to an atomic ratio D/Pd of approximately unity and sustain this loading for weeks.

Calorimetric experiments were performed in palladium rods highly loaded with D and/or H and electrolyzed at substantial current densities (typically 300-600 mA cm⁻², but up to 6400 mA cm⁻²) for considerable periods (typically 1000-2000 hours). Our calorimeters were designed with the philosophy that with precise calorimetry and the search for unusual reaction products make it desirable to have a closed system and a knowledge at all times of the composition of the reacting system. All experiments were performed with closed and sealed electrochemical cells operating from 40 to 10,000 psi above atmospheric pressure. Axial resistance measurements were made to monitor the D/Pd or H/Pd ratio.

Approximately 30 experiments have been performed with flow calorimeters operating at constant power input. The calorimeters were designed and constructed with the following features:

- A conceptually simple system based on the first law of thermodynamics.
- Maintenance of complete control of operating parameters (including cell temperature).
- A large working range of power input and output (0.1-100 W).
- On-line monitoring of all important variables.
- Multiple redundancy of measurement of critical variables such as temperature.
- High accuracy (the greater of 50 mW or 0.5%) and precision (10 mW or 0.1%).
- Known sources of potential error to yield conservative estimates of output power.
- Steady-state operation, leading to simple analysis.

All experiments were performed with thermodynamically closed electrochemical cells. A large area catalyst was provided in the head space of the cells to recombine evolved O₂ and D₂ so that the net reaction in all cells after the Pd rod is loaded is D₂O = D₂O, for which the thermoneutral voltage is zero. Constant current or slowly ramped conditions were used in all cases. Commonly, experiments were performed electrically in series to test the effects of different variables.



We have observed unexplained excess power in palladium cathodes when a minimum of three criteria were met:

- (1) **The average loading (D/Pd) approached or exceeded unity.**
- (2) **This high loading was maintained for considerable periods (hundreds of hours for 3-mm-diameter cathodes).**
- (3) **The interfacial current density exceeded a certain critical value.**

For the thermodynamically closed and intentionally isothermal systems described here, output power was observed to be as much as 300% in excess of the electrochemical input power or 24% above the known total input power. When excess power was present, it was more typically in the range 5%-10%, in calorimeters that were accurate to better than approximately 0.5%. The largest observation of excess energy corresponded to 1.08 MJ, or 45.1 MJ/mol, or ~450 eV/atom normalized to the Pd lattice or to the deuterium in the palladium at a loading of ~1.

Some degree of experimental reproducibility between cells was also observed. Five experiments were performed in an attempt to replicate a prototype experiment, with only minor variations in electrode and electrolyte treatment. All the heavy water experiments produced excess heat and reproduced in general form the observation of excess heat in the prototype experiment. However, excess power in these four experiments

was *not* produced in exactly the same amounts, or at exactly the same times, in response to the same stimuli. Except for times when the calorimeter was caused to depart significantly from its steady-state condition, "negative excess" was never observed.

Finally, we are unable to account for the observed excess heat by any artifact known to us and are forced to conclude that the source of the excess power is a property of the D/Pd system. Further, we cannot account for the measured excess power and energy by any chemical or mechanical process with which we are familiar.

The association of apparent excess power with a set of necessary conditions for the D/Pd system implies a degree of reproducibility. These conditions are not easy to attain, a fact that may explain the irreproducibility of the phenomenon of excess heat. Examined separately, the three criteria may be taken as normal conditions of reacting systems (chemical or nuclear). The criterion of loading is of a thermodynamic driving force, a measure of the activity or chemical potential of a possible reactant species. The need to maintain loading for considerable periods before the onset of excess heat suggests a mass transport constraint, possibly involving nucleation and growth of an active region within the volume of the bulk Pd lattice.

The final requirement, a large interfacial current density, suggests a kinetic criterion. Cathodic current provides the means by which atomic hydrogen or deuterium is discharged onto the palladium electrode surface. The role of current density in producing calorimetric excess power in heavy water systems may be more complex than simply that of initiating adsorption. In our experiments, we observe that the excess heat, when present, increases roughly linearly with current density above some threshold value and achieves a maximum at an upper threshold of current density. Under different experimental conditions, others have observed a second order or higher dependence of excess power on current density above an initiation threshold, but with no observed upper limit.

In energy-producing experiments, we observe that the loading initially increases monotonically with current density, but this increase is not sustained, and the apparent loading (determined from the resistance ratio) may decrease at moderate and high current densities while the excess power continues to increase. We also observe in repeated experiments that excess power can consistently be reduced to unmeasurably small values by reducing the current density below its lower threshold value. The decrease in excess power generally occurs faster than the time constants of diffusional loading.

These results suggest the potential for using current control as a very effective means of controlling a practical heat producing

system. The current appears to act by many complex mechanisms. Some suggested mechanisms follow:

- Controlling the loading through the electrochemical process of discharge, recombination, and adsorption.
- Providing kinetic impetus to possible interstitial nuclear processes by coupled motion of e^- and D^+ plasmas in the metal phase.
- Providing optical or acoustic phonon excitation to stimulate lattice neutron transfer reactions.
- Increasing the cathode temperature.

Current perturbation provides the most direct means of probing the electrochemical system and of controlling any practical device. For practical and fundamental reasons, it is critical that we gain a clear understanding of the methods by which it operates to induce excess power.

The apparent discrepancy between our observation of a roughly linear dependence of excess power on current density and that of Fleischmann and Pons of a roughly second-order dependence may be resolved by understanding the influence of temperature. We have designed our experiments, as closely as possible, to decouple the influences of temperature and current density; calorimetric experiments are performed under constant input power conditions, approaching the steady state. Our calorimeters also have large heat conduction so that, even in the condition of substantial excess power, the cathode temperature is not raised appreciably. Under these conditions, we observe an approximately linear response of excess power with current density.

In the experiments of Pons and Fleischmann, the current density is raised without reducing the power in a compensatory heater, in a calorimeter with very low heat conduction. For this reason, the cell temperature rises markedly with increasing current density, and the temperature increase is exacerbated by the onset of any excess power production. Under these conditions, Fleischmann and Pons observed second-order or higher power dependence of excess power on current density, with no observed maximum.

Taken together, these results suggest that the rate of excess enthalpy production increases at least transiently, with increasing temperature. Such a degree of autocatalysis would be useful in achieving large power gain; the apparent positive derivative with temperature suggests that it may be possible to produce heat efficiently at a usefully elevated temperature.

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ILLINOIS - REFUTING MODERN PHYSICS

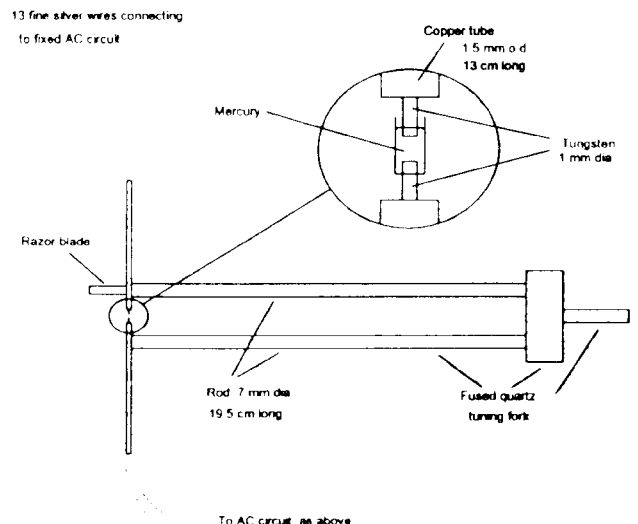
Thomas E. Phipps, Jr. (Urbana, IL), "A Do-It-Yourself Refutation of Modern Physics," *Galilean Electrodynamics*, vol 6, no 5, Sept./Oct. 1994, pp 92-97, 31 refs, 2 figs. (*Galilean Electrodynamics*: P.O. Box 545, Storrs, CT 06268-0545)

AUTHOR'S ABSTRACT

Some simple experiments employing a tuning fork sensor are described that confirm the existence of Ampere longitudinal forces and the validity of Newton's third law as applied to electrodynamics. These empirical results contradict the "universal covariance" hypothesis and the Lorentz force law, upon which modern physical theory is built.

AUTHOR'S SUMMARY

Descriptions have been given here of experimental methods, using metal or quartz tuning forks driven both inductively and non-inductively, bridging gaps with either mercury or fine wires, that plainly reveal the existence of longitudinal electrodynamic forces parallel to current direction. These experiments are so cheap and simple that it would be an embarrassment to suggest their attempted repetition by important pooh-bahs of academic or "real" science. It will suffice that such scientists continue to assert their "reality" by acting as APS journal referees to suppress any dissemination of knowledge of what nature herself has to say on the topic of the electrodynamic force law. For readers less professionally committed -- that is, more interested in seeking the truth than in imposing it -- it is to be hoped that the present description of experimental procedures is clear enough to allow checking by approximate repetition.



Sketch of quartz tuning fork force sensor.

Although Ampere is plainly confirmed by our observations, the big winner in this exercise is Newton. His third law stands supreme -- vindicated once more, as by countless failures of perpetual motion and an endless continuum of other disillusioning human experiences. This time the vindication is manifestly in the realm not of contact actions but of electrodynamic actions-at-a-distance. The marvel is how physicists of this century have had the audacity or insouciance to set the third law quietly on the shelf, as if such insouciance were a viable scientific option, unanswerable to empiricism. The third law was the first and greatest of the *universal* "symmetry principles" known to human science. It deserved, and deserves, more respect -- even if understanding (or a model that will satisfy the stoogian intuition) continues to lie beyond our grasp.

MASSACHUSETTS - BIOMASS FOR ENERGY

George Sterzinger, "Making Biomass Energy a Contender," *Technology Review*, vol 98, no 7, pp 35-40.

SUMMARY

Although using Biomass for energy is as old as fire, it has not been one of the more economical choices, since its mass to useable energy conversion ratio was an inefficient 20% by the previous technology. Now, that may change with new turbine generators and techniques that allow the generation plants to be smaller and have a higher efficiency too.

Military advances in turbine design for aircraft have transferred to commercial airlines, and eventually to turbines used for electric power generation. The turbines range in size from a 13 MW system derived from an engine that runs a McDonnell Douglas F/A-18 to a 45 MW system similar to a Boeing 747.

Technology is now available to make the gassification of the biomass more efficient, producing a more energy-rich gas -- 500 BTU per sq. cu. ft. as opposed to around 200 BTU/SCF previously. Combine that with cleaning the gas and reusing the heat generated in the process so the gassifier and the gas turbine run better, and you have a prototype system that handles 10 tons of biomass per day and generates 200 kW of electricity.

Then the problem becomes economic, because power generation has to be competitively priced at around 6 cents/kwh. This is not possible with the old conversion technology. Growers, transportation and capital costs took up too much of the profit share. But with higher efficiency, it becomes much more viable economically. In the U.S. there are up to 200 million acres of marginal lands, unsuited to food

production that could be used to raise energy crops that grow fast and provide a high quantity of biomass per acre. According to the DOE, the biomass from this land fully utilized could provide over half of our national yearly energy consumption. But first, the need is for start-up capital to build generation plants. They may be government subsidized like the Burlington project, but will have to become privatized very soon. Then, further development will be on the shoulders of investors and energy income from the plants themselves.

Of the development done to integrate turbines with gassifiers, especially the improvement of the gas cleanup processes, much can be used in conjunction with another energy technology-- hydrogen fuel cells-- by providing plentiful and pure hydrogen gas extracted from biomass. For developing countries this is ideal, since many have substantial agricultural wastes to keep the gassifiers busy. During the past year, Secretary of Energy Hazel O'Leary has lead delegations to India, Pakistan, and China, countries that were eager to cooperate with the U.S. in providing applications for this technology.

EDITOR'S COMMENTS

Compared to the cost of energy from biomass, it is estimated that the now developing enhanced energy devices will be considerably less costly.

NEW HAMPSHIRE - FUSION FOR HAMS

Wayne Green, column "Never Say Die," *Amateur Radio Today*, August 1995, p 74.

EDITOR'S SUMMARY

Explaining cold fusion to ham radio enthusiasts, Wayne Green lets them know about Jim Patterson's cell design that functioned so well at Monaco ICCF-5. He had been in Florida for a meeting with Patterson when Dennis Cravens was testing one of the cells before the conference. Green points out how this is the best time to get into the fusion arena, and to get in on the ground floor for entrepreneurs, mentioning others who got in that way in the personal computer explosion. We hope some of them might invest into fusion research, instead of just a magazine subscription.

NEW MEXICO - OVERVIEW OF PROGRESS

Edmund Storms, "Chemically Assisted Nuclear Reactions," paper to be presented at IEEE/NPSS 16th Symposium on Fusion Engineering, 30 September 1995.

AUTHOR'S ABSTRACT

More than six years have passed since the modern era of "cold fusion" was started by Profs. Stanley Pons and Martin Fleischmann (then at the University of Utah). Their claims of being able to produce nonpolluting energy from a renewable source using a simple apparatus created great initial excitement. However, difficulties in repeating the work, combined with the absence of any acceptable explanation, caused most scientists to conclude that the claims were based on delusion. Nevertheless, some people continued to explore the possibilities. Criticisms made by skeptics were taken seriously, errors have been reduced or eliminated, and a wide variety of studies have been done using very modern equipment in many countries. The early problem of reproducing the effect has been largely eliminated, nuclear byproducts have been found, and theoretical explanations abound. The problem now is more psychological than scientific. In spite of this new and improved information, general skepticism about the effect continues within the scientific community and general rejection by the U.S. and many other governments remains unchanged.

Nine international conferences have been held and several professional societies have included sessions about cold fusion, the most recent being the American Chemical Society. The literature on the subject has grown to over 1300 publications, many peer reviewed by major scientific journals. A magazine called "*Cold Fusion*" is struggling to survive and *21st Century Science and Technology* has regular articles. Nontechnical readers can also obtain information from *Fusion Facts*, *Cold Fusion Times*, *The Cold Fusion Newsletter* and *Infinite Energy*. [refer to our Commercial Column, page 23, for more information. Ed.] Occasionally the print and TV Media have acknowledged continued interest, sometimes with objectivity and sometimes not.

The field has expanded from claims of d-d fusion being produced in palladium using electrolysis to at least ten different method-environment combinations. These environments include normal hydrogen as well as deuterium. Evidence for d-d fusion, p-(K,Rb) transmutation, and (p,d)-Pd transmutation has been presented. A variety of nuclear products have been detected. Sufficient energy has been observed to encourage commercial development.

The present status of the field will be summarized with respect to what has been discovered; where work is being done; and how this new field is expected to affect conventional thinking.

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PENNSYLVANIA - SPREADING THE WORD

Ken Ball, "Has Hot Interest in Cold Fusion Cooled?" *Industry.Net News*, 7 September 1996.

A corollary to the title question could well be: Whatever Happened to Pons & Fleischmann? This is easily answered! These two University of Utah scientists are doing well continuing cold fusion research at a Technova facility (Nice, France) supported by Toyota.

In retrospect, two or possibly three factors seemed to have contributed most to early controversies regarding cold fusion. The first is that the original experiments were difficult to replicate, largely since cold fusion was not and still is not well understood. The second is that most scientists initially believed that cold fusion reactions and formed products would more or less emulate hot fusion reactions. Apparently, there are numerous cold fusion reactions which are relatively easily induced and most are quite different from hot fusion in active nuclei, products formed and neutron roles. The other - perhaps - factor is that the prestigious Northeastern Universities led a negative campaign which attracted the media and tended to protect the funds of the hot fusion research program (Centered at Princeton's Tokamak Facility). The DOE sponsored a highly

critical report and as yet has not funded any cold fusion program [since 1990].

Meanwhile, since the University of Utah's March 1989 disclosure of the Pons/Fleischmann work, over 660 papers worldwide have reported successful cold fusion experiments. Over the past two years, only about one-fourth of these papers were from the US. Among other countries; Japan, Italy, Russia and China appear to be more active in pursuing the technology. An annual International Conference on Cold Fusion has been established and a Cold Fusion magazine appeared in late 1994.

The first Pons/Fleischmann experiments were replicated about six weeks later at Texas A&M where cold fusion research is an on-going program. Although Pons/Fleischmann used heavy water, they anticipated success with light water. In 1991, Randell Mills (Lancaster, PA) reported fusion in light water cells using alkali metal carbonates. Bush & Eagleton (Cal Polytech at Pomona) have extended this work and have demonstrated proton capture reactions by various alkali metals. Similar, reproducible results have been reported in Japan and India with excess heats from 20% to 300% mentioned. Other fusion reactions are utilizing molten salt cells; low temperature gas plasmas with palladium cathodes; and using capillaries in metal crystals as reactor vessels. A proton conductor device has produced excess heat for periods up to 20 hours; fusion in an electrical spark chamber has been reported; and a 350° C heated nickel bar (9 cm long) in a hydrogen atmosphere has, with some electromagnetic massaging, reproducibly generated 40 watts of excess heat.

In the US, EPRI (Electrical Power Research Institute) has a \$12 million research program underway. However, it is estimated that the Japanese are currently spending about \$90 million annually. Utah based ENECO has been quietly buying up cold fusion patent rights worldwide. At present, several companies are readying "thermal multiplier" packages for commercial sale. Claims are that roughly 10 times as much thermal energy will be produced over electrical energy consumed. Reportedly, another cold fusion pioneer is near disclosing a new product which is expected to have an appreciable impact on conventional energy systems.

So, in summary; hang onto your fusion fedora--the technology is further along than most realize. An Institute for New Energy now exists in Salt Lake City; president is Dr. Patrick Bailey. Much of the material herein was extracted from a Fox/Bailey survey paper on Cold Fusion presented at the 1995 Intersociety Energy Conversion Conference. Among various cold fusion interests, Hal Fox is the editor of *Fusion Facts* and can be contacted by calling 801-583-6232.

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F. NEWS FROM ABROAD

BELARUS - SYNERGETIC ACTIVATION MODEL

Courtesy of author

Veniamin Filimonov (Chem. Faculty, Belarus. St. Univ., Minsk), "Synergetic Activation Model - One More Non-Quantum Approach for Solving the Problem of Cold Fusion and Clean Hadronic Energy," presented at inauguration workshops of the Istituto per la Ricerca di Base, in Monteroduni, Molise, Italy, 7-14 August 1995.

AUTHOR'S ABSTRACT

The Synergetic Activation Model (SA) is proposed to explain, in particular, the nature and probability of implementation and features of "cold" nuclear reactions in solids (Cold Fusion) caused by impact actions (shock waves or detonation), cooperative mass transfer or phase transitions proceeding.

Consideration of such processes in the framework of this model shows that they are the activation processes with unchanged values of potential barrier heights and sections of nuclei interactions but the atoms distribution by energy in the non-equilibrium systems in which these processes occur is not of the exponential type, but of a powered one, as follows:

$$P_n = A E_n/E_0^{-\gamma} \quad (1)$$

where P_n is the probability of receiving energy packet E_n by an atom having average (thermal) energy E_0 ; n is a quantity of intermediate energy levels between E_n and E_0 ; $\gamma > 1$ and it is determined by the structure of excitation energy levels of crystalline medium.

Such distribution is an example of the self-organization of matter with dissipative structures formation and it is found in spatiotemporal limits of such structures. It is best implemented in the shock wave fronts, which are considered here as dissipative structures and may be introduced in the system or self-generated in the system after phase transition.

The Synergetic Activation Model suggests certain criteria for Cold Fusion's reliable implementation which are consistent with recent experimental data in the field. The model is also complimentary to all approaches to Clean Hadronic Energy except non-threshold ones.

BRITAIN - COLD FUSION IS A LIVE ISSUE

Harold Aspden (Sabberton Research, England), "Cold Fusion is a Live Issue."

On April 15, 1989, a few days after Fleischmann and Pons announced the excess heat discovery indicative of a cold fusion reaction, I applied for a patent at the British Patent Office. It was later granted as GB Patent No. 231,195 and is now assigned to ENECO.

It explained why a cold fusion reaction might be triggered by a mass resonance effect as deuterons adsorbed into the palladium cathode 'fine-tuned' the effective atomic mass of deuterated palladium within the cathode to a value close to 102 plus 6.60 atomic mass units (amu). I referred to this as a 'supergraviton resonance' at 102 amu together with a lower 'graviton resonance' at 6.60 amu, the latter being effective for quantum dynamic interactions involving light atomic elements.

Readers of the August issue of *New Energy News (NEN)* (p. 1) will have seen how the 102 amu resonance is relevant to warm superconductivity and permanent magnets. Also, in the September issue of *NEN* (p. 1), I took the theme further by showing why samarium cobalt alloys form powerful magnets. Arising from a discussion with Walter Rosenthal since that August publication, in which the even more powerful neodymium-iron-boron magnets were mentioned, I need to comment on that too. Briefly, neodymium has an atomic mass of 144.24 amu but it involves a spread of isotopes from 142 to 150 and these are not concentrated near the mean mass value. Indeed, the 142 isotope accounts for 27.2% whereas the 146 isotope accounts for 17.2%. Adding 56 nucleons of an iron atom to the 146 isotope gives twice 101 and so is in the appropriate mass resonant range. However, 142 plus 56 falls 5 or 6 nucleons short of resonance with two supergravitons. The metal boron brings along 11 nucleons and so it could 'fine-tune' the resonance of two such Nd-Fe pairs or even three where the 144 isotope predominates.

The ideal resonance is one which avoids mixed isotopes by involving groups of atoms that are all virtually single isotope elements and I note that my theoretical derivation of the supergraviton mass, as presented in *Speculations in Science and Technology*, 12, 179-186 (1989), evaluated it as 102.18 amu.

Can one then find a molecular form that is an integral multiple of 6.60 amu but develops, when added to the integer amu mass of an atom of a single-isotope element, into a heavy composite atomic group that has this 102.18 amu supergraviton mass?

The atom would need to have a mass number 89, 56, or 23. These elements are yttrium, iron and sodium. Iron is of mixed

isotope composition. Yttrium and sodium are 100% of single-isotope form. The 13.2 amu molecular form needed to complement yttrium could comprise one hydrogen atom (99.985% isotope) plus one carbon atom (98.893% isotope), which with yttrium sum to a 102 nucleon value.

The sodium alternative requires a 79.2 amu molecular form which could not easily be analyzed, so I searched through a commercial listing of chemical compounds based on sodium. Sodium bromide came close at 102.90 amu, but there was one, and only one, compound that fitted better. It was sodium polyphosphate $[\text{NaPO}_3]_n$ recorded as 101.96 amu and it so happens that phosphorus is a 100% single isotope species and oxygen is 99.8% O_{16} .

Now, what has this to do with cold fusion and nuclear transmutation? The answer, very simply, is that **sodium is known to transmute into magnesium in living cells and the action is known to involve as a catalyst ATP and ADP, adenosine triphosphate and adenosine diphosphate, which play a major role in energy conversion in living matter!** See the mention of ATP by Gerald Lindley at p. 17 in the September issue of *NEN*.

That 102 mass resonance seems to hold the key to this mystery activity in plant life and within our bodies. Now, to add some spice to this account, consider the earlier reports in *Fusion Facts* (September 1993, p. 9) that a cold fusion cell using a light water/potassium carbonate solution had generated large amounts of heat with production of calcium by what seemed to be potassium-hydrogen cold fusion. Here there would presumably be some KHCO_3 molecules in that electrolyte and K^{41} plus CO_3 sums to 101 amu. Add H^1 and one obtains 102 amu. The *Fusion Facts* account mentioned Dr. Robert Bush's

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reference to alternative nuclear reactions involving K^{39} or K^{41} but said further study was underway to see which isotope was predominant in the transmutation. It will, I presume, be K^{41} that is converting to Ca^{42} .

EDITOR'S NOTE

Dr. Harold Aspden recently retired after serving many years as IBM's patent agent in Europe. He is the discoverer of the "Aspden Effect" or rotational inertia in spinning magnets (*NEN*, Jan. & Feb. 1995). His Ph.D. thesis involved demonstrations of anomalies in magnetic fields that are best explained by the presence of an energetic ether.

FRANCE - NUCLIDE PERIODIC TABLE

Olof Sundén, "Centripetal De Broglie Wave Fields Connected to Particles at Rest - A Proposed Nuclide Periodic Table," *"Cold Fusion,"* issue 13, pp 16-21, 5 figs, 3 tables.

AUTHOR'S ABSTRACT

The aim of this paper is to show that a Time-Space-Oscillation (TSO) connected to matter is a physical perspective able to



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explain cold fusion (CF) and the particle-wave duality, even able to propose technical means for further developments. According to this perspective a particle--even at rest--is joined to a concentric, *centripetal* TSO, a "de Broglie wave field," which propagates with velocity c toward a focus, where the particle is created as a flickering wave vortex that can push a trigger of an instrument. Particles and nuclides, including their Coulomb barriers, thus become endowed with phase dependency and a centripetal wave field, able to interfere in slits. This explains the particle-wave duality and also that the Coulomb barrier can be broken through when certain phase conditions are met. This TSO perspective renders physics causal and hints at nuclear reactions of a "centripetal" kind different from the "transitional" once described by present high-energy physics. This TSO perspective even gives accurate accounts for physical constants, for particle masses and charges, while the nuclides appear as focal resonance-shells which can be classified in a Mendeleev periodic table. This table finally points out the elements which have the quality to function as Coulomb shields and catalytic templates in CF.

GERMANY - POMERONS EMITTED

Courtesy of Dr. Samuel P. Faile

Andrew Watson, "HERA Physicists Finally Put Flesh on a Putative Particle," *Science*, vol 269, no 5226, 18 Aug 95, pp 919-20.

EDITOR'S SUMMARY

When two high-speed protons strike a glancing blow one often breaks up into a particle shower. Why? An explanation is that one of the protons carried a pomeron which struck and destroyed the other proton. The "putative" (assumed to exist) particle, the pomeron, has apparently been observed in **electron-proton collisions** recorded at the HERA accelerator at Germany's DESY high-energy physics lab in Hamburg. According to the article, "In the HERA experiments, electrons and protons interact electromagnetically, because electrons do not feel the strong force."

Apparently the interaction between the electron and the proton begins when the electron emits a photon, which then strikes a charged component of the proton. This type of collision is known as "deep inelastic scattering". One question is how the electron knows when to emit a proton. The following speculation is reported. As the proton and electron approach each other at high speeds, the proton emits a pomeron. The pomeron is then struck by a photon emitted by the electron. The proton is only slightly affected (a slight change of direction) by this interaction. Apparently, the pomeron - photon collision breaks up the pomeron into a shower of a few

(presumably) point-like particles. This information is expected to accelerate the understanding of the basic structure of matter and will probably result in some changes, such as to the QCD (quantum chromodynamics) in an attempt to explain the observed results.

These new discoveries in high-energy physics are always welcomed by this editor. We applaud the scientists that continue to expand our knowledge of the real world. We suggest that they consider what it means to have these experiments and particles imbedded in a high-energy field (vacuum field energy) where each particle must have some kind of a boundary between its particle structure and the ubiquitous disorder of the high-energy vacuum. There is increasing evidence that such energy fields exist and will, sooner or later, be a necessary part of the scientific model of matter and energy.

JAPAN - NEW HYDROGEN SYMPOSIUM

Second Symposium of the New Hydrogen Energy Basic Research Group (Organizer, Prof. M. Okamoto), held in Tokyo on 11-12 July 1995. 23 Reports were given on recent research in various institutions belonging to the Group. The following were the presenters as listed in "Cold Fusion" magazine, (issue 13, p 2) who will print a conference summary in their next issue.

Opening talk, Organizer of the Symposium, M. Okamoto (Tokyo Inst. Tech.)

"Repetitive Hydrogen Occlusion into Palladium Rods of 9 mm Diameter by Electrolysis," H. Numata (Tokyo Inst. Tech.)

"Calorimetry and Electric Resistance Measurement in a Pd Foil-H(D) System," Y. Sakamoto (Nagasaki Univ.)

"Study of Materials for Developing Solid State Electrolytes (Oxides of Perovskite Structure such as $\text{ArCe}_{0.95}\text{Y}_{0.05}\text{O}_{3x}$)," H. Iwahara (Nagoya Univ.)

"Problems in Estimation of Reaction Characteristics (pressure-concentration- temperature relation) of Metal-Hydrogen Systems," H. Uchida (Tokai Univ.)

"Measurement of D-D Fusion Probability in Low Energy Region (under 10 keV)," S. Yamaguchi (Tohoku Univ.)

"Excess Heat and Reaction Products (Bi, Al) from Oxide Proton Conductors ($\text{SrC}_{0.9}\text{Y}_{0.08}\text{Nb}_{0.02}\text{O}_{2.97}$) in Deuterium Gas by Electrolytic Operation," T. Mizuno (Hokkaido Univ.)

"Change of Isotope Ratios of Fe and C Precipitated in Au(Pd)-H₂O Electrolysis System," T. Ohmori (Hokkaido Univ.)

"New Energy from Double Structure (DS)-Cathode using "Pd-Black," Y. Chang and Y. Arata (Osaka Univ.)

"Cold Fusion Reaction Driven by Latticequake," Y. Arata (Osaka Univ.)

"Electrochemistry and Heat Measurement of Hydroelectrolysis using Pd Cathode," K. Ota (Yokohama Nat. Univ.)

"Nuclear Reaction of Alkaline Metals Induced by Pt, Ni-Hydrogen Electrodes," R. Notoya (Hokkaido Univ.)

"Reaction Products (Tritium, Neutron, Gamma and X) from Pd(D) System Heated in Vacuum," Y. Iwamura (Mitsubishi Heavy Industry)

"Sensitive Measurement of Tritium Density by Proportional Counter," S. Yoshikawa (Tokyo Univ.)

"Deuterium Gas Pressure Dependence of Neutron Generation by Mechanofusion in LiNbO₃ Powder," M. Fujii (Tokyo Metropolitan Univ.)

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"Formation of Metal Deuterides (Ti, Al-D) and Nuclear Reaction (~10 MeV alpha) in Solid by Deuteron Beam (243 keV D₃⁺) Injection." N. Beppu and A. Takahashi (Osaka Univ.)

"Experimental (Precise Twin) Investigation of Correlation Between Reaction Products (X ray bursts, n) and Excess Heat," A. Takahashi (Osaka Univ.)

"Excess Heat Generation by 175 keV Electron Bombardment in D₂ Molecule-Implanted Al Foil," K. Kamada (Nat. Inst. Fusion Sci.)

"Unified Interpretation of Cold Fusion Phenomenon in TNCF Model," H. Kozima (Shizuoka Univ.)

"Sonofusion in Liquids and its Realizability," K. Fukushima (Joetsu Coll. of Edu.)

"Nuclear Processes in Metals (Ti, Pt, Zr, Au, Pd) Induced by Low Energy (~1 keV) Deuteron (D⁺) Irradiation," J. Kasagi (Tohoku Univ.)

"Trials to Improve Reproducibility (by Surface Treatments)," M. Okamoto (Tokyo Inst. of Technology)

"Neutron Emission and Reaction Products Deposited on Pd Cathodes Surface by Glow Discharge in Deuterium Gas," Yamada (Iwate Univ.)

"Present Status of Cold Fusion Research (especially in Pd/D System by F-P Method)," H. Ikegami (Nat. Inst. Fusion Sci.)

Concluding talk, M. Okamoto (Tokyo Inst. Tech.)

JAPAN - RESEARCH GROUP REPORT

Hideo Kozima (Dept. Phys., Shizuoka Univ.), "A Unified Interpretation of Cold Fusion Phenomena in the TNCF Model," *"Cold Fusion,"* issue 13, pp 3-6.

AUTHOR'S ABSTRACT

A unified interpretation of cold fusion phenomena is given based on the Trapped Neutron Catalyzed Model for Cold Fusion (TNCF Model), developed by the author for these past two years. Recent calculations of the neutron band and the lifetime of trapped neutrons are included.

G. SHORT ARTICLES

MRA REVISITED

Greg Hodowanec (GH Labs, Newark, NJ), "Cosmology Notes: More on the Mini-MRA."

Here are some additional speculations on the operation of the MRA (and the Mini-MRA in particular) from the Rhysmonic Cosmology viewpoint. Shown in the figure is a simplified and idealized depiction of the original Mini-MRA test. The sketch has been arranged so as to emphasize the possible "interactions" between the MRA scalar fields and the earth's scalar gravity field. These interactions are believed to be the source of the "extra power" seen with this device. For these "space energy" interactions to be most effective, it is believed that the capacitor must be of the stacked layer type, and the inductor must be of the open "flux circuit" type. To emphasize the interactions with the earth's gravity field, the sketch was arranged to show the possible orientations needed for maximum effect.

The MRA is basically a series resonant circuit which is "excited" by a low level sinewave signal generator of some sort. It is believed that the signal generator should be primarily resistive in nature for maximum performance. In essence, the MRA is a parametric or "reactance" type of power amplifier. Each "pole" or reactance is a source and sink of scalar type fields as indicated in Figure 1. It is speculated that the returning flux fields in each reactance will "extract" some additional energy from the earth's g-field in a simple superposition of scalar fields, and thus sum their amplitudes. Using only a very small amount of energy from the local signal source (at resonance) the circuit will develop high reactive powers which will be "exchanged" between the capacitor and inductor. For example, when energy is being stored in the capacitor electric scalar field, energy will be returning to the circuit from the inductor's scalar magnetic field, and vice versa. This is normally considered electronic theory.

Rhysmonic theory, however, also infers that the returning flux to both the capacitor and the inductor will be "augmented" at least two to four times (and even more in some special cases) in the scalar interaction with the earth's scalar field (or possibly some other universe scalar fields?). This means that the reactive "circulating" currents in the series resonant circuit would also be at least two to four times the real current being drawn from the local generator source. Thus, the reactive powers could be increased by the current squared, or at least four to sixteen times! This has been verified in some of my past coil experiments.

The reason for this is that, circuit-wise, the reactances of the capacitor and inductor are 180° out-of-phase and thus would "cancel out," leaving only the residual resistance in the series circuit to determine the real current level. However, since each reactive voltage is 90° out-of-phase with the reactive current, the reactive powers are essentially non-dissipative (or lossless), assuming low loss components are used. Thus, the real powers, as a function of $EI \cos \phi$, are essentially zero, but the reactive powers, as a function of $EI \sin \phi$, are at their highest levels! The reactive powers continue to exist at resonance - they are not cancelled out - and the high reactive voltages can be measured across each reactance! The MRA makes use of the high reactive power developed across inductor, L_1 , of Figure 1 available to a real load across, L_2 , through the use of transformer action. Some of these reactions and other data are summarized also in Figure 1 for your convenience.

Some additional comments

1. At resonance, in a properly working Mini-MRA circuit, all waveforms are essentially sinusoidal and quite similar. Thus, most true RMS reading meters can be used to make relative power gain measurements, even somewhat outside of their normally calibrated ranges!

2. At slightly off-resonance conditions, some additional waveforms may be seen superimposed upon the generator induced waveforms. These were recognized by the writer as quite similar to those "seen" with his gravity "wave" detector units, which are known to be interacting with cosmic induced "modulations" on the earth's gravity field. While the gravity detectors generally have only one active pole, the presence of two active poles in the MRA can and does at times complicate these interactions. However, the effect seems to increase the parametric or reactive amplification - thus the output powers here would be best determined with rectification and thus as a dc power.

3. In general, the real power developed in the resistive load across the secondary, L_2 , is a clean sinusoidal even under off-resonance conditions.

Some final remarks

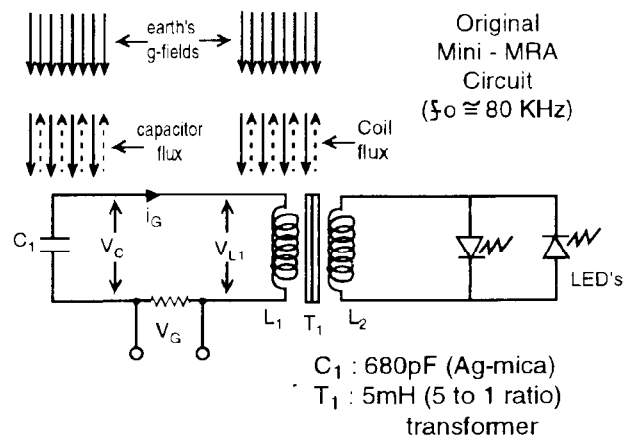
The writer feels that the MRA is real and a potential new energy source for mankind. It is free from pollution effects and uses a universal energy source which cannot be depleted!!

It is also speculated that the 60 Hz energy source experiments using ferrites and coils (ala Sweet) are possibly "tapping" into the 50-60 Hz power grids which range over this earth. The long wavelengths of the 60 Hz transmission lines essentially generate scalar type fields which can "excite" the universe (or

possibly only the earth-ionosphere complex). However, this energy is normally returned to the power grids - except for that which may be "tapped" in this manner.

It may be hard to convince academia on all this, but you "hands on" experimenters should be able to run these types of simple experiments and determine for yourself if this is real or not - go for it!

This will be my final remarks on the MRA. Let's hope that many more of you get involved with this device - it can be important to mankind.



Test Data:

$V_g \cong 3.8$ V (rms) measured

$$i_g \cong \frac{V_G}{5K} \cong \frac{3.8}{5 \times 10^3} \cong .76 \text{ mA (rms) calculated}$$

$V_c \cong V_{L1} \cong 9.3$ V (rms) measured

$$Q \cong \frac{V_C}{V_G} \cong \frac{V_{L1}}{V_G} \cong \frac{9.3}{3.8} \cong 2.45 \text{ calculated}$$

$P_{wr L2} \cong 33$ mW (rms) measured

V: open ckt. I: short ckt.

Remarks:

$$V_{L1} \cong 9.3 \cong i_{circ} \times X_{L1} \cong i_{circ} \times 2\pi f L_1$$

$$\cong i_{circ} \times 6.28 \times 80 \times 10^3 \times 5 \times 10^{-3}$$

$$9.3 \cong i_{circ} \times 2512 \therefore i_{circ} \cong .0037 \text{ or } 3.7 \text{ mA} *$$

$$P_{in} \cong V_G i_g \cong 3.8 \times .76 \cong 2.9 \text{ mW (rms)}$$

$$P_{wr L1} \cong i_{circ}^2 \times 2512$$

$$\cong .0037^2 \times 2512 \cong 34 \text{ mW (rms)}$$

$$P.G. \cong \frac{P_{wr L1}}{P_e} \cong \frac{34 \text{ mW}}{2.9 \text{ mW}} \cong 11.7X$$

* Note: this is $4.87 \times i_g$!

H. LETTERS FROM OUR READERS

LETTER FROM CHUCK BENNETT

I'm sure you've heard that Senator Bill Bradley from New Jersey is considering a run for President. He has been one of the elected officials that has responded to my mailings on cold fusion. As indicated by the enclosed letters to me, he is not afraid to say the words, "cold fusion". If he runs, I would strongly consider becoming an avid supporter. I called his office in New Jersey today at 1-609-983-4143 and left a message stating so. I wonder if you or any of your readers would also be interested in encouraging Bill Bradley to run for president.

LETTER FROM BILLINGS BROWN

[in response to letter about Johnson patent, in August '95 *FF*]

... How brilliant minds at colleges can think up and publish such baloney -- and receive a patent escapes me..."anharmonic vibraton"... "latent heat of water"...-neither of which could possibly provide ANY excess thermal energy to the surroundings....

Enclosed are some ramblings of a crackpot but genius publisher. Patterson's patent is REALLY a bold step forward. [Enclosed was an editorial from Wayne Green's *Amateur Radio Today* magazine, talking about cold fusion and the Patterson patent. See page 11 this issue.]

Please refer to the addendum to my article or paper presented by you in Belarus in 1994, wherein you editorially capitalized the key concept: BASED ON Pd ELECTRODE SURFACE AREA (NOT volume as held by Pons.) The more surface area the better, and Patterson has found a way. (My thesis 42 years ago was on extended surface catalysis.)

Keep up the good work.

/s/ Billings Brown, retired professor, Univ. of Utah

LETTER FROM BELARUS

On August 7-14, 1995, I participated in the Inauguration Ceremony and International Workshops of *Instituto per la Ricerca di Base* in a medieval castle at Monteroduni, Molise, Italy, with a talk on Synergetic Activation model for cold fusion [see page 13]. This Institute is founded by Prof. Ruggero M. Santilli (Palm Beach, Florida), President of Institute for Basic Research and Chief Editor of Hadronic Press Publ., and it was funded by the government of the Molise

region. I had a half hour talk in front of about 200 leading scientists in mathematics, theoretical physics (including gravitation, relativity, astrophysics, cosmology, nuclear physics) and theoretical biology from all continents. It was my contribution in "breaking ice," i.e. convincing world responsible scientific opinion in the vitality and importance of Cold Fusion.

I had become acquainted with Eng. Leonard Radyno (Minsk, Belarus), the producer of Dr. Yuri Potapov's Enhanced Energy Device. This FSU analog of Jim Griggs' Machine is of great interest to me. I am aware from our mutual friend Dr. Peter Glück that groups in the U.S. had tested that device without obtaining positive results. Are descriptions of those test available? If so, I ask you to send me a copy.

Veniamin (Ben) Filimonov

LETTER FROM GENEVA, SWITZERLAND

I recently met a researcher who said that research bears out the fact that $\pm 70\%$ of cancer cases are caused by pollution - air, water, etc. - and most of that 70% is directly or indirectly caused by fossil fuels. As a consequence, he is involved in a group studying alternative fuels (energy). To date the focus has been almost entirely on solar energy. Of course, I mentioned cold fusion and his reaction was extremely positive. His group is not wedded to solar energy, but instead to backing an alternative to fossil fuels. The other 30% is thought to be related to genes. He said all the cancer research money is going to this 30% and very little to alternative clean energy. He is writing articles to encourage more money to solar and maybe now cold fusion research.

Ron Flores

LETTER TO THE EDITOR OF *FUSION TECH.*

R.A. Rice, Y.E. Kim, Mario Rabinowitz

REPLY TO "RESPONSE TO 'COMMENTS ON 'ELECTRON TRANSITIONS ON DEEP DIRAC LEVELS I'," *Fusion Tech.*, vol 27, May 1995, pp 348-349.

Introduction

Despite the rhetoric of Maly and Vavra (MV), who used unwarranted terms like "confused" and "completely in error" in referring to our comments, we are sincerely desirous of a rational and congenial resolution of this important scientific question. We would like to clarify the issues so that interested readers can easily decide for themselves and, more importantly, so that this important scientific issue can be decided upon by merit rather than by rhetoric.

The existence of deeply bound electron energy levels was proposed by MV. According to MV, these solutions arise from previously neglected solutions of the relativistic Schrödinger and Dirac equations. We show that these deeply bound energy levels are physically impossible and arise from an incomplete analysis of the differential equations involved. MV claim that our analysis and conclusions are in error.

...In summary, it appears that MV agreed with us on the second point as they did not attack us on point two. However, they vociferously disagreed with us on the first point. We think we have now incontrovertibly shown that such levels do not result from the Coulomb potential even in the relativistic case as claimed by MV.

R.A. Rice & Y.E. Kim
Purdue University, Department of Physics
West Lafayette, IN 47907

Mario Rabinowitz
Electric Power Research Institute
Palo Alto, CA 94303

August 8, 1994

Interested readers are referred to the original letter printed in *Fusion Technology*, May 1995.

ROTEGARD WRITES WASHINGTON

To Senator Paul Wellstone

Dear Senator Wellstone,

The last time I talked to your office concerning breaking developments in the field of cold fusion, Scott Adams asked me to request in writing, a course of action to expedite the development of this new energy source. Hundreds of patents have been filed since then and major new corporate sponsors have emerged in the field both in the USA and abroad. I am writing to ask your help to do something about the continued obstruction of cold fusion commercialization by the U.S. Office of Patents & Trademarks. As you probably know, Drs. Oriani, Broadhurst, Lee, and Nelson of the University of Minnesota Materials Science Department replicated a variation of the original Fleischmann & Pons cold fusion experiment in 1990. A patent application was made by the University's attorneys Merchant, Gould, et al., which was summarily rejected 8-14-91 by patent examiner Harvey Behrend. Since then scores of worthy patent applications for variations of cold fusion have been summarily rejected by the patent office using boiler plate language. This has not obstructed this science

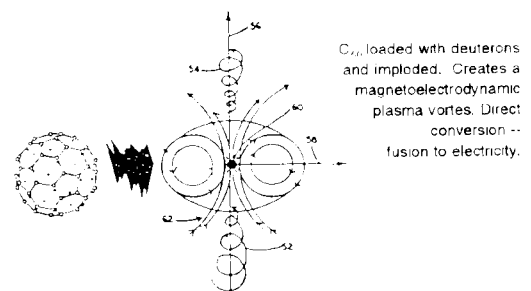
overseas. Patents for cold fusion have been granted in Great Britain and in Japan.

The University of Minnesota, and private individuals such as Mark Hugo and myself, have continued to do experiments. Japanese scientists, Drs. Mizuno, and Masao, from the University of Hokkaido invented a cold fusion process using ceramic cathodes and filed a patent on it in Japan on 10-5-93. The results of this research were presented at the international conference in Hawaii on 12-8-93. This approach to cold fusion appears to be very promising for commercial development. Dr. Oriani, at the University of Minnesota, replicated these results in mid-1994. In late 1994 patent filings were made by the U's attorneys for original variations on the Japanese work.

Dr. Mizuno was granted a patent by the Japanese patent office on 4-21-95. He visited the University of Minnesota on 6-21-95 for conferences with Dr. Oriani and other interested parties, myself included. Dr. Mizuno is reportedly sponsored by Mitsubishi. I recount this story to show how this critically important technology is being ceded to Japanese Zaibatus because of blind obstruction by the U.S. patent office.

The patent office is unwilling to admit that this area of technology is real and that Fleischmann and Pons (who are now heavily sponsored by Toyota) invented it. Several hundred U.S. patent filings from American and foreign inventors have been left in legal limbo because of this attitude. Foreign corporations are going to be the direct beneficiaries of this malfeasance. The prize of this line of research is a 20-50 kilowatt power source that could be used in lieu of clumsy

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batteries in a Toyota, Mitsubishi, or Fiat electric car. While one unusually clever Saturn TV commercial mentions this possibility, no American auto manufacturer is following the lead of their foreign competitors and more importantly no American inventor or scientist has the secure legal position *vis a vis* investors that a granted patent guarantees.

I ask you to begin a congressional investigation of the patent office for its derelict attitude toward this new science. The legal confusion about who has patent position in the USA is a major problem. Many cold fusion scientists, and patent law specialists both inside and outside the government have made this point to me in conversation. The stakes are very high in this issue. Mark Twain once said that no country without a decent patent office can amount to anything. This situation has advanced to the point where I believe it can be credibly raised as a political issue.

Sincerely,

Dana Richard Rotegard

[All of *Fusion Facts* readers should similarly contact their Senators and Representatives! Ed.]

LETTER AND REVIEW FROM JED ROTHWELL

Attached is my review of Hoffman's new book about cold fusion [17 pages, 12 refs.]. As you see, I think it is a pretty shoddy job. He claims that cold fusion researchers use heavy water from CANDU fission reactors; he claims they never measure true rms power; and he claims that Mike McKubre never revealed any substantive details about his work. He "forgot" to mention any of the excess heat results. To make a long story short, this book has no scientific merit. It is a politically motivated hatchet job. It is a clumsy attempt to discredit good scientific work.

... I think it is a disgrace to EPRI, to the American Nuclear Society, and to Rockwell. Perhaps Hoffman honestly does not realize that the level of tritium in used fission reactor moderator water is a hundred million times greater than the levels in the heavy water sold by chemical supply houses.

INTRODUCTION FROM THE REVIEW:

Review of the book A Dialogue on Chemically Induced Nuclear Effects - a Guide for the Perplexed About Cold Fusion, by Nate Hoffman. Published by the American Nuclear Society (ANS) with support from the Electric Power Research Inst. (EPRI), 1995.

This is a strange little book. It is well written in some parts, with knowledgeable, in-depth, analysis. Yet elsewhere the author makes factual errors that might easily have been avoided. Some of his mistakes are mind-boggling, like his suggestions that chemical supply companies sell used moderator heavy water from CANDU fission reactors, or that no researcher in any cold experiment has ever measured true rms power. The focus of the book is wrong. It covers a few backwater aspects of cold fusion. It describes a handful of unimportant, botched experiments while it ignores the real work. The most important fact about cold fusion is that it produces excess heat beyond the limits of chemistry. As Fleischmann says, "heat is the principal signature of the reaction." In most experiments, heat is the easiest parameter to measure, giving the highest signal to noise ratio. Yet Hoffman does not discuss any experiments in which excess heat was observed. He censors them out, he pretends they do not exist. This eliminates most of the literature. In the second paragraph of the book, Hoffman says that Pons and Fleischmann claimed excess heat, but that is the last we hear about the subject until the closing remarks. He never says that hundreds of other scientists replicated their findings. He never mentions any particulars about heat. There is no discussion of power; net energy; energy versus mass (megajoules per mole of cathode material); power density; temperature; current density and other triggering mechanisms; or metallurgical conditions and surface treatments required to generate excess heat.

I. EDITORIAL

DEVELOPING NEW NUCLEAR MODELS

By Hal Fox

There is a well developed model of nuclear reactions based on the many years of experimental work with gas-plasmas, high-energy beams, and nuclear reactors. This model, or more precise, these developing models, seek to explain all or most of the observations from the decades of experiments. **Almost every scientist will admit that this model (or almost any scientific model) is incomplete.** It is a well-understood fact of reality that no models fully represent physical reality.

Now we have the new information on low-energy nuclear reactions reported in over 600 technical papers about successful cold fusion and related experiments. **The model based on gas-plasma physics does not explain these new experimental observations.** This finding should be good news because it means that we are learning more about the physical reality of this world.

The purpose of this note is to suggest that new models of physical reality should also include the latest discoveries **and experimental evidence concerning the nature of the**

environment in which all fundamental particles and all nuclear reactions are embedded. The concept of an empty vacuum is dead. The empty space was based on the negative experiments of Michelson and Motley. Michelson and Gale later showed the early results to be in error. The concept of an empty and non-energetic space was used as an *a priori* condition in the development of Einstein's Special Theory of Relativity. The concept of an empty space was revised for the development of the General Theory of Relativity. With an increasing amount of experimental evidence, an empty, non-energetic space should be not be considered as a part of a model of modern physics.

There are now over 500 peer-reviewed and published articles depicting various aspects of the vacuum space energy. The underlying concepts of vacuum space energy should now be used in the development of a model of nuclear reactions that explains the latest experimental observations.

The work being accomplished on high-density charge-clusters technology (see U.S. Patent No. 5,018,180) by Kenneth Shoulders and his son Steven cannot be explained in an empty vacuum. The cited patent is the first patent, as far as the author knows, that has been granted for a device which states that the excess energy appears to be from the vacuum space energy field.

J. MEETINGS / CONVENTIONS

THE NEW "NATURAL PHILOSOPHY ALLIANCE," CHALLENGING CONTEMPORARY PHYSICAL THEORY

Courtesy of John E. Chappell

MOVE TO CALL FOR PAPERS

Members of the Natural Philosophy Alliance, organized in mid-1995, concentrate primarily on revealing and solving various little-recognized theoretical problems in contemporary physics, astronomy, and cosmology; but they also welcome any overlap of interests with those concerned with practical matters including the development of new energy sources (as some of them already are). Since most members are critics of special relativity theory, and most of these believe in an electromagnetic ether, clearly their work has potential for laying theoretical groundwork for attempts to draw "free energy" from said ether.

This organization, now including about 60 active members, was formed by contributors to three recent meetings of dissidents held in connection with regional meetings of the American Association for the Advancement of Science: in San

Francisco in June 1994; in Norman, Oklahoma in May 1995; and in Vancouver, B.C. in June 1995.

The next such meeting will occur with the Southwestern and Rocky Mountain (SWARM) division during 2 to 6 June, 1996, in Flagstaff, Arizona. **Those who wish to be considered to contribute to special symposia--some of which will probably be panel discussions with very brief formal remarks--need to supply paper titles and any ideas for organizing such sessions by mid-October 1995.** Titles for separate individual papers may be sent as late as early December 1995. (Abstracts are not due until later, probably January 1996.) A special symposium on new energy research would be welcome.

For more information about this upcoming meeting, please ask for a copy of the September newsletter by contacting Prof. Domina E. Spencer, Dept. of Mathematics, Univ. of Connecticut U-9, Storrs, CT. 06268 (office: 203/486-3927, mainly MWF afternoons). If you wish to join the Natural Philosophy Alliance, you may also send her a dues payment, made out in the name of this group; it will last through 1996. Regular dues are \$20 (\$10 for low-income people; \$50 for contributing members; free for those wishing only to obtain occasional literature).

General inquiries may be sent to the NPA's Director, John E. Chappell, Jr., 1212 Drake Circle, San Luis Obispo, CA 93405; or to its Assistant Director, Neil E. Munch, 9400 Five Logs Way, Gaithersburg, MD 20879.

COLD FUSION CONFERENCE PROCEEDINGS

Copies of each conference proceedings can be obtained by writing to the following addresses:

* First Annual Conference on Cold Fusion (Salt Lake City, Utah - 1990)

University of Utah
Office of General Council
201 Park Building
Salt Lake City, UT 84112
Phone: (801) 581-5115
Fax: (801) 585-6211

* Second Annual Conference on Cold Fusion (Como, Italy - 1991)

Societa Italiana di Fisica
Redazione
Via L. Degli Andalo, 2
40124 Bologna, BO, ITALY
Fax: 011-39-51-58-1340

* Third International Conference on Cold Fusion (Nagoya, Japan - 1992)

Universal Academy Press, Inc.
C.P.O. Box 235

Tokyo 100-91, Japan
Phone: 011-81-3-3813-7232
Fax: 011-81-3-3813-5932

* Fourth International Conference on Cold Fusion (Lahaina, Hawaii - 1993)

Tom Passell, EPRI
3412 Hillview Avenue
Palo Alto, CA 94303
Phone: (415) 855-2070
Fax: (415) 855-2041

* Fifth International Conference on Cold Fusion (Monte-Carlo, Monaco - 1995)

IMRA EUROPE S.A., Centre Scientifique
B.P. 213-220, rue Albert Caquot
06904 Sophia Antipolis Cedex, FRANCE
Tel: 011-33-93-95-73-37
Fax: 011-33-93-95-73-30

**There is no bar to knowledge greater
than contempt prior to examination.**

Herbert Spencer

K. COMMERCIAL COLUMN

The following companies (listed alphabetically) are commercializing cold fusion or other enhanced energy devices:

COMPANY: PRODUCT

American Cold Fusion Engineering and Supply: Information and troubleshooting for the fusion research and development industry. Sacramento, California. The president, Warren Cooley, can be reached at 916-736-0104.

CETI (Clean Energy Technologies, Inc.): Developers of the Patterson Power Cell™. Dallas, Texas. Voice (214) 458-7620, FAX (214) 458-7690.

ENECO: Portfolio of intellectual property including over thirty patents issued or pending in cold nuclear fusion and other enhanced energy devices. Salt Lake City, Utah. Contact Fred Jaeger, Voice 801/583-2000, Fax 801/583-6245.

E-Quest Sciences: Exploring The Micro-Fusion™ process. Seeking qualified research partners for their sonoluminescence program. Contact Russ George, FAX (415) 851-8489.

Fusion Information Center: Amassing and publishing energy research data from around the world, has the largest collection of cold fusion scientific papers in one place. Contact information on back page, this issue.

Hydro Dynamics, Inc.: Hydrosonic Pump, heat-producing systems using electrical input with thermal efficiencies of 110 to 125 percent. Rome, Georgia. Contact James Griggs, Voice 706/234-4111 Fax 706/234-0702.

Nova Resources Group, Inc.: Design and manufacture ETC (Electrolytic Thermal Cell); EG (commercial power cogeneration module); and IE (integrated electrolytic system). Denver, Colorado. Call Chip Ransford. Phone (303) 433-5582.

UV Enhanced Ultrasound: Cold Fusion Principle being used for an ultrasonic water purifier. Hong Kong. FAX (852) 2338-3057.

Note: The Fusion Information Center has been acting as an information source to many of these companies. We expect to augment our international service to provide contacts, information, and business opportunities to companies considering an entry into the enhanced energy market.

INFORMATION SOURCES

Fusion Facts monthly newsletter: Salt Lake City, UT 801/583-6232. also publishes Cold Fusion Impact and Cold Fusion Source Book. Plans on-line database access for later in 1995.

New Energy News monthly newsletter, edited by Hal Fox, Salt Lake City, UT 801/583-6232

Cold Fusion Times, quarterly newsletter published by Dr. Mitchell Swartz, P.O. Box 81135, Wellesley Hills MA 02181.

Infinite Energy, new bi-monthly newsletter edited by Dr. Eugene Mallove (author of Fire from Ice), P.O. Box 2816, Concord, NH 03302-2816. 603-228-4516.

Fusion Technology, Journal of the American Nuclear Society publishes journal articles on cold nuclear fusion. 555 N. Kensington Ave., La Grange Park, IL 60525.

21st Century Science & Technology, P.O. Box 16285, Washington, D.C., 20041. Includes cold fusion developments.

For more information on **Cold Fusion** contact:

Cold Fusion Times

P.O. Box 81135, Wellesley Hills, MA 02181

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of \$5.00 per order outside the U.S.

Published Quarterly by
Dr. Mitchell Swartz, Publisher and Editor

Planetary Association for Clean Energy Newsletter, quarterly, edited by Dr. Andrew Michrowski. 100 Bronson Ave, # 1001, Ottawa, Ontario K1R 6G8, Canada.

Electric Spacecraft Journal, quarterly, edited by Charles A. Yost, 73 Sunlight Drive, Leicester, NC 28748.

Space Energy Journal, edited by Jim Kettner & Don Kelly, P.O. Box 11422, Clearwater, FL 34616.

"Cold Fusion", monthly newsletter, edited by Wayne Green, 70 b Route 202N, Petersborough, NH 03458.

The above list of commercial and information sources will be growing. New listings will be added as information is received. Send information to *FF*, P.O. Box 58639, Salt Lake City, UT, 84158.

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