FUSION facts

A Monthly Newsletter Providing Factual Reports On Cold Fusion Developments

ISSN 1051-8738 • University of Utah Research Park •

ISSN 1051-8738

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

VOLUME 5 NUMBER 12 FUSION FACTS JUNE 1994

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NEXT MONTH

FUSION FACTS
BEGINS ITS SIXTH YEAR

Bringing you the latest in research and news in the ever-growing field of Cold Fusion

A. BELARUS, MINSK - COLD FUSION CONFERENCE

By Hal Fox, Editor

The Belarusian State University was the host for an **International Conference on Cold Fusion and New Energy Sources**. This conference was held in Minsk, Republic of Belarus, on May 24-26, 1994 and was co-chaired by Russian, Belarusian, Romanian, and U.S. representatives. Hal Fox, editor of *Fusion Facts* was one of the co-chairpersons.

"Why have another cold fusion conference in Belarus?" is an appropriate question. The answers are twofold. First, the cost of transportation from the member countries of the Commonwealth of Independent States (CIS) to foreign countries is prohibitive for most CIS scientists, while transportation within the CIS is much more economical. Second, Chernobyl is located about 18 miles south of the southern border of Belarus and the wind was into Belarus at the time of the Chernobyl reactor explosion. The results are that 12 entire annual national budgets would be required for partial recovery form this radioactive devastation and worse, only 8% of the children of Belarus are now considered healthy. **There is no country better deserving of the rapid application of new energy technology than the Republic of Belarus.**

Presenters at the Minsk conference reported mostly on cold fusion theory and experiments, however, a few papers treated other aspects of the production and control of energy. The abstracts of most of the papers presented at the conference appear in the April, May, and this issue of *Fusion Facts*. Some abstracts of late Russian papers will be presented as translations are received.

HIGHLIGHTS OF THE MINSK COLD FUSION CONFERENCE

Where authors were able to meet the publication deadlines, their papers were translated (if necessary), edited, and printed in two volumes of the proceedings of the conference. The Russian version was edited by Dr. Ben Filimonov (with the able assistance in translation by Tamara Grinevich). The English version was published by Fusion Information Center (FIC) in Salt Lake City, Utah. These publications were made available to authors and to attendees at the conference prior to the start of the conference. This procedure, adopted by the organizing committee, allowed the conference attendees to enjoy the conference by having access to the details of most papers prior to the presentations. Simultaneous translations in Russian or English were provided by Ms. Grinevich and another translator.

Highlights of the conference included the following:

After preliminary welcoming speeches, Hal Fox presented a review of the various types of cold fusion and new energy devices that are currently being investigated and which appear to have potential for commercialization.

The best theory paper in the proceedings was the paper by Dr. Robert Bass (a member of the FIC Technical Advisory Group). This paper was developed from basic physical principles and requires no invention of special types of particles to explain the observed experimental phenomena of cold fusion. The theory covers both heavy-water and light-water phenomena. See Robert W. Bass, "Is the Coulomb Fusion-'Barrier' a Resonantly-Transparent Mirror? Refutation of the Conventional Cold-Fusion `QM-Impossibility' PROOF", Cold Fusion Source Book, Proceedings of the International Symposium on Cold Fusion and Advanced Energy Sources, Minsk, Belarus, May 24-26, 1994.

A Hungarian team appears to have solved the problem of treatment of the palladium cathode materials so that reproducible results can be obtained and excess heat generated and produced at will. [We will have more information on this topic as soon as the paper has been translated. Ed.]

Peter Glück from Romania presented compelling information about the source of cold fusion being mainly the surface catalysis of nuclear reactions. The new science of cold fusion has been condemned for not having an adequate theory while at the same time the seventy-year-old (and more) technology of chemical catalysis still does not have a completely adequate theory. See Peter Glück, "Cold Fusion - A Logical Network Approach", Cold Fusion Source Book, Proceedings of the International Symposium on Cold Fusion and Advanced Energy Sources, Minsk, Belarus, May 24-26, 1994.

A group from the Ukraine has surfaced, after over 25 years of research, with information on new types of nuclear reactions. In this Ukrainian work, the reactor cells appear to strip a neutron from the nucleus of many elements and transmute the element "one down" in the periodic table. It has been the acceptance of cold fusion that has caused this group to publicly announce their work. They had previously been unable to publish because their work was contrary to the current accepted scientific doctrine. Six inventors are involved in this work. One of the by-products of this group is a process for cleaning up or reclaiming contaminated oil. [More information is expected to be obtained as their paper is translated. Ed.]

Another Ukrainian group has made a practical application of nuclear reactions within certain types of metals. They are able to weld two different types of metals together by controlled excess heat from supposed nuclear reactions. Many of the combinations of metals have previously not been subject to current metal-welding technology. We first leaned of this impressive work at the Russian Cold Fusion Conference held in Abrau Durso in September, 1993. They are reporting on considerably expanded developmental efforts. See paper by Yu. A. Kornienko, Z.P. Tomza, V.I. Vysotskii, "The Cold Nuclear Fusion and the Gamma Decay Control are the Two Yields of the Controlled Rheological Process Application," Cold Fusion Source Book, Proceedings of the International Symposium on Cold Fusion and Advanced Energy Sources, Minsk, Belarus, May 24-26, 1994.

A Minsk scientist, Dr. Bulyga, has developed a new type of temperature-measuring device by sensing changes in thermionic emission (electrons boiled off from a heated surface). In so doing, Bulyga has shown that the Coulomb barrier is porous. The Coulomb barrier is the average electrical repulsion between particles of the same charge that is often shown to be able to prevent nuclear

reactions from occurring in or on a metal lattice. In gas-plasma physics, it is the Coulomb barrier that necessitates the development of huge, expensive, and so far, inefficient methods to produce fusion of hydrogen isotopes. That the Coulomb barrier is "porous" is (in the editor's opinion) a much more understandable concept than the solid-state physics idea of "tunneling". The porosity may be a space-time function in which the vigorous interaction of charged particles in a metal lattice embedded in the intense energy of space allows for local (in time and space) cancellation of charges. We will hear more about this concept in a paper by A.V. Bulyga entitled "Simulation of Self-Organization and Energy Conversion Processes in Heavily Nonequilibrium Inorganic Systems." This paper will be printed in the revised and corrected Cold Fusion Source Book.

Other reports included additional experimental work on the "glow discharge" device by Drs. Karabut and Savvatimova; proton conductors by Dr. Samgin; an excellent review report on the work funded by the Electrical Power Research Institute at SRI, International by Dr. Michael McKubre; an excellent addition to the understanding of the new Italian nickel/hydrogen device by Dr. Robert Bush; the development of multi-layered cathodes having very high heat-generating capacity per cubic centimeter of cathode material written by Drs. Miley and Batyrbekov; and many other fine papers.

In general, this conference was a success and will, I hope, become a periodic event to gather the scientists together, especially from the AIS (Affiliated Independent States) countries. Invited and selected conference papers, including most of those published in the "pre-proceedings" of the conference will be translated, edited by Hal Fox, and published in a re-issue of the **COLD FUSION SOURCE BOOK** by FIC.

PROGRESS FOR COMMERCIALIZATION

The potential for commercialization appears to be a near future event. This author has been over optimistic about the coming of the first commercial applications. However, here are some of the new energy developments which can be used to make new estimates.

In the new science of cold fusion the following developments are considered important:

1. There is no longer any reasonable doubt that excess heat is being produced in a variety of "table-top" reactors (as contrasted to huge Tokamak-type reactors.)

2. There are definite measures of the so-called nuclear ashes, specifically, neutrons and tritium have been produced and measured by many experimental groups in a variety of countries. Helium has been detected by several groups.

3. New methods by which excess heat and/or nuclear reactions are produced are continuing to be reported. The list now includes heavy- and light-water electrochemical cells, molten-salt electrochemical cells, gas-plasma devices, capillary "cold" fusion, anomalous results from electrical discharges in both gaseous and liquid-based devices, gaseous devices with controlled electro-magnetic fields, in some types of superconductors, and in proton conductors.

4. Considerable progress has been made in developing a cold-fusion theory based on fundamental principles of physics (see especially a recent paper by Robert W. Bass in Cold Fusion Source Book published by Fusion Information Center.)

5. Transmutation is an experimental fact. [Note that nearly all nuclear reactions involve the production of one or more elements that were not initially present. This nuclear effect is transmutation. Strangely, there is localized strong objection to the use of the term "transmutation" and such reports are criticized as being alchemy.]

6. In several laboratories, high rates of thermal energy of the order of 1-3 kilowatts per cubic centimeter of cathode material have been reported.

7. Applications for controlled cold nuclear fusion are being found. [Note, for example, the welding of unusual materials by nuclear reactions.]

In view of all these experimental discoveries, it is suggested that commercialization is in process and will now rapidly grow. Some of the difficulties or barriers to early commercialization of cold fusion are the following:

1. Heavy-water cold fusion reactors, usually with palladium alloys as cathodes, still suffer from considerable variation from batch-to-batch of the

palladium alloy. This problem is the primary source of difficulty with cold fusion reactors and must be resolved before commercialization is achieved.

2. Light-water cold fusion reactors appear difficult to take from laboratory to commercial sizes. Specifically, excess heat of ten times the input power is often achieved in small laboratory reactors. In larger units, it appears difficult to reliably produce output power that is three times the input power.

3. The molten-salts reactors work in highly corrosive environments and there are material problems that have to be resolved. Replication has been difficult.

4. Various types of gas-plasma reactors are also erratic in operation.

5. Other types of sparking and arcing devices have relatively low outputs of excess power.

In summary, however, these problems are typical of new technologies. We remember the early problems with transistors when the yield of usable product would vary from 10% to 90% with no apparent changes of production techniques. As progress was made, it was found that some contaminants in parts per billion could make dramatic differences in transistor yield. The transistor problems were resolved, so too, will be the replication problems in cold fusion. I have predicted, for five years, that we will have commercial applications for cold fusion within two years. Soon, my latest predictions will prove correct.

B. ST. PETERSBURG, RUSSIA - ANTI-EINSTEIN CONFERENCE

S. Grigorian (Russia) & D. Pestre (France) co-chairmen, International Conference on Space, Time, Gravitation, Program and Abstracts, May 23-28, 1994, sponsored by Russian Academy of Sciences, Research Institute of Radio and Electronics, and Institute of History of Science and Technology.

EDITOR'S COMMENTS

This conference was covered for *Fusion Facts* by Alexander Frolov of St. Petersburg. He obtained for us a copy of the program and abstracts (in English), three monographs (in English), and 23 other monographs and books (in Russian). We will be reporting on some of the topics of the conference as we receive summaries from our Russian friends who are reviewing the Russian papers and books.

Here are some highlights from various abstracts of papers presented at the conference: [Quotes is bold are the editor's]

J. Chapell, "The Incipient Erosion of Intolerance in American Physics and the Formidable Task of Completing the Process." The abstract contains the following comments: "In recent years several books and articles from within the American physics profession ... have indicated comparatively new and clearly growing suspicions about modern physics, especially as concerns the inadequate empirical grounding and lack of testability of many recent theories. **Also this year the American Association for the Advancement of Science is showing unusual tolerance by allowing criticisms of the special theory of relativity (STR) on a large scale at its Pacific Division meeting.** Among the challenges we dissidents face in further increasing the degree of tolerance is to provide better answers to the last line of defense of establishment physicists, who usually ignore criticisms of STR based on logical analysis and reinterpretations of presumed experimental confirmations: namely, the claim *`We confirm it every day in the lab.'* The circular reasoning, unsupported assumptions and other defects that surely underlie this claim need to be better identified and clarified."

M. Böhm in "A New Analysis of Michelson's Interferometer" states that from the analysis and considering metal reflection theory, it is concluded that certain modifications of the mirrors may lead to results different from null.

O. Akimov in "To the Problem of Space-Time in the Special Relativity Theory" states that "Attention is drawn to the fact that an ultimate transition from the Galilean coordinates translation to the Lorentz coordinates rotation displacement is impossible by virtue of their fundamentally different group symmetry."

S. Brusin and L. Brusin in "On Einstein's Mistakes and a Mathematical Proof of Time and Space Absolute Nature" state that to base science upon concepts of the absolute nature of time and space becomes possible due

to the unraveling of physical essence of ether which gives wide scope for the veritable development of science.

Y. Gulak in "Are the Paradoxes of the SRT Reality or Fiction?" argues that "using Newton's three laws the effect of the particle mass change with velocity in accelerators is shown to be a possible consequence of a change in the **force of interaction between the particles and physical vacuum.**"

H. Hayasaka in "Parity Breaking of Gravity and Generation of Antigravity due to the Rham Cosmology Effect on an Object's Spinning" makes the following statement: "The theory explains our experimental previous results that the right spinning of a gyro around the vertical axis caused weight decreases proportional to the frequency of rotation, and the left spinning did not cause any change in weight."

Finally, one more example from W. Van der Kamp in "Einstein: Right or Wrong?" decides that it can be demonstrated that Einstein's hypothesis in untenable.

WHAT IS A TRUE SCIENTIST?

After reading many of the implied or direct criticisms of the western view of science, one might ask, "What is a **true scientist?"** A true scientist must, first of all, be a seeker of truth. A true scientist, by my definition, **must be more dedicated to scientific fact than to theory**. To ensure communication with the reader: *a scientific fact is best defined as the close agreement of a series of observations of the same phenomenon*.

In the teaching of the scientific method it has been much stressed that if facts do not agree with the present hypothesis or with the present theory, then it is the hypothesis or theory that must be changed. Because of the widely accepted belief that the Michelson-Morley experiment (with its famous negative results) was a true scientific fact, Einstein (and others) with remarkable superb ingenuity built a theory based on the negative results, specifically, there was no ether and the speed of light was a universally fixed magnitude in vacuum, regardless of direction or frame of reference. An early result was the Special Theory of Relativity and later followed by the General Theory and by various embellishments to quantum mechanics.

As some new facts became available the most accepted theory was supported, embellished, and expanded to explain the selected new facts. Other facts that were obviously contrary to the current accepted and popular theories were ignored. By this selection of facts, science became laced with dogmas (something held as an established opinion) and science became a pseudo-science with smatterings of a religion with its classical belief structure mingled with fact. Many who had struggled mightily to learn the mysteries of science at the feet of older, learned professors were loath to change or challenge existing dogmas with new facts.

Harold Aspden's doctoral experiments with magnetism could best be explained by the existence of an energetic ether. His laboratory measurements were unassailable and were accepted. His attempts to publish his results were unacceptable because the data was contrary to the currently accepted dogma. Peter Graneau, a professor at MIT, showed conclusively that the Lorentz approach to electromagnetism did not fit his experimental data, but that the older Ampere Law was correct in all counts. He published but his papers were ignored because the data was contrary to the currently accepted dogma.

Meanwhile, with good scientific embellishments, that would at least explain the facts that could not be ignored, quantum dynamics achieved a remarkable ability to explain many of the scientific discoveries and, on occasion, to predict new discoveries. Due, I believe, to the fact that the growing field of quantum dynamics was kept closely aligned with many of the new discoveries, the equations showed that space must be energetic. In fact, a rigorous acceptance of the equations appeared to predict an infinite amount of space energy. At first this mathematical presentation was believed to be only "virtual energy" and not real energy.

Meanwhile other scientists have been (for about 40 years or more) exploring other models of reality. Stochastic electrodynamics has been used to build on the premise that space is energetic. A variety of scientists including J.A. Wheeler, T.H. Boyer, and more recently Harold Puthoff, have been having enormous successes in explaining reality (as defined by a vast array of **scientific facts**) and in predicting new exciting avenues for fruitful research.

Finally, after 75 years of the denial of the reality of an energetic space, many scientists are questioning some of

their long-cherished theories. Some are beginning to separate dogma from proven theories and to question some of the long-held theories. Among the theories being questioned are the Theory of Special Relativity. Many of our Russian friends (scientists) have not been so enamored by nor dogmatically adhering to the Theory of Special Relativity. There is now a healthy exchange of information that is being made now that the cold-war barriers have fallen. The end result is likely to be a strong resurgence of interest in alternative explanations for observed **scientific facts.** There is now an intense interest in the concept of vacuum energy and it will continue. Tapping space energy is going to be the next most interesting (and controversial) subject for discussion and for experiment.

Just as the "false" negative results of the Michelson-Morley experiment lead to a studied selection of scientific facts, so too, has the "false" negative results of some famous (or infamous) cold fusion experiments. [The term "false" as used here implies that where the results were truly negative, the experiments were flawed.] Now we have a succession of scientists, including a Nobel prize winner, suggesting that even cold fusion phenomena may be a result of the all-pervading energetic space. [These scientists include Julian Schwinger, Robert Bush, Robert Bass, et. al.]

MARSHALL THE FACTS AND RE-EVALUATE THE THEORIES

It is time to unemotionally marshall **all** of the observed **scientific facts** and re-evaluate the theories. It is time for scientists to take off their political lobbyist suits and put on their laboratory coats. It is time to dispense with pathological skepticism and use the array of brilliant minds to evaluate new explanations for the rich, new array of scientific data. It is now well known that deuterons within or on the surface of a metal lattice exhibit radically different behavior than deuterons in a gas plasma. It is well proven that capillary fusion is a reality. It is well proven that space is anisotropic. It is well proven that the Michelson-Morley experiment was flawed (as showed later by Michelson and Gale.)

The scientific facts pertaining to cold fusion will not disappear regardless of who is promoting pathological skepticism. Space energy will not disappear regardless of the most cherished beliefs of an empty vacuum. It is time to forgo the satisfaction of being a member of a peer-group who vigorously defends dogma. It is time to again become seekers of truth and not protectors of tradition. Let's marshall the efforts of the current largest number of scientists that the world has ever known. **Let's seek truth. Let's develop cold fusion. Let's tap space energy. Let's clean up this polluted world.**

C. NEWS FROM THE U.S.

CALIFORNIA - REPRODUCIBLE EXCESS HEAT

Michael McKubre, "SRI Experiments Explore Excess Heat," *21st Century Science and Technology*, Spring 1994, pp 76-80.

EDITOR'S SUMMARY

Dr. McKubre stresses several important factors that influence the reproducibility of a Pons-Fleischmann cold fusion cell. These are the loading of deuterium into the metal lattice of the cathode, the level of the current moving through the cell; the temperature of the cell, especially if there is a rapid increase in temperature after loading; and possibly the electro-chemical potential of the deuterons in the palladium lattice.

The most important contribution of this article is the graphic emphasis on what it takes to have a successful cell (one that produces excess heat).

Fig. 1 (adapted from the article) plots the resistance ratio of the palladium cathode against the loading (the ratio of deuterons to palladium atoms in the lattice). It is important to note that as a cathode is loaded with hydrogen (or deuterium) the end-to-end resistance of the cathode increases up to about a loading ratio of 0.7 deuterons per palladium atom. Thereafter, with increased loading the resistance ratio of the palladium decreases. No excess heat has been observed unless the loading ratio is in excess of 0.9 and excess heat has always been observed if the loading ratio is in excess of 0.95. Between the two loading ratio values of 0.9 to 0.95, the cell may or may not exhibit the production of excess heat. In general, the higher the loading ratio, the larger the amount of excess heat that can be expected. [Many of the negative papers, reports from experimenters who did not find excess heat, were experiments wherein the palladium cathode never did achieve a sufficient loading ratio.]

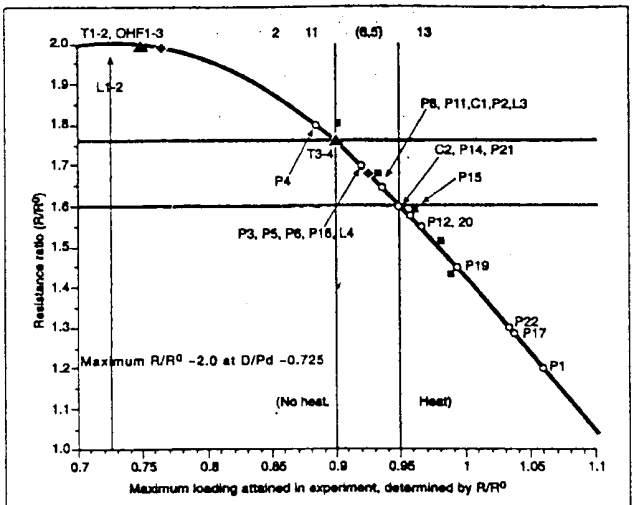


Figure 1
REPRODUCIBLE EXCESS HEAT IN RELATION TO DEUTERIUM LOADING
Cells for which the loading ratio of deuterium to palladium atoms exceeded 0.95 always produced excess heat. As palladium loads, the resistance ratio decreases. The y-axis shows the resistance ratio; the x-axis, the maximum loading ratio in the experiment determined by the resistance ratio. The maximum resistance ratio of about 2 occurred at a loading of 0.725.

McKubre discusses some of the parameters that affect the palladium metallurgy and the methods developed to determine the best methods to evaluate palladium before it is used in an electrochemical cell. In addition, McKubre describes details of the calorimetry and some of the findings that have been made at his laboratory. There is no question that excess heat is being produced in electrochemical cells. The nature of the reactions that produce this excess heat have not been fully determined.

CALIFORNIA - REVIEW OF THEORETICAL MODELS

V.A. Chechin, V.A. Tsarev (Levedev Phys. Inst., Rus. Acad. Sci., Russian Fed.), M. Rabinowitz (EPRI, Palo Alto, CA), and Y.E. Kim (Phys. Dept., Purdue Univ., W. Lafayette, IN), "Critical Review of Theoretical Models for Anomalous Effects in Deuterated Metals," *Int. J. of Theor. Phys*., vol 33, no 3, 1994, pp 617-670, 173 refs, 4 figs. [See also Bass's article page 18]

AUTHORS' ABSTRACT

We briefly summarize the reported anomalous effects in deuterated metals at ambient temperature commonly known as "cold fusion" (CF) with an emphasis on the latest experiments, as well as the theoretical basis for the opposition to interpreting them as cold fusion. Then we critically examine more than 25 theoretical models for CF, including unusual nuclear and exotic chemical hypothesis. We conclude that they do not explain the data.

AUTHORS' CONCLUSION

We conclude that in spite of considerable efforts, no theoretical formulation of CF has succeeded in quantitatively or even qualitatively describing the reported experimental results. Those models claiming to have solved this enigma appear far from having accomplished this goal. Perhaps part of the problem is that not all of the experiments are equally valid, and we do not always know which is which. We think that as the experiments become more reliable, it will be possible to narrow down the contending theories and zero in on a proper theoretical framework, or dismiss CF. There is still a great deal of uncertainty regarding the properties and nature of CF.

Of course, the hallmark of good theory is consistency with experiment. However, at present, because of the great uncertainty in the experimental results, we have been limited largely in investigating the consistency of the theories with the fundamental laws of nature and their internal self-consistency. Unfortunately, a number of the theories do not even meet these basic criteria.

Some of the models are based on such exotic assumptions that they are almost intestable, even though they may be self-consistent and not violate the known laws of physics. It is imperative that a theory be testable, if it is to be considered a physical theory.

The simplest and most natural subset of theories are the acceleration models. They do explain a number of features of the anomalous effects in the deuterated systems. However, these models seem incapable of explaining the excess energy release which appears to be uncorrelated with the emission of nuclear products, and incapable of explaining why the branching ratio $t/n \gg 1$. If these features continue to be confirmed by further experiments, we shall have to reject the acceleration mechanism also.

It is an understatement to say that the theoretical situation is turbid. We conclude that the mechanism for anomalous effects in deuterated metals is still unknown.

At present there is no consistent theory that explains or predicts CF and its specific features from first principles.

CALIFORNIA - ULTRAFAST SCANNING

S. Weiss, D.F. Ogletree, D. Botkin, M. Salmeron, and D.S. Chemla (Dept. Phys., U. of California, Berkeley, and Mat. Sci. Div., Lawrence Berkeley Lab., Berkeley), "Ultrafast Scanning Probe Microscopy," *Appl. Phys. Lett*, vol 63, no 18, 1 Nov. 1993, pp 2567-2569, 11 refs, 5 figs.

AUTHORS' ABSTRACT

We have measured the response of the tunneling gap of a scanning tunneling microscope to excitation by a sub-picosecond electrical pulse. Combining ultrashort laser pulses techniques with scanning tunneling microscopy (STM), we have obtained simultaneous 2-ps time resolution and 50-Å spatial resolution. This is 9 orders of magnitude improvement in the time resolution currently attainable with STM. The potential of this powerful technique for studying ultrafast dynamical phenomena on surfaces with atomic resolution and mesoscopic device physics is discussed.

CALIFORNIA - HYDROGEN BONDING

Quan Du, Eric Freysz, Y. Ron Shen (Dept. Phys., Univ. Cal. and Mat. Sci. Div., Lawrence Berkeley Lab., CA), "Surface Vibrational Spectroscopic Studies of Hydrogen Bonding and Hydrophobicity," *Science*, vol 264, no 5160, pp 826-828, 19 refs, 2 figs.

AUTHORS' ABSTRACT

Surface vibrational spectroscopy by sum-frequency generation was used to study hydrophobicity at the molecular level at various interfaces: water-surfactant-coated quartz, water-hexane, and water-air. In all cases, hydrophobicity was characterized by the appearance of dangling hydroxyl bonds on 25 percent of the surface water molecules. At the water-quartz interface, packing restrictions force the water surface layer to have a more ordered, ice-like structure. A partly wettable water-quartz interface was also studied.

FLORIDA - QED EXPLANATION OF CF

Jorge C. Curé (Prof. Phys., Science Consultant and Entrepreneur), "On a Probable Quantum Electrodynamic Explanation of Cold Fusion or Quantum Nuclear Chemistry," Proceedings of the International Symposium on New Energy, Denver, CO, May 12-15, 1994, pp 503-510, 6 refs, 1 table.

AUTHOR'S ABSTRACT

Theoretical conclusions, based on Newtonian relativistic electro-dynamics (NRED) and experimental results, show that the phenomenon of cold fusion is due to a new quantum transition in hydrogen atoms. Using experimental values of magnetic moments of proton, electron, and neutron, and the NRED, for a circular electronic orbit in the hydrogen atom, we obtain a quadratic equation for the orbit's radius. One solution provides the Bohr radius of normal hydrogen. The other solution gives a radius 10,000 times smaller than Bohr's radius. This latter solution points to the existence of a miniature hydrogen atom or neutron. The energy associated to a quantum transition between the hydrogen ground level to the new sub-ground level is of the order of 2 MeV, which corresponds to gamma emission.

This new quantum transition can be induced in hydrogen absorbed by the crystalline structure of metals. Decreasing the lattice constant by means of impractical extremely high pressure, or by decreasing the temperature of the metal below the liquid nitrogen temperature, we should expect the emission of neutrons and gamma rays. This phenomenon has been observed experimentally with hydrogen isotopes but not with normal hydrogen at temperatures higher than the liquid nitrogen temperature.
[The author has failed to cite the work by Dr. Randall Mills (*Fusion Technology*, vol 25, no 1, Jan. 1994, pp 103-119) in which Mills has reported reduced orbit hydrogen atoms.]

MASSACHUSETTS - COLD FUSION HEATS UP THE MAY ISSUE OF *TECHNOLOGY REVIEW*

Edmund Storms, "Warming Up to Cold Fusion," *Technology Review*, vol 97, no 4, May/June 1994, pp 19-29.

In a 10-page article by Dr. Edmund Storms, the visibility of Cold Fusion as well as its credibility just took a big

leap. *Technology Review*, edited and published by the MIT Association of Alumni, is a cross-sampling of research, technology and business in many fields of science, aimed at making the lay person knowledgeable about the overall progress of technology. In this issue, *Technology Review* provides a neutral ground from which readers may learn about the facts of cold fusion development from an established scientist (who worked at the government-funded Los Alamos National Laboratory) instead of accusations and suppositions from people who generally have not pursued cold fusion research themselves.

Dr. Storms gives an overview of the research citing both the positive results as well as the negative ones. He discusses the finicky nature of the parameters that have been proven to result in excess heat and nuclear products, and why some of the early experimenters failed to achieve positive results (because of the lack of knowledge of these parameters). It has taken nearly 5 years to refine the processes leading up to successful cold fusion experiments, there are more variables than the scientists first realized. And now that many of these parameters are known, the success in replication of the cold fusion phenomena has risen sharply.

Dr. Storms says, "*If the validity of the effect rested only on results reported during the first year after the initial claims by Pons and Fleischmann, this strange diversion from routine science would have joined "n-rays," polywater and other excesses of the imagination. But enough reputable researchers have now published findings, produced from a broad enough range of experimental approaches, that it has become difficult to doubt that something is going on outside the explanations offered by conventional physics. "*

"What is happening might be fusion; it might not be. But to dismiss the claims as the result of experimental error or fraud is no longer appropriate. Regardless of admitted conflict with accepted theory, these results strongly support the conclusion that a new class of phenomena, which I call chemically-assisted nuclear reactions, has been discovered. Given the enormous scientific and economic importance of this work if it turns out to be valid, it is prudent to examine the data with an open mind."

Dr. Storms then goes on to enumerate the evidence for cold fusion being a definite nuclear reaction, by exhibiting the presence of nuclear products in many widespread research locations. In each case (tritium, excess heat, helium) he cites examples from widely recognized facilities who have measured these nuclear "ash" products. He debunks the assertion that fraud could be at the root of the claims of cold fusion, simply by referring to the same results: many, worldwide, and repeatable.

In summation, Dr. Storms admits that we are still a ways from having a complete theory to describe cold fusion. There are several dozen models that have been published, trying for the most part to explain the overcoming of the Coulomb barrier, i.e. overcome the natural repulsion of charged particles for each other, in a cold fusion-type experiment. But none of the proposed models takes into account all the possible experimental observations that have been made. And a workable theory of the complete phenomenon is necessary in order to apply it to new energy uses.

But before a concrete theory can be put together, more research needs to be done, papers written and peer-reviewed, and results analyzed and digested. But the scientific community powers-that-be are hindering the development of the theory, by preventing the funding, patenting and publishing of the research that is needed. To quote Storms, "*Early investigations of all new phenomena tend to be incomplete, prone to error, and difficult to reproduce. Further scientific investigations require money; the more complex the phenomenon, the more money is required. But dollars tend to flow toward research with a clear chance of success. Thus many potentially important ideas never receive enough funding to enable scientists to understand them."*

Since "big business" and the government in the U.S. have listened to the skeptics, very little funding has been provided. But a few organizations are farsighted enough to be listening to the worldwide research and to begin backing U.S. research. The Electric Power Research Institute (funded by many electric utility companies) and ENECO (a company in Salt Lake City) are funding cold fusion research at several facilities.

The peer-review system has, for the most part, fallen prey to prejudice when dealing with cold fusion. Without considering the positive reports from worldwide research institutes, the editors and chosen peer-reviewers of certain important journals insist that all cold fusion is

a bogus science, and therefore will not publish any cold fusion articles. And with circular reasoning, the journals will not accept papers until more papers are published in such journals and report positive evidence for cold fusion.

Superconductors were first observed in 1911, but only recently have been widely researched. Lasers, predicted before 1920 by Einstein, are now commercially viable and widely used. Cold fusion has been harder to replicate, in the beginning, than either of these other technologies, but potentially may be the most commercially important discovery. *"It is up to scientists of all disciplines to perform the experiments and devise the theories that will transform cold fusion from a laboratory scale phenomenon into something of lasting value,"* states Storms.

Summary by Dineh Torres

EDITOR'S COMMENTS

MIT is one of my favorite institutions of higher learning with a long history of academic contributions to the advancement of science. It is especially gratifying to have the MIT Alumni magazine provide the nation with a more positive view of cold fusion in contrast to the vociferious pronouncements of the tax-money lobbyists from MIT's plasma physics laboratories. With laboratories in over thirty countries working on various types of devices that produce and control excess heat and evidence for nuclear reactions, it is timely that an MIT publication bring that institution into the real world of the new science of cold fusion.

MASSACHUSETTS - PAPER REPRODUCTION

"Cold Fusion Reproduced - on Paper," *Science*, vol 264, no 5160, 6 May 1994, p 771.

EDITOR'S SUMMARY

In a short article, *Science* magazine is reprising its detractions of cold fusion research by sniping at *Technology Review* who ran a cover story on the current situation of cold fusion in its May-June issue. (Reviewed just previous to this entry) Since MIT once was one of the main skeptics of cold fusion, this cover story has gotten an incredulous reaction from some areas. Richard Petrasso, an MIT plasma physicist who is a major skeptic, claims the article is byproduct of competition between MIT and Harvard. "If Harvard can push abductions by UFO aliens, it's only fair that MIT still has cold fusion." The UFO reference was to a recent book by Harvard psychiatrist John Mack. [Yes, but do the aliens produce excess energy? Summary by D.T.]

NEW YORK - QUANTUM - SIZE EFFECTS

Phaedon Avouris and In-Whan Lyo (IBM Research Div., T.J. Watson Res. Ctr., Yorktown Heights, NY), "Observation of Quantum-size Effects at Room Temperature on Metal Surfaces with STM," *Science*, vol 264, 13 May 1994, pp 942-945, 19 refs, 5 figs.

AUTHORS' ABSTRACT

Surface steps act as confining barriers for electrons in metal-surface states. Thus, narrow terraces and small single atom-high metal islands act as low-dimensional, electron-confining structures. In sufficiently small structures, quantum-size effects are observable even at room temperature. Scanning tunneling spectroscopy is used to image the probability amplitude distributions and discrete spectra of the confined states. Examination of the electronic structure of the steps provides evidence for electron-density smoothing and the formation of step-edge states. Estimates of the electron-confining barriers are obtained.

The charge-density distributions and field gradients resulting from confined states, such as in a growing interface, are different from those at an extended terrace. These factors are likely to influence surface processes that depend on them, such as the sticking, diffusion, and spatial distribution of adatoms and the growth of islands. The STS methods provide a powerful tool to start exploring these issues.

NEW YORK - PLAY THE JOKER

Jim Bennett, "The Joker in the Deck: The Return of Cold Fusion?" *Strategic Investment*, April 20, 1994, p 6.

EDITOR'S SUMMARY

Since dismissing cold fusion years ago when it appeared irreproducible, this writer did as many others had and

turned his attention elsewhere. While in Denver for a NASA conference in April, he was taken to visit Nova Resources Group, Inc., a private group that was recently started to produce cold fusion research devices. Then he heard about ICCF4 and the past five years of cold fusion research. He began to pay attention.

The future of stand-alone, cheap, clean power systems seems to loom on the horizon, as a threat to the large utility holdings. He reflects on the economic impact of the reality of cold fusion commercialized, and the "gold-rush" in the investment world to keep up with the perceived high-tech revolution that accompanied the commercialization.

In closing Bennett says, "We will be keeping an eye on this field, reporting future developments, and making recommendations as seem appropriate. Science and technology are games with wild cards -- every so often one turns up which unpredictably changes the whole game. The transistor was one such phenomenon; previous mainstream science had not expected it at all. Do I believe cold fusion is real? Right now I'm agnostic. It is still too early to tell whether this will ultimately produce the revolution it portends. But one thing is clear: The cold fusion joker is back."

[Summary by D. Torres]

TEXAS - GOOD NEWS - BAD NEWS

H.E. Puthoff (Inst. Adv. Studies at Austin, Texas), "Alternative Energy Sources: Good News/Bad News and `the 1-Watt Challenge'," presented at ISNE, Denver, May 12-15, 1994, 7 mms pages, 6 refs.

AUTHOR'S ABSTRACT

In researching innovative energy sources, we are faced with a good news/bad news situation. On the good news side, new arenas of research activity are being opened up and pursued vigorously. These range from relatively mainstream approaches to develop solar energy, to highly innovative approaches to extract energy from vacuum fluctuations. On the bad news side, despite varying degrees of claimed success, there are as yet no stand-alone devices in this class (with the exception of solar devices) that unambiguously demonstrate the generation of net excess energy to the satisfaction of the consensual research community.

AUTHOR'S CONCLUSION
"The 1-Watt Challenge"

Based on the above discussion, we would recommend that the surest route to credibility for alternative energy research lies in meeting what we call "The 1-Watt Challenge." This is the demonstration of a device that, on a stand-alone, self-powered basis, can continuously generate a minimum of at least 1 watt *excess* output power. Specifically, consider that one has a device that required ten watts of input power from an external source, say, a battery, but with this input was capable of generating, say, twenty-one watts of output power in the form of heat (a little over 2:1 power gain). We would argue that if one could operate alternatively by diverting twenty of those output watts through a 50%-efficient thermoelectric converter to provide the ten-watt input power, the reduction of the output from twenty-one watts to one watt would be worth the sacrifice in output power to remove the ambiguity of the measurement argument, and the reliance on a separate energy source. Clearly, since to our knowledge such operation has not yet been demonstrated to consensual satisfaction, this is a tough requirement to meet, despite the perhaps disappointingly-small-sounding, 1-watt requirement. Nonetheless, in the absence of our research community collectively "holding its feet to the fire" to meet such a challenge (and this includes our own research effort as well), we would submit that the credibility of the alternative energy research field is subject to erosion by false hopes and unsubstantiated claims. Alternatively, the satisfaction of such a requirement would provide a solid foundation for discussion and presentation of the reality of the energy developments we wish to bring to fruition. And this is a challenge I think can be met.

D. NEWS FROM ABROAD

WORLD - 6.2 MW OUT / 29.5 MW IN

J.D. Strachan et al., (in a paper bearing the names of 136 different researchers from 15 affilitating agencies in 5 different countries, reports Tokamak experiments fueled with deuterium and tritium are more successful), "Fusion Power Production from TFTR Plasmas Fueled with Deuterium and Tritium," *Physical Review Letters*, vol 72, no 22, 30 May 1994, pp 3526-3529 (22 refs, 5 figs).

AUTHORS' ABSTRACT

Peak fusion power production of 6.2±0.4 MW has been achieved in TFTR plasmas heated by deuterium and tritium neutral beams at a total power of 29.5 MW. These plasmas have an inferred central fusion alpha particle density of 1.2×10^{17} m^{-3} without the appearance of either disruptive magnetohydrodynamics events or detectable changes in Alfvén wave activity. The measured loss rate of energetic alpha particles agreed with the approximately 5% losses expected from alpha particles which are born on unconfined orbits.

In a short article in *Science News*, vol 25, no 21, 21 May 1994, writer I. Peterson points out that at the experiment at Princeton Univ. Plasma Physics Laboratory, last December 1993, which received such notoriety, there were no unexpected losses of alpha particles. The tritium-deuterium plasma used in the experiments stores obout 20% more energy than a pure deuterium plasma.

BELARUS - SIMULATED CONVERSION

A.V. Bulyga (Inst. Physico-Chem. Problems, Belarusian St. Univ., Minsk), "Simulation of Self-Organization and Energy Conversion Processes in Heavily Nonequilibrium Inorganic Systems," presented at International Symposium on Cold Fusion and Advanced Energy Sources, Minsk, 24-26 May 1994, 6 mms pages, 21 refs, 2 figs.

AUTHOR'S ABSTRACT

It is shown that the number of studies on self-organization of heavily nonequilibrium systems (HNES) of inorganic nature (IN) is scanty in comparison with, for example, similar studies of open biological systems in which such processes are the condition of their existence. For investigation of the self-organization mechanism in HNES, a physical model is suggested as a vacuum thermionic energy converter (VTEC) with a narrow emitter-collector spacing. The advantages of this model are shown on the basis of the results of the author's studies on the laboratory model VTEC with electrodes with identical work function. The prospects of VTEC's for simulation of self-organization and direct energy conversion processes in HNES IN's are discussed.

CANADA - ^{4}He

R.E.J. Florizone, J. Asai, G. Feldman, E.L. Hallin, D.M. Skopik, and J.M. Vogt (Saskatchewan Accel. Lab., U. of Sask., Saskatoon, Sask.), R.C. Haight and S.M. Sterbenz (Los Alamos Nat. Lab., Los Alamos, NM), "Simultaneous Measurement of the (γ,p) / (γ,n) Cross-Section Ratio in ^{4}He as a Test of Charge Symmetry," *Physical Rev. Lett.*, vol 72, no 22, 30 May 1994, pp 3476-3479, 21 refs, 3 figs.

AUTHORS' ABSTRACT

We have measured (γ,p) and (γ,n) differential yields at 90° for the two-body photodisintegration of ^{4}He using tagged photons of energy E_γ = 25-60 MeV. Data for both channels were obtained simultaneously using windowless ΔE-E telescopes to detect the ^{3}He and ^{3}H recoils. The ratio of our angle-integrated yields, which is insensitive to systematic uncertainties due to the simultaneity of the measurements, agrees with calculations employing only charge-symmetric nuclear interactions. Thus, within the present errors, our data show no evidence of a significant charge-symmetry violation in ^{4}He in this energy range.

CHINA - ELASTIC STRAIN ENERGY

Courtesy of Peter Glück

Da-Lin Sun, Yong-Quan Lei, Jing Wu, Qi-Dong Wang (Dept. Mat. Sci. & Eng., Zhejiang Univ., Hangzhou), and Rong Wang (Zhejiang Ctr. Modern Phys., Hangzhou), "An Explanation for the Abnormal Temperature Rise of Palladium Cathode During Electrochemical Deuterium Charging," *Science in China A*, vol 36, no 12, pp 1501-1508, 12 refs, 4 tables, 2 figs.

AUTHORS' ABSTRACT

Palladium bars in different states were used as cathodes to electrolyze the heavy water in a special calorimeter. During the seven long-period electrolysis tests, the abnormal temperature rise was observed only once. On the basis of experimental data and theoretical analysis, the possibilities of chemical and D-D fusion reactions which may cause this phenomenon were eliminated. According to our calculations, we believe that the abnormal temperature during the electrolysis of heavy

water may result from the release of the elastic strain energy accumulated in the palladium cathodes.

FRANCE - POSSIBLE THEORIES

M. Fleischmann, S. Pons (currently at Technova, Valbonne, France), and G. Preparata (Dept. Fisica dell'Univ., Milano, Italy), "Possible Theories of Cold Fusion," *Il Nuovo Cimento*, vol 107A, no 1, Jan. 1994, pp 143-156, 78 refs, 2 figs, 2 tables.

AUTHORS' ABSTRACT

We review some of the key facts in the phenomenology of Pd-hydrides usually referred to as "cold fusion." We conclude that all theoretical attempts that concentrate only on few-body interactions, both electromagnetic and nuclear, are probably insufficient to explain such phenomena. On the other hand, we find good indications that theories describing collective, coherent interactions among elementary constituents leading to macroscopic quantum-mechanical effects belong to the class of possible theories of those phenomena.

AUTHORS' CONCLUSIONS

We have shown that satisfactory explanations of the conventional behavior of hydrogen and its isotopes dissolved in metal host lattices as well as of the phenomenology of cold fusion must be based on models which take full account of the collective behavior of the proton (deuteron) and electron plasmas. As far as cold fusion is concerned this leads to ready explanations both of the reduction of the Coulomb barriers as well as of the violation of the principle of "asymptotic freedom."

A key feature of these models is that the superradiant proton (deuteron) and electron plasmas are described by macroscopic wave functions whose coupling can account both for the creation of the required initial state to allow deuteron tunneling and the dissipation of the energy in the outgoing channel. Such an argument should not come as a surprise to physical chemists at least since there is some analogy between the deuteron-electron plasma coupling and the dipole-fluctuation-induced activation of outer-sphere redox reactions. Indeed it is our view that the latter processes would be best described by the relevant macroscopic wave functions of that superradiant system. We note also that reactions at metal surfaces could well be described by the macroscopic wave functions which allow for the coupling of the reacting species to the collective modes of the electron plasmas. In the system we have considered here, a model of this kind would give an immediate explanation for the formation of the "unbound transition state" in the electrochemical discharge of hydrogen and deuterium at Pd-cathodes which we have referred to.

FRANCE - GOOD MORNING FUSION

In an interview aired May 31st, on "Good Morning America," Stanley Pons and Martin Fleischmann were recorded at their Japanese-financed research center south of Nice. While ABC ran only brief clips of the interview, the scientists did make plain their thoughts on the system bias in the United States against innovative science. "It is only guided toward making a better product, not to look at new things. And you are damned for looking at new things," said Pons.

"The public in America - and the system - has to devise a more effective way to do innovative science and technology," Fleischmann said. "If it doesn't do that, America will really slide down the scale." Speaking of current research, he told ABC, "We have been able to achieve heat output at the boiling point for 15 minutes. So now we have to devise cells which can be maintained under boiling conditions for three months because that is required in order to develop a technically useful device."

Pons displayed one of their latest cells, which he said generates about 20 watts and "is a low-power test which will give us the information we need to scale up to our goal of 10 KwH" in about 5 years.

Program host Charles Gibson and science editor Michael Guillen had previously thought the cold fusion case had been closed long ago, but have since discovered it is alive and well. They have discovered the many research labs around the world that have continued to pour time, effort and money into cold fusion, with many positive results. *Cold fusion* magazine editor Eugene Mallove, when interviewed told them that "cold fusion is too good to be true, but it's real."

Gibson and Guillen are not exactly believers yet, but they admit that something is certainly going on that we just

don't have complete knowledge of yet. "...They have half a chance of maybe having something there. It may not be the cold fusion they're talking about. But I think there's half a chance there's some phenomenon here that is unknown to us," Guillen said. "These folks just need a fair hearing, and the two or three years they were given in this country was not hearing enough. That's my bottom line." They definitely haven't heard the last of cold fusion.

[Summary by D. Torres]

ITALY - LEGAL VICTORY

"Arrivederci," small news clip in *Salt Lake Tribune*, 18 May 1994.

EDITOR'S SUMMARY

Fusion scientist Stanley Pons has won a lawsuit against *Il Giorno*, a Milan newspaper, which published two libelous articles about him in November 1991. The articles contained both ethical and religious slurs against Pons. The suit was settled in Milan Civil Court for a significant, undisclosed amount for damages.

JAPAN - REVIEW OF TECHNIQUES

Setsuo Ichimaru (Dept. Phys., Univ. Tokyo), "Nuclear Fusion in Dense Plasmas," *Reviews of Modern Physics*, vol 64, no 2, April 1993, pp 255-297, >50 refs, 12 tables.

AUTHOR'S ABSTRACT

The review begins by grouping the fundamental nuclear reactions into two classifications, namely, the usual binary processes and few-particle processes. In the few-particle processes, the possibility of electron-screened cold fusion is discussed. The special features of dense plasmas rest in the enhancement of reaction rates over these fundamental processes due to *internuclear many-particle processes.* The many-particle processes arise from a modification of the short-range correlations between reacting nuclei and are the effects related closely to differences between Coulombic chemical potentials before and after the nuclear reactions. Quantum statistical-mechanical formulation of the enhancement factors is presented. Thermodynamic functions for various realizations of dense plasmas, pertinent directly to the reaction-rate theories through the screening properties and free energies, are summarized. Those analyses are then applied to the estimation of nuclear reaction rates in specific examples of dense astrophysical plasmas, namely, the Sun, brown dwarfs, giant planets, white-dwarf progenitors of supernovae, and helium burning on the degenerate stars, as well as in those dense laboratory plasmas that are found in the inertial confinement fusion experiments, in metal hydrides such as PdD and TiD_2, in cluster-impact fusion experiments, and in ultrahigh-pressure liquid metals. The essential similarity between the nuclear fusion reactions in supernovae and those projected in the ultrahigh-pressure liquid metals is particularly emphasized.

JAPAN - SHORT LOADING TIME

Hideo Uchikawa (Dept. Teachers Ed., Meijo Univ., Tanpaku, Nagoya), Tsugio Okazaki (Dept. Phys., Meijo Univ.), and Kazutaka Sato (Aichi Prefectural Jr. College, Moriyama, Nagoya), "New Technique of Activating Palladium Surface for Absorption of Hydrogen or Deuterium," *Japan J. Appl. Phys., Part I*, vol 32, no 11a, Nov. 1993, pp 5095-5096, 3 refs, 2 figs.

AUTHORS' INTRODUCTION

Activation is carried out by heating a Pd specimen at about 600°C for several minutes in air. The activated surface is blue, and it is bleached when immersed in hydrogen gas. The blue film is identified as PdO, and the bleached surface consists of nanocrystallites of metallic Pd, as proved by electron diffraction. An activated Pd plate 0.7 mm in thickness is capable of absorbing, in 1 h, about 70 atomic% of H or D, the saturation value, in hydrogen gas of 1 atm at room temperature. The atomic ratio of H absorbed in Pd has been estimated to be about 70% when Pd metal is in equilibrium with hydrogen gas of 1 atm at 25°C. Since this value could not easily be attained in ordinary experimental studies, various activation procedures have been proposed. The present note proposes a new activation technique which is very simple and more efficient. It is useful also for D, although detailed data for H are given below.

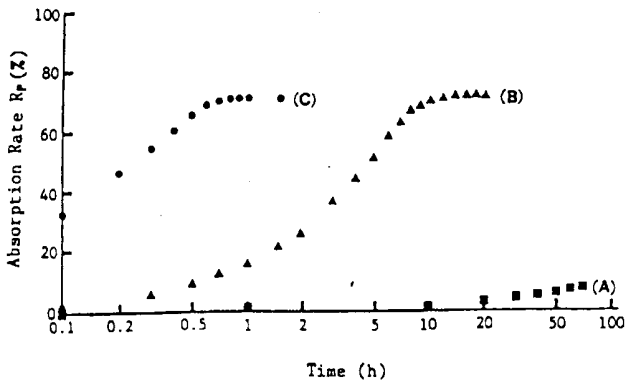


Fig. 1 Increase of R_p value with time. (A) as received from a manufacture, (B) polished with emery paper and (C) activated by the present technique.

Yamaguchi and Nishioka, in their experiment on cold fusion, required 60 h to reach the ratio D/Pd of about 60%. The present technique enables us to obtain an ideal value of 70% in less than 1 h.

NETHERLANDS - REDUCED RADIOACTIVITY

Otto Reifenschweiler (Philips Res. Labs., Eindhoven), "Reduced Radioactivity of Tritium in Small Titanium Particles," *Phys. Lett A*, vol 184, 1994, pp 149-153, 14 refs, 3 figs.

AUTHOR'S ABSTRACT

By heating a $TiT_{0.0035}$ preparation consisting of extremely small monocrystalline particles ($\phi \approx 15$ nm) a decrease of the radioactivity by 40% was observed. In further experiments the concentration of tritium in such preparations was varied (TiT_x experiments) and seems to rule out the possibility of trivial errors. A provisional hypothetical explanation is formulated. Our experiments may point to a connection with cold D-D fusion.

AUTHOR'S HYPOTHESIS

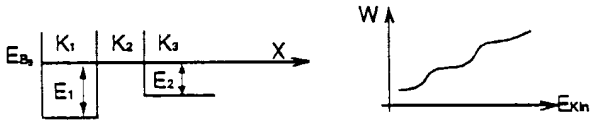
Under these circumstances it seems justified to put forward a highly unorthodox hypothesis, the nuclear pair hypothesis. If we assume that tritons absorbed in the extremely small single Ti-crystals can combine into pairs and that the decay constant of such a pair is much smaller than that of a free triton, then the observed behavior of all TiT_x experiments can be explained.

RUSSIA - TUNNELING EFFECT

Alexander Krivoshein and D. Kamaev (T.S.E., Obninsk, Kaluga region), "Tunneling Effect in Cold Fusion," presented at International Symposium on Cold Fusion and Advanced Energy Sources, Minsk, 24-26 May 1994, 1 manuscript page.

AUTHORS' ABSTRACT

The main ideas:
Radius of nuclear interaction depends on kinetic energy of nucleus and increases while kinetic energy is decreasing. Shapiro adduces results about increasing of total section interaction of ultra-cold neutrons while the speed is decreasing to ~I/V. The effective radius of nuclear interaction increases according to the low $\sim I/\sqrt{V}$ if we can suppose that nuclear interaction behaves the same. In that case W = | - γ(V), γ(V) ~ $I/\sqrt{V}$, where W is the effective radius.



Particles flying close to the nucleus stimulate excess neutron exit at the expense of tunneling effect phenomenon. The particle influence is that it stimulates the nuclei and increases the probability of excess neutron exit.

Let us consider the task of particle translation through the barrier:

$$\left(\frac{P^2}{2m} + V\right)\Psi = E\Psi \qquad \Psi(x) = ae^{iKx} + be^{-iKx}$$

Boundary conditions

$$\begin{pmatrix} a_1 \\ b_1 \end{pmatrix} = R\begin{pmatrix} a_3 \\ b_3 \end{pmatrix} \qquad a_1 = R_{11}\, a_3 \qquad \frac{B_1 = 0}{I}\Big|\frac{}{II}\Big|\frac{B_2 = 0}{III}$$

Simple calculation shows that:

$$R_{11} = e^{iK'_3 x_2 - iK'_1 x_1}\sqrt{K_1^2 - K_2^2}\,\sqrt{K_3^2 - K'^2_1}$$

$$\frac{e^{i\alpha}e^{iK_2 W} - e^{-i\alpha}e^{-iK_2 W}}{4K'_1 K'_2}$$

$$\alpha = arctg\left(i\frac{K'_2}{K'_1}\right) + arctg\left(i\frac{K'_2}{K'_3}\right) \qquad W = x_2 - x_1$$

Now it is not difficult to get tunneling coefficient

$$\rho = \frac{16K'_1K'_3K'^2_2}{(K'^2_1 - K'^2_2)(K'^2_3K'^2_2)} \cdot e^{-2K_2W}$$

$$K'^2_2 = 2(E_2 + E_1)m \cdot \frac{1}{\hbar^2}$$

According to the variables that interest us, ρ looks like

$$\rho(K'_1, W, E_1, E_2) = \frac{16K'_1K_3 \cdot 2(E_1 - E_2)m \cdot \frac{1}{\hbar^2}}{(K'^2_1 - 2(E_1 - E_2)\frac{m}{\hbar^2})(K_3^2 - 2(E_1 - E_2)\frac{m}{\hbar^2})} \cdot e^{\frac{-4m(E_1 - E_2)}{\hbar^2}W} =$$

$$= \frac{32K'_1K'_3(E_1 - E_2)m\hbar^2}{[\hbar^2K_1^2 - 2m(E_1 - E_2][\hbar^2K'^2_3 - 2m(E_1 - E_2)]} \cdot e^{\frac{-4m}{\hbar^2}(E_1 - E_2)W}$$

It is seen from that formula that the passing cofficient depends on "interaction distance" W. Besides the flying particle increases the value K (nucleus is stimulated) and so causes ρ to increase.

RUSSIA - CHARGE & MASS OF PARTICLES

L.G. Sapogin (Dept. Phys., MADI, Moscow) and V.A. Borichenko (Inst. Control Sci., Rus. Acad. Sci., Moscow), "On the Charge and Mass of Particles in Unitary Quantum Theory," *Il Nuovo Cimento*, vol 104, no 10, Oct. 1991, pp 1483-1487, 8 refs.

AUTHORS' ABSTRACT

The scalar analogue of the main (principal) equation of the unitary quantum theory together with the Poisson equation are solved numerically in this paper. The value of the electrical charge and also the fine-structure constant are found, which are in good agreement with the experiment. The evaluation of the electrical form factor and the mass of such a particle is also carried out.

RUSSIA - GLOW DISCHARGE & RADIATION

A.B. Karabut, S.A. Kolomeychenko, I.B. Savvatimova (Sci. Ind. Assoc. "Luch", Moscow, Russia), "Registration of Nuclear Radiation in Glow Discharge Experiments," to be printed in Cold Fusion Source Book.

AUTHORS' ABSTRACT

The experimental results of the nuclear product registration are presented in this paper. In our previous experiments with glow discharges in deuterium excessive release, neutron, gamma and charged particle emission have been observed. Recently we modified the experimental facilities. New measuring techniques were added. New data on emission of radiation (neutrons, gamma and x-rays, heavy charged particles, fast electrons) and on electric processes near the cathode provide clearer understanding of the specific nuclear processes involved into the reported observations. A possible mechanism for the initiation of these reactions is suggested.

RUSSIA - CATHODE IN GLOW DISCHARGE

I.B. Savvatimova, A.B. Karabut, Ya. R. Kucherov (Sci. Ind. Assoc. "Luch," Russia), "Process on the Cathode of the Glow Discharge in the Deuterium," to be printed in the Cold Fusion Source Book.

AUTHORS' ABSTRACT

Results of the impurity concentration changes in a palladium cathode after deuterium and hydrogen glow discharge experiments are presented. The concentration of some impurities increases up to 10^4 times after deuterium irradiated and to 10 times after hydrogen irradiated. Autoradiography of cathode samples shows that activity of the sample is observed after irradiation by deuterium, hydrogen, argon ions. Isotopes with different radiation energy (more and less 20 kev) exist in the cathode after experiment. The obtained results cannot be explained by the existence of a conventional fusion reaction, but may be explained by a more complex fusion-fission reaction.

TAIWAN - HYDROGEN TRANSPORT

Courtesy of Peter Glück

C.L. Chen and J.K. Wu (Dept. Marine & Mech. Eng., Matl. Prog., Nat. Taiwan Ocean Univ., Keelung), "Electrolytic Hydrogen Transport in Palladium," *J. Matl. Sci. Letters*, vol 13, 1994, pp 84-85, 7 refs, 5 figs.

AUTHORS' INTRODUCTION

P.C. Searson (*Acta Metall. Mater.*, vol 39, 1991, p 2519) reported an extremely high hydrogen absorption efficiency (86-94%) for palladium, and the mechanism for hydrogen entry into palladium involved a proton discharge followed by absorption of the adsorbed intermediate into the palladium lattice immediately. The purpose of this investigation was to study the hydrogen permeation flux through palladium from acid and alkaline solutions under various cathodic charging current densities at 25°C.

The material chosen for this study was pure palladium (99.9%) sheet. The thickness of palladium was 0.2 mm. The specimens were ground with Carbimet-SiC grinding paper down to 1000-grit. All specimens were then annealed at 910°C with vacuum furnace-cooling.

UKRAINE - INTERACTION - H & HYDRIDES

V.D. Rusov and T.N. Zelentsova (Odessa St. Univ., Odessa), "Quantitative Assessment and Time Evolution of Neutron Multiplication and Number of Active Centers of Cold Fusion in Hydride-Forming Materials," presented at International Symposium on Cold Fusion and Advanced Energy Sources, Minsk, 24-26 May 1994, 5 mms pages, 4 refs, 2 figs.

AUTHORS' ABSTRACT

Our analysis of recent theoretical papers concerning possible mechanisms of cold nuclear fusion as well as results of several experiments, particularly those presented at workshops on cold fusion brought out the following specific features of interaction of hydride-forming materials with isotopes of hydrogen:

- presence of active centers of cold fusion; their distribution is apparently in correlation with that of hydrogen isotopes' segregation locations;
- the clearly discrete character of neutron emission; the estimated life-time of one neutron burst is within the range of 10 psec - 200 mcrsec, according to Jones, and the number of neutrons in one burst is 20 ± 4.

The above features fully justify applicability of the probabilistic-statistical approach in describing the statistics of neutron emission detection to obtain more accurate parameters quantitative assessment of cold nuclear fusion, e.g. time evolution of the mean number of active centers of nuclear fusion and the mean number of neutrons <n> emitted by one active center in one burst.

UKRAINE - COLD FUSION WELDING

Yu.A. Kornienko, Z.P. Tomza, and V.I. Vysotskii (Science-industrial firm "Avacuum," Kiev), "The Cold Nuclear Fusion and the Gamma Decay Control are the Two Yields of the Controlled Rheological Process Application," presented at International Symposium on Cold Fusion and Advanced Energy Sources, Minsk, 24-26 May 1994, 5 mms pages, 7 refs.

AUTHORS' ABSTRACT

The search of the decision for the energy production and enforced waste utilization (EWU) problems in terms of the cold nuclear fusion (CNF) can be connected with the experimentally observed elements transmutation in cathode matrixes, on the one hand, and with the energy-profitable nuclear fusion process, on the other hand. The difficulties of these problems decision arise under the search on the effective action for the nuclear fusion or fission operating due to the possibility of gamma decay control (GDC). The possibility of such action, as it will be shown below, can be expected, from the controlled rheological process in the solid matrix due to the "virtual microvacuum pores" (VMP) arising.

The controlled rheological process (CRP) in the solid matrix is connected with the matrix material deformation, which provides to produce the breaking and the reconstruction of interatomic bonds in the matrix, i.e. to generate the VMP in the matrix. The CRP conditions can be realized for more than 20 metals, for example, palladium, copper, aluminum. The VMP generation process existence can be observed practically in matrices, which have the initially separated fragments, which join into unit sample, adequate to the continuous one. The particular case of the CRP can be presented by the cold welding of metals process (CW), which can be successfully used for the creating of the complex matrix constructions for the CNF and EWU.

UKRAINE - COULOMB BARRIER BREAKDOWN

V.I. Visotskii (Kiev Univ., Radiophys. Dept.) and R.N. Kuz'min (Moscow Univ., Phys. Dept.), "Mechanisms of Non-Barrier Interaction of Cold Fusion on the Basis of Non-Equilibrium Fermi-Condensate of the Few-Particle Ensemble and Pulse Two-Deuteron Localization in Microholes of Optimal Shape and Size," presented at International Symposium on Cold Fusion and Advanced Energy Sources, Minsk, 24-26 May 1994, 6 mms pages, 8 refs, 2 figs.

AUTHORS' ABSTRACT

In our articles the theory of controlled nuclear synthesis for charged particles under dynamical regime was constructed. The main ideas of this theory are connected with a drop or break-down of Coulomb barrier for target atoms due to spatial averaging under oriented motion of deuterons or tritons in the lattice. Much attention is given to optimization of nuclear reaction (d-d, t-t) for a drop or break-down of barriers for LiD compound.

E. ARTICLES FROM OUR READERS

REBUTTAL TO "NO ADEQUATE CF THEORY" CLAIM (See Chechin, et al., p 7)
By Dr. Robert W. Bass

Recently there has appeared a landmark 54-page review [1] of some 173 theoretical papers attempting to explain the Fleischmann-Pons (FP) discovery of cold fusion. The final sentences (on p. 666) are "We conclude that the mechanism for [CF] is still unknown. At present there is no consistent theory that explains or predicts CF and its specific features from first principles."

In my second contribution [2] to the F.I.C. Cold Fusion Source Book, I have referred to this "monumental" review as both "indispensable" and "invaluable." But with all due respect to the diligent authors, I had to differ from their conclusions. In the first place they had failed to cite what I regard as the single "most seminal" paper [3] on the subject, by Los Alamos hot fusion plasma theorist Leaf Turner, who called attention to the Quantum Mechanical (QM) phenomenon of Resonant Transmission through Coulomb Barriers in periodic lattices, a phenomenon well understood theoretically and well-substantiated in both nuclear and atomic physics [4].

In the second place, "my" own theory [5] (regarding which I gratefully acknowledge that I have "stood on the shoulders of giants," namely Schwinger [6], Turner [3], Bush [7, 12, 13], Parmenter & Lamb [8], and Chubb & Chubb [9]) passes every single test proposed by the cited Critical Review [1], and fills in or corrects allegedly "fatal" flaws in the works of the just-cited authors. (For example, no one has doubted Schwinger's results for small lattice perturbations, but my work extends his electrostatic/nuclear potential to be globally valid, even when the particles are near to each other.)

According to a verbal communication from Mario Rabinowitz, the most critical test which he has proposed is correct discrimination between the FP Effect rate in the Pd lattice loaded with deuterium vs. one loaded with ordinary hydrogen; however, "my" QRT theory (the subject of a June, 1991, pending patent application) passes that test. In fact, after benefitting from the discovery by Schwinger [6] that what I call, in his honor, the Schwinger Ratio $\sigma = L/\Lambda$ (where L is the deuteron-lattice period-length, and Λ is the rms oscillation amplitude of a bound deuteron in its [Absolute Zero Kelvin] Zero Point Fluctuation [ZPF] state) represents "albeit crudely" all forces at work in the lattice, I derived [using only conservation of energy & momentum together with the 1923, pre-Schroedinger, Old Quantum Theory, "Duane's Rule"] a semi-classical theory of a resonant collision between a free and a bound deuteron, dependent for its possibility upon whether $\sigma_{QRT} \equiv \sigma/\pi$ is closer to an ODD or an even integer. (Following Bush [7, 12] the inexactitude is permitted by phonon-mediated "line broadening.") This Quantum Resonance Triggering (QRT) test predicts the correct result in 7 (SEVEN!) different particle/host-lattice pair cases, only the first and third of which I had verified when I submitted my patent application. In particular the QRT test (second pair) passes the "Rabinowitz Acid Test." Furthermore, it passed the test of predicting (in June 1991) proton fusion in nickel lattices, as recently announced by Piantelli et al. following a series of experiments begun in 1992. Thus, considering the pairs:
$(Pd{\cdot}D_{1.0},\ Pd{\cdot}H_{1.0},\ Pd{\cdot}D_{2.0},\ Ni{\cdot}D_{1.0},\ Ni{\cdot}H_{1.0},\ Ti{\cdot}D_{2.0},\ Ti{\cdot}H_{2.0})$
the QRT criterion predicts (using Λ's from Scott and Talbot Chubb of the NRL [9])

$$\sigma_{QRT} = (\ 9,\ 8,\ 3,\ 9,\ 7,\ 3,\ 2.5\ ),$$

which agrees with all known empirical results.

In the second place, the most serious criticism of the Turner-Bush resonant transmission theory [12] and

experimental confirmation [13], that of Jändel [10], was (in my opinion) decisively rebutted by my theory of ZPF-line broadening of Resonant Transparency Energy Levels [5]. Unless and until an error in this rebuttal [5] can be pointed out, the Resonant Transparency approach must be accepted as valid. Furthermore, in a letter to the Editor of *Fusion Technology*, I intend to point out that the early 1989 theory of Rabinowitz himself, dependent upon an "effective" reduction of the deuteron mass by a resonant transmission effect of the lattice periodicity, is just another manifestation of the Turner-Bush-Bass resonant transparency approach. Accordingly the following chart of published results is submitted as a rebuttal to the claim that there is now no adequate foundation for a comprehensive *ab initio* QM theory of CF.

REBUTTAL TO "NO ADEQUATE THEORY" CLAIM

Theory / Theorist:	Bass	Bush	Chubbs	Kim et al.	Parmenter & Lamb	Rabinowitz & Lamb	Schwinger	Turner
1. ZPF / LV Zero-Point Fluctuations & Lattice Vibrations	•	•	•			•	•	
2. Schwinger Ratio L / Λ Predicted Importance							•	
Provided Λ for $\sigma = L / \Lambda$			•					
Predicted Value for σ	•							
3. Phonons Fusion Heat Mediation	•	•	•				•	
Inverse Mössbauer Effect Ion Excitation & De-Ex.	•	•	•				•	
4. QRT Ion Excitation Resonant Collision Criterion: σ / π = ODD	•	•						
5. Globally Valid $V(r)$ OK near Collision	•		•	•	•	•		
6. Velocity Distribution Fusion Rate Enhancement				•		•		
Resonance Line-Broadening	•							
7. Periodic $V(r)$ In Solid-state Lattice	•	•	•			•		•
8. Floquet-Bloch Thm. $(\nabla \psi) / \psi$ Required Periodic	•	•	•					•
9. Effective Δ – Mass For Periodicity of $V(r)$					•	•		
10. Electron Screening Fusion Rate Enhancement	•		•	•	•	•	•	
11. Madelung Forces Fusion Rate Enhancement	•		•		•		•	
12. Three Dimensions Mössbauer-Analysis OK			•					
Conduction Electrons in Host Lattice ($\Rightarrow \Lambda$)	•		•		•			
13. Duane's Rule for Inelastic Collisions & Resonant Transmission	•	•	•					
14. Resonant Transparency Energy Levels	•	•						•
15. Nuclear Well Present	•							
16. Heat v. Loading Pred'n		•						
17. Heat v. Current Pred'n Bush TRM fine structure	•	•						
18. Lattice Suitability for Deuterons v. Protons (QRT criterion) Pred'n	•							

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[8] Robert H. Parmenter and Willis E. Lamb, Jr., k"Cold Fusion in Metals," *Proceedings Nat. Acad. Sci.*, vol. 86 (1989); cf. *ibid*, vol. 87, (1990), pp. 3177-3179 & 8652-8654.

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[12] Robert T. Bush, "Cold Fusion: the Transmission Resonance Model Fits Data on Excess Heat, Predicts Optimal Trigger Points, and Suggests Nuclear Reaction Scenarios," *Fusion Technology*, vol.19 (1991), pp. 313-358.

[13] Robert T. Bush & Robert D. Eagleton, "experimental Studies Supporting the Transmission Resonance Model for Cold Fusion in Light Water: II Correlation of X-ray Emission With Excess Power," presented at ICCF-3, Nagoya (1992); printed in Frontiers of Cold Fusion, Universal Academy Press Inc., 1992, pp 409-416.

COULD VACUUM EXCITATIONS START A CHAIN REACTION?

By Samuel F. Faile

It is speculated that under cold fusion conditions something related to zero-point energy involving a distortion or disproportionation would produce neutral transient particles with some sort of pair relationship of negative and positive energies. These particles would be related to the vacuum fluctuations and disrupt atomic equilibrium allowing electron capture by nuclei in atomic clusters. The particles would be transient and rapidly moving. The high speed at faster than the speed of light in the medium would produce an EM `shock wave,' the telltale Cerenkov baby-blue-colored emissions. Upon decay the neutral particles instead of emitting charged particles would produce more vacuum fluctuations. An increase in the number of these neutral particles would result as atomic clusters fused leading to a chain reaction.

The implication of such a mechanism is that energetic self-sustaining cold fusion reactions would produce blue light like seen in water near a reactor core. Also the transient nature of the particles with an absence of charged decay products would be less harmful to the environment.

FREE-ENERGY INTERPRETATION OF THE PONS-FLEISCHMANN EFFECT

by A.V. Frolov, St. Petersburg, Russia

"I don't see another way out of this state... if somebody doesn't take the rest to begin the synthesis of facts and theories, although our knowledge in some areas is not complete and it is received at second hand, and although we are exposed to the danger of appearing ignoramuses." E. Schrödinger (d. 1961)

1. Matter and Time Energy Exchange

The discovery of cold nuclear fusion by Pons-Fleischmann's 1989 experiment is developing now mainly in the conventional fusion direction. This fallacy is similar to old erroneous view to nature of star power. Russian astronomer N. Kozyrev proved that there are no conditions for thermonuclear fusion process in the matter of stars, and the star doesn't loose any mass when it emits heat. By Kozyrev, the star is "machine that produces energy from flow of time," or in other words, it is free energy transformer of energy from time-view (chronal) to electromagnetic waves (heat). The thermonuclear products are only secondary effects of this process. N. Kozyrev calculated "special condition" for star matter.

From the other side, Dr. Puthoff shows that matter exists thanks to energy exchange with vacuum electromagnetic field zero-point fluctuations (ZPF). Note the analogy between Kozyrev's and Puthoff's ideas to make a conclusion for Pons-Fleischmann's experiment: the fact of nuclear fusion in this kink of cold fusion experiments is not the primary reason of over-unity effect. In most general form, the scheme of system is next: in water is immersed the cathode and anode. The cathode is metal that can absorb hydrogen ions (protons) from water when [negative] of potential source is connected to the cathode. The density of this type of "proton plasma" inside of cathode is equal to 10^{28} per m^3 that is more than the 10^{20} per m^3 density in hot-fusion Tokamak system. For this reason, most of the investigators develop the idea of

Pons-Fleischmann's experiment in the direction of cold nuclear fusion. But it is not the cause of over-unity heat emission here.

The immediate solution between the cold fusion idea and free energy idea is transmutation concept. By Randall Mills, Pennsylvania, U.S.A., it is possible to observe the transmutation of Ka-39 plus proton to Ca-40 or Na-23 to Mg-24. The same approach is described by C.L. Kervran. But transmutation is only example of utilization of "transition energy" that emits when matter changes form.

According to Dr. Puthoff, "the ground state of the hydrogen atom is defined by a dynamic equilibrium in which collapse of the state is prevented by the presence of ZPF of electromagnetic field... the stability of matter itself is largely mediated by ZPF phenomena..." Now we have the next: two atoms create new atom (fusion), atom can change form (transmutation), hydrogen atom also can take part in fusion or transmutation, **but this simplest atom can directly take energy from ZPF when the danger of the collapse of the state exists**.

In normal situation the heat emission of ground state hydrogen atom is minimal since the atom is a very economical highly effective system. Note that any matter (electron, proton, atom) use free energy source ZPF of vacuum in process of existence, but it is normally a quiet type of energy exchange. The heat emission or "temperature" of matter is directly connected with tempo of flow of time.

The solution rings as paradox: we must disturb the atom out of optimal resonance stable state. In other words, we must increase the entropy in the atom. According to Kozyrev, "the flow of time will try to counteract to entropy" in some limits, but if we use too strong motive for disturbance, the atom will change state.

2. T.E. Bearden's Concept for Hydrolysis Scheme

The main element in Pons-Fleischmann's scheme is a cathode that can absorb the protons. Fig. 1 shows an ordinary hydrolysis version. Note that current is necessary for water dissociation to hydrogen and oxygen and we must use power from primary source for it.

In P-F version, the scheme has interesting difference. The electric field between the cathode and anode makes

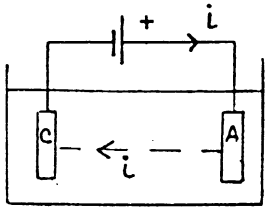


Fig. 1

work to separate charged particles. But when proton if formed at the cathode it goes into cathode. Since electric field inside of metal cathode is equal to zero, there is no longer any current. Fig. 2 shows that primary source is only potential source but not a power source. This situation continues until the cathode is saturated, and then we can observe ordinary current as in Fig. 1.

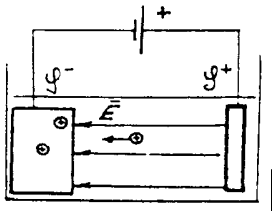
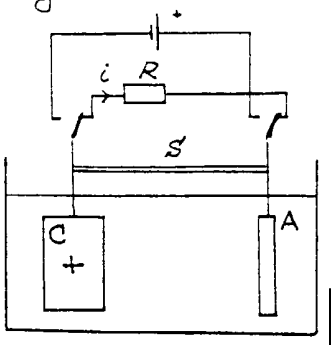


Fig. 2

By analogy with Bearden's concept that is described in "The Final Secret of Free Energy," it is possible to create pulsed mode. Fig. 3 shows the scheme of a device that uses switch S. In this state of switch, the primary source is disconnected and load R is connected to electrodes. The electric current flows from electrode C to electrode A that means electrons move from A area to electrode C through load R, since protons cannot move in wire.

Fig. 3



When this "restoration period" is finished, it is necessary to switch S and connect electrodes to primary source. The momentum of new switching is defined by period of cathode saturation.

F. MEETINGS & MISCELLANEOUS

PRELIMINARY ANNOUNCEMENT

FIFTH INTERNATIONAL CONFERENCE ON COLD FUSION
(ICCF-5)
9-13 APRIL 1995
MONTE-CARLO CONVENTION CENTRE
MONTE-CARLO, MONACO

Further progress has been made in many laboratories during the last few months in experiment design, reliability and reproducibility of results both for the generation of excess energy and the observation of nuclear products in "cold fusion" systems.

The development of various experimental devices has progressed to a point where they may be considered to be demonstration of the effect.

Theoretical treatments continue to be developed and several of these are at the point where quantitative predictions can be made.

It is therefore opportune to convene a further scientific conference to consider the significance of these new results, demonstrations, and developments in theory.

PRELIMINARY REGISTRATION

If you are interested in attending this conference, contact one of the organizations below for a Preliminary Registration Form and return before **August 15, 1994**. We expect a large attendance and we encourage you to reply as soon as possible. Please note that in view of the wide spread interest, we may be required to limit registration numbers.

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"COLD FUSION" REVIEW

The second issue of *"COLD FUSION"*, June, 1994, Vol. 1, No. 2, is a Wayne Green Publication and is filled with interesting articles on the new science of cold fusion.

Here are the articles in this issue:
How the Oil Age Ends, by Chris Tinsley.
Hot fusion: From Beginning to End, By Lawrence Forsley.
"CF" interview with Dr. M. Srinivasan, Bhabha Atomic Research Center with Russ George.
The Hydrosonic Pump: An excess energy device, by Jed Rothwell and Eugene Mallove.
Excess Heat: Key to Understanding Cold Fusion, by Jed Rothwell.
Wild and Wooly Theories, by Eugene Mallove.
AND columns by Eugene Mallove, Editor, Wayne Green, Hal Fox, Wm. A. Boas, Jr. Phillip Gothelf **PLUS** several department musings and reports.

Here are some highlights:
Page 5. Eugene Mallove: "In Italy, corporate sponsorship of the recently announced spectacular gas-phase nickel-hydrogen development at the University of Siena could lead to a demonstration unit of some kind within the next few months."

Page 8. Wayne Green: "The cold fusion field will be offering unlimited entrepreneurial opportunities. We'll be seeing more new millionaires than ever before in history, and a few billionaires."

Page 9. [Letters]. U.S. Senator Bob Smith: "I have contacted the Department of Energy in order to obtain the most current information on the status of cold fusion projects. I am awaiting a response which I will forward to you as soon as it arrives."

Page 11. [Guest Commentary] Gary L. Kissler: "What can we do then, about the increasing evidence that cold fusion and cold transmutation do exist? The answer is: We must recognize a severe case of paradigm paralysis and overcome it."

Page 13. Wm. A Boas, Jr.: A good scientific idea that defies the present consumption and capital growing pattern in a global system that measures growth, wealth, and human identity by the narrow monetary standard is not going to be well received. It is that reality that any emerging cold fusion industry must keep in perspective and work around, as it tries to set a new energy agenda in global markets."

Page 15. [Money and Markets] Phillip Gotthelf: "Among the most profound developments have been the

announcement and development of cold fusion technology. ... The profit potential is enormous. ... Licensing companies stand to gain the most in the shortest periods."

Page 23. M. Srinivasan: "I won't be surprised if the devices that eventually emerge have nothing to do with electrolysis and are completely different. I understand that Randell Mills has already shifted to gas-based systems which don't use electrolysis."

Page 26. Jed Rothwell & Eugene Mallove: "So what happens when they are confronted with a device that puts out kilowatts of apparent excess heat and seems to have nothing to do with electrochemistry?"

Page 32. Hal Fox: "Never in the history of the U.S. protection of intellectual property has an entire new science been subjected to such an obsessed, directed attack on citizen rights as has been perpetrated by one small group in the patent office."

Page 34. Lawrence P.G. Forsley: "The quest for hot fusion involved some of the greatest scientific minds of this century. It has been a path fraught with scientific revelation and error, politics and greed, and the battle of big science against little science."

Page 43. Christopher Tinsley: "As far as I know, there is as yet not a professional assessment of the effect of cold fusion on the world." [We will send Mr. Tinsley information on the book "Cold Fusion Impact in the Enhanced Energy Age, by Hal Fox.] "It has been said ... that an American dog uses more of the world's resources than does a family in India."

Page 52. David Moon: "It is generally agreed that most cold fusion effects are caused by something other than normal d+d fusion. In fact, nuclear researchers and theoretical physicists alike have inked phrases like *it's entirely new physics* and *it's not an ordinary nuclear reaction.*"

Page 59. [Washington Report] U.S. Congressman Dick Swett (D-NH): "But after 40 years and almost $10 billion of government-funded research, experts say commercial fusion energy is still at least a half-century away. ... The problem is, U.S. utilities--who are supposed to be the beneficiaries of this research--have said that even if such a reactor could be built, they would not want to buy one because of its extreme complexity, high cost, unreliability, and radioactive waste problems."

Page 61. [Media Watch] Eugene Mallove: "It matters not at all to nature that the American Institute of Physics's journalistic publications refuse to comprehend this [the reality of cold fusion], but it matters a great deal to our economic well-being. It will be amusing to see many U.S. physicists, who are now so negative, run pork-barreling to the trough of cold fusion funding ... after the complete triumph of this startling new phenomenon and source of energy."

Page 63. [Items...] Quoting Wolfgang Pauli in 1931: "I don't like this solid state physics ... though I initiated it ... One shouldn't work on semiconductors, that is a filthy mess; who knows whether they really exist?"

That is a sample of an important new journalistic event in the marching history of cold fusion development. If you are a scientist, engineer, R&D director, make sure that you continue to subscribe to *Fusion Facts*. **Regardless of your occupation**, if you can read and want to be aware of one of the greatest scientific discoveries of all time, subscribe to *"COLD FUSION"*, and become an informed pioneer in the most fascinating saga of science that we have yet witnessed.

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COLD FUSION IMPACT BOOK

Four years worth of enthusiasm and scientific research are gathered into this informative book on our enhanced energy future. Hal Fox is an authority on the subject and is now sharing with the reader his far reaching vision of all the changes that low-cost, clean, abundant energy will bring to the world. Written in a simple, non-technical style, Cold Fusion Impact is a clear and concise book that everyone who plans on living in the future needs to read. The future starts tomorrow, and we all need to be ready for the changes that will come as a consequence of the commercialization of enhanced energy systems. Available in English, Russian, and soon in Spanish.

The book is sold with an updated diskette filled with over 4 years worth of scientific bibliography covering research papers, articles and books primarily on cold fusion, with some other energy research also. The bibliography sells separately for $25. You can buy both for only $25, through this publication. Direct inquiries to *Fusion Facts* Subscription office, as listed below.

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