

FUSIONfacts

A Monthly Newsletter Providing Factual Reports On Cold Fusion Developments

ISSN 1051-8738

• University of Utah Research Park •

Copyright 1993

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

VOLUME 4 NUMBER 10

FUSION FACTS

APRIL 1993

CONTENTS FOR APRIL 1993

A. A TRIBUTE TO BILL BEIERWALTES.....	1
B. DO ELECTRON BEADS TAP ZPE?.....	2
C. NEWS FROM THE U.S.....	3
D. NEWS FROM ABROAD.....	6
E. SHORT ARTICLES FROM READERS.....	14
Thermoelectric Cold Fusion Reactors By Harold Aspden.....	14
Non-Hertzian Waves Possible Effect By Sameul P. Faile.....	17
New Science Advisor in D.C. By Dineh Torres.....	17
Thoughts on Cold Fusion By Mark Hugo.....	18
F. LETTERS TO THE EDITOR.....	19
Letter From Sam Faile.....	19
Letter From Harold Aspden.....	19
Letter From Xing-Zhong Li.....	21
G. MEETINGS AND MISCELLANEOUS.....	21

A. TRIBUTE TO BILL & LYNDA BEIERWALTES

This issue of *Fusion Facts* is being published in the week that the International Symposium on New Energy is being sponsored in Denver, Colorado by the International Association for New Science. It is fitting that this conference is being sponsored by **Bill and Lynda Beierwaltes**, who are the founders of Colorado Memory Systems, a high-tech Colorado corporation.

Bill Beierwaltes, *Fusion Facts* pays you a special tribute for your generosity and your foresight in funding this important event. The accomplished goal of this conference was to assemble the world's leading scientists, inventors, and writers concerned with New Energy Systems to meet in a two-day workshop; discuss what has, can, and should be done to make this world more energy-sufficient; and to report to the public and the media. Therefore, the workshop is followed by a two-day public conference to which scientists, inventors, public, the media, and venture capitalists are invited.

When the Department of Energy of the world's greatest industrial nation not only fails to recognize the many developments in New Energy Systems technology but participates in dispensing distorted information about one of the most thoroughly replicated new energy sources, it is especially noteworthy to find a concerned citizen that will fund this important conference. Thank you, **Bill Beierwaltes**, and may the creator of all energy especially bless you and yours.

Fusion Facts is pleased to be invited to this conference and be represented by its Editor-in-Chief, Hal Fox, as a participating member of the workshop. Hal is also chairing a Saturday evening workshop on "Theories and Models for Advanced Energy Systems." Dr. Harold Aspden, a correspondent for *Fusion Facts* is also a workshop chairman as is our friend Dr. Peter Graneau.

The following persons, who are well known to *Fusion Facts* readers, will be addressing the conference on the subjects indicated:

We Are Attending The INTERNATIONAL SYMPOSIUM ON NEW ENERGY

April 16-18, 1993

Denver, Colorado

Sponsored by the International Association
for New Science

Conference Proceedings and Report
in May *Fusion Facts*

Harold Aspden, The World's Energy Future.

Harold E. Puthoff, Quantum Zero-point Energy (ZPE), Condensed-charge Technology (CCT), and Engineering Application.

Stefan Marinov - The Self-accelerating Generator VENETIN COLIU Produces Free Energy.

John O'M. Bockris - Cold Fusion.

Moray King - The Basics of Zero-point Energy Technology.

Peter Graneau - Concept of a Capillary Fusion Reactor.

Hal Fox - Impact of Cold Fusion and Other Enhanced Energy Systems.

B. DO ELECTRON BEADS TAP ZPE?

By Hal Fox

1. A DESCRIPTION OF THE EV

Kenneth Shoulders, who discovered the EV (high-density negative charge cluster or electron bead) states in U.S. patent 5,018,180 [1] that, "An EV passing along a traveling wave device, for example, may be both absorbing and emitting electrons. In this way, the EV may be considered as being continually formed as it propagates. In any event, energy is provided to the traveling wave output conductor, and the ultimate source of this energy appears to be the zero-point radiation of the vacuum continuum." EVs have been measured to have from 10^8 to 10^{12} electrons in a toroidal ring that is about 20 microns in diameter and about 1 micron thick. This measurement has been made by launching an EV into a ceramic material in a manner that it drills a hole through the ceramic. The hole is approximately 20 microns in diameter and may be several millimeters long. It is significant to observe that the drilled hole does not change dimension as the EV travels through the solid ceramic (such as sapphire or aluminum oxide). This is a strong indication that the EV is obtaining energy from its environment. It appears that the EV performs the task of melting or vaporizing the ceramic material as it travels at about one-tenth the speed of light.

Another method of viewing the structure of an EV is to launch the EV into a thin metal film used as a witness plate and microscopically observe the damage to the metal film. If the EV travels for some appropriate distance through a vacuum (or near vacuum) before striking the witness plate, the EV appears to become organized into a ring-like structure. As shown on the witness plate, the EV makes a ring of several holes in the thin metal. This ring or circle has a diameter of about 20 microns (about the same size as the diameter of a hole drilled by an EV). A single EV can apparently be

produced but with a little more energy the EV is produced as a necklace of electron beads and apparently travels in a manner similar to a smoke ring. This author has suggested that each electron bead in an electron bead necklace is a small intensely dynamic vortex of electrons and that the electron bead necklace is a vortex of these smaller vortices.

2. THE HYDROGEN ATOM TAPS ZERO-POINT ENERGY

An early model of the hydrogen atom speculated that it consists of a very small nucleus around which an electron orbits, much in the manner of the planets around the sun. The velocity of the electron around the nucleus could be calculated, based on classical mechanics. It would appear plausible that the centrifugal force of motion would be sufficient to balance the attractive forces between the orbiting electron and the hydrogen nucleus. However, an orbiting electron emits energy and, therefore, should gradually lose energy and spiral into the nucleus. Such a general event would end matter and life as we know them.

Experimental evidence showed that the orbiting electron has a ground state below which it does not normally move. Further evidence shows that the electron at this ground state orbit size "jitters." This Zitterbewegung has been explained (at least partially) by relativistic effects. A more acceptable explanation is that at this distance from the nucleus, the orbiting hydrogen electron gives up and receives energy from its environment, from the structure of space, also called zero-point energy. This idea is nicely described by Hal Puthoff [2]. The end result is that the orbiting electron appears to lose energy to its environment, as one would expect from classical mechanics, but taps a source of energy to boost it along and therefore continues orbiting the nucleus in its ground-state orbit or orbital shell.

3. THE CASE FOR THE EV IN TAPPING ZPE

The hydrogen atom (in fact, most atoms) have a dimension that is roughly 1 Angstrom in diameter. The Angstrom is defined as 10^{-10} meters or 10^{-8} centimeters. The diameter of an EV is 20 microns or about 20×10^{-6} meters. This dimension is equivalent to about 20×10^4 Angstroms or diameters of a hydrogen atom. The EV that occupies this dimension of 20 microns consists of about 8 to 10 electron beads each of which apparently consists of from 10^8 to 10^{12} electrons.

It is strongly suggested that if the orbiting electron with a diameter of about 1 Angstrom can tap the energy of space, then these intensely compact vortices of about 100 million or

more electrons having a dimension of a few hundred Angstroms should certainly be expected to have the ability to tap the energy of space. Experimental evidence cited in Shoulders' patent shows that the EV can develop more than 30 times the amount of energy than was required to form the EV.

4. JUSTIFICATION FOR ELECTRON VORTICES

It is suggested that the electron beads are small dynamic vortices. This view is based partially on experimental evidence (the ring of holes formed in a witness plate); the knowledge that nature has a great propensity for vortices; and a mathematical solution to Maxwell's equations showing that a vortex (or an infinitely-long cylinder) is a non-Hertzian wave solution of Maxwell's equations [3].

5. CONCLUSION

Omar Khayyam is quoted as saying [4],

"Why if the Soul can fling the Dust aside,
And naked on the Air of Heaven ride,
Were't not a Shame -- were't not a Shame for him
In this clay carcass crippled to abide?"

Why if the dense charge clusters can tap ZPE, is it not a shame that we crippled by polluted energy production should abide? It is suggested that this and other methods of developing enhanced energy systems that are non-polluting, virtually inexhaustible, and inexpensive should be vigorously pursued.

REFERENCES

- [1] Kenneth R. Shoulders, "Energy Conversion Using High Charge Density," U.S. Patent Number 5,018,180, May 21, 1991, 65 pages, 97 figures, 42 claims.
- [2] H.E. Puthoff, "Ground State of Hydrogen as a Zero-point-fluctuation-determined State," *Phys Rev D*, Vol 33, No 10, May 15, 1987, pp 3266-3269.
- [3] Robert W. Bass, "Self-sustained Non-Hertzian Longitudinal Wave Oscillations as Rigorous Solutions of Maxwell's Equations for Electromagnetic Radiation," June 15, 1979, an unpublished manuscript, 4 pages, 2 figures. Also, "On Toroidal Non-Hertzian (Longitudinal) Electromagnetic Radiation Waves as an Element of Bostick's Self-confined Plasmoids," October 31, 1985, 5 pages, 2 figures, courtesy of the author. Reviewed in *Fusion Facts*, August, 1992, pp 20-21.
- [4] Edward Fitzgerald, "The Rubaiyat of Omar Khayyam," verse XLIV.

C. NEWS FROM THE U.S.

CURRENT CONTENTS MAGAZINE SPOTLIGHTS C.F.
February 8, 1993, vol. 33, no. 6, pp 3-5

Current Contents (Physical, Chemical and Earth Sciences) magazine cites a wide variety of magazines and journals to fill a lead article called "Cold Fusion: A Spark of Hope?" This magazine presents digested summaries of articles, usually in topical format. Some of the articles on the Cold Fusion theme were about Dr. McKubre speaking at MIT, new research developments vs. skeptics, NTT lab advances, Dr. Takahashi's light water experiments, MITI (Japanese Ministry of International Trade and Industry) commitment to spend millions of dollars in cold fusion research, U.S. skepticism vs. Japanese enthusiasm, and doubts of the nuclear nature of cold fusion reactions.

EDITOR'S COMMENTS

Fusion Facts welcomes the return of *Current Comments* to reporting on cold fusion developments. This series of review articles is but one of a month-long series of small but important evidences that the scientific world is accepting the reality of cold fusion. More publications are promising their readers to follow cold fusion developments. TV productions are completed or promised. Even the *London Times* is reported to have a relatively favorable article about cold fusion in process.

CALIFORNIA - PYCNONUCLEAR FUSION

S. Schramm, K. Langanke, S.E. Koonin (W.K. Kellogg Radiat. Lab., California Inst. Technol., Pasadena, California), "Pycnonuclear Triple- α Fusion Rates," *Astrophys. J*, vol 397, no 2, part 1, 1992, pp 579-583.

AUTHORS' ABSTRACT

Pycnonuclear triple- α reaction rates are calculated for mass densities at $(0.1-5) \times 10^9 \text{ g cm}^{-3}$. The plasma is presumably a fluid phase of α particles interacting through both nuclear and Coulomb potentials. It is described by Jastrow-type 2-body correlations. The many-body wave function is determined variationally within a space of trial 2-body wave functions that reproduce the expected long- and short-range behaviors of the correlations. The resulting 3-body fusion rates are compared to previous calculations.

MASSACHUSETTS - COLD FUSION TIMES

Courtesy of Mitchell Swartz

Welcome to *Cold Fusion Times*! A new monthly newsletter for those interested in the progress of cold fusion research

worldwide. Written in words a layman can understand, this first issue of *Cold Fusion Times*, covers the technical aspects of some research, as well as gives a review of the history of cold fusion, the Nagoya Conference, and a recent conference at MIT. One section contains some questions posted by cold fusion skeptics on the Internet cold fusion bulletin board, and the answers that were posted for them. The motto on the masthead proclaims, "To coldly go where no one has gone before."

MASSACHUSETTS - SURFACE CATALYSIS

Courtesy of Dr. Samuel P. Faile

Cynthia M. Friend (Dept. Chem., Harvard), "Catalysis on Surfaces," *Scientific American*, vol 268, no 4, April 1993, pp 74-79, 4 refs, 5 figs.

AUTHOR'S INTRODUCTION

When atoms on the surface of a solid interact with molecules of a gas or liquid, they may alter the structure of the molecules ever so slightly, thereby promoting unusual chemical reactions. Indeed, by investigating the interactions between molecules and the surfaces of solids, researchers have learned to synthesize a myriad of novel substances, develop chemical processes of unprecedented efficiency and remove pollutants from the environment. Yet the study of chemistry on solid surfaces will have the most impact, in my opinion, on the technology of catalysts -- substances that increase the rates of desirable chemical reactions at the expense of others."

EDITOR'S COMMENTS

In her article, Dr. Friend uses three cases of catalytic reactions that have great importance: the synthesis of ammonia from air, the breakdown of nitric acid in auto exhaust, and the removal of sulfur from fossil fuels. She ends by saying, "Yet researchers need to continue to make technological and conceptual advances if we are truly to understand how surfaces influence the bonding and structure of complex intermediates. The next decade promises major advances in experimental and theoretical methods that should give a tremendous boost to our knowledge of the complicated catalytic reactions that occur on surfaces." This newsletter suggests that Dr. Friend's comments may be far more important than she realizes. If Dr. Peter Glück, our Romanian correspondent, is correct, cold fusion is the end product of the catalysis of nuclear reactions on the surface of special metals.

MASSACHUSETTS - ATOMIC SURFACE MOTIONS

Courtesy of Dr. Peter Glück

Ing-Shouh Hwang and Jene Golovchenko (Div. Applied Sci., Harvard, Massachusetts), "Observation of Metastable

Structural Excitations and Concerted Atomic Motions on a Crystal Surface," *Science*, vol 258, 13 November 1992, pp 1119-1122, 12 refs, 4 figs.

AUTHORS' ABSTRACT

The addition of a small number of lead atoms to a germanium(111) surface reduces the energy barrier for activated processes, and with a tunneling microscope it is possible to observe concerted atomic motions and metastable structures on this surface near room temperature. The formation and annihilations of these metastable structural surface excitations is associated with the shift in position of large numbers of germanium surface atoms along a specific row direction like beads on an abacus. The effect provides a mechanism for understanding the transport of atoms on a semiconductor surface.

COMMENTS BY DR. GLÜCK

This paper is, in a way, complementary to the study of the intimate mechanism of heterogeneous catalysis presented by E. Pennisi (*Science News* staff writer) in "Microscopic Pillars Test Catalytic Theories" (*Fusion Facts*, vol. 4, no. 8, February 1993, page 6) which refers to I. Zuburtikudis and H. Saltsburg paper on page 5, this issue. Both papers are possibly related to the theories which consider the surface as the locus of the cold fusion phenomena. Another paper, dedicated to an outstandingly interesting subject, prone to some useful exchange of information with our field, (V. Lahmann, "Porous Silicon Preparation: Alchemy or Electrochemistry," *Advanced Materials*, vol. 4, no. 11, 1992, p. 762) begins with the following words: "There is a saying in the silicon community that THE BULK OF THE CRYSTAL WAS CREATED BY GOD, WHILE THE SURFACE WAS MADE BY THE DEVIL. This must be interpreted as a joke as well as the motto of the chlor-alkaline products industry, which is confronted with severe ecological problems. "God has created 91 elements, man - about a dozen, the devil only one - chlorine." However it seems that the surface is the locus of what has to be considered clearly white magic to be readily metamorphosed in normal science. The surface is the best place for the Good (including cold fusion), there's no trace of evil there!

EDITOR'S COMMENTS

This report should be compared with Neilsons' report on a similar phenomenon in which nickel atoms are transported or form on the surface of a nickel crystal in the Ni(110) direction. (see L.P. Neilsen et al., "Nucleation and Growth of a H-induced Reconstruction of Ni(110)," *Phys. Rev. B*, vol 44, no 23, Dec. 15, 1991, pp 13156-59 (*Fusion Facts*, Jan. 1992)

NEVADA - GUNNERMAN CAR RALLY

Courtesy of Dr. Samuel P. Faile

Dr. Gunnerman, the inventor of the A-55 fuel with 55% water by weight, has extended his trip to Germany where a deal with a major German auto manufacturing company may be completed soon, according to Steve Roen. The car rally in Reno, Nevada, with 10 cars will be delayed until he returns from Europe. The fuel is reported to be as good (in terms of miles per gallon) as regular gasoline if the car's engine is properly retro-fitted.

(See *FF* Feb 93, p 3 and *FF* Mar 93, p 17)

NEW MEXICO - ORIENTED NUCLEI

Chemical Abstracts, February 8, 1993

Peter Herczeg (Theor. Div., Los Alamos Natl. Lab., New Mexico), "Theoretical Aspects of Searches for New Interaction Using Oriented Nuclei," *Hyperfine Interact.*, vol 75, no 1-4, 1992, pp 127-51, 100 refs.

AUTHOR'S ABSTRACT

We review and discuss the information provided by some low-energy nuclear processes on physics beyond the standard model of the fundamental interactions. We focus on probes where nuclear orientation is either essential or helpful.

NEW YORK - POPULAR SCIENCE MAGAZINE

Courtesy of W. David Lord

Emphasizing the impact of science and technology on environmental quality, *Popular Science* magazine plans future articles to cover issues such as clean coal, non-fossil fuels, **cold fusion** and advanced fuel cells. With their July 1992 issue "Environment and Technology" they started to explore in depth the developments that will sustain our world in the future. Hopefully they will be diligent to keep their reporting non-biased, factual and up-to-date. Mr. Lord sent a letter to Mr. Fred A. Abatemarco, Editor-in-Chief of *Popular Science* along with the latest three issues of *Fusion Facts*. It would be helpful if Abatemarco would subscribe to *Fusion Facts*.

NEW YORK - INCREASING CATALYTIC RATES

Ioannis Zuburtikudis (Eastman Kodak Research Labs., Rochester, New York) and Howard Saltsburg (Dept. Chem. Eng., U. of Rochester, New York), "Linear Metal Nanostructures and Size Effects of Supported Metal Catalysts," *Science*, vol 258, 20 November 1992, pp 1337-1339, 13 refs, 3 figs.

AUTHORS' ABSTRACT

Nickel metal catalysts composed of nanometer by micrometer strips have been produced with solid-state microfabrication techniques. The strips are actually the edges of nickel-catalyst thin films, which are sandwiched between separating support layers, which are also nanometers thick. These linear nanostructures constitute well-defined and well-controlled catalytic entities that reproduce the size of traditional supported metal clusters in one dimension, thus separating size from total number of atoms in the catalyst. Examination of their catalytic activity showed that they duplicate the behavior of conventional supported clusters. A specific rate maximum was observed for the hydrogenolysis of ethane at a nanoscale dimension similar to the cluster size at which the rate is maximum in the case of the supported cluster studies, whereas the hydrogenation of ethylene shows no such size dependency. The results suggest that the surface-to-volume ratio or the number of atoms in the catalytic entity cannot be the source of these size effects and that either support effects or nonequilibrium surface structures are determining factors.

EDITOR'S COMMENTS

The catalytic surface is made by vacuum deposition of several thin layers of selected materials. This sandwich is then cross-hatch etched producing a forest of pyramid-shaped towers exposing large surface areas of the thinly deposited catalytic materials. The end result is that catalytic reaction can be increased by an order of magnitude.

WASHINGTON - NAS REVIEW OF C.F.?

Statement of the Honorable Dick Swett before the House Appropriations Committee, Energy and Water Subcommittee, March 25, 1993

Mr. Chairman, I appreciate the opportunity to testify before your Subcommittee this morning. I am here today to bring to your attention some recent developments in a remarkable new field.

Mr. Chairman, as you no doubt recall, back in 1989, University of Utah researchers Stanley Pons and Martin Fleischmann startled the world when they announced that they had created a fusion reaction at room temperature -- an effect which came to be known as cold fusion.

Their remarkable announcement, however, turned out to be premature. At that time, the cold fusion effect was not readily reproducible, and numerous researchers tried, unsuccessfully, to replicate Pons and Fleischmann's results. In response to the cold fusion uproar, the Department of Energy produced a report which said, in effect, that there was nothing to cold fusion.

Since 1989, however, researchers both here in the U.S. and around the world have continued to work on cold fusion. Pons and Fleischmann are currently based in France, funded by a Japanese group. U.S. scientists at SRI, Los Alamos National Laboratory and at various other laboratories and universities around the country report getting excess heat from cold fusion experiments. The Third International Conference on Cold Fusion was held in Nagoya, Japan last October. **Positive technical evaluations of the Nagoya conference have been submitted by researchers from MIT, the U.S. Office of Naval Research in Japan, and the U.S. Army Research Office.**

Mr. Chairman, I'm not a scientist, and so I'm not in a position to evaluate the technical merit of recent cold fusion research. It seems to me, however, that significant new advances have occurred since the Department of Energy issued their negative report back in 1989.

I believe there exists sufficient new factual evidence to warrant another comprehensive scientific review of cold fusion -- preferable done by a blue-ribbon panel of non-biased experts.

Mr. Chairman, **I would like to respectfully request that your Subcommittee consider appropriating funds for a National Academy of Sciences review of cold fusion, so that NAS scientists could evaluate the scientific validity of the work being done by current cold fusion researchers.**

Much of the hostility toward cold fusion is due to the fact that cold fusion results are inconsistent with current knowledge. I'm sure you'll agree, however, that it is the things that we don't understand that lead to breakthroughs, not the things that we already know. I think we would be making a mistake not to investigate a phenomenon with such potentially revolutionary ramifications.

Mr. Chairman, I hope you and your colleagues will carefully review this matter. I would be happy to provide you and the others Members of the Subcommittee with additional information.

EDITOR'S COMMENTS

Congressman Dick Swett is a Democrat representing New Hampshire. Congressman Swett's testimony is the direct result of considerable effort on the part of several cold-fusion advocates who, as concerned citizens decided to **do something about it**. Among our readers who are actively involved in promoting government recognition of the reality of cold fusion are Dr. Eugene Mallove, Dr. Mitchell Swartz, Jed Rothwell, Dana Rotegard, Mark Hugo, and many others. One person can make a difference, especially if there are lots of us.

WASHINGTON - CARBON CLUSTER IMPACT FUSION

Chemical Abstracts, February 8, 1993

R. Vandenbosch, D. Ye, J. Neubauer, D.I. Will, T. Trainor (Univ. of Washington, Seattle, Wash.), "Fusion Yields for Carbon Cluster Impact on Carbon Deuteride (CD₂) Targets," *Phys. Rev. A* 1992, vol 46, no 9, pp 5741-5744.

Nuclear fusion yields for the secondary reaction D + D have been measured for carbon-atom anions and carbon-cluster energies up to 324 keV. Comparison of the cluster- and atom anion fusion yields evidence of a collective enhancement for clusters as large as C₁₉. The absolute yields can be reproduced by a knock-on model. An upper limit to the fusion yield for deuterated *p*-toluenesulfonate (C₇D₇SO₃⁻) bombardment has also been detected.

D. NEWS FROM ABROAD

BRAZIL - NEUTRON EVIDENCE

Chemical Abstracts, 118, 18 March 1993

Carlo Borghi, Camillo Giori, Attilio Dall'Olio (Center for Nuclear Energy, Recife, Brazil), "Experimental Evidence on the Emission of Neutrons from Cold Hydrogen Plasma," *Hadronic J.*, vol 15, no 4, 1992, pp 239-252.

AUTHORS' ABSTRACT

The authors tried to see experimentally whether there is some interaction between electrical charges, other than the coulombic one, and whether it may produce some kind of bound states between a *p* and an *e*, electrical neutral but different from an H atom state. This requires that the stronger, and more rapid, coulombic interaction may be avoided by using a high-frequency ionizing electromagnetic field. This field succeeds in maintaining a cold plasma which consists of a considerable number of *p* mixed and colliding with an equal number of free *e*, for a time >10⁻⁸ seconds. This limit is suggested by the known average recombination time of the ionized H atom.

CHINA - ABNORMAL NUCLEAR REACTION

S.Y. Duan, S.Q. Cheng, X.M. Chen, Z.G. Yang, Q. Pan and W.S. Guan (S.W. Inst. Phys., Chengdu, China), "The Observation of the Abnormal Nuclear Reaction Phenomenon in the Deuterated Metal," preprint, 3 pages, 1 ref, 1 fig.

AUTHORS' INTRODUCTION

The deuterium ions are implanted into the palladium (Pd) or titanium (Ti) target by use of the deuterium plasma confined in a simple mirror device. Two identical BF_3 neutron detectors, no. 1 and no. 2, are located at different positions and used to measure the events of the nuclear reaction. During experiments, we use two kinds of gases to create plasma: pure deuterium (99.8% D_2 + 0.2% H_2) and deuterium mixed with hydrogen (50% D_2 + 50% H_2). The following phenomena are observed: in the case of the plasma created by mixed gas, no neutron count rate beyond the background level is detected. It means that there is no anomalous nuclear reaction to be produced. Meanwhile, in the pure D_2 plasma, after having implanted for several hours, the neutron burst can be measured and it lasts for half an hour. The highest count reaches up to 10^4 count/burst, after having been calibrated by a Ra-Be standard neutron source of 4.15×10^5 neutron/sec, it is corresponding to a neutron source with count rate of 10^7 neutron/sec. The results indicate that there is anomalous nuclear reaction phenomenon indeed in the deuterated metal system. It is suggested that fracto-accelerating fusion mode is valid to explain this phenomenon and local thermal fusion induces the cold fusion.

EDITOR'S COMMENTS

The authors create a deuterium ion beam having 7 to 10 ma and bombard either titanium or palladium targets. The source to target voltage is 8 to 10 kilovolts. Bombardment times up to nine hours are used. The experiment is reported to be repeatable.

CHINA - RESEARCH IN CHINA

Courtesy of Dr. Xing Zhong Li

Xing-Zhong Li (Dept. Phys., Tsinghua Univ., Beijing, China), "Cold Fusion Researches in China - from Confirmation to Analyzing the Mechanism," preprint, 4 pages, 3 refs.

AUTHOR'S ABSTRACT

While the number of activities was decreasing, the quality of the research activities on cold fusion was improved in the third year. Neutron emissions from the glow discharge tube with flowing deuterium gas are addressed to confirm the anomalous nuclear phenomenon. "Combined Resonance Tunneling" and the concept of "Semi-resonance" are proposed to be the possible mechanisms.

EDITOR'S COMMENTS

Dr. Li reports that after the Como conference there was a decrease in Chinese cold fusion research due to, in part, the

closing of the National Cold Fusion Institute. Prof. Long He-Quing of Sichuan Institute of Material and Technology has improved his experimental results using a glow discharge tube and has increased by ten-fold the output of neutrons to 10,000 neutrons per sq. meter per second. This experiment is reproducible. An accidental explosion of an electrolytic cell at the Inst. of Southwestern Nuclear Physics and Chemistry was analyzed and it was found that the energy released was much greater than could be explained by chemical reactions. At the Tsinghua University scientists seek to explain the Coulomb barrier tunneling by "Combined Resonance Tunneling" using the concept of "Semi-resonance." Two theoretical questions posed are: "Among the long list of questions, the first is how the Coulomb barrier is penetrated at such a low incident energy; the second is why the parameter variation in crystal scale has an effect on the reaction in nuclear scale, i.e. why the operation in 10^{-8} cm has an effect in 1^{-13} cm?"

Dr. Li continues: "In fact, these two questions were solved in fission reactor already, since the neutron needs not to penetrate any Coulomb barrier, and the resonance energy levels at low energy make it possible to control the nuclear reaction by careful design of the neutron slowing-down process in terms of macroscopic parameters. However, in the fusion reaction, the Coulomb barrier is inevitable, and no resonance energy level has been found at low energy after 20-years of searching. Fortunately, looking at the energy spectrum of ^4He nucleus there is a "Semi-resonance" level at low energy [cites H.Q. Long et al. in the Nagoya Proceedings.] "Semi-resonance" is not a resonance, but it is an energy level just in the middle of two resonance levels. When two deuterons approach each other with zero energy, the energy of two-deuteron system is 23.8 MeV higher than the ground level of ^4He . We noticed that there are two excited states of ^4He at energy levels of 25.5 MeV and 22.1 MeV. The 23.8 MeV energy level is just in the middle of these two resonances. Since "Semi-resonance" is not a resonance, the penetration of a single Coulomb barrier at "Semi-resonance" level is still impossible. Nevertheless, the combination of two "Semi-resonances" by a resonance in the crystallattice might be penetrated together. This [concept] is proved by Quantum Mechanics tunneling theory. A new formalism for W.K.B. approximation is proposed to facilitate the calculation. In parallel, a microwave experiment is done to prove this conclusion of wave mechanics."

Dr. Li proposes a close academic exchange of information to help the research efforts. Dr. Li also states that there will be cold fusion papers given at the International Conference on Plasma Physics in Changsha in 1993. Dr. Li's report ends with, "The scientific community is changing its attitude toward

this new hydrogen energy source. We may expect a new discipline of science, *Solid State Nuclear Physics*, soon."

CHINA - RESONANCE TUNNELING

Courtesy of Dr. Xing Zhong Li

Xing Zhong Li, De Zhe Jin, Lee Chang (Dept. Phys., Tsinghua Univ., Beijing, China), "The Combined Resonance Tunneling and Semi-resonance Level in Low Energy D-D Reaction," preprint, 4 pages, 2 refs.

AUTHORS' ABSTRACT

When nuclear potential wells are connected by an atomic potential well, a new kind of tunneling may happen even if there is no virtual energy level in nuclear potential wells. The necessary condition for this combined resonance tunneling is the resonance in the atomic potential well. Thus, the nuclear reaction may be affected by the action in atomic scale in terms of combined resonance tunneling. The nuclear spectrum data support this idea.

AUTHORS' INTRODUCTION

While more evidences are confirming the anomalous nuclear phenomena in deuterium/solid system, there are still two puzzles remaining: i.e. the penetration of the Coulomb barrier at low energy, and why the process in nuclear scale is affected by the parametric variation in atomic scale. It is well known in quantum mechanics that the potential barriers [surrounding a potential well in a metal lattice] may be penetrated without any reflection when the energy of the incident nucleus is in resonance with the virtual energy level of the potential well between the barriers. [The authors then use the WKB approximation and introduce the matrix for solutions of Schrodinger equations.]

EDITOR'S COMMENTS

The paper presents a mathematical solution and use the WKB connection formula to show that "When the energy of incident particle is in resonance with the meta-stable energy level in the potential well, ..., and this connection is possible, which means a perfect penetration of the barrier-well-barrier. They then state that there is no experimental evidence for this combination and the paper proposes the "semi-resonance" energy level in the deuterium-deuterium system. It will be remembered by *Fusion Facts* readers that Leaf Turner suggested the wave-like penetration of a series of barriers. It is now suggested that there may not be experimental evidence for the *d-d* reaction in electrochemical cells because the action may be a deuterium-lithium reaction.

CHINA - NEUTRON MEASUREMENTS

Courtesy of Xing Zhong Li

W.X. Liang, D.M. Xu, G.Y. Zhang, Z.L. Yao and E.Y. Wang (S.W. Inst. Physics, Sichuan, P.R. China), "Neutron Measurements in a AC-discharged Tube," preprint of paper presented at the Third International Conference on Cold Fusion, October 21-25, 1992, Nagoya, Japan, 2 pages, 2 refs, 3 figs.

AUTHORS' SYNOPSIS

A schematic diagram of the device is shown in Fig. 1 [see reproduced below]. Discharge is produced by an AC voltage (300V-600V, 50Hz) applied between two Pd coaxial electrodes in a glass tube filled with deuterium gas with pressure in the range of 0.1 to tens Torr. The neutron counts are recorded by two long counters consisting of BF_3 counter. One of the neutron detectors is close to the glass tube and another is far away from the glass tube for background neutron level measurements. After 20 minutes discharge cleaning with 350V AC, the voltage is increased to 500V, the neutron counts are suddenly increased to the level higher than 4 times of the background. Fifteen minutes later increasing a little deuterium pressure again, the neutron counts rise to a level of 10 times higher than the background (see Fig. 2 reproduced below).

On the basis of traditional electrolysis proposed by Fleischmann and Pons, a electrolyzer consisting of Pd cathode and Pt anode is placed in a solution of D_2O and LiOD is placed in a pulsed magnetic field to observe the effect of magnetic field on the electrolysis. The width, peak height and period of pulsed magnetic field are as follows: 50 microseconds, 7 Tesla and 13 seconds respectively. One of the above mentioned long counters is used to measure the neutrons from the electrolyser. From the neutron measurement results it is shown that the measured neutron counts with and without pulsed magnetic field appear to be the same.

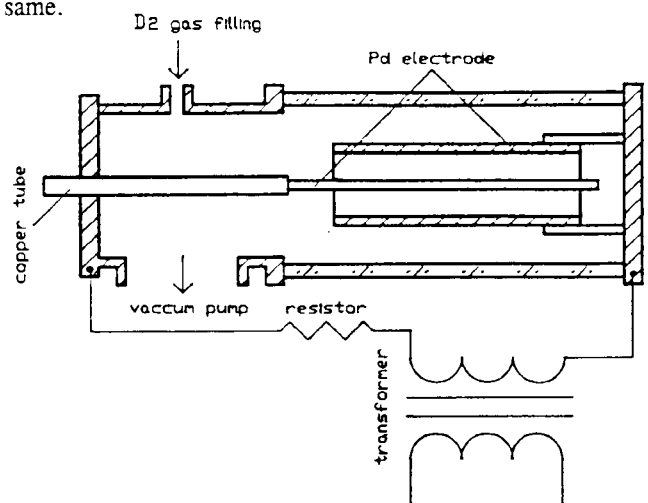


Fig. 1 Diagram of AC discharge device

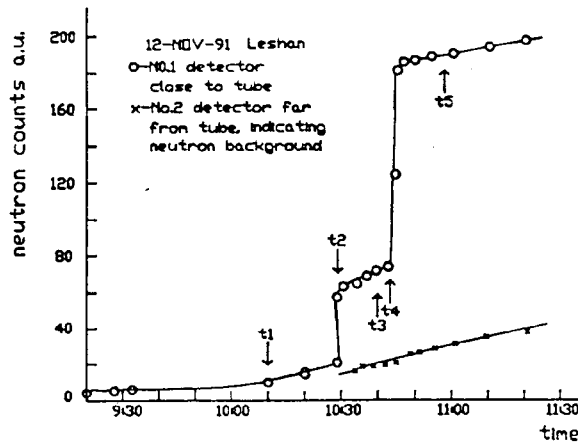


Fig. 2 Neutron counts changing with experiment condition changing. At time t_1 starts gas filling and AC voltage is 350V, at t_2 voltage raises from 350V to 500V, at t_3 gas fills further, at t_2 and t_4 neutron counts increase suddenly, at t_5 stops gas filling.

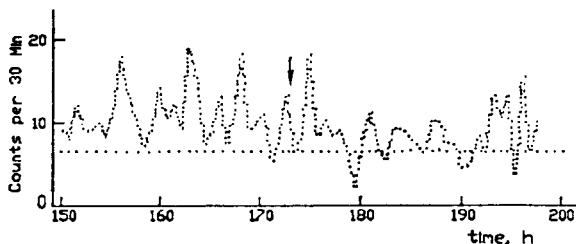


Fig. 3 Neutron count changing with time. The arrow indicates the time applying pulsed magnetic field. The straight line denotes average neutron background counts.

CHINA - MEASURING Pd/D RATIO

Courtesy of Xing Zhong Li

Da-Wei Mo, Li Zhang, Bo-Xian Chen, Yi-S Liu, Shi-Yang Doing, Ming-Yan Yao, Li-Y Zhou, Hong-Guo Huang, Xing-Zhong Li, Xian-Da Shen, Shi-Cheng Wang, Tie-Sun Kang, Nai-Zhang Huang (Tsinghua University, Beijing, China), "Real Time Measurements of the Energetic Charged Particles and the Loading Ratio (D/Pd)," preprint of paper presented at the Third International Conference on Cold Fusion, October 21-25, 1992, Nagoya, Japan, 4 pages, 4 refs, 3 figs, 3 tables.

AUTHORS' ABSTRACT

A loading D_2 gas system was built, which can measure the gas pressure, the temperature, the loading ratio, the charged particles and burst [of charged particles], in real time. The charged particles and burst were investigated successfully and the condition was found to be reproducible.

AUTHORS' INTRODUCTION

...Measurement of charged particles possess distinctive advantages. The experimental arrangement has been

developed into a real time measurement system, which can measure the temperature of the vessel, the pressure of deuterium gas in the vessel, the loading ratio of D/Pd, and the number and energy of bursts of charged particles. ...

EDITOR'S COMMENTS

This experimental apparatus must be classed as one of the best systems that we have seen for the loading of palladium with deuterium and the measurement of experimental results. If you are working in this D-gas loading of Pd wire, call us or the authors for more information.

CHINA - SOFT DIPOLE MODE

Chemical Abstracts, 118, 18 March 1993

Zhongzhou Ren, Gongou Xu (Dept. Phys., Nanjing Univ., Peop. Rep. China), "Soft Dipole Mode of Lithium-11, Beryllium-14, and Boron-17 Nuclei," *Wuli Xuebao*, vol 41, no 5, 1992, pp 720-725, in Chinese.

AUTHORS' ABSTRACT

Assuming that the ^{11}Li , ^{14}Be and ^{17}B nuclei are composed of the core and 2 outer n , the giant dipole mode of these nuclei were investigated by sum rule approach. The excitation energy and the strength of the soft dipole mode are calculated and compared with other theoretical results.

CHINA - DETECTION OF ^4He IN Ti CATHODE

Courtesy of Xing Zhong Li

Q.F. Zhang, Q.Q. Gou, Z.H. Zhu, B.L. Xio, J.M. Luo, F.S. Liu, J.X.S. (The Institute of Atomic and Molecular Science at High-temperature and High-pressure, Chengdu Univ. of Science and Tech., China) and Y.G. Ning, H. Xie, Z.G. Wang (Center of Electronic Materials Microanalysis, University of Electronic Science and Technology, Chengdu, China), "The Detection of ^4He in Ti-Cathode on Cold Fusion," preprint of paper presented at the Third International Conference on Cold Fusion, October 21-25, 1992, Nagoya, Japan, 5 pages, 5 figs, 2 refs.

AUTHORS' ABSTRACT

The Ti-cathode has been examined after electrolysis with remarkable phenomenon of 'excess heat' by SIMS. The special mass peak of 4 amu is SIMS spectra of Ti-cathode has been detected by a series of experiments. It is concluded that the mass peak of 4 amu is the mass peak of ^4He in Ti-cathode produced in cold fusion. To avoid interference of D_2 and H_2D with ^4He in SIMS spectra, the negative SIMS spectra are used in the detection of ^4He .

AUTHORS' CONCLUSIONS

Our experiments show:

1. The "excess heat" phenomenon is related to the helium products, so the process of $D + D \rightarrow {}^4\text{He} + 23.8 \text{ Mev}$ may exist in the cold fusion.
2. The method of negative SIMS is feasible for detecting He in the Ti-rod after "excess heat."

EDITOR'S COMMENTS

The authors do not relate in this paper whether the electrolysis used lithium nor do they specify the extent of the "excess heat." We shall ask the authors to please respond to this request for further information. This is the first report of finding helium in a titanium cathode that this editor remembers.

CHINA - COLD FUSION THERMODYNAMICS

Courtesy of Xing Zhong Li

Zhong-liang Zhang (Inst. of Chem., Academia Sinica, Beijing) and Shu-I Liu (Univ. of Science and Technology of China, Beijing), "Thermodynamic Theory of Cold Nuclear Fusion (C.N.F.)," preprint of paper presented at the Third International Conference on Cold Fusion, October 21-25, 1992, Nagoya, Japan, 5 pages, 10 refs.

AUTHORS' INTRODUCTION

A new discipline known as STATE-FIELD THEORY OF THERMODYNAMICS (S-F. TOT) had been established in the period 1979-1991 by Shi-I Liu. In the present paper, (S-F. TOT) was applied to set up a strict thermodynamic theoretical foundation for the problem of cold fusion.

EDITOR'S COMMENTS

The authors cite a new second law of thermodynamics, the Law of Coupling, which states: "It is impossible for a simple system to approach a high entropy state from a low entropy one with evolution of heat at the same time!" The authors then show that Cold Nuclear Fusion (CNF) belongs to a class of thermodynamics characterized by Exothermic Process with Entropy Decrease. Then the authors develop the critical values for which CNF occurs or does not occur. The authors conclude that their results are supported by some of the published data but that more experiments are needed.

CHINA - FURTHER EXAMINATION OF C.F.

Courtesy of Xing Zhong Li

Zhong-liang Zhang and Fu Tan (Inst. Chem., Academia Sinica, Beijing, China), "Further Examination of Fusion

Products and Anomalous Heat Generated During the Electrolysis of Heavy Water," preprint, 3 pages, 2 figs.

AUTHORS' ABSTRACT

In this report, a series of experiments have been conducted to examine further 'excess heat' generated by electrolyzing heavy water using palladium and platinum electrodes. This anomalously generated heat from the system using high-low current charging is different from that in systems with direct power input. Anomalous heat generation was found after a period of electrolysis. In this paper, the fusion product ${}^4\text{He}$, which is a gas product in electrolysis of heavy water, has been monitored.

EDITOR'S COMMENTS

The experimental apparatus, as shown in the diagram, uses a U-shaped tube with a platinum anode in one branch and a palladium wire cathode in the other branch. This arrangement is not consistent with the arrangement that Pons and Fleischmann use and emphasize the importance of axial symmetry for best results. It appears that the authors examined the electrolyte and not the metal lattice for helium. As part of the paper was not received, we are unsure of the final results except that, as stated, the authors did find some bursts of excess heat in over 3 months of electrolysis.

ENGLAND - PATENT GRANT IN UK

Courtesy of Dr. Harold Aspden

U.K. Patent No. 2,231,195, Dr. Harold Aspden, "Thermal Power Generation by Electrically Controlled Fusion," Date of Grant 13 January 1993, Priority Date 15 April 1993, 17 claims.

PATENT ABSTRACT

The process by which deuterons adsorbed into a palladium cathode combine to generate heat energy is enhanced under the control of an electrical current flowing around an all-metal circuit including the cathode. The current is an A.C. current very much greater than the ionic anode-cathode current involved in deuteron adsorption. It causes adsorbed deuterons to excite fusion-triggering energy fluctuations when traversing field boundaries inside the cathode in the presence of a strong electron counterflow. Deuterium may be adsorbed into the cathode by electrolysis or by a corona discharge.

ENGLAND - H-ABSORPTION IN TUNGSTEN BRONZES

P.A. Sermon and A.R. Berzins (Dept. Chem., Brunel Univ., Uxbridge, UK), "Hydrogen Sorption in Tungsten Trioxide," Metal-Hydrogen Systems, the proceedings of the Miami

International Symposium on Metal-Hydrogen Systems, 13-15 April 1981, Miami Beach, Florida, pp 451-457, 32 refs, 3 figs.

AUTHORS' ABSTRACT

The rate of absorption of gaseous hydrogen by tungsten trioxide with the formation of non-stoichiometric hydrogen tungsten bronzes H_xWO_3 is promoted by platinum. Temperature programmed desorption and volumetric isotherm measurements indicate that platinum also promotes desorption. Results show for the first time that the majority of hydrogen so absorbed may be desorbed if the temperature is raised or the pressure is reduced; up to 87% of this hydrogen being desorbed. Sorption isotherms at 423K exhibit hysteresis. Similarities and differences between this system and traditional metal hydrides are considered.

FRANCE - NEW SCIENCE CENTER

Courtesy of Dr. James McIntyre

Ted Eyring, "New Science Center Opens in France," *The Catalyst*, Univ. of Utah Chem. Dept., Dec. 1992

ARTICLE SUMMARY

On November 12, 1992 a new wing of the IMRA Europe S.A. building near Nice was formally opened and houses a new science center. The director of the center is Professor Martin Fleischmann, vice-director is Professor Stanley Pons. The new wing has three floors and 4,200 sq. meters floor area. Presently, the principal scientific research activity of the French, Japanese and other workers in the new Science Center wing is cold fusion. There is a large climate-controlled laboratory which houses a long row of as many as 40 cold fusion cells operating at atmospheric pressure. Another laboratory on the top floor will house cold fusion cells operating at elevated pressures.

The new Science Center will also be used for research to be done by short-term visitors on sabbatical or other leaves. One million dollars per year of the laboratory budget has been allocated for visitor research. Innovative research projects that have not been able to interest funders may find a home here, with priority given to energy related research that is environmentally benign.

GERMANY - H AND ANTIHYDROGEN

Chemical Abstracts, February 8, 1993

Abdel-Raouf, Mohamed Assad (Erlangen-Nuremberg Univ, Germany), "Coexistence of Hydrogen and Antihydrogen: Possible Application to Cold Fusion," *Positron Positronium Chem., Int. Workshop, 3rd*, 1990, pp 299-305.

AUTHORS' ABSTRACT

The authors' previous theory, which guarantees the existence of arbitrary 4-body molecules with symmetrical masses and charges is extended to prove the possible existence of a molecular structure composed of 2 different particle-antiparticle pairs, (e.g. e^-e^+ and $\mu^-\mu^+$). Thus, the extended version supports the possible coexistence of H and null H in the form of a quasi-molecular structure (a so-called heterohydrogen molecule). The implication of heterohydrogens for cold fusion is briefly discussed. Further implications in connection with the existence of antimatter in the universe are explored.

INDIA - COHERENT NUCLEAR REACTIONS?

Chemical Abstracts, 118, March 8, 1993

S.N. Vaidya (Chem. Div., Bhabha At. Res. Cent., Bombay, India), "On Possibility of Coherent Nuclear Reactions at Atmospheric Pressure and at High Pressures," *Recent Trends High Pressure Res., Proc. AIRAPT Int. Conf. High Pressure Sci. Technol., 13th 1991*, pub. 1992, pp 899-903.

AUTHOR'S ABSTRACT

A criterion for coherent nuclear interactions between propagating d (or n) and the N lattice nuclei is derived. The nuclear reaction rate increases by N at coherence. The coherence mechanism provides a possible explanation for $d-d$ cold fusion and also suggests a technique for production of intense γ -rays by the (n,γ) reaction. Applications to Jupiter and certain stellar objects are considered.

ITALY - LITHIUM-HYDROGEN REACTION

Chemical Abstracts, 118, 18 March 1993

A. D'Arrigo, G. Fazio, G. Giardina, A. Italiano, M. Lombardi, V.S. Olkhovsky, A. Taccone, V.D. Tchesnokova, A.K. Zaichenko (Gruppo Coll. Messina, Ist. Naz. Fis. Nucl., Italy), "Competition Between the Ground and First Excited Lithium-5 States by the ${}^6\text{Li}({}^3\text{He},\alpha p)$ Reaction at E(helium-3) = 2.0 and 2.2 MeV," *Hadronic J.*, vol. 15, no. 4, 1992, pp 303-313.

AUTHORS' ABSTRACT

The ${}^3\text{He} + {}^6\text{Li} \rightarrow \alpha + \alpha + p$ reaction was studied by detecting the $\alpha\alpha$ coincidences at 2.0 and 2.2 MeV incident ${}^3\text{He}$ energies. The data analysis shows the contributions of both the ground and first excited ${}^5\text{Li}$ states. The measured excitation energy and width of the $1/2^-$ ${}^5\text{Li}$ state are in line with the values deduced by the same reaction at incident energies of 1.65 and 1.7 MeV. Therefore, in the 1.65-2.2

MeV range, the spectroscopic parameters do not seem to depend on the ^3He bombarding energy.

JAPAN - H-H AND D-D FUSION

Chemical Abstracts, March 22, 1993

Kohji Kamada (Natl. Inst. Fusion Sci., Nagoya, Japan), "Electron Impact Hydrogen-hydrogen and Deuterium-deuterium Fusions in Molecules Embedded in Aluminum. I. Experimental Results," *Jpn. J. Appl. Phys., Part 2*, vol 32, no 1A-B, 1993, L55. [Erratum to document cited in CA117, (18):179608]

An error in equation (2) has been corrected. The error was not reflected in the abstract or the index entries.

JAPAN - TRIGGER MAGAZINE

Translation and Comments by Jed Rothwell

There is a Japanese monthly technical magazine called *Trigger*, which is published by Nikkei Industrial (Nikkei Kogyo). The March, 1993 edition, vol. no. 3 is, "a special edition on the COLD FUSION REVOLUTION," to quote the front cover:

Jed Rothwell states, "This is a superb source of information, and I urge everyone who can read Japanese to get it. Here is a quick look at the Table of Contents:

Special interview with Hideo Ikegami, by S. Tahara.

On the front lines of cold fusion research, by T. Fukami.

Document: Four years after "A sun in a test tube" is revealed, by T. Fukami.

Creative front runner: A burned hand proved the existence of cold fusion!

NTT Basic Research Lab's Senior Researcher Eichi Yamaguchi, by K. Kobayashi

A reporter tone deaf to high-tech looks at cold fusion: will cold fusion become the source of clean energy in... 100 years!?, V. Miyagawa [This article is kind of cute. -J. Rothwell]

A review of keywords and concepts relating to "nuclear energy," N. Hashimoto.

Pages 4 and 5 show a greatly enlarged closeup of Yamaguchi's hand wearing surgical glove, holding a post-experimental run spoon-shaped Au-Pd-MnO plate. The bold black on red text on page 4 says:

"Special Edition. COLD FUSION REVOLUTION. Was it the greatest discovery in the history of twentieth century science and technology? or just a mistake? ...cold fusion, the scientific mystery, has now become the target of serious, large scale scientific research, as the consensus of opinion is reached: 'no mistake about it, something is happening.' At the same time, some skeptics hang on to the opinion that 'the heat cannot be explained by the reaction products.'

"If it can be perfected, hopes now run high that it will become the ultimate energy source. This month, we zero in for a close look at just what this mysterious source of energy is, and we take an in-depth look at the researchers on the front lines."

The caption on page 5 says (among other things), "...the surface temperature of the plate goes over 100 C, and gas is liberated into the vacuum. The gas is shown to be helium 4, which proves that a fusion reaction is occurring."

This is a serious, technical magazine, so the articles get right down to brass tacks. If you have been following the cold fusion story closely, you will not find any great surprises here, but it is nice to see organized information in one place. Fukami's articles are particularly thoughtful, accurate and detailed. For example, on p. 12 he writes:

"...while Drs. Fleischmann and Pons demonstrated the most excess heat, McKubre has shown some of the most remarkable replicability, and Takahashi has succeeded in generating the longest running high heat reaction. In other words, the research is progressing on several fronts simultaneously, although not in an even fashion..."

"While others have shown significant results, I think it is fair to say that the overall leaders in the field, as a whole, are still F&P... They have achieved power densities of several kilowatts per cubic centimeter... These levels would be immediately usable in industrial applications, if it were not for the difficulty they experience sustaining the reaction. Their longest high heat run to date only lasted for several hours. Most of the power density is in the range of 10s of watts. Intensive, systematic research is now being conducted to clarify exactly what conditions are needed to sustain the high heat indefinitely..."

"F&P's cathode is not 100% palladium. It is... an alloy containing carefully controlled amounts of silver, cerium, lanthanum, and tiny, trace amounts of lithium-6... Crystal grain size is also carefully controlled to a range of 10 to 14 microns..."

Page 18 has rather scathing descriptions of MIT's R. Parker, *Nature* Magazine, and former Pres. Arima of Tokyo U., who was Japan's leading skeptic and is now thankfully retired. It points out that most cold fusion experiments take a long time to load and begin generating heat, but the experiments done

under Arima lasted only a short time. It points out that successful workers like McKubre and Okamoto had to work day and night for years before they were finally able to achieve success, whereas the skeptics dismissed the whole business "in the first weeks of the controversy." Page 18 also features a nice photo showing one of Japan's leading HF&CF G.O.M. [hot fusion and cold fusion Grand Old Man] sound asleep in the front row of a recent CF conference.

The Ikegami interview is full of interesting tidbits, including a complete listing of the New Hydrogen Energy Panel (NHEP - a consortium organized by MITI consisting of 15 companies) membership and lead researcher names. It gives the reader a good sense of Ikegami's thinking and policies. It is vintage Hideo. He is a forceful, dynamic person, who never hesitates to call a spade a spade. He is charming and forthright as usual. He touches on the history of cold fusion, mentioning some of the work in the '30's; he praises the Russian program; he explains the on-going planning at MITI; and describes the "scenario" needed to develop practical applications.

The Yamaguchi interview gets into the details. It explains how they have been applying MOS computer chip manufacturing techniques to CF R&D. It includes a lot of personal details about Yamaguchi, and descriptions of his earlier work in semiconductors.

The glossary starting on page 30 is great for people like me. It has exact definitions and kanji for words like "nucleon" & "nuclide;" and it includes a brief history of National Inst. of Fusion Science and the JT-60 tokamak, a cutie-pie illustration, etc. (In case you are wondering, the cutie-pie is saying "so far guys, we can pull it off with a magnet or laser..." and she is aiming that laser beam at the JT-60, which is a telling motion, in my opinion).

I wish I had time to translate more of this Great Stuff, and the many other documents coming to me from Japan. /s/ Jed Rothwell.

NEW ZEALAND - ADAMS MOTOR & GRAVITY

Courtesy of Dr. Samuel Faile

Robert Adams (46 Landing Road, Whakatane, New Zealand), "Adams Breaks the Gravity Barrier," *Nexus*, April-May 1993, pp 47-49, 2 figs.

NEXUS EDITOR'S INTRODUCTION

Inventor Robert Adams appears to have broken the gravity barrier, with his advanced Adams Electric Motor Generator operating in a high state of resonance and apparently tapping gravitational energy.

EDITOR'S COMMENTS

The statement that would cause any scientist to ignore this article is the following: "The equations and methods of application in design procedures, however, remain, at this stage, secret. The efficiency figures possible from the device are such that they simply cannot be published." A standard practice would be for an inventor to protect his/her invention by filing patent applications. The next step would then be to permit or promote the publication of detailed information about his/her invention.

However, the claims are interesting, especially on the eve of the International Symposium on New Energy. Adams claims, "The results of these first trial tests have been superseded, with the new figures obtained being found beyond anything that is known of in the present-day field of free energy research. There is every possibility that these latest figures, also, will be surpassed in the near future." Adams claims that, "Mr. Bruce Cathie, an internationally recognized New Zealand researcher in this field", has helped him with certain unspecified harmonic equations. Adams relates, "Bruce Cathie and I spent an entire day together in January, 1993 going over his harmonic equations in regard to my advanced machine, and confirmed that it was running in an advanced state of resonance, **harnessing gravitational energy and demonstrating evidence of the magnets forming a 'gate' to harness one half-cycle of the gravitational pulse**, but doing no actual work over and above the 100%."

In a separate portion of the article where Adams is responding to comments by Dr. Rolf Schaffranke, Adams advises, "There are secrets and mysteries surrounding magnets and collapsing field energies, and only after exhaustive studies of these two phenomena in practice, do these mysteries unravel themselves and emerge in their glory, and, correctly applied through the use of the required mathematics, pave the way to tapping gravitational energy in astronomical quantity." Adams does promise the readers of *Nexus*, "...some further such tidbits of information will be drip-fed..."

Robert Adams may have invented the greatest energy machine of all time, however, it would be more plausible if he wrote with precision, without the hype (e.g., "incredible energies can be very easily and cleanly made available."), and with graphs, charts, and tables of data. In other words, if he wrote a good engineering article, his story would be more believable. It is this lack of precision, and not lack of interest, that strongly discourages the review and publication of reports on many over-unity inventions. *Fusion Facts* has an open policy to review scientific and engineering reports on cold fusion and other enhanced energy devices. We receive many reports that are anecdotal, or promise to have a working unit soon, or claim that their invention(s) are so revolutionary that they have been kept from their work by one of the following: the science mafia, government agents, the oil

cartel, the military, or the one-world government. For the record, the staff of *Fusion Facts* believe that they have done much to promote the world-wide acceptance and use of cold fusion. The reality of cold fusion as a new energy source is now widely accepted and commercialization is being planned. *Fusion Facts* has proclaimed that future energy costs (by the commercialization of cold fusion enhanced energy systems) are expected to be about one-fourth of current energy costs. Several subscribers to our newsletters are members of the oil or power "cartel"; members of the military; government laboratories; scientists of many specialties; and government offices. We have been visited twice by "government agents" (to obtain specific information from our collection); many times by scientists; a few times by employees of the oil or power "cartels". We have crossed swords with some of the scientists who are the most vocal opponents of cold fusion. **We have never been threatened, brow-beaten, warned, or attacked; rather we have been encouraged, complimented, and applauded.** We even count among our new-found friends, the likes of Dr. Morrison and Dr. Huizenga, who will admit that they hope that this (or some other discovery) is the answer to the world's increasing energy needs. We thought you would like to know. Hal Fox, Editor-in-Chief.

RUSSIA - COLD FUSION MECHANISM

Chemical Abstracts, March 22, 1993

A.G. Lipson, V.A. Kuznetsov, D.M. Sakov, B.V. Deryagin (Inst. Fiz. Khim., Moscow, Russia), "Yield of Cold Fusion Products During Energy Absorption by Metal Deuterides," *Dokl. Akad. Nauk*, vol 323, no 6, 1992, pp 1097-1101.

AUTHORS' ABSTRACT

A possible mechanism is discussed for the cold fusion reaction, which is realized during an excess of compressional energy in a metal-D system and allows one to explain the asymmetrical yield of products of the *dd*-reaction in both channels. Such a condition can be treated both by an external mechanical action on the given system as well as in the process itself of deuteration of metals as a consequence of the lattice compressional stress. As an example, the generation was examined of nuclear fusion products during the individual actions of cavitation and electrolysis on the surface of a Ti vibrator. The anode in this case was Pt.

RUSSIA - Au / Pd / PdO NEUTRONS

Chemical Abstracts, February 8, 1993

A.G. Lipson, B.V. Lyakhov, B.V. Deryagin, D.M. Sakov (Inst. Fiz. Khim., Russia), "Parallel Recording of the Pulsed Thermal Effects and Neutron Bursts in Gold/Palladium/Palladium Monoxide Heterostructures Saturated with

Deuterium by Electrochemical Means," *Pis'ma Zh. Tekh. Fiz.*, vol 18, no 20, 1992, pp 58-63, in Russian.

AUTHORS' ABSTRACT

In connection with cold fusion phenomenon, the interrelation between thermal and nuclear processes in Au/Pd/PdO heterostructures saturated with D was studied and found to be nonexistent. In the experiments, cold-rolled Pd foil (30- μ m thick) was used (containing 99.9% Pd) with a working area of 2.5 cm². The PdO layer was formed on the surface by short-term annealing at 1000° and was ~200 Å thick. Teflon was used to coat one surface of the foil and a Au electroplate ~200 Å. Teflon was used to coat one surface of the foil and a Au electroplate ~5000 Å thick was applied to the other surface from a cyanide bath. Further treatment purified the samples from the usual H which can penetrate them in the Au electroplating process. Electrolysis was conducted on a closed cell with separate cathodic and anodic compartments using a Pt anode and a 1M solution of NaOD in D₂O as the electrolyte. The current density was 10-30 mA/cm². A gas thermometer was used to record the thermal effect up to the end of the electrolysis. Proportional counters were used to record the neutrons produced.

E. SHORT ARTICLES FROM READERS

THERMOELECTRIC COLD FUSION REACTORS

By Harold Aspden, Sabberton Research
Southampton, England

ABSTRACT

Thin film bimetallic stacks fed by heat input can provide high frequency electrical output power with an extremely high efficiency. The author here discusses the convergence of aspects of this technology and recently reported findings from cold fusion research. It is suggested that deuterated bimetallic stacks may ultimately provide direct electrical power output from the fusion reaction.

The author is co-inventor of an 'electronic heat engine' which comprises a stack of thin film bimetallic elements. By causing the stack to be the seat of electrical current oscillations transverse to an applied temperature gradient, an astoundingly high efficiency of thermoelectric power conversion has been obtained.

Research effort is presently still focused on the diagnostic testing to track the cause of the very high efficiency, pending which publicity has been avoided. However, as a result of recent disclosures [1,2] commercial and industrial interests are expressing interest in this development. Of particular interest

is the highly efficient and very rapid way in which this solid state panel-structured device can use low voltage dc power to freeze water and, in reverse mode, generate electricity efficiently from warm water input or ice. The invention offers a non-polluting solution to the problem of practical refrigeration with no CFC gas or potentially explosive fluids. The technology only awaits the development of optimum manufacturing techniques for the multilayer thin film structures plus final determination of optimum dimensions, metal combinations, and excitation frequency. The coefficient of performance of the first prototype demonstration devices already assembled without the benefit of research and development to ascertain the best design already exceeds by a factor of two state-of-the-art non-CFC ice cube making machines currently being marketed.

As part of this effort and with an eye to events in the field of cold fusion, the author has for some time seen the potential emergence of common technological features, as between the thin film cold fusion research and the Strachan-Aspden 'electronic heat engine'. The time has come to present what the author sees as a way forward in merging the two technologies and the stimulus for this proposal is the *Fusion Facts* [Dec. 1992, page 37] report on recent developments in Japan.

Firstly, it is noted that one design problem that has arisen with the Strachan-Aspden device is that the thin film bimetallic stack provides a direct heat conduction path between the hot and cold heat sink surfaces. This has meant using infill layers of low heat conduction and the three prototype devices built to date have all used a polymer sheet material having two thin film bimetallic coatings on each face. With this construction the transverse current oscillations had to be set up in what was a series-connected capacitor stack and highly tuned high frequency resonance was the only way of getting sufficient current flow. In principle, however, the stack could comprise alternate layers of the two metals used, without there being any spacer layers, but then the power rating in terms of heat transfer rates to the heat sinks would pose formidable problems.

The technology faces the unusual challenge of working at too high an efficiency, which makes us feel that there is something in the physics of the process that we still do not understand. Furthermore, the design of the converter section has to be engineered down from its very high throughput power potential to the levels which suit heat input rates.

It is expected that the development of cold fusion reactors will pose the opposite and complementary problem that too much heat energy is being released, with the result that heat transfer problems will restrict their onward development. Moreover, there is another complementary factor. If heat input is supplied from an external heat source that heat has to be transferred through a layer of electrical insulation to reach

the bimetallic junctions in our 'electronic heat engine'. There is, of necessity, a loss of efficiency because there is a temperature drop associated with that heat transfer. In contrast, the excess heat generated by cold fusion is produced **in the metal** and so does not have to traverse an insulator if that metal is a functioning part of the thermoelectric power generator.

The question then raised is whether that cold fusion heat can be generated by an action concentrated on one side of a deuterated bimetallic stack so that the energy can be removed as electricity directly by thermoelectric action. One would still need to remove heat to cool the low temperature side of the stack. That is a lesser problem, but the combination of the heat source and the converter into a common unit might well solve problems for both.

The secret of the Strachan-Aspden technology is the use of transverse excitation with thin bimetallic films, of which the two metals have opposite Thomson coefficients. This causes an electric current to circulate around the metal circuit located between the hot junction and the cold junction, the current being powered exclusively by the action of heat in migrating the positive and negative charge carriers in the same direction in both metals. This means that the current flow direction is opposite in the two metals. When heat differentials are applied, the Peltier EMFs at the junctions act in the lateral sense and are opposed in direction as between alternate junctions on each side of the stack. By then allowing just enough current to flow as an oscillation in this transverse sense, through what is an extremely low resistance, the superimposition of the two current flows always results in power being drawn from that Peltier EMF to cool one side and heat the other.

Now, it is noted that the NTT Japanese press announcement reported in *Fusion Facts* on page 37 of the December 1992 issue declared that thin films were used in which palladium was first filled with deuterium and then a thin layer of gold was deposited on top of that film. Upon applying heat to this composite structure, there was a trigger effect by which the temperature of the palladium suddenly rose several hundred degrees. The production of helium-4 evidenced the fusion reaction.

Note then that gold and palladium form a bimetallic thermocouple structure. Note that gold and palladium have opposite Thomson coefficients, as required by the Strachan-Aspden technology. Note that when heat is applied, presumably in a way that involves thermal gradient, that must signify a circulating thermoelectric current. Given that this current will be transported by the free charge carriers and that these have opposite polarity, separating at the Peltier cooled junction and combining at the heated junction, in a kind of pair creation and pair annihilation activity, we see how there

can be preference for deuteron fusion at one or other of these junctions.

This leads the author to wonder whether one can build a device in the form of a deuterated bimetallic stack and, by the lateral excitation technique of the Strachan-Aspden invention, seek to extract electrical power directly. It is still assumed that one needs to feed current through the palladium host metal to enhance the cold fusion activity and this is why the NTT (Yamaguchi) observations, in which deuterons were absorbed from gas under pressure, are of special interest to this thermoelectric bimetallic proposal. By using two metals and a heat input the current flow occurs and it should be noted that flow in a closed circuit thermoelectric path can be in excess of 1,000 A/cm². Yet such current, to the extent that it is powered by the Thomson Effect, does not develop any ohmic heating. It is migratory current driven by the heat differential.

One could, on this basis, imagine bimetallic blocks being assembled in a reactor, much as carbon 'brush' connectors are used in electrical machines. They would be located in housings and spring pressure applied to secure end contacts for the transverse oscillatory output current. The heat would be generated from the deuterium preloaded into the blocks and one side of the housing would be cooled by fluid at atmospheric temperature to set up the operating temperature differential.

Since there is no neutron production, the handling of components of such a reactor would avoid the usual hazards and reap all the advantages of aneutronic energy generation. There are nuclear reactions which produce energy without significant neutron release. They are proton-based and involve interaction with another light element. This subject has been discussed at length by Bogdan Maglich in a report [3] which predates the excitement aroused by Fleischmann and Pons and, against the background of this earlier aneutronic debate, one really must wonder why there has been so little tolerance of the no-neutron aspect of cold fusion.

Another link with an item in the December 1992 issue of *Fusion Facts* is the theme of superconductivity. Note that the cooling action of current traversing a junction between an electropositive metal and an electronegative metal involves the creation and separation of an electron and a positive 'hole'. This act of creation occurs in the zero-point energy field and the particles appear at a temperature of zero Kelvin. In merging with the environment by collisions within the metal these particles heat up and in so doing cool the junction. Each event involves 3kT of cooling and so the Peltier EMF is 3kT/e or about 260 μ V/°K. Now, this implies that the cooled junctions are regions where superconductivity on a local scale might occur owing to the charge carriers being extremely cold. Since the Peltier EMF powers the current flow there is the possibility of some very high current surges with

accompanying electric field build up as part of the junction's transient activity. This then bears upon the comments in the Yabuuchi paper referenced on page 36 of the December 1992 issue of *Fusion Facts*.

Furthermore, the latter paper refers to phenomena in cracks in the Pd structure, arising from lattice vibrations and it is of interest here to draw attention to the European Patent Application of Luigi Bagnulo [4]. This patent application which has a first priority date of 14 June 1989 concerns the absorption of deuterium in metals by electrolysis or gas-pressurizing, followed by consequent liberation building up high pressure within cracks, which in turn can lead to fusion.

Reverting, however, to the main theme of this article, and the feasibility of manufacturing laminated bimetallic blocks filled with deuterons, there is the 'Thin Film Electrode' paper referenced at page 8 in the December 1992 issue of *Fusion Facts*. This shows that interest is developing in electron effects occurring at junctions between two metals and the fabrication and testing of structures of typically 20 layers of 200 angstrom thick Ti alternate with 150 angstrom thick Fe. This compares with the Strachan-Aspden devices in which a similar number of layers of 400 angstrom thick Ni alternating with 200 angstrom thick aluminum reveal interesting thermoelectric action with anomalously-high energy effects.

The author can but wonder, therefore, whether one can merge the two technologies by deuterating bimetallic stacks with the object of producing electricity directly from the excess heat generated.

The key point to remember about the Strachan-Aspden bimetallic stack is that, owing to their opposite electrical polarity, when heat moves through the metals parallel to their interfaces the effect is to set up a negative resistance in the stack at right angles to those interface surfaces. This is conducive to electrical current oscillations supplying output power fed by the heat source.

References

- [1] H. Aspden, 'The Electronic Heat Engine', SAE Technical Series Paper No. 929474, Intersociety Energy Conversion Engineering Conference Paper, San Diego, California, August 3-7, 1992.
- [2] H. Aspden, 'Electricity without Magnetism,' *Electronics World*, pp. 540-542, July 1992.
- [3] B. Maglich, 'Aneutronic Energy - Search for Nonradioactive Nonproliferating Nuclear Power,' New Energy Technology Planetary Association for Clean Energy Conference Proceedings, Hull, Québec, Canada, pp 191-199, 1988.

[4] L. Bagnulo, 'A process with relevant plants and devices for the production of energy through the industrial application of plausible dynamics concerning so-called controlled cold nuclear fusion,' European Patent Application No. 0402988, published December 19, 1990.

Summary of Ways Non-Hertzian Waves Could Reduce the Coulombic Barrier to Fusion.

By Dr. Samuel P. Faile

Recently, I have suggested the following possibilities:

1. The longitudinal non-Hertzian waves can bring the string-like character of particles into ordinary space so that like charges can join into beads with the charges traveling along an extended interconnected mass string at nearly the speed of light producing strong plasmoid-like toroidal helical structures. The strong magnetic field (allowed by moving charges along a neutral mass string in a massless charge state) is extremely high since the charges can move at speeds approaching the speed of light. The extreme strength of the magnetic field helps hold the structure together. Such a bead of electrons (EV entities?) can provide screening of positively charged nuclei, thus reducing the Coulombic repulsive force. If positive nuclei formed into string-like structures the fusion would be even more direct since one would have polarized charges that would allow many nuclei to join together under the action of strong force.

2. The non-Hertzian longitudinal waves instead of rotating the mass string into ordinary space, could move the charge along the mass string out of ordinary space and into hyperspace. Then one would be left with invisible non-Coulombic mass particles in ordinary space that could be moved and superimposed in the state of another lattice or mass in ordinary space. After the invisible object was shored into another visible object, the non-Hertzian waves could be turned off leaving two ordinary Coulombic objects adjusting to the reality of occupying the same space at the same time. Many nuclei could be so close that the Coulombic force would be surmounted allowing the strong force to produce fusion. Materials partially transmuted plus a mosaic structure of the original materials would form new composites.

3. A fairly mundane possibility is that the longitudinal waves could exert a fairly still compressional force on the neighboring atoms akin to an Ampère force. The wave action could be less obvious since some of the material would be simultaneously undergoing **rarefaction**. Nevertheless, some of the particles (during these collective coherent excitations of the EM field) could be subjected to a high compressional force leading to fusion.

4. The action of the non-Hertzian waves connected to 8-dimensional complex Minkowski space could involve space-

time transformations leading to unmasked advance wave phenomena (extended time vistas) while producing compensating gaps in ordinary space. The temporary gaps or increased roughness of the space-time form could leave some nuclei abruptly within fusion distances with the Coulombic barrier surmounted. This could lead to the melding of objects with some transmutation such as illustrated in the "Philadelphia Experiment" story.

Thus the non-Hertzian waves could produce filamentary material continuums, neutral particles, strong compressional forces, and space gaps which would reduce the Coulombic barrier. Presumably the intensity and frequency would be major factors when using the non-Hertzian waves and fusion (or other effects) could be more easily realized, in some instances, by using superconducting non-inductive coils.

[Please note the reference to a non-Hertzian solution of the Maxwell equations on page 2 of this issue. Ed.]

NEW SCIENCE ADVISOR IN D.C.

A news summary by Dineh Torres

John H. Gibbons is President Bill Clinton's new science advisor, unanimously confirmed by the Senate. He was also made a member of the new Economic Policy Council, which is expected to play a major role in implementing the administration's economic plans. The plans for economic growth and for environmental conservation need to have a balance maintained between them. This was a major agreement point between Gibbons and Vice President Gore. Gibbons remarked, "It's that conviction that a wise use of technology can provide human amenities with far less environmental impact, far less use of material resources, that is compelling both of us."

Gibbons has the background to be perfectly suited to the job. He has seen science and technology from a variety of perspectives: bench scientist, academician and entrepreneur as well as administrator and policy advisor. He was trained in physics, receiving his doctorate from Duke University in 1954, and spent the next 15 years at Oak Ridge National Laboratory doing research in nuclear physics. In 1960, Gibbons initiated a program at Oak Ridge which concerned ways to conserve energy and minimize the environmental impact of energy production and consumption. In 1962, Gibbons and some co-workers started a company that sold radiation detectors and other instruments. Though that company was eventually sold to EG&G, he also served on the boards of several other companies. He says this business experience should help him fulfill the administration's goals of building "new, productive bridges of cooperation and co-venturing between the private sector and the people of this nation."

In 1973, Gibbons went to Washington to head the first federal program on energy conservation. He also directed the U. of Tennessee's Energy, Environment and Resources Center, and in 1979, he came to Washington again to head the Office of Technology Assessment for the next fourteen years.

To sum up what he sees as the essence of his new job, Gibbons says he hopes to "give the president and the vice president and other members of government -- and in fact the American people -- more effective access to the specialized knowledge of science and technology." He foresees ruffling more feathers on his new job than he did at OTA, though. Scientists looking for greater support and funding for basic research may not be too happy with some of Gibbons ideas. Some of the big science projects that have been primarily symbols of American ambition and scientific prowess may need to attract commercial and international support to survive.

Gibbons says, "There are many things we really not only can't, but logically shouldn't, do on a national basis." He cites the space station, the Superconducting Super Collider, the Human Genome Project and the effort to build a hot fusion reactor as examples. The internationalization of science "could be one of the most important things in the human experience," he claims. This should be an interesting four years.

[*Fusion Facts* sent him a letter offering to provide cold fusion information to his alternate energy specialist. To date no answer has been received. Ed.]

THOUGHTS ON COLD FUSION

By Mark Hugo

Courtesy of *Futurics* magazine

Upon actually starting to write what I believe the Future would be like with a limitless, personally portable, energy source, I find myself quite frightened! I would be a little like someone trying to predict the impact of the automobile and the electric light bulb about 100 years ago. We may recall that many of the services of the automobile and the light bulb were already available, i.e., the general public could move about quite freely on the publicly available transit of the day (and, in the case of the rail-road and street-car connections, at a fairly reasonable rate), and also with gas lamps and arc lights, there was in place, a fairly reasonable lighting system. However, the vast revolution that a more personalized and available incarnation of these services and devices would bring could hardly be anticipated by my grandparents.

But, I will now make myself a "great grandparent" and try to anticipate what the "next great revolution in personal freedom" will bring.

First of all, I should state that I believe we WILL achieve a replacement of petroleum automobiles with cold fusion based automobiles. Let's consider what this will mean. The move toward public transit will suffer a great blow because two of the primary driving forces for public transit will have disappeared, i.e., conservation of petroleum resources and the resultant "pollution" problems. Please note: This will NOT clear up the traffic congestion, that will have to be the result of public works to improve streets and freeways. But also note, there will come from this revolution an emphasis on philosophy and ideals: i.e., there will be a cadre of people who will bemoan quite loudly the death of interest in public transport. In fact, I am quite sure these people will bring out the hue and cry about "the poor," those without resources, etc. To which I will note that another of our current "revolutionary" inventions will probably bring the cure, and that being the **microprocessor**. I have great faith that self-steering vehicles will be available in the future. And I see NO reason why a public system of self-driven buses should not continue to serve those who do not own or care to drive their own vehicle. I also think that with infinite range, cold fusion transit, questions about waste of fuel, personnel time, etc., which may cause discontinuation of less-traveled routes (much to the dismay and true inconvenience of some people) will become moot.

Back to the individual transport cold fusion cars: These will form the basis for an "industrial" revolution. What I mean by this is that because we spend only a small amount of time driving our autos, (average of 2 hours a day?) the 100 Kilo-watt electric power system that will be in the automobile would remain idle, or merely dumping to resistance heat dissipation unless put to better use. The current electrical systems around the world are quite capable (thanks to Nicolai Tesla's fine work) of allowing a small power source to "backfeed" into the electrical power system. When one adds to this inherent capability the ability to mesh such individual generating systems with the system enhanced by the use of SCR (Silicon Controlled Rectifier) technology, one can see the following possibility: The closure of major utility generation plants. This closure could occur if one proposes having 200,000 vehicles in a metro area such as Minneapolis/St. Paul feeding 100 Kw into the grid consistently. This combined input would total 20,000 Megawatts which would seem to be more than adequate when compared with the current peak usage of 7000 MW and average use of around 5000 MW. However, we must not forget the community heating demands that range as high as another 10,000 to 15,000 MW at peak. Therefore, we can imagine the "vehicle excess power" to give us an ideal match with our peak demands.

Those schooled in the advantages of unit size versus cost per kilowatt; the traditional "returns to scale" view may object. I will not challenge your view. I will, however, note that because everyone needs transport, and because a cold fusion driver could be made to last for many years and perhaps be

transferable from chassis to chassis, the overall \$/KW capacity of individual cold fusion auto/generators may appear significantly higher, at first analysis, than a typical large fossil or nuclear power plant -- the near-zero (effective) fuel cost for the cold fusion power system, combined with the dual use, could make this combined small generating systems competitive with metropolitan-sized power plants. Also, as much as I may personally have philosophical objections to the PURPA (Public Utilities Resale and Purchase Act), it has established the legal (and in many cases the technical) mechanisms to make the sale of power from a multitude of generators to a central distribution source not only possible, but probable, given the existence of the generators. If one were to place the price of a cold fusion automobile as high as \$75,000, it may seem too expensive for transportation. However, if that cold fusion automobile were generating \$20/day of income -- or \$600/month, the vehicle cost would seem much more reasonable. Plus, you would normally be paying \$150 to \$300/month for an automobile anyway. In addition, the cold fusion auto will probably cost under \$20K for the body and the power plant. It may be that you would have an automobile power plant that could also be used to provide heat and electric power for your home use. If you combine the value of all these services, a cold fusion automobile costing \$50K could make sense for many individuals.

Eventually, much of the US will be run from such power sources. An interesting speculation is the following: Because long distance transmission of power does involve a loss factor, and because of the existence of major urban areas, we will continue to see heavy power-consuming industries locate in or near large urban areas. We could also expect a resurgence of the great American "small town" as people could enjoy a greater freedom with the integral cold fusion energy system. The smaller communities may be combined with the self-driving cold fusion vehicle. Where would you be willing to live if you could step into a comfortable, SLEEPABLE, vehicle at quitting time and snooze while your car carried you home, even a hundred miles distant. The reality of this speculation will have to be left to the future. I would hope that the speculation above will provide enough food for thought to increase your interest in the future of cold fusion.

F. LETTERS TO THE EDITOR

BOEING AND THE C.F. BORON INVENTION

By Dr. Samuel P. Faile

I called Albert M. Momeny at the Boeing Commercial Airplane Group in Seattle and asked about their European patent involving his invention "Cold Nuclear Fusion Thermal Generator." He says that for many years there has been a pattern of clues involving cold fusion. A lot of work was done by others using light hydrogen in the mid-eighties with

Russian work going back to the fifties. Boeing filed this patent application, based on the various clues, to protect the aircraft company position in the aircraft business. They selected a specific area where they believe cold fusion has to go if it is to succeed. Other researchers are also investigating this approach using boron. Momeny said he would inform me if these non-Boeing efforts succeed.

If success is achieved by others and Boeing obtains a patent, they would willingly license others. A logical application would be an aircraft engine manufacturer such as Pratt & Whitney or G.E. He did not indicate any opposition to the idea that a smaller company might want to develop the invention prior to obvious aerospace implementation.

I mentioned my post-doc observation that dehydrated beryl, with or without a past history of attempts to load it with molecular hydrogen, had a tendency to glow in the dark for as long as an hour after irradiation with soft x-rays. Beryl, the near neighbor of beryllium, contains boron. He said observations such as this are not considered strange at Boeing as they have vast amount of data on boron and other materials due to availability of an extensive survey.

In regard to the overall cold fusion field, Momeny said that in such places as Japan, Russia, and India, the major successes, in general, have not been publicized. [And maybe he isn't reading *Fusion Facts*. Ed.]

LETTER FROM HAROLD ASPDEN

A COMMENT ON 'CAPILLARY FUSION'

I wish to comment on the reference in *Fusion Facts* (February 1993) to the Graneau work and that of Rambaut and Vigier concerning Ampère's electrodynamic law and the experimental evidence of longitudinal propulsive forces in ionized filamentary flows.

The law of electrodynamics has been a research topic of mine for many years in connection with energy and force anomalies.

There are essentially four distinct physically-rounded, non-arbitrary ways of formulating the law governing the non-Coulomb part of the interaction force between two charges in motion. The Lorentz law is based on the prescription that the force which one charge exerts on the other always acts at right angles to the motion of the charge acted upon. By physical definition this means that no energy can be fed from the first charge to another charge or vice versa by virtue of the electromagnetic interaction. This result has to be the consequence of acceptance of this form of Ampère's law. That, indeed, is an interesting facet of what physicists have chosen to adopt as standard for electromagnetic

theory, bearing in mind that **somehow** there is, in Nature, a process by which energy can be stored in a magnetic field by regulating the motion of electric charge. Those who debate this conflict, side-track the issue by invariably directing attention to the analysis of integrated actions involving closed circuit flow of current and do not pursue the truth as it concerns two discrete interacting charges. Indeed, all four of the laws mentioned above assure reconciliation on this energy and force anomaly issue when actions are integrated to apply where interactions involve a closed circuit or its magnetic field equivalent. However, formulating a force condition by explicit mathematical treatment is not the same as explaining how the energy of mutual inductance finds its way into the field when the two interacting charges act on each other in a way that neither slows them down or speeds them up.

The Lorentz force law is the one having the simplest form, **because it omits the key term which affects energy transfer**; it does this by excluding the possibility of force action directed longitudinally along a current filament. The classical Ampère formulation, to which Peter Graneau subscribes, has its physical basis in the balance of action and reaction, which by physical definition means that energy is conserved in the transfer action between the two charges. The Ampère force law cannot therefore explain energy storage in the vacuum field medium or aether **unless that vacuum medium or aether contains other charges in motion**. However, the Ampère law can be reconciled with experimental evidence of the existence of longitudinal force and such forces are, it seems, observed in Graneau experiments on discharges in which heavy ions are propelled through salt water.

I do, however, wish to stress that, whilst the Ampère law may give basis for the escalating anomalous forces observed in such discharges, which in turn **might act as a trigger to cold fusion reactions**, that law does not admit the kind of anomaly by which so-called free energy appears, as if from the vacuum itself. Now, there are those who delve into experimental work with electromagnetic machines and assert that they are discovering evidence of energy transfer that can only be sourced in that aether or vacuum field medium. This is the topic of 'tapping zero-point energy,' exemplified by the short article by Mrs. Win Lambertson also in the February, 1993 issue of *Fusion Facts*.

It is important, therefore, that physicists really pay attention to the other two forms of the law that comply with empirical circuit theory.

These each have their own governing physical criterion in that, subject to the need for compliance with empirical fact pertaining to closed circuit conditions, one law declares that linear out-of-balance force interaction is to be precluded, but allows out-of-balance turning action or couples to be developed by the two-charge interaction. This form of law

was advocated by Sir Edmund Whittaker in his book History of the Theories of Aether and Electricity. The other law declares that there cannot be an out-of-balance turning action generated solely by the mutual interaction of two charges, but that there can be an out-of-balance linear force interaction **inasmuch as that is the way in which energy is transferred between those charges and the vacuum field medium acted on by that out-of balance force**. This latter law is the one which this writer has advocated for the past 35 years. It does permit longitudinal force to act on a current in its flow direction, thereby endorsing Peter Graneau's findings, and it has an additional special feature, namely, if the interaction is between two electrons, for example, which move mutually parallel, there is complete balance of action and reaction. There is, therefore, a circumstance for which the form of the force law fits the condition required by the law of gravity. Keep in mind here the fact that Einstein spent much of his life unsuccessfully trying to link the law of electrodynamics and gravitation. He failed because **he had adopted the wrong law**.

In fact, the Whittaker law and the Lorentz law are both contradicted by the 1903 Trouton-Noble experiment unless one assumes that the Earth-bound laboratory, in which the experiment is performed, is at rest in the electromagnetic space medium. It was this experiment, taken together with the Michelson Morley experiment, that gave stimulus to Einstein's theory which abolished belief in the aether and took away the prospect of researching the related energy resource of that medium.

I stress, therefore, that settling this question of the true law of electrodynamics should be at the focal point in researching enhanced energy sources. Certainly, it may have bearing upon the cold fusion process, but I believe that the true law will not be that of the Ampère formulation.

The reference which Hal Fox makes to the Kaliev experiment in which excess heat was generated accompanied by neutron production in capillaries of tungsten bronze crystals does cause one to wonder whether the escalating acceleration forces generated by deuteron transport as electric current surges are indirectly evidence of action requiring us to accept a new law of electrodynamics.

I suggest that the law is the one which I advocated in the following references:

H. Aspden, "The Law of Electrodynamics," *Journal of the Franklin Institute*, 287, 179-183 (1969).

H. Aspden, "A New Perspective on the Law of Electrodynamics," *Physics Letters*, 111A, 22-24 (1985).

LETTER FROM XING ZHONG LI

Dear Mr. Fox,

It was very nice to meet you in Nagoya Conference. Your free gift of Bibliography of Cold Fusion is very helpful and was appreciated by the attendees in Nagoya Congress Center.

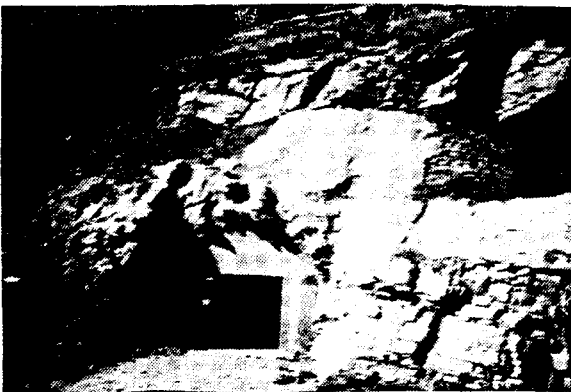
When I went to Nagoya, I had one additional copy for you, but I needed it temporarily also for a poster session (I was supposed to present all of them on behalf of my colleagues who were not able to attend ICCF3). I could not find you after the poster session, hence I have mailed them to you now.

You may notice that some of them are not in a good shape because cold fusion is poorly supported here. I send them you for your reference. I believe that you have gotten the other three papers from my Chinese colleagues at Nagoya, so I did not send them to avoid over-duplication.

--Xing Zhong Li

UPDATE FROM BYU

Last October in a letter from Prof. Steven Jones, he spoke of a new laboratory for cold fusion studies located in a tunnel about 10 km from the campus in the Wasatch mountains.



Entrance to Provo Canyon Laboratory, run by Brigham Young University.



One of three neutron detectors, shielded with salt, showing cosmic-ray veto counter. X-ray, gamma-ray and charged particle counters are also available.

G. MEETINGS AND MISCELLANEOUS

4th INTERNATIONAL
CONFERENCE ON COLD FUSION

Scientists from all over the world will be gathering on December 6-9, to learn and discuss the multiple aspects of the Cold Fusion question. Participation is open to all interested scientists and technologists. In particular, the following are encouraged to attend: nuclear and solid-state theoreticians, advanced energy technologists and long range utility planners. There will also be an exhibit of scientific instruments and supplies by various manufacturers. But that's not the only reason to go. There is one more reason. It's in Hawaii this time!!

The proposed agenda is as follows: Morning sessions will be devoted to one keynote presentation and a number of shorter, invited presentations. Afternoon presentations will be divided into a number of thematically organized parallel sessions to accommodate the anticipated number of presentations. Papers reporting the results of simultaneous measurement of different kinds are particularly encouraged. Subject areas to be covered include: Materials and Fundamentals, Calorimetry, Nuclear Measurements, Solid-state Theory, Electrochemical Studies, and Safety Issues.

CALL FOR PAPERS

Those wishing to present papers should submit two copies of an abstract containing the title of the presentation, contact author, affiliation(s), etc. to S.Crouch-Baker, SRI International, 333 Ravenswood Ave., Menlo Park, CA 94025. Mark these submissions "ICCF-4 Abstract." Two-page abstract due by Sept. 10, 1993. Author notification by Oct. 10, 1993.

Abstracts should be no more than two pages including figures and tables; 10 point type, single-spaced. A bound volume of abstracts will be produced for distribution to attendees at the conference, so abstract submittal in magnetic form is encouraged. (Mac users: Word 4.0 + sys. 7; PC users: Word 4.0 is preferred, but will accept other w.p. programs or ASCII.) Be SURE to include two hard copies.

Poster sessions will be used to supplement presentations and discussions. Presenters are encouraged to prepare a poster of 3' x 6' maximum size.

The co-chairs are Dr. T.O. Passell (EPRI) and Dr. M.C.H. McKubre (SRI) who can be reached at (415) 855-2070 and (415) 326-6200 respectively, for technical information.

The registration fee of \$300 covers conference proceedings, continental breakfasts, three luncheons, and an evening

reception. To register, contact Linda Nelson, Conference Coordinator (EPRI) at (415) 855-2127 or Fax (415) 855-2041. Hotel reservations can be made with the Hyatt Regency Maui (mention ICCF-4 conference to obtain the special group rate), call for information: (808) 661-1234 or Fax (808) 667-4499. Reservation deadline Nov. 6, 1993.

IECEC - 28th INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE

August 8-13, 1993

Hyatt Regency Hotel, Atlanta, Georgia

Sponsored by the American Chemical Society

The IECEC provides a forum to present and discuss engineering aspects of energy conversion, advanced and unconventional energy systems/devices, energy conversion/utilization, environmental issues, and policy implications in research, development, and implementation of technologies. Papers dealing with all engineering facets of terrestrial and aerospace power, and advanced energy systems, which fall into the above topic areas are welcome.

For more information call the ACS Meetings Department:

(202) 872-6286 or Fax (202) 872-6128.

183rd ELECTRO-CHEMICAL SOCIETY MEETING

May 16-21, 1993

Honolulu, Hawaii

Contact: The Electro-Chemical Society,
10 South Main Street, Pennington, NJ 08534-2896,
Phone (609) 737-1902, Fax (609) 737-2743

COLD FUSION TIMES

A Newsletter Devoted To Relevant Research and Developments of Safe, Reliable Power Sources
For Submissions or Subscriptions please write:

**COLD FUSION TIMES, P.O. Box 81135,
Wellesley Hills, MA 02181**

International Conference on Plasma Physics May 4-12, Changsha, China

This conference is mainly for hot fusion and plasma science in general, but the organizer thinks that it is important to have information on the current status of the anomalous nuclear phenomenon research too.

FUSION FACTS STAFF & CORRESPONDENTS

Hal Fox.....Editor-in-Chief

Eva Call.....Circulation

Dineh Torres.....Publication

Technical Correspondents:

Subbiah Arunachalam, New Delhi, India

Dr. Robert W. Bass, Registered Patent Agent, Thousand Oaks, California

Dr. Dennis Cravens, Texas

Dr. Samuel P. Faile, Cincinnati, Ohio

Avard F. Fairbanks, Resident Snr. Engineer

Marge Hecht, Washington, D.C.

Dr. Peter Glück, Romania

Dr. Maurice B. Hall, Resident Snr. Physicist

Prof Wilford Hansen, USU Logan, Utah

Prof. Xing Zhong Li, Beijing, China

Dr. Takaaki Matsumoto, Hokkaido U., Japan

Jed Rothwell, (Japanese Translations), Chamblee, Georgia

Fusion Facts Subscription Office

P.O. Box 58639

Salt Lake City, UT 84158

Phone:(801) 583-6232FAX:(801) 583-6245

Street Address: 391-B Chipeta Way

University of Utah Research Park

Salt Lake City, UT 84108

FUSION FACTS Each Issue Mailed First Class.

12 ISSUES.....\$ 345

36 ISSUES.....\$ 900

FUSION FACTS SINGLE ISSUES

CURRENT ISSUES EACH.....\$ 35

3 MONTHS OR OLDER ISSUES EACH.....\$ 10

SUBSCRIPTION REQUEST

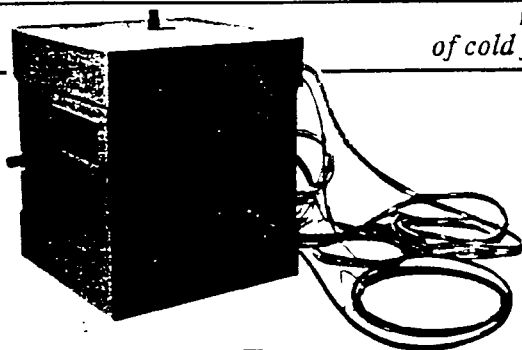
For your convenience you can order by phoning (801) 583-6232, or FAX (801) 583-6245, or use the Mail. Send *Fusion Facts* to:

NAME: _____ COMPANY: _____
 PO BOX, DEPT: _____ CITY: _____
 STATE _____ ZIP _____

Send check or money order with order and receive one extra issue free. Make checks payable to *Fusion Facts*.

ADVERTISEMENT

Seebeck Envelope
CALORIMETER
*measures total heat output
 of cold fusion electrochemical reactions*



INTRODUCTION

Thermonetics has been designing and building accurate calorimeters based on a unique, well-tested principle for twenty years. Applications include physics, chemistry, engineering, biology and medicine. Sizes range from 1-1/8 inch cube to 8 x 9 x 10 feet. Temperature levels range from cryogenic to 1500° F. Open literature papers by many research teams have described the use and value of the Thermonetics SEC Calorimeters in their research programs.

PRINCIPLE OF OPERATION

The Seebeck Envelope Calorimeter (SEC) is based on an elementary principle:

All of the heat produced or absorbed by any reaction within the calorimeter must pass through its walls, which incorporate proprietary heat flux transducers. Therefore, the calorimeter "envelope" integrates the total heat flowing into or out of the system being studied, whether instantaneous or long term.

The calorimeter envelope is quite thin so time constants are low. The transducers are thermopiles which generate a DC millivoltage directly proportional to the heat flow. In a properly designed calorimeter, the millivolt output signal is affected only by the rate of heat flow. These desirable properties markedly simplify operating procedures compared with classical calorimetry methods and make possible a whole spectrum of experimental investigations.

DESCRIPTION OF THE SEC CALORIMETER

Heat flows from the reaction vessel through air or water layers in the calorimeter, through the Seebeck Envelope to an aluminum jacket incorporating water cooling coils. The millivolt output signal from the SEC, which is related to the heat release via an accurate calibration process, can be read out by a millivoltmeter, recorded continuously by any millivolt recorder or fed to a computer. Each calorimeter is supplied with a calibration heater that allows the researcher to verify the calorimeter at any time.

HOW COLD FUSION ELECTROCHEMICAL HEAT AND GAS RELEASES ARE MEASURED

When using the SEC Calorimeter to monitor cold fusion electrochemical reactions, it is also possible to test for gaseous releases. The calorimeter lid is sealed by an O-ring so that the calorimeter is gas tight. There are ports in the walls of the calorimeter, which can be used for liquid reagent additions, sampling gaseous releases, making temperature and calibration measurements, etc. If it is desired to view the reaction during the experiment, Thermonetics can provide a special thermal window.

AVAILABLE SEC MODELS

Many "off the shelf" models and sizes of SEC calorimeters are available, and special designs can also be provided. However, the following models are offered as likely to meet many needs of this field:

MODEL NUMBER	INTERNAL SIZE (inches)	CALIBRATION CONSTANT (Heat flow producing 1 mv output)		PRICE fob San Diego
		BTU hr' mv'	Watt mv'	
SEC-0601	6x6x6	1.25	0.366	\$6000
SEC-1201	12x12x12	5.0	1.46	\$8000
SEC-2403	24x24x24	10.0	2.93	\$16000

(These models can also be leased with an option to buy)

THERMONETICS CORPORATION

Box 9112, San Diego, CA 92169 • Phone: (619) 488-2242