

FUSIONfacts

A Monthly Newsletter Providing Factual Reports On Cold Fusion Developments

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

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A. HOUSE COMMITTEE HEARS ABOUT COLD FUSION

The Energy Subcommittee of the House Committee on Science, Space, and Technology held a public hearing on hot and cold fusion on May 13, 1993. One of the technical presentations was given by Dr. Edmund Storms, recently retired from the Los Alamos National Laboratory. Here is Dr. Storms statement:

"Chairman Lloyd, I want to thank you for this opportunity to present new and important results about a phenomenon that has been conventionally called "Cold Fusion." Starting with the work reported in 1989 by Drs. Pons and Fleischmann, many observations have indicated that it is apparently possible to initiate nuclear reactions in certain metals near room temperature and that these reactions result in significant heat production as well as various nuclear products.

"I am not speaking for the Los Alamos National Laboratory on this subject because policy in this area has not been formulated. The Laboratory does not want me to pre-empt this process.

"Nevertheless, a careful and extensive examination of available information as well as personal research has convinced me and many other scientists that this phenomenon is real and, I believe, may have important consequences to the U.S.

"Much skepticism and frustration resulted from lack of reproducibility during early experiments. For this and other reasons, many scientists still believe that positive results are not possible. However, the phenomenon is now reproducible using a variety of techniques. Excess heat production has occasionally approached useful levels and the many positive results are now described in a variety of peer reviewed scientific journals and conference proceedings. In addition, the phenomenon has been demonstrated under many conditions including those employed in conventional physics. However, a satisfactory explanation and much supporting information are still lacking.

"Accumulated evidence is now so persuasive that it would be convincing to most people if we were discussing any other

**4th INTERNATIONAL
CONFERENCE ON COLD
FUSION
December 6-9, 1993
Hyatt Regency Maui, Hawaii**

See page 25 for information about
papers, membership, hotel, etc.

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field. Indeed, the evidence is sufficient to cause the Electric Power Research Institute (EPRI) to support work (\$4M/year) at SRI and at Texas A&M University where positive results have become increasingly reproducible. The company called Technova (Japan) is sufficiently impressed by the evidence to equip a large laboratory in France for the use of Drs. Pons and Fleischmann. They can now produce power densities (1000 watt/cm³ Pd) that exceed those in a nuclear reactor (100 watt/cm³ UO₂). A growing number of companies in the U.S. are showing interest in the field. Interest in India, China, Italy and Russia is also expanding. An increasing number of positive results as well as new ways to initiate the reaction have been reported. Support has been especially strong in Japan, where MITI has recently committed \$24M to be added to other larger sources of funding. Indeed, Japan is now leading the field in understanding this remarkable phenomenon. We are once again in the position where a major discovery made in the U.S. is being developed in Japan.

"If this were just another example of conventional science being slow to accept new ideas, you might be advised to wait for nature to take its course. However, I believe this phenomenon is of such potential importance that it would not be prudent to wait. I may not be able to convince you of these conclusions in the brief time I have. There is now a significant collection of published papers, books, and reviews available for review. Some detailed sources of information are part of the written testimony.

"One might ask what consequences might result if only a fraction of these assertions is true?

"**First**, the theory of electron structure in a metal and its interaction with the atomic nucleus needs to be reexamined. I would expect such a reexamination to produce even more useful insights.

"**Second**, experiments indicate a strong potential for creating energy that has no identified pollution or significant radioactivity, and is essentially inexhaustible.

"**Third**, some speculate there is a possibility of converting harmful radioactive isotopes into nonradioactive elements at room temperature using properly constructed electron environments. Consequently, one of the troublesome aspects of fission energy might be eliminated.

countries. As a result, control of the technology is slipping away on these two important fronts. A modest amount of support now can have a significant impact on reducing both problems without the need to shift major priorities before the potential of the phenomenon is better understood.

"I would like to recommend three actions:

"**First, a panel of open-minded technical experts be appointed to evaluate recent results. This suggestion was first made by Congressman Swett in an earlier testimony.**

"**Second, in the interim, it is prudent to provide some resources in view of the increasing activity of other countries. This money would extend the understanding of this complex field and help train a larger number of scientists in its subtleties. Efficient use of these limited resources could be achieved by supporting laboratories that have reported positive results in the past.**

"**Third, encourage the Patent Office to start issuing patents in the field.**

"Thank you for the opportunity to bring this information to the committee's attention."

A FAVORABLE RECEPTION

Dr. Eugene Mallove reports that three members of the subcommittee were favorable toward cold fusion. None of the subcommittee were against cold fusion. Questions that were asked of those making presentations about the progress of hot fusion indicated some degree of concern that the hundreds of millions being spent each year may be wasted funds. There is some indication that the results of this subcommittee hearing may result in the allocation of funds for a review of the progress made in cold fusion during the three and one-half years since the November, 1989 report on cold fusion by the Energy Research Advisory Committee's Panel on Cold Fusion, chaired by John R. Huizenga. It is hoped that any funds for a review of cold fusion progress be directed to the National Science Foundation and not to the Department of Energy. The advisors to the DOE may continue their strong opposition to any technology that appears to threaten the \$500 million annual expenditures for hot fusion.

of vital legal and intellectual property infrastructure. At the present time, very few scientists in the U.S. have a competent understanding of the field. Because this field is so new and complex, training people will neither be an easy nor a rapid task. In addition, the U.S. patent office is not issuing patents in the field while this limitation does not exist in other

FIANS SPONSORS ENERGY RETREAT & CONFERENCE

With financial sponsorship from Bill & Lynda Beierwaltes (founders of Colorado Memory Systems, a company recently acquired by Hewlett-Packard) the International Association for

New Science sponsored a **new energy** retreat and conference in Colorado. Some twenty scientists, inventors, and writers from various countries gathered for a two-day retreat and exchange of information on **new energy** at Estes Park, Colorado. Subsequently, members of this group were the keynote speakers at a two-day **new energy conference** held in Denver on April 17 & 18, 1993.

Cold fusion, over-unity energy machines, solid-state excess energy devices, and zero-point energy devices were the subjects of the retreat and conference. This gathering of the world's leaders in new energy devices was an historic first.

The following persons (listed alphabetically) were guests at a two-day retreat held in the Stanley Hotel in Estes Park, Colorado on April 14-16, 1993:

FOUNDERS OF THE IANS: Dr. Maurice Albertson, Professor of Civil Engineering, Colorado State University. Co-founder of the Peace Corp; Dr. Brian O'Leary, former Apollo astronaut, former professor in astronomy and physics at Princeton and Cornell; and Dr. Robert L. Sibley, O.D., M.S., environmental physiology researcher with Rocky Mountain Research Institute, Inc.

MEMBERS OF THE STEERING COMMITTEE: Dr. Patrick Bailey, nuclear engineer and solar energy researcher; Toby Grotz, B.S., electrical engineer, founder of the International Tesla Society; and Morey King, M.S., system engineer, author, zero-point energy researcher.

INVITED GUESTS: Dr. Harold Aspden, former patent manager for IBM in the U.K., retired and founder of Thermodynamics Limited in England; Dr. Frano Barbir, associate editor for *International Journal of Energy *Environment Economics**; William Baumgartner, director of New Energies Foundation; Robert Beutlich, television engineer; Dr. Timothy A. Binder, graduate of National College of Naturopathic Medicine, Western States Chiropractic College, and North American College of Acupuncture; Hal Fox, editor of *Fusion Facts* & author of *Fusion Impact in the Enhanced Energy Age*; Dr. Peter Graneau, retired professor and world-recognized authority on Ampère forces in electrodynamics; Donald A. Kelly, founder of Space Energy Association and publisher of *Space Energy Newsletter*; Stefan Marinov, theoretician and writer, publisher of *Deutsch Physik*; Roy E. McAlister, founder and president of TransEnergy Corporation and an expert in solar to hydrogen conversion; Dr. Henry C. Monteith, teacher of mathematics and science at the Albuquerque Academy while carrying on private research into a vastly superior microscope; Dale Pond, founder of Delta Spectrum Research, Inc. and an expert on the work of John Ernst Worrell Keely; Troy G. Reed, president of Reed Technologies and inventor of the "Reed Magnetic Motor"; Dr. John C. Stover, president of TMA Technologies, a company that manufactures optical measuring instruments;

Paramahansa Tewari, Chief Project Engineer of the Kaiga Project for the Nuclear Power Corporation in India; and Charles A. Yost, an aeronautical engineer and publisher of the *Electric Spacecraft Journal*.

HIGHLIGHTS OF THE TWO-DAY RETREAT

The objective of the retreat was to get the world's top scientists, inventors, and writers in the new energy field together. The most significant part of the retreat was the face-to-face meeting, the sharing of information, and the beneficial results. The outcome of the meeting was the decision to form an **Institute for New Energy**, publish the *New Energy News* newsletter, and to hold future retreats, workshops, and conferences. In other words, to facilitate communication.

All of the attendees at the retreat were selected because they were associated with new, non-standard, or "way-out" methods of producing energy. Some were theoreticians with splendid credits for technical publications, e.g. Harold Aspden, Peter Graneau, and Stefan Marinov. Others could be counted as dogged and determined experimenters who had some evidence of being able to get energy from space, e.g. Don Kelly, Troy Reed, and P. Tewari. Others could be classified more as reporters or writers such as Hal Fox and Moray King. Some of the group were dedicated to recovering or building upon historic work that never made it into the august halls of science, such as work of Keely, Tesla, Edwards, and Russell. Others were working in scientifically-acceptable fields such as hydrogen energy and fuel cells where current technology could replace environmentally-costly fuels. All were gentlemanly, courteous, and in the environment of the retreat ready to play a supportive role in achieving mutual maximum benefit from this historic meeting.

After the workshops, the group met as a committee of the whole and discussed the outcome of the workshops. The participants spent some time in answering the question, "Where do we go from here?" The consensus of the group is summarized as follows:

1. This meeting was an historic first and should become a periodic event. However, there were some important new energy people, such as Tom Bearden, who should be present.
2. The most important activity was the meeting with others who are working in new energy; the exchange of information; and the group acceptance of work that is sufficiently important to each participant that he/she is willing to devote time and money to such projects. Such inter-disciplinary experiences should be encouraged for other groups in other countries.
3. The recognition that the various projects are based on real science (but, in many cases, not readily accepted science).

This is the message that must be communicated. [Which is the main objective of *New Energy News*.]

4. The importance of establishing modes of communication among new energy workers. Therefore, it was unanimously agreed that the IANS should establish the **Institute for New Energy**. A newsletter, *New Energy News* should be published monthly with Hal Fox as editor. Other methods of communication should be established such as conferences, workshops, and computer bulletin boards.

5. It was unanimously agreed that one valid, proven, and demonstrable over-unity device should be built and verified. Then a proper press conference should be called to tell the world about the demonstration device.

[For further information, see the first issue of *New Energy News* which was published early May, 1993. This first copy was mailed free to all subscribers of *Fusion Facts*.]

C. ABSTRACTS FROM NEW ENERGY CONFERENCE

Harold Aspden, "The World's Energy Future," in Proceedings of the International Symposium on New Energy, April 16-18, 1993, Denver, CO, edited by Maury Albertson, c1993 Rocky Mountain Research Institute, Room 203, Weber Bldg., Colorado State Univ., Fort Collins, CO 80523, pp 1-19, 1 fig, 4 refs.

[Note: the above and all of the following abstracts appear in the proceedings. To save space, the words citing the proceedings will be deleted in the references that follow. Ed.]

AUTHOR'S ABSTRACT

Although economists can estimate when known sources of energy will run out, they are not able to predict anything of comfort that can afford real hope for our energy future. Nor, indeed, are those engineers and scientists, who profess to understand energy matters, likely to foresee the real shape of things to come. Invention has been the driving force powering our industrial civilization so far and one simply cannot predict invention! Even so, the author, who combines a professional career patenting high technology inventions with a lifelong vocation devoted to the study of energy fundamentals, here argues that the needed solutions to our problems are already visible on the energy horizon. We do not need to gaze into a crystal ball. All that is needed is to direct our vision to focus on the truths which are now emerging from the work of those engaged in New Energy Science.

Patrick G. Bailey, "A Unique Class of Alternative Catalysts for Fuel Cell Applications that Replace the Need for Precious Metals," pp 21-27, 2 refs.

AUTHOR'S ABSTRACT

A method has been found that allows the replacement of precious metals with non-metal alternative materials for use as the required catalysts in various fuel cell applications. The amount of the precious metal currently used for the catalyst per fuel cell is substantial, and is a significant fraction of the non-variable cost of the entire fuel cell unit. Through the use of a recently developed trade-secret process, a class of non-metal materials can be manufactured into a metal-like polymer that behaves electrically in an identical manner as do the precious metals during normal fuel cell operation. Samples of these alternative catalysts have been manufactured using an inexpensive process developed and protected under trade-secret agreements. Actual small-scale fuel cell demonstration tests have been successfully conducted that verify the operational capabilities of these low-cost alternative catalysts in place of platinum and rhodium. The cost savings of using these alternative catalysts within large scale fuel cell power units is economically profound.

Frano Barbir & T. Nejat Veziroglu, "Hydrogen Energy Technologies: Pathway to Commercialization," pp 29-46, 1 table, 2 figs, 52 refs.

AUTHORS' ABSTRACT

Hydrogen is being considered as a possible replacement for the fossil fuels. Hydrogen is not an energy source, but rather an energy carrier. It can be produced from any energy source, including the fossil fuels. Hydrogen can be used in any application where fossil fuels are used today. At the end use, hydrogen is versatile, efficient and clean. A combination of renewable energy sources and hydrogen results in an energy system which can permanently satisfy all the energy needs of the modern civilization without damaging the environment. This paper depicts a system where hydrogen is used as a major energy carrier. The emphasis is given on the technologies for generation of hydrogen, its storage and its applications. The survey of the hydrogen technologies has shown that all major hydrogen energy technologies already exist. An insight into their status and further development and perfection is given including the examples of niche applications. Prospects for commercialization of these technologies are discussed. Possible scenarios for implementation of hydrogen as an energy carrier, and their technical, environmental and economical advantages and drawbacks are discussed.

William Baumgartner, "Energy Extraction from the Vortex," pp 47-58.

AUTHOR'S INTRODUCTION

From the earliest humans to their present-day descendants, vortices have fascinated mankind. Everyone has observed at some time whirling leaves on a stormy autumn day or eddies at the surface of a river. ... Indeed vortices are not rare creations of Nature but are essential for the movement of matter, and most of all, are responsible for the CREATION of matter from a primary substance, one may call SPACE FABRIC.

EDITOR'S COMMENTS

Although his article does not provide experimental data, Baumgartner discusses energy extraction through centripetal motion. He has claimed to have produced water turbine/pump systems that can be classified as over-unity systems.

Tom Bearden, "The Final Secret of Free Energy," pp 59-86, 2 figs, 26 notes and refs.

EDITOR'S COMMENTS

Tom Bearden is well-known among the "over-unity" energy followers. He has degrees in both nuclear engineering and mathematics. Bearden characterizes himself as a theorist who does not build things. The paper is impressively documented with references, many of which are worthy of additional study. Bearden's conclusions, as conveyed by the title of his paper, may be a bit ambitious. Send a self-addressed, stamped large envelope for a commentary on Bearden's paper written by Hal Fox.

Timothy A. Binder, "Transmutation of the Elements, a Modern Alchemical Team's Experiments with the Concepts of Walter Russell," pp 107-134, 8 refs, 6 figs.

AUTHOR'S ABSTRACT

The following topics will be explored: A brief presentation of present establishment scientific concepts and the resulting unsustainable and polluting technology will be contrasted with their possible whole cycle counterparts; data supporting the Russell's contention of radioactively induced oxygen-ozone depletion via transmutation; and suggested avenues of experimentation for transmutation of radioactive wastes; Walter Russell's, Louis Kervran's, and Georges Ohsawa's experiments with transmutations; and outlines of their concepts regarding the mechanisms of transmutations with ordinary lab apparatus, temperatures, and pressures, and in living

organisms; and a summary of the World Balance Through Free Energy Project research and direction of ongoing efforts.

Hal Fox, "Impact of Cold Fusion and Other Enhanced Energy Systems," pp 135-152, 1 fig, 15 refs.

AUTHOR'S ABSTRACT

Among the many proposed or developed enhanced energy systems, cold fusion is probably the best developed and most maligned. Since the announcement of the discovery of cold fusion on March 23, 1989, there has been significant developments in the replication of the original work and dramatic developments in other means by which excess energy can be obtained from the interaction of hydrogen (and its isotopes) with metal lattices. Drs. Pons and Fleischmann are now achieving power levels that surpass 1 kilowatt per cubic centimeter of palladium alloy. This paper reviews significant developments in cold fusion in some newer and unexpected means of sustained nuclear reactions. The paper cites some of the scientific and political problems that have been partially covered in the positive and negative media reports. In addition, the paper reviews some of the primary impacts that this new energy science (or any successful enhanced energy system) will have on the world. In closing, this paper discusses some of the pitfalls and problems that can be avoided by developers of enhanced energy systems. Suggestions as to how to avoid controversy among the scientific elite are presented. In addition, a summary is provided of some of the ways in which enhanced energy systems will improve the world in which we live.

Peter Graneau, "Concept of a Capillary Fusion Reactor," pp 153-168, 2 figs, 18 refs.

AUTHOR'S ABSTRACT

In 1992 a number of cold fusion successes were scored which indicated that the underlying process was similar to that of capillary fusion discovered twenty-five years earlier in Germany. This paper considers how capillary fusion might be used for the large-scale generation of electricity. It is argued that the capillary units will inevitably be small cells, and a large number of these cells have to be assembled in a reactor core of the power plant. Methods of reinforcing the capillary reaction cells against very high internal pressure and a refuelling procedure are proposed. The plasma in the capillary filaments of fusible liquid is created by capacitor discharges, and the cells are assumed to operate at 500 degrees C. After heat exchange between the cells and water, it is proposed that the plant may rely on conventional turbo-alternators.

Toby Grotz, "Working Models of Free Energy and Transmutation Systems," pp 169-188, 8 illus., 15 figs, 21 refs.

AUTHOR'S ABSTRACT

This paper is a report on an experimental re-examination of the data reported by Westinghouse Laboratories on the work of Walter Russell. ... Nikola Tesla was so impressed with the theories and experiments of Walter Russell that he advised Russell to lock his knowledge in the Smithsonian for 1,000 years until mankind was ready. Recent research has been conducted by the authors in order to verify Russell's theories and experiments. The experiments that Russell conducted in 1927, which were verified by Westinghouse laboratories, have been repeated. Russell reported at that time that he had found a novel way to change the ratio of hydrogen to oxygen in a sealed quartz tube containing water vapor. The use of magnetic fields was shown to produce this effect. The end result of the experiments was to demonstrate a cheap and efficient method of hydrogen production for a hydrogen based economy. Experiment performed to repeat these results have met with some success. This paper will present the theory and results of experiments performed in an attempt to duplicate these tests.

Don Kelly, "The Status of Free Energy," pp 189-199.

AUTHOR'S ABSTRACT

... We now have solid, proven examples of successful, operating free energy hardware in three separate categories. The basic categories of systems are the dynamic, or rotating machines, the solid-state converters, and the hybrid systems, which are combinations of the dynamic and solid-state types of systems. The successful machines in each category are the "N" machines in the dynamic type, the Moray radiant energy system in the solid-state type, and the Swiss M-L Converter in the hybrid type of system. ... The "N" machines are now well established as breaking the limitations of the Law of Energy Conservation, with several projects on record with over-unity outputs in the 200% to 400% efficiency range.

EDITOR'S COMMENTS

None of the above mentioned machines were available to demonstrate at the conference. However, one of the main goals of the conference organizers is to have a public demonstration of one or more of the excess-energy producing machines. Several of the papers provided experimental evidence of the over-unity energy-producing machines. There are several machines that produce 10 to 20 percent excess energy and some as high as 300 percent or more but none of them have been widely accepted by the scientific or engineering community. This paper also reports on some

gravity-drop tests where specific types of electromagnetic equipment have been shown to affect the time of fall in earth's gravity by several tens of percents. This later work should be pursued and replicated.

Moray B. King, "Fundamentals of a Zero-Point Energy Technology," pp 201-217, 2 figs, 74 refs.

AUTHOR'S ABSTRACT

The vacuum polarization of atomic nuclei may trigger a coherence in the zero-point energy (ZPE) whenever a large number of nuclei undergo abrupt, synchronous motion. Experimental evidence arises from the energy anomalies observed in heavy-ion collisions, ion-acoustic plasma oscillations, sonoluminescence, fractoemission, large charge density plasmoids, abrupt electric discharges, and light water "cold fusion" experiments. Further evidence arises from inventions that utilize coherent ion-acoustic activity to output anomalously excessive power. A ZPE coherence sufficient to manifest a gravitational anomaly might occur from circulating charged plasma through a helical vortex ring. Abruptly pulsed, opposing electromagnetic fields may further augment any ZPE interaction.

EDITOR'S COMMENTS

King's book, Tapping the Zero-Point Energy, must be considered as having spurred a serious interest in this topic among scientists. King has an excellent set of slides which he used for his presentation. The paper and King's presentation are recommended to readers who do not, as yet, believe that ZPE is a reality.

Stefan Marinov, "The Generator 'Venetin Coliu' Produces Free Energy," pp 219-237, 12 figs, 1 table, 5 refs.

AUTHOR'S ABSTRACT

I show that every generator of electric current with permanent magnets demonstrates an anti-Lenz effect, i.e., for certain moments the magnetic action of the current induced in the coil is supporting the rotation and not braking it, although for the major part of the time it is opposing the rotation (normal Lenz effect). The reason for the appearance of the anti-Lenz effect is the retardation of the induced current with respect to the induced tension. I present several experiment where this retardation can be clearly observed. When the inductive resistance of the coil is much bigger than its ohmic resistance the Lenz and anti-Lenz effects become equal and the generator does not brake when producing electrical energy, so that the whole electric energy produced by it is free energy. I present one of the Venetin Coliu machines built by me which clearly

shows that if the free power will be sufficient, one can feed with it the driving motor and thus realize a perpetual motion.

EDITOR'S COMMENTS

Marinov's proposed machine received considerable attention at the conference. He plans to have such a machine (using no outside electrical input) running within a few weeks. However, two highly-respected Ph.D.s at the conference suggest that Marinov's mathematical approach is faulty. One suggests that the use of the widely-accepted formula cited by Marinov is faulty. The comments from both of these scientists have been forwarded to Marinov. Marinov is the publisher of *Deutsch Physik*, a publication which encourages the development of free-energy devices.

Roy E. McAlister, "Improved Energy-Conversion Efficiency will Spark Transition to Hydrogen in Commercial Applications," pp 239-250, 3 tables, 2 figs, 17 refs.

AUTHOR'S ABSTRACT

Fifty percent of the oil used for transportation in the U.S. is imported. Ninety-seven percent of the transportation system is powered by engines that are dedicated to oil-source fuels such as gasoline and Diesel fuel. U.S. domestic reserves constitute less than 3% of world oil reserves but the U.S. consumes about 25% of the world's oil production. In order to sustain leadership in living standards, the U.S. must adopt more efficient energy conversion practices. Photosynthesis produced all fossil reserves. Overall conversion efficiencies of about 0.09% or less result from making electricity in a conventional fossil-fired steam power plant or driving a gasoline-fueled car when original photosynthesis is taken into account. Solar engine-generators called Solar Stirling Dish Gensets have been developed that are 30-times more efficient than photosynthesis.

Direct-injection and spark-ignition engines called Precision Spark Injection (PSI) engines have been developed that are up to 2.5 times more efficient than most automobile engines. Producing electricity in Solar Stirling Dish Gensets and using advanced engines based on PSI Technology will improve overall propulsion efficiencies to about 15% to 20%. This is over 100 times more efficient than continuing to burn fossil gasoline in present cars. Such improvement in efficiency can be facilitated by the present electric grid system. The present automobile fleet can be converted to operation on hydrogen with current technology and beneficial results can be achieved much more quickly than waiting for electric battery-powered cars to replace internal combustion engines.

EDITOR'S COMMENTS

McAlister has an impressive group of slides to buttress the arguments made in his presentation. In addition, he is the inventor and manufacturer of an improved ignition device for use in engines that are converted to multi-fuel (including hydrogen) uses. At the present time, the use of hydrogen as a fuel appears to be the only **present** non-polluting alternative to fossil-fuels. However, the production of hydrogen must be accomplished without the use of energy produced from burning fossil fuels for hydrogen systems to be a strong environmental improvement. The use of solar-generated hydrogen is an engineering answer. A careful economic study, including cost of capital and environmental costs would be an important contribution.

Troy G. Reed, "The Reed Magnetic Motor," pp 277-281, 2 refs.

AUTHOR'S ABSTRACT

The Reed Magnetic Motor technology builds upon well-established principles of mechanics and ferromagnetism. It compresses various incremental yet crucial improvements to existing technology, creating commercial potentials. Reed has designed, engineered and constructed two proof-of-concept prototype power units. One has driven a conventional electric generator to output 500 watts at 67 volts. Currently, Reed has designed and constructed a unit that could drive a 7-kilowatt electric generator, sufficient to power a small home. Reed Technologies, Inc., has applied for U.S. and overseas patent protection covering numerous claims, including magnet configurations and geometries as well as other proprietary aspects of the technology.

EDITOR'S COMMENTS

The Reed motor claims to bend or focus magnetic lines of force in such a manner that power can be produced. At some stages in the rotating cycle of the Reed motor, a mechanical device provides an extra force to keep the device spinning (so as not to lock up on the attractive force of the magnets.) We look forward to a demonstration of this zero-input magnetic motor system.

John C. Stover, "Motional Fields and the Edwards' Effect," pp 283-290, 2 figs, 10 refs.

AUTHOR'S INTRODUCTION

This paper briefly reviews the early work of William Hooper on motional field theory and relates it to more recent theoretical and experimental developments that may play a role in understanding the importance of motional fields and their relationship, if any, to gravity. In particular, the Edwards effect (measured in 1976) appears to be an experimental

confirmation of Hooper's measurements, and there may also be some relationship between these results and more recent disagreements about the relativity theory.

EDITOR'S COMMENTS

Peter Graneau, a keynote speaker at the symposium, related that he had a student who demonstrated the Edward's Effect but that the effect was very small. Stover may well use this current investigation as a lead-in to future excess-energy experiments. Stover's conclusions are important.

Paramahansa Tewari, "Generation of Cosmic Energy and Matter from Absolute Space (Vacuum)," pp 291-303, 6 figs, 8 refs.

AUTHOR'S ABSTRACT

This paper provides a very brief summary of the author's theoretical works on the basic nature of space medium and the correlation of space and matter. The fundamental nature of cosmic energy that generates all the universal matter is also identified. The experiments carried out on a system of rotating electromagnets through which electrical power has been generated at efficiency higher than unity provide positive proof of spatial reality. Einstein's postulate on the constancy of light velocity as measured by two observers in uniform motion relative to each other has been discussed with a new model of light. It has been stated that the universe has only one universal constant, and all other physical constants can be derived from one universal constant.

EDITOR'S COMMENTS

Tewari is the Chief Project Engineer, Nuclear Power Corporation for the Kaiga Project in Karnataka, India. In 1983, at a European conference, Tewari demonstrated his over-unity rotating energy machine. According to his paper, and his presentation, he is now able to obtain on a daily basis an output of about three kW from his generator while it is being driven by a motor that consumes about one Kw. The paper presents graphical data to show that the systems must be operating at better than 2,500 to 3,000 rpm to achieve excess energy. In a video presentation, Tewari showed motion pictures of his system coming up to speed and then the more dramatic increase in output power after reaching a rotational speed of 3,000 rpm. Tewari told me that he can achieve the 3 to 1 power output ratio "any day". He is now planning to transform the low voltage (about 3 volts) high-ampereage d.c. output into an a.c. output so that the output power can be converted to operate the motor that supplies the input power. Tewari stated that he would be able to accomplish that planned experimental demonstration within about six months. If the data and the representations are factual, the Tewari machine

may be a candidate for a public demonstration of a method of tapping power from space energy.

Charles A. Yost, "Possibilities for Electric Field Propulsion," pp 305-320, 10 figs, 26 refs.

AUTHOR'S ABSTRACT

Electric field propulsion and efforts to prove that a relationship exists between electric and gravitational fields have not yet been accomplished. Physical interpretations of gravity, mass, electrical charge, and dimensions are seen to need closer investigation and revision if electric field propulsion is to be developed. The longitudinal electric wave is viewed as a key factor necessary for developing field propulsion, and experiments are suggested in order to demonstrate the existence and properties of such waves.

EDITOR'S COMMENTS

Charles Yost is the Editor of the *Electric Spacecraft Journal*. In this review paper, Yost has provided information on a variety of methods that have been investigated for use in resolving the problem of propelling a spacecraft without throwing away mass. This article should be studied by any who are planning experiments in tapping space energy or in modifying gravity. Now that science is more willing to accept the presence of space energy, an increased amount of progress is expected. Some workers in the field claim that James Clerk Maxwell's original equations in his Treatise on Electricity and Magnetism, allow for longitudinal waves. Those of you who are experienced in quaternion algebra may want to check Maxwell's original work. Please let *Fusion Facts* know if you find something interesting.

George D. Hathaway, "Experiments with a Unipolar Dynamo of Novel Construction," pp 321-345, 20 figs, 10 refs.

AUTHOR'S ABSTRACT

A novel design of a unipolar electric machine is described together with preliminary experimental results. The design allows considerable flexibility for experimentation and may prompt the development of more robust commercial units. In particular, the machine described allows quantitative investigation of certain puzzling aspects of unipolar dynamo performance. Emphasis in this paper is on experimental results and detailed design equations are not provided.

EDITOR'S COMMENTS

Although the author states that in the experimental results there is no indication that this machine could drive itself, the data is highly interesting. There have been other investigators

who have claimed "over-unity" operation with types of homopolar machines. For example, Tewari, DePalma, and Adams all claim over-unity machines.

Stanley A. Meyer, "Atomic Energy Balance of Water ... Using Water as Fuel," pp 389-407, 10 figs.

AUTHOR'S ABSTRACT

The Atomic Energy Balance of Water is activated and performed in a sequence of events in an instant of time. The Hydrogen Fracturing Process simply triggers and releases atomic energy from natural water by retarding and slowing down the reformation of the water molecule being subjected to sub-critical state during thermal gas ignition. The Voltage Intensifier Circuit brings on the Electrical Polarization Process that switches off the covalent bond of the water molecule without amp influxing. Energy Pumping Action undergoing "Resonant Propagation" of opposite electrical stress oscillates the "Energy Aperture" of the combustible gas atoms to increase the atomic energy level of the combustible gases to decrease atomic mass while applied Voltage Pulse-Frequency of opposite electrical polarity initiates the triggering process once maximum voltage deflection is achieved...[sic] releasing Thermal Explosive Energy (gtnt) beyond normal gas burning levels. The energy contained in a gallon of water exceeds 2.5 million barrels of oil when equated in terms of atomic energy. Water, of course, is free, abundant, and energy recyclable.

EDITOR'S COMMENTS

As is evident from the author's uses of "buzz words", his paper is not a scientific presentation. There is little data and the several Meyer patents are not cited. In my opinion, Meyer has developed an over-unity method of extracting hydrogen from water and using the hydrogen to fuel his modified engines. He promises to have a more dramatic demonstration within six months. We again wish Meyer success in meeting his frequent six-month objectives.

A. Michrowski, "Vacuum Energy Developments," pp 407-417, 3 figs, 48 refs.

AUTHOR'S ABSTRACT

Important scientific work, theoretical and experimental, has been devoted to the controlled release of useful energy from the vacuum - a cosmic resource. Some details are provided about experimental research conducted by Dr. Alexander V. Chernetskii and his colleague, Dr. Uri Galkin in Moscow where plasma interaction with the physical vacuum resulted in the release of supplementary energy, over and above input supply. The theoretical rationalization of empirical results lies within the confines of conventional electrodynamic parameters,

and includes longitudinal electromagnetic waves. Theoretical analysis of the repeated experiments was developed by Dr. Vladimir Ivanovich Dokuchayev. Additional overview is made of related developments worldwide.

EDITOR'S COMMENTS

This is a good review paper, especially about Chernetskii's work. Michrowski should add to his list of references the several papers by Karabut, Kucherov, and Savvatimova who have been achieving over 500% excess energy from the use of glow-discharge devices. See the award and discussion in *Fusion Facts*, January 1993 beginning on page 1.

Thomas F. Valone, "Armature Reaction in the Homopolar Generator," pp 511-519, 4 figs, 18 refs.

AUTHOR'S ABSTRACT

The investigation into the one-piece homopolar, unipolar, or Faraday generator as a new energy source must involve a treatment of the armature reaction or back torque. Appearing as an increased load on the drive motor when power is drawn from the homopolar generator, it tends to counter the output of the homopolar generator. Based upon the interaction of the electron and the atomic lattice of the conducting disk, the armature reaction creates a physically spiraling effect on the generated current as it moves in a magnetic field. This intrinsic mechanism of radial current draw has a rich history which is highlighted in this paper. Methods for ameliorating its effect are included. Much of the material for this paper is taken from the author's book, The Homopolar Handbook: A Definitive Guide to Faraday Disk and N-Machine Technologies.

Note: Copies of the Proceedings of the International Symposium on New Energy can be purchased from IANS, 1304 S. College Ave., Ft. Collins, Colorado 80524, mailed in the U.S. for \$45. Foreign orders add \$5 for mailing.

D. NEWS FROM THE U.S.

CALIFORNIA - PEER-REVIEW PROBLEMS

Dr. Melvin H. Miles (Naval Air Warfare Center, China Lake, CA) and friends have an elegant experiment that proves that hydrogen-4 is a byproduct of the successful operation of a Pons-Fleischmann type of cold fusion electrochemical cell. The paper of Miles et al. was recently rejected by the *Journal of Physical Chemistry*. The paper was submitted for peer review. Although this work by Miles et al. is one of the most important experimental works in cold fusion, three of three "peer-reviewers" made the judgement that it should not be published in the journal.

Miles writes, "...scientists in this field are being criticized for the fact that only a few journals will publish positive papers relating to anomalous effects in deuterated metals. This situation can only be corrected by the commitment of the editors of the various journals to scientific objectivity."

[Peer-review decisions should not be made for political purposes, such as the fear of loss of funding from DOE.]

CALIFORNIA - ^4He PRODUCTION

Courtesy of Sam P. Faile

M.H. Miles, R.A. Hollins (Chem. Div., Research Dept., Naval Air Warfare Center, China Lake, California), B.F. Bush, J.J. Lagowski (Dept. Chem., Univ. of Texas), and R.R. Miles (Nuc. Safety Dept., EG&G, Colorado), "Correlation of Excess Power and Helium Production During D_2O and H_2O Electrolysis Using Palladium Cathodes," *J. Electroanal. Chem.*, vol 346, nos 1-2, 1993, pp 99-117, 8 figs, 46 refs, 3 tables.

AUTHORS' ABSTRACT

A critical issue in determining whether or not the anomalous effects that occur during D_2O electrolysis are of nuclear origin is the measurement of nuclear products in amounts sufficient to explain the rate of excess enthalpy generation. Calorimetric evidence of excess power up to 27% was measured during the electrolysis of heavy water using palladium cathodes. Maximum excess power was 0.52 W (1.5 W/cm^2) at 250 mA/cm^2 . Eight electrolysis gas samples collected during episodes of excess power production in two identical cells and analyzed by mass spectrometry showed the presence of ^4He . Furthermore, the amount of helium detected correlated qualitatively with the amount of excess power and was within an order of magnitude of the theoretical estimate of helium production based upon fusion of deuterium to form ^4He . Any production of ^3He or neutrons in these experiments was below our detection limits. However, the exposure of dental X-ray films placed outside the cells suggests the emission of radiation. Control experiments performed in exactly the same way but using $\text{H}_2\text{O}+\text{LiOH}$ in place of $\text{D}_2\text{O}+\text{LiOD}$ gave no evidence of helium, excess power or radiation.

AUTHORS' CONCLUSIONS

Our electrochemical experiments unambiguously show a direct correlation between the time of generation of excess enthalpy and power and the production of ^4He , established in the absence of outside contamination. This correlation in the palladium/ D_2O system provides strong evidence that nuclear processes are occurring in these electrolytic experiments and that helium is produced at or near the surface of the palladium rather than deeper in the bulk metal. The major gaseous fusion product in $\text{D}_2\text{O}+\text{LiOD}$ is ^4He rather than ^3He . No

experimental evidence for helium products, excess enthalpy or radiation is found in $\text{H}_2\text{O}+\text{LiOH}$ control experiments. In summary, nuclear events with ^4He as a major product occur during the electrolysis of the $\text{Pd}/\text{D}_2\text{O}+\text{LiOD}$ system.

CALIFORNIA - QUANTUM TUNNELING

Courtesy of Sam P. Faile

Richard J. Saykally (Dept. of Chem., Univ. of Calif., Berkeley, California) and Geoffrey A. Blake (Div. of Geology and Planetary Sci., Calif. Inst. Tech., Pasadena, California), "Molecular Interactions and Hydrogen Bond Tunneling Dynamics: Some New Perspectives," *Science*, vol 259, 12 March 1993, pp 1570-1575, 38 refs, 5 figs.

AUTHORS' ABSTRACT

The recent development of tunable far-infrared lasers and other high-resolution spectroscopic probes of weakly bound clusters is having a significant impact on our understanding of intermolecular forces and on the complex quantum tunneling dynamics that occur in hydrogen-bonded systems. Far-infrared studies of a variety of interactions are discussed, including several prototypical water-hydrophobe complexes, the water trimer, and the ammonia dimer. Particular attention is paid to the inversion of spectroscopic data to yield detailed intermolecular potential energy surfaces. Investigations of nonpairwise additivity are also described.

CONCLUDING REMARKS

The study of intermolecular forces has entered a new era. It is now possible to place nearly any conceivable functional group into the gas phase with supersonic jet technology. Furthermore, with the development of tunable FIR lasers, a general spectroscopic technique which probes the degrees of freedom that are most intimately related to the intermolecular potential energy surface has become available.

Theoretically, it is now possible, in principle, to directly invert high-resolution cluster spectra, although for systems of low symmetry the computational requirements are prodigious. The development of improved methods for eigenvalue generation of complicated, multidimensional potential energy surfaces can therefore be expected to have an enormous impact on not only intermolecular interactions but intramolecular dynamics as well. Nevertheless, the means to generate experimentally accurate, fully anisotropic representations of intermolecular forces, including the critical role of nonpairwise contributions, are now clearly at hand. The newly developed view of van der Waals and hydrogen bond VRT dynamics has revealed the delicate interplay between the attractive and repulsive terms in intermolecular potentials. By elucidating the true character of weak interactions, these powerful tools will enable scientists to

examine the molecular details of a multitude of chemical and biological processes at unprecedented levels of accuracy and detail.

INDIANA - ATOMIC FORCE MICROSCOPE

Courtesy of Dr. Don Chernoff

EDITOR'S COMMENTS

We were impressed by the Atomic Force Microscope work being performed by Dr. Don Chernoff at the Advanced Surface Microscopy, Inc., 6009 Knyghton Road, Indianapolis, IN 46220, (phone 317-251-1364.) We asked Dr. Chernoff to provide us with sample pictures to publish in this issue of *Fusion Facts*. See below for pictures of surface contaminants with an enlargement, and two views of polycrystalline thin films. Images are copyright 1993 by Advanced Surface Microscopy, Inc. Used by permission.

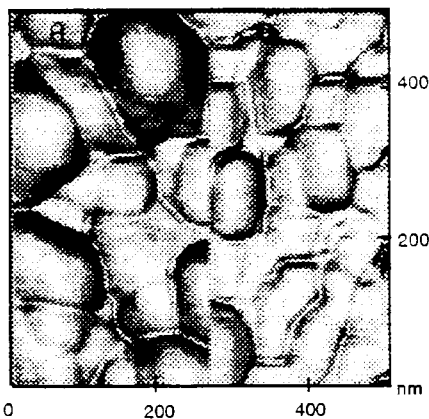
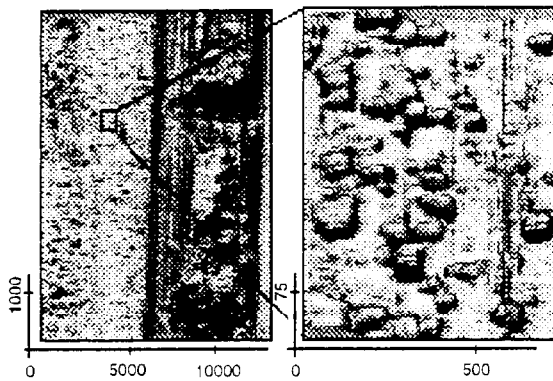


Fig. 1 A sample of microscopic surfaces as shown with the Atomic Force Microscope.

The Atomic Force Microscope (AFM) is being used to solve processing and materials problems in a wide range of technologies affecting the electronics, telecommunications,

biomedical, chemical, automotive, aerospace, and energy industries. The materials under investigation include thin and thick film coating, ceramics, composites, glasses, synthetic and biological membranes, metals, polymers, and semiconductors. And the AFM is being applied to studies of phenomena such as abrasion, adhesion, cleaning, corrosion, etching, friction, lubrication, plating, and polishing.

The AFM is a type of a scanning probe microscope which is able to capture high-resolution, 3-dimensional images of the surface structure of any solid. Compared with scanning electron microscopes (SEM), the AFM provides extraordinary topographic contrast, direct height measurements and unobscured views of surface features. Compared with transmission electron microscopes, 3-dimensional AFM images are obtained without expensive sample preparation and yield far more complete information than the 2-dimensional profiles available from cross-sectioned samples. [Some of you cold fusion experimenters may want to look into the use of AFM.]

IOWA - LANTHANIDE ELEMENTS

Courtesy of Sam P. Faile

K.A. Gschneider, Jr. (Ames Lab. and Dept. Mat. Sci. and Eng., Iowa State Univ., USA), "Systematics and Anomalies," *Journal of Alloys and Compounds*, vol 192, nos 1-2, 1993, pp 1-10, 45 refs, 15 figs.

AUTHOR'S ABSTRACT

Systematics is a powerful tool and anomalies thereof are extremely helpful in our comprehension of the behaviors of the rare earth elements and in particular, the lanthanides. It is shown that a greater knowledge of the lanthanide elements is obtained if information is available on the corresponding Sc and Y compounds, and these are also included in the systematic evaluation of the property, than if the lanthanide data are used by themselves. Initially, the behaviors of the pure elements are examined, and then in turn systematics is applied to solid solution alloys (especially H in R), the melting behavior and heats (free energies) of formation of rare earth compounds, and finally aqueous solutions (stability constants of complexes). All of these data indicate that 4f hybridization with the valence electrons (5d, 6s) of the lanthanide and the non-rare earth element in an alloy or compound occurs. The most striking evidence for 4f bonding is seen in the H dissolved in R solid solution alloys. A new method for predicting heats (free energies) of formation of the lanthanide element compounds from the known values of the corresponding Sc, Y and La compounds has been developed. The estimated values are believed to be correct within $\pm 20\%$.

NEVADA - WATER-GASOLINE FUEL

Courtesy of Steve Roen

"Emissions Benefits of Water Fuel Interest Automaker, Mileage Gains Unresolved," *Oil Market Listener*, OLM946, 26 April 1993, 5 pages.

SUMMARY

Extended testing by a major European automaker of gasoline and diesel fuel emulsions containing 55% water is the highlight of several fast-paced developments with this provocative technology.... Imprecise volumetric measurements that previously suggested spectacular mileage efficiency gains--around double--now appear exaggerated after further stationary engine dynamometer tests in Europe. Nevertheless, the automaker acknowledges that "significant" efficiency gains remain possible and the core technology is "for real."...The seven car rally in Reno is postponed indefinitely amid the ongoing bustle of the European work during most of March and three days of live driving tests by the automaker in Reno last week. A technical representative from a major Japanese automaker is paying a visit this week, and the European company resumes testing thereafter with keen interest.... Thus A-55 and D-55, the diesel counterpart, continue to hold out mind-boggling scenarios as well as skepticism for the oil industry as it evaluates how to deal with consumer taxes, costly environmental standards, and oil's long-term share of the world energy market.

...There is certainly no question that these emulsions with 55% water content by weight (about 45% by volume) and the engines combusting these fuels are "for real." This is a striking revelation to every scientist and engineer who has gained direct experience with the technology. So is the fact that the fuel is not flammable--a non-trivial factor alone in light of the recent \$100 million judgement against General Motors in a liability case of an exploding fuel tank and the mandated recall of millions of pick-up trucks with similar concern.... During the initial tests in Europe, the engineers were betting one another about whether the fuel would combust at all. Perhaps needless to say, those betting against the technology lost....

...Other potential auto design benefits, translating to lower manufacturing costs, include the elimination of the catalytic converter and the vapor canister on the fuel tank, as well as reducing the size of the radiator due to cooler combustion temperature. ...Concerning the possible mileage efficiency benefits, the automaker confirmed Gunnerman's assertion that at least a 50% improvement had been seen during the tests in Europe, but that more testing would be required--and research needed to develop proper measurement techniques--before this could be concluded with much confidence.... Nevertheless, for *Oil Market Listener's* own verification of the technology, especially in the mileage efficiency dimension, recognizing the

technical limitations--and credibility to worldwide oil industry readers, an unrestricted and unsupervised two-week test drive was requested for May. ...Gunnerman has agreed for *OML* to release whatever the results--good or bad.

Since a 55% water fuel is not even considered a carbon fuel by the US EPA, and because of the probable substantial emissions reductions, ...governments would be hard pressed to explain carbon-related taxes on a mostly water fuel yielding lower emissions. Officials at the US Dept. of Energy tel *OML* that the US Btu tax proposals do not address the A-55 case as an alternative fuel eligible for exemption at this time. ...The worst nightmare for oil producers...would be for consumer governments to reap as much tax revenue as possible from any efficiency benefits of A-55, thereby negating any possible additional demand from lower prices to consumers while fuel consumption was reduced.

HAWAII - NICKEL-OXYGEN INTERACTION

Courtesy of Sam P. Faile

R.S. Saiki, A.P. Kaduwela, M. Sagurton, J. Osterwalder, D.J. Friedman, C.S. Fadley (working at U. of Hawaii, Dept. of Chem., Hawaii) and C.R. Brundle (IBM Research, California), "X-ray Photoelectron Diffraction and Low-energy Electron Diffraction Study of the Interaction of Oxygen with the Ni(001) Surface: $c(2 \times 2)$ to Saturated Oxide," *Surface Science*, North-Holland, vol 282, no 1 2, 1993, pp 33 61, 39 refs, 20 figs, 1 table.

AUTHORS' ABSTRACT

We have carried out a combined X-ray photoelectron diffraction (XPD) and Low-Energy Electron Diffraction (LEED) study of the interaction of oxygen with Ni(001) at ambient temperature from the $c(2 \times 2)$ structure up to the saturated oxide. Several structural conclusions are possible based on an *R*-factor comparison of an extensive series of azimuthal- and polar-O 1s XPD data to theoretical simulations based on a single-scattering cluster (SSC) model with spherical wave scattering. A new method for normalizing experimental and theoretical intensities for XPD *R*-factor analyses is also used. For the $c(2 \times 2)$ structure, we find that the oxygen sits in the fourfold hollow site, at a vertical distance (*z*) of approximately 0.75 Å above the first Ni plane, in excellent agreement with the most recent LEED determination. There is also strong evidence from the XPD results that oxide nucleation occurs very early in the chemisorption region (much earlier than observable by LEED) and this effect could explain the proposals for in-plane bonding or pseudobridge bonding previously reported in the literature. The saturated oxide that forms at ambient temperatures is found from LEED and XPD to form a strained superlattice that is expanded by $1/6$ with respect to the underlying Ni(001). We also find that the saturation oxide coverage is much larger than that previously

reported in the literature of 2-4 monolayers (ML), and that it is in fact 4-5 ML. Other conclusions concerning the nature of the strain in the oxide are also possible, including a vertical expansion in lattice constant from the first to second plane of 0.1-0.2 Å.

MASSACHUSETTS - AMPERE-FORCE LAW

Courtesy of authors

Peter Graneau (Center for Electromag. Res., N.E. Univ., Boston, Mass.) and Neal Graneau (Dept. Eng. Sci., Oxford Univ., UK), "Ampère Force Calculation for Filament Fusion Experiments," *Physics Letters A*, vol 174, 1993, pp 421-427, 14 refs, 5 figs, 1 table.

AUTHORS' ABSTRACT

Recent developments in filamentary fusion techniques are discussed. Ampère electrodynamic force law is used to calculate the forces on filamentary currents, and is shown to predict the observed beading. Subsequent computation reveals compression forces on the beads, which may be sufficient to account for the observed fusion reactions.

MASSACHUSETTS - NEUTRON-TRANSFER REACTIONS

Peter L. Hagelstein (MIT Research Lab. of Electronics, Massachusetts), "Coherent and Semicohherent Neutron Transfer Reactions III: Phonon Frequency Shifts," *Fusion Technology*, vol 23, no 3, May 1993, pp 353-361, 49 refs.

AUTHOR'S ABSTRACT

A new model describing the transfer of neutrons to and from nuclei embedded in a lattice was recently proposed. The coupling between the nuclei and lattice phonons is now explored, focusing on the question of whether it is possible under any conditions for anomalously large energy transfer to or from the lattice to occur during a neutron transfer reaction.

By studying the gamma line shape, no anomalies are expected for a ground-state lattice or for a thermal lattice. Under certain conditions, the frequency of a phonon mode can be shifted significantly in a neutron transfer reaction; phonons initially present in that mode are shifted in frequency during the reaction. This effect produces an anomalous energy shift in the event that the mode is initially strongly excited.

NEW MEXICO - TRITIUM PRODUCTION

T.N. Clayton, D.G. Tuggle, and S.F. Taylor (Los Alamos Nat. Lab., New Mexico, USA), "Evolution of Tritium from

Deuterided Palladium Subject to High Electrical Currents," preprint from Los Alamos National Laboratory, 12 pages, 9 refs, 6 figs.

AUTHORS' ABSTRACT

An increase in the tritium level was detected in deuterium when various configurations of palladium foil or powder and silicon wafers or powder were subject to a high pulsed current. The deuterium, at over one atmosphere pressure, was circulated in a sealed loop containing the cell and an ionization chamber to measure the tritium increase as a function of time. Over 4800 hours of data, spanning 10 cells (including deuterium and hydrogen controls), were collected with this system. Average tritium production has varied from 0.02 to 0.2 nCi/h. Due to experimental constraints we have not been able to measure neutron output with these cells while simultaneously measuring the tritium increase. The question of tritium contamination in the palladium has been primarily resolved by the development of techniques that allow the palladium powder or foil to be reused. Various methods for increasing the tritium production, such as, increased current density, surface modifiers, and higher deuterium loading, will be discussed.

AUTHORS' CONCLUSIONS

A reproducible method of tritium generation has been demonstrated. The tritium output scales with the current applied to the cells. The tritium yield is found to depend strongly on the type of palladium metal used (powder or foil). Various tests for tritium contamination confirm that there is no initial tritium contamination in the powder, foil, or other materials used in this study.

Annealing of the palladium seems to be necessary to reactivate foils after a deep dehydride. Lower values of stoichiometry or lower gas pressures are less efficient for the generation of tritium. In the experiments conducted to date, tritium production is not enhanced by increasing the concentration of hydrogen in the deuterium gas.

On the basis of an analysis of all our experiments and those of others, it appears that the tritium is produced during the dehydriding of palladium deuteride with a surface impurity layer. The layer in the case of the powder and the foil may be an oxide or a monolayer of adsorbed CO. Other impurity layers such as metals may be much more effective. The main effect of the current is to dehydride the palladium by heating. Only a small area near the surface is important to this process. The foil is less productive than the powder because of smaller surface area and the fact that the surface barrier is largely absent. In the powder cells, the rapid decline in tritium production at the start of the experiment may be due to the depletion of the favored oxygen sites at the interface. The only purpose of the silicon is to provide a non ohmic heat

source to heat the palladium surface. Arcing is less efficient than cyclic heating because the arcing essentially melts the palladium resulting in a complete dehydride, the material then would have to be reannealed to become active. However, partial dehydriding within the two phase region preserves the activity of the material.

If our conclusions are correct, it should be possible to construct much more efficient cells with less material. More robust partially permeable surface modifiers are available and microfabrication of the palladium would allow rapid hydride-dehydride cycles.

NEW YORK - POPULAR SCIENCE MAGAZINE

In the March 1993 issue of *Popular Science*, a box with an article about environment stated: "...But by the very nature of their interests, our readers want to learn about the impact of science and technology on environmental quality. To that end *Popular Science* has published--and will continue to publish--articles demonstrating our conviction that science and technology have an ever more powerful role in fostering environmental well-being. ...Future articles will include such topics as clean coal, non-fossil fuels, the status of cold fusion, and the promise of fuel cells."

Fusion Facts has since supplied the editorial staff with information: three news-packed issues of *Fusion Facts* to show them the development and viability of cold fusion. The word seems to be beginning to get around.

TEXAS - TRITIUM & HELIUM PRODUCTION

Chun-Ching Chien (Chem. Div., Inst. Nuc. Energy Res., Taiwan), Dalibor Hodko (on leave from Rudjer Boskovic Inst., Zagreb, Croatia), Zoran Minevski and John O'M. Bockris (Chem. Dept., Texas A&M Univ., Texas), "On an Electrode Producing Massive Quantities of Tritium and Helium," *J. Electroanal. Chem.*, vol 338, 1992, pp 189-212, 30 refs, 11 figs, 5 tables.

AUTHORS' ABSTRACT

A Pd electrode has been examined which produced a concentration of tritium in a 0.1 M LiOD solution around 10^3 times above background. Tritium production at a given potential ceased after a few days, but could be restarted by a small increase of the deuterium overpotential. Correspondingly, ^4He was found in 9-10 pieces of the Pd electrode at 2-100 times background. Addition of fresh amounts of D_2O quenched the T production which began again spontaneously after 1-2 days. If the T had come from contamination, ^3He would have been found in the electrode: it was absent. Loss of charge by the nucleus takes place when

the fugacity of D in voids exceeds 10^{17} atm (Lifshitz and Pitaevskii, 1963). Sporadicity of function arises from the state of the surface, which is difficult to reproduce. The surface state controls the mechanism of D_2 evolution; only some mechanisms give a fugacity high enough to cause fusion. Only one electrode out of four examined produced T and ^4He . The surface of this electrode contained a Cu-mosaic structure, not seen on the inactive electrodes.

AUTHORS' CONCLUSION

It has been shown that at an electrode described in this paper, about 750 h of tritium production at about 10^7 atoms $\text{cm}^{-2} \text{s}^{-1}$ have taken place. After this time, the reaction was interrupted intentionally, and could not be re-started.

The facts reported are consistent with the achievement, as a result of a particular and specific configuration on the surface of the electrode, of a surface condition corresponding to high fugacity of D_2 in voids within the electrode.

TEXAS - CATHODE COOLING

Bruce E. Gammon (Thermodynamics Res. Cent., Texas A&M Univ., Texas), "Cathode Cooling by Expansion of Hydrogen in Calorimetric Tests for Cold Fusion," *Fusion Technology*, vol 23, no 3, May 1993, pp 342-345, 11 refs, 1 table.

AUTHOR'S ABSTRACT

Expansion of hydrogen and its isotopes from hydrogen-absorbing cathodes can transfer significant amounts of energy to the surrounding aqueous media. In calorimetric efforts to confirm cold fusion, allowance must be made for thermal conduction along electrical leads. In conjunction with consideration of the extent of cathode cooling by expansion of hydrogen, the rupturing of the cavities within the cathodes and limitations to charging of the electrode by hydrogen flowing from fresh cracks are briefly addressed.

AUTHOR'S CONCLUSIONS

The excess powers shown in the table are the same magnitude as those reported in many calorimetric reports of excess power generated during the electrolysis of D_2O solutions on palladium cathodes. In these experiments, the currents ranged from 0.1 to 10 A, and $V-V_{chem}$ was of the order of 1V; however, exact matching of these to experimental results cannot be done because information is not available for exact specification of the effective pressures required to load the cathode during any particular experiment.

The calculated gas temperatures show that boiling of the electrolyte can arise from the gas expansion. Burst release of the gas can produce a temperature gradient along the electrical

lead several times those calculated, but such values are not inordinate and could go unnoticed owing to the difficulty in probing the temperature of bare electrical leads carrying high currents. If highly pressurized cavities deep within the cathode rupture in a manner that permits the metal to make good heat exchange with the expanding gas, then the metal temperature will rise rapidly during such transient events. These short-duration temperature rises are interruptions of the steady removal of energy by gas expansions that are not restricted by passage through small fissures.

As a final reiteration, cathode release of hydrogen at a high chemical potential can cause conduction of significant amounts of energy along the cathode lead during electrolysis of water. Calorimetric measurements to show excess power generation from nuclear reactions induced in these experiments should have adequate provisions for eliminating heat pumping action from this potential source.

TEXAS - ENERGY FROM VACUUM

Courtesy of the author

Harold E. Puthoff (Inst. for Adv. Studies at Austin, Texas), and Daniel C. Cole (IBM Corp., Essex Junc., Vermont), "Extracting Energy and Heat From the Vacuum," Pre-print, accepted for pub. by *Physical Review E*, 12 pages, 9 refs, 2 figs.

AUTHORS' ABSTRACT

Relatively recent proposals have been made in the literature for extracting energy and heat from electromagnetic zero-point radiation via the use of the Casimir force. The basic thermodynamics involved in these is analyzed and clarified here, with the conclusion that, yes, in principle these proposals are correct. Technological considerations for actual application and use are not examined here, however.

E. NEWS FROM ABROAD

AUSTRALIA - REDUCING COULOMB REPULSION

Courtesy of Sam P. Faile

Heinrich Hora, J.C. Kelly (School of Physics, Univ. of N.S.W., Australia), J.U. Patel, G.H. Miley, J.W. Tompkins (Fusion Studies Lab., Univ. of Illinois and Rockford Technology Assoc., Illinois, USA) and Mark A. Prelas (Fulbright Visiting Professor from Univ. of Missouri, USA), "Screening in Cold Fusion Derived from D-D Reactions," *Physics Letters A*, vol 175, no 2, 1993, pp 138-143, 25 refs, 2 figs.

AUTHORS' ABSTRACT

Based on the few reliable and reproducible cold fusion experiments, the power law of reaction probability on nuclear distance arrived at a value of 3 pm which is in agreement with results derived by a different method (Vigier and Rambaut) of 2.5 pm. For our plasma and swimming electron model we calculate a screening factor of 14.

AUTHORS' CONCLUSIONS

The recent experimental results by Yamaguchi and Nishioka have emphasized that there are two different categories of cold fusion experiments. (a) those associated with phase transitions in the palladium metal plates which cause jumps in temperature, with mechanical deformations, and with burst of released gas, but not necessarily cold fusion reactions, though they may do so under special circumstances; (b) continuous and reproducible production of fusion neutrons and X-rays, with spectra showing 8.1 MeV peaks. To explain this high energy peak we extended the model of plasma and swimming electron layers to evaluate the screening needed to reproduce the repulsion of deuterons that would allow separations of the 3 pm necessary for the observed cold fusion reaction rates. It turns out that the screening factor has to be about 14 to reduce the Coulomb repulsion sufficiently. This rather high screening seems to coincide with an evaluation of the Preparata plasmon model where the screening is implicitly taken into account. Our results based on the power law of eq. (2) for reaction rates depending on the nuclear densities and reliable experiments in cold fusion resulted in a reaction distance of 3 pm in agreement with the 2.5 pm derived from a different model of Vigier and Rambaut. Further conclusions of the ⁴He production are given by a mechanism leading to the only stable isotopes of Co from Ni or of Rh from Pd.

AUSTRALIA - NEGATIVE RESULTS

Courtesy of Sam P. Faile

T.I. Quickenden and T.A. Green (Dept. Chem., Univ. of West. Aust., Australia), "A Calorimetric Study of the Electrolysis of D₂O and H₂O at Palladium Cathodes," *J. Electroanal. Chem.*, vol 344, nos 1-2, 1993, pp 167-185, 46 refs, 6 figs, 5 tables.

AUTHORS' ABSTRACT

A search for excess heat production during the electrolysis of D₂O and H₂O at palladium cathodes was conducted using a sensitive flow calorimeter. A total of 20 long-term experiments using 10 control cells and 10 test cells was performed and the effects of different electrode pretreatments and electrolysis conditions were examined. In all cases, the thermal output from the cell matched the Joule input energy within the experimental error of $\pm 1.5\%$. These results

provided no evidence for any excess heat production over the aggregated cell operating time of 17762 h.

CHINA - CLUSTER IMPACT FUSION

Chemical Abstracts, 19 April 1993

Ts. S. Wang, V. Leonas, A. Parnpuu (Inst. Appl. Phys. Math., Beijing, China), "Cluster Fusion: Possible Activation Mechanism," *Pis'ma Zh. Tekh. Fiz.*, vol 17, no 16, 1991, pp 56-60, in Russian.

AUTHORS' ABSTRACT

An explanation and numerical analysis are given of the contribution of the more effective trajectories realized during the collision of a cluster (e.g. a singly-charged cluster of $(D_2O)_N.D^+$, whose dimensions vary within the limits of $25 < N < 10^3$) with the surface of a deuterated target, such as TiD. This study was made in connection with the anomalously high yield of D-D fusion reaction products resulting therefrom, at bombarding energies of ≤ 300 keV. For the collision of the above-type cluster, the collisional configurations of the linear chain type (e.g. Ti-D-D-O) provide for a significant increase in the probability of fusion. On this basis, one can explain the anomalously high yield of D-D fusion reaction products initiated by bombarding deuterated targets with accelerated clusters of heavy water. However, the mechanism of activation, owing to the use of the pumping effect in specific collisional configurations, rules out the possible prospects (explained in an earlier work) of an energetic yield from cluster fusion.

CHINA - PENETRATION OF DEUTERIUM

Chemical Abstracts, 19 April 1993

Yunyu Wang, Maorong Huang, Wongsu He, Juhua Yang (Inst. High Energy Phys., Acad. Sin. China, Beijing, China), "Studies of Deuterium-Oxide-Lithium Deuterioxide-water Electrolysis System by Positron Annihilation (PA)," *Positron Positronium Chem., Int'n'l. Workshop, 3rd*, 1990, pp 416-419.

AUTHORS' ABSTRACT

An attempt was made to measure the penetration depth of deuterium into the Pd cathodes during electrolysis of D_2O containing LiOD by a positron annihilation method. Deuterons can be squeezed and accelerated by the electric field between cracks in Pd lattice and it may be a cause of the heat formation.

FRANCE - METHANE CLUSTERS

Chemical Abstracts, 19 April 1993

M. Fallavier, R. Kirsch, J.C. Poizat, J. Remillieux, H. Rothard, J.P. Thomas (Inst. Phys. Nucl. Lyon, Univ. Claude Bernard, France), "No Evidence for Enhanced (d+d) Fusion Under Methane- d_4 ($(CD_4)_n^+$) Cluster Ion(1+) Impact," *Phys. Rev. Lett.*, vol 70, no 7, 1993, pp 1022-1025.

AUTHORS' ABSTRACT

Possible enhancement of (d,d) nuclear fusion rate under cluster impact has been investigated. $(CD_4)_n^+$ clusters were sent onto deuterated polyethylene targets and protons resulting from fusion were detected. Using a light cluster (n from 1 to 5) of constant velocity we measured essentially constant proton yields per incident deuteron, i.e., observed no deviation from binary (d,d) fusion cross sections. With a heavier cluster (n=110, 145) we could only determine the upper limits of proton yields which seem to be entirely accounted for by beam contamination.

FRANCE - IT ISN'T EASY TO REMAIN A SKEPTIC

Courtesy of Dr. Peter Glück

Daniel Tarnowski, "The Metamorphosis of Cold Fusion," *Science et Vie*, no 905, February 1993, pp 46-61, ill., in French.

AUTHOR'S ABSTRACT

Act I: The discovery of the century. Act II: The cold shower. Act III: The burial. Act IV: The resurrection. Act V: The corpse moves again. A proof is the great interest raised by the Third International Conference on Cold Fusion held in Nagoya, October last year.

DR. GLÜCK'S COMMENTS

This is a trial to present a very morbid "Grand Guignol type" picture of cold fusion, which even after its resurrection remains a corpse. The author is surprised by the vitality of cold fusion, by the high interest of the Japanese and by some experimental results--Fleischmann-Pons, McKubre, Storms. He regrets that the unexplained heat excess phenomenon is not studied in France, because the cold fusionists are ridiculed and are obviously confused by the contradictions and controversies in the field. The "lack of the art and the methods to reproduce the results," (e.g. tritium by Prof. Bockris) remains a major obstacle for the acceptance of the phenomenon. The author's counsellors remain Dr. Douglas Morrison and Prof. J.R. Huizenga, but he doesn't seem to believe them 100%. Prof. Huizenga quotes an industrialist (inventor): "I don't care if cold fusion is real or not, all I'm interested in is to make money with it." The presentation of facts is ample, even if

the comments are not always impartial. It would be beneficial to help such journalists with proper, first-hand information (e.g. *Fusion Facts*).

GABON - WEAK INTERACTIONS

Chemical Abstracts, 19 April 1993

John L. Russell, Jr. (Alpharetta, Gabon), "On the Nature of the Cold Fusion Process," *Ann. Nucl. Energy*, vol 20, no 3, 1993, pp 227-228.

AUTHOR'S ABSTRACT

The experiment by G.P. Chambers et al. (1990) in which they identify 5.1 MeV tritons emerging from a cold fusion experiment apparently can only be explained by a process involving the weak interaction, i.e., a deuteron captures an electron to become a virtual di-neutron which in turn interacts with two more deuterons to form tritons of the observed energy.

[This is our first contribution from Gabon. Ed.]

GERMANY - NEUTRON PRODUCTION

Michael Bittner, Andreas Meister, Dieter Seeliger, Rainer Schwierz and Peter Wüstner (Dresden Univ. of Tech., Inst. for Nucl. & Atomic Phys., Germany), "Observation of d-d Fusion Neutrons During Degassing of Deuterium-loaded Palladium," *Fusion Technology*, vol 23, no 3, May 1993, pp 346-352, 10 refs, 10 figs, 2 tables.

AUTHORS' ABSTRACT

Experiments with two massive deuterium-loaded palladium samples designed to search for deuteron-deuteron (d-d) fusion during thermal degassing are described. In the heavier of the two samples which has a total mass of ~0.5 kg, during deuterium expulsion from the metal, a significant neutron excess count rate was detected by two independent NE-213 scintillation neutron detectors. The maximum time-dependent excess count rate corresponds to a d-d reaction rate of $(3 \pm 1) \times 10^{25}$ per deuteron pair per second. From detector pulse high spectra, the energy of the neutrons is determined to be ~2.5 MeV, as expected for d-d fusion neutrons.

AUTHORS' CONCLUSION

Experiments with a 0.5-kg palladium sample show a definite excess neutron count rate for a period of ~1 h. This is just the time interval during which the deuterium is expelled from the massive palladium sample. The energy of the detected neutrons is near 2.5 MeV, as expected for d-d fusion neutrons. Therefore, the conclusion is obvious: These

neutrons are caused by the d-d fusion reaction. The excess neutron count rate, which is time dependent, corresponds at its maximum to a d-d reaction rate of $(3 \pm 1) \times 10^{25}$ per second per deuteron pair.

INDIA - INCREASING ELECTRON ACCUMULATION

Chemical Abstracts, 19 April 1993

Lali Chatterjee, Sunit Mandal, Amal Chakrabarty (Phys. Dep. Jadavpur Univ., Calcutta, India), "Electron Accumulation and Reproducibility of Cold Fusion," *Indian J. Pure Appl. Phys.*, vol 31, no 2, 1993, pp 131-133.

AUTHORS' ABSTRACT

A method to increase electron accumulation in the deuterated metals used to host cold fusion events is proposed. This will serve to aid understanding of the physical phenomenon itself as well as to assist the reproducibility of the events. Expected enhancement of observed rates are calculated for different media.

INDIA - OXYGEN PERTURBATION

Courtesy of Peter Glück

M.K.S. Ray, R.D. Saini, D. Das, G. Chattopadhyay, R. Parthasarathy, S.P. Garg, R. Venkataramani, B.K. Sen, T.S. Iyengar, K.K. Kutty, D.N. Wagh, H.N. Bajpai and C.S.P. Iyer (Bhabha Atomic Research Centre, Bombay, India), "The Fleischmann-Pons Phenomenon--A Different Perspective," *Fusion Technology*, vol 22, no 3, 1992, 11 refs, 2 figs, 2 tables.

AUTHORS' ABSTRACT

Attempts have been made to initiate the Fleischmann-Pons phenomenon through selective perturbations during experimental studies in divided electrolytic cells. Despite wide variations in the operating parameters and the attainment of high loading (sometimes up to D/Pd ~ 2), the phenomenon was not observed either during the unperturbed electrolysis or on physical perturbation. However, instances of its occurrence were observed when the state of equilibrium of the deuterated cathode (having a scale free portion) was chemically perturbed by oxygen. This observation, viewed in light of available information, is indicative of oxygen playing a vital role in the phenomenon.

ITALY - CO & NO ABSORPTION ON Ni

Courtesy of Sam P. Faile

L.S. Caputi, R.G. Agostino, A. Amoddeo, E. Colavita (INFN and Dip. di Fisica, U. della Calabria, Cosenza, Italy)

and A. Santaniello (Sincrotrone Trieste, Italy), "X-ray Photoelectron Diffraction Study of CO- and NO-saturated Ni(111)," *Surface Science*, vol 282, nos 1-2, 1993, pp 62-66, 18 refs, 4 figs.

AUTHORS' ABSTRACT

We studied the molecular axis orientation of CO and NO adsorbed on Ni(111), at saturation and at room temperature, by x-ray photoelectron diffraction of the C, N and O 1s core level peaks. Although previous studies are indicative of strong interactions between adsorbed molecules, we do not observe any induced tilt of the molecular axis with respect to the surface normal.

ITALY - SUPERRADIANCE & MAGNETISM

Courtesy of Sam P. Faile

E. Dei Giudice (INFN, Sezione di Milano, Italy), B. Giunta and G. Preparata (Dipt. di Fisica dell'Univ di Milano, Italy), "Superradiance and Ferromagnetic Behaviour," *Il Nuovo Cimento*, vol D, no 11, pp 1145-1155, 12 refs, 2 figs.

AUTHORS' SUMMARY

The ferromagnetic behaviour is analyzed in terms of a new physical mechanism based on superradiance. We show that if the *d*-electrons' plasma is in a superradiant state, then ferromagnetism arises in transition metals such as Fe, Co and Ni. Satisfactory agreement with experimental information on several important quantities is obtained.

ITALY - THEORETICAL ASPECTS

Courtesy of Pier Giorgio Sona

Pier Giorgio Sona (Laboratori CISE, Milano, Italy), "Phenomenological and Theoretical Aspects of Cold Fusion," Manuscript from author, 17 pages, 10 figs.

AUTHOR'S INTRODUCTION

The internal discussion reported herein is developed as follows: Known phenomenology --> Scheme of a theoretical model --> Expected phenomenology. From experiments the following have been reported:

- Tritium production (F. Will, and others),
- High T/n ratio,
- ⁴He observed, correlated with heat production, and
- Heat >> Tritium production >> neutron production.

Therefore, we infer that the lattice interacts strongly with the nuclear process, and that the prevailing channel of the reaction is: $d + d \rightarrow ^4\text{He} + \text{energy}$ directly released to the lattice.

There are **theoretical considerations** connected with the theorem of **Leggett-Baym** and with the **short lifetime** of alleged **intermediate states** of the excited nucleus (S. Jones).

The limitations from the above considerations are **overcome** if, together with the assumption of a mechanism of partial electronic screening of the Coulomb barrier, one takes into account a possible **delocalization** of the phenomenon over a coherence radius large in comparison with the lattice period, owing to the **bosonic statistics** of the deuterons and to their high mobility in the lattice.

EDITOR'S COMMENT

Sona presents both theoretical considerations and suggests experimental means for verification. No information has been received as to where this paper will be published. Those who are interested can contact the author at Laboratori CISE; Via Reggio Emilia, 39; 20090 Segrate (Milano), Italy. We suggest to the author that he considers the possibility that the predominant nuclear reaction may be $d + ^6\text{Li} \rightarrow 2 ^4\text{He} + \text{energy}$ to the lattice. This nuclear reaction has been suggested by several scientists, including Dr. Robert Bush.

JAPAN - ACOUSTIC EMISSION

Courtesy of Sam P. Faile

Kazuhisa Azumi, Shukuryoh Ishiguro, Tadahiko Mizuno and Masahiro Seo (Faculty of Engineering, Hokkaido Univ., Japan), "Acoustic Emission from a Palladium Electrode During Hydrogen Charging and Its Release in a LiOH Electrolyte," *J. Electroanal. Chem.*, vol 347, no 1-2, 1993, pp 111-121, 11 refs, 8 figs.

AUTHORS' ABSTRACT

Acoustic emission (AE) from a palladium electrode dipped in a 0.1 N LiOH electrolyte was measured during electrochemical hydrogen charging and its release. Large AE signals were observed for a few minutes in the first stage of the hydrogen charging in contrast with the small random AE signals caused by the evolution of hydrogen and oxygen gas. These signals appear to reflect the deformation of the Pd lattice by hydrogen charging. Various types of periodic AE signals were also observed during hydrogen charging and hydrogen release after charging for long periods. It is believed that these phenomena are associated with the hydrogen-transfer mechanism through defects existing in the palladium.

AUTHORS' CONCLUSIONS

Hydrogen was charged into a palladium electrode by cathodic polarization, and acoustic emission from the palladium was

measured during the charging and the subsequent hydrogen release. The following conclusions were drawn.

(1) When palladium was anodically polarized, AE signals corresponding to the evolution of oxygen gas were observed. When palladium was cathodically polarized, the number of AE events was small at first because the hydrogen atoms were absorbed by the palladium, and then increased due to decrease of hydrogen absorption. The AE signals corresponding to gas evolution appeared randomly, and the number of AE events depended on the gas evolution current.

(2) A burst of AE was observed during hydrogen charging, i.e. a large number of AE signals continued for a few minutes. This phenomenon may be related to deformation of the lattice or cracking in palladium caused by hydrogen charging.

(3) A few AE signals of the periodic type were observed during hydrogen charging by cathodic polarization and its release at open circuit after a long period of charging. These phenomena appear to be associated with a hydrogen-transfer mechanism through defects existing in the palladium.

(4) The spectra of AE reflect its origin such as gas evolution and lattice deformation or crack generation. However, identification is difficult because the spectra also depend on the shape of the specimen, the method used to attach the AE sensor and the history of hydrogen charging.

JAPAN - HYDROGEN REFRIGERATION

S. Fujitani, H. Nakamura, A. Furukawa, T. Yonesaki, K. Nasako, T. Saito and I. Yonezu (Sanyo Electric Co., Ltd., Functional Mat. Research Center, Osaka, Japan), "Development of Hydrogen-absorbing rare earth-Ni alloys for a -20°C Refrigeration System," *Journal of Alloys and Compounds*, vol 192, nos 1-2, 1993, pp 170-172, 7 refs, 3 figs.

AUTHORS' ABSTRACT

The equilibrium and reaction rate performance of pseudo-binary $\text{La}_{1-x}\text{Y}_x\text{Ni}_5\text{Mn}_y$ ($x=0-0.4$; $y=0-0.2$) alloys were investigated with regard to their use in a -20°C refrigeration system with a $130-150^{\circ}\text{C}$ thermally driven heat source, such as solar heat. The substitution of Mn for Ni in LaNi_5 improved the reaction rate, while substitution of Y for La raised the equilibrium hydrogen pressure to approximately 1 MPa at room temperature, which is ideal for a refrigeration system. As a consequence, a -20°C refrigeration heat cycle with $\text{La}_{0.6}\text{Y}_{0.4}\text{Ni}_{4.8}\text{Mn}_{0.2}$ was designed successfully.

AUTHORS' CONCLUSION

The substitution of Mn and Y for the Ni and La in LaNi_5 improved both the reaction rate and the equilibrium hydrogen pressure. This enabled the development of $\text{La}_{1-x}\text{Y}_x\text{Ni}_{5-y}\text{Mn}_y$ material for a -20°C refrigeration system.

JAPAN - HYDROGEN-STORAGE ALLOYS

Chiaki Iwakura, Yukio Fukumoto, Masao Matsuoka, Tatsuoki Kohno and Katsuhide Shinmou (Dept. Appl. Chem., Univ. of Osaka Prefecture, Osaka, Japan), "Electrochemical Characterization of Hydrogen Storage Alloys Modified With Metal Oxides," *Journal of Alloys and Compounds*, vol 192, nos 1-2, 1993, pp 152-154, 7 refs, 2 figs.

AUTHORS' ABSTRACT

Negative electrodes were made from hydrogen storage alloys ($\text{MmNi}_{3.9}\text{Mn}_{0.4}\text{Al}_{0.3}\text{Co}_{0.7}$) modified by mixing them with metal oxide powders. The discharge capacity of cathodes was greatly increased by the modification with metal oxides with high electric conductivity, for example RuO_2 and Co_3O_4 . An exchange current density (J_0) for the Hydrogen electrode reaction was also increased remarkably by modification with metal oxides. High-rate dischargeability was found to increase asymptotically with an increment of J_0 . An impedance analysis indicated that the modification of the alloy powder with the metal oxides was discussed on the basis of the electrocatalytic activity of the modified surface.

AUTHORS' CONCLUSIONS

Changes in the catalytic nature of negative electrodes by modification with powder of various metal oxides were examined. Modification with a few metal oxides (RuO_2 and Co_3O_4 and CoO) increased the discharge capacity and the high-rate dischargeability and J_0 could be recognized. AC impedance analysis indicated that catalytic activity of the negative electrode might be improved by mixing the metal oxides. The high performance of the modified negative electrode was explained on the basis of improved electrocatalytic activity and reduced contact resistance as well as an increment of effective surface area.

JAPAN - NO CLEAR EVIDENCE FOR CF

Chemical Abstracts, 118, 15 April 1933

Hiroshi Mishima (Therm. Energy Combust. Eng. Dept., NIRE, Japan), "Experimental Trial for Cold Fusion Using Electrolysis Technique of Heavy Water with Palladium Electrode. Part 1," *Shigen to Kankyo*, 1992, vol 1, no 4, pp 273-281. In Japanese.

AUTHOR'S ABSTRACT

The possibility of the cold fusion by the electrolysis method with deuterated water and Pd and Pd alloy as the cathode has been studied. The gamma ray, neutrons and change in the solution temperature were used as parameters as evidence for cold fusion. The present experiments, however, did not indicate clear evidence for cold fusion, since no significant difference in the above parameters was obtained between the electrolysis and the background.

Compounds, vol 192, nos 1-2, 1993, pp141-144, 9 refs, 3 figs, 1 table.

AUTHORS' ABSTRACT

The changes in electrical resistivity caused by electrolytically charged hydrogen in a series of palladium-rare earth (RE) solid solution alloys (RE ≡ Sc, Gd, Dy, Tb, Ho, Er, Yb, Lu) were investigated in the low hydrogen concentration region of the alpha phase, together with measurements of the electrode potential.

JAPAN - HYDROGEN STORAGE ALLOYS

R. Mishima (Mitsubishi Kasei Corp. Research Center, Yokohama, Japan), H. Miyamura, T. Sakai, N. Kuriyama, H. Ishikawa and I. Uehara (Govt. Indust. Res. Inst., Osaka, Japan), "Hydrogen Storage Alloys Rapidly Solidified by the Melt-spinning Method and their Characteristics as Metal Hydride Electrodes," *Journal of Alloys and Compounds*, vol 192, nos 1-2, 1993, pp 176-178, 2 refs, 5 figs.

JAPAN - METAL HYDRIDE ELECTRODES

Nobuhiro Kuriyama, Tetsuo Sakai, Hiroshi Miyamura, Itsuki Uehara and Hiroshi Ishikawa (Govt. Indust. Research Inst., Osaka, Japan), "Characterization of Metal Hydride Electrodes by Means of Electrochemical Impedance Spectroscopy," *Journal of Alloys and Compounds*, vol 192, nos 1-2, 1993, pp 161-163, 8 refs, 2 figs, 2 tables.

AUTHORS' ABSTRACT

Rapidly solidified LaNi₅-based hydrogen storage alloys were prepared by a melt-spinning method. The prepared melt-spun alloy ribbon had very fine crystal grain of below 10 μm. The hydrogen absorption behavior and electrode properties of the alloys were greatly improved. Heat treatment at 400°C which did not cause enlargement of the grain further improved these properties.

AUTHORS' ABSTRACT

Resistive components of various metal hydride electrodes were evaluated by means of electrochemical impedance spectroscopy. Examples of applications of the technique are reported: characterization of (1) the difference in performance between a misch-metal-based alloy electrode and a titanium-based alloy electrode and (2) the influence of the storage period of misch-metal-based alloy powder on the alloy surface activity.

JAPAN - Pd-Sc ALLOYS

Y. Sakamoto and F.L. Chen (Dept. Mat. Sci. & Eng., Nagasaki Univ., Japan), "Thermodynamic Studies of Hydrogen Solution in Pd-Sc Alloys," *Journal of Alloys and Compounds*, vol 192, nos 1-2, 1993, pp 145-148, 11 refs, 3 figs, 1 table.

AUTHORS' ABSTRACT

Thermodynamic quantities for the absorption of hydrogen by Pd-Sc alloys with up to 7.5 at. % Sc have been determined at temperatures between 273 and 473 . The results are compared with those of other palladium-rare earth alloys reported previously.

JAPAN - SURFACE-MODIFIED ELECTRODES

Masao Matsuoka, Katsuhiko Asai, Kazuaki Asai, Yukio Fukumoto and Chiaki Iwakura (Dept. Appl. Chem., Univ. of Osaka Prefecture, Osaka, Japan), "Electrochemical Characterization of surface-modified Negative Electrodes Consisting of Hydrogen Storage Alloys," *Journal of Alloys and Compounds*, vol 192, nos 1-2, 1993, pp 149-151, 7 refs, 2 figs.

AUTHORS' ABSTRACT

Negative electrodes consisting of MmNi_{3,6}Mn_{0,4}Al_{0,3}Co_{0,7} (Mm=mischmetal) alloy powder filled in a porous nickel substrate were modified by using different electroless plating baths or alkaline solutions containing hypophosphite as a reducing agent. The deposited metals function as a microcurrent collector and then increase the discharge capacity of the negative electrodes. In contrast, modification with a reducing agent gives rise to high electrocatalytic activity of the negative electrodes which leads to a remarkable reduction in overvoltage in charging and discharging even at the first cycle.

JAPAN - Pd-RARE EARTH ALLOYS

Y. Sakamoto, F.L. Chen, M. Kinoshita and M. Minamikawa (Dept. Mat. Sci. & Eng., Nagasaki Univ., Japan), "Electrical Resistivity Changes Due to Dissolved Hydrogen in Palladium-rich Palladium-rare Earth Alloys," *Journal of Alloys and*

It was found that such simple surface modifications improved the performance of negative electrodes under appropriate conditions with respect to the amount of electroless deposit or the concentration of reducing agent.

AUTHORS' CONCLUSIONS

The modification of molded negative electrodes consisting of $\text{MmNi}_{3.6}\text{Mn}_{0.4}\text{Al}_{0.3}\text{Co}_{0.7}$ alloys with electroless deposition or reducing agents resulted in a much improved performance, as indicated by an increment in discharge capacity as well as high-rate capability. Such high performance of modified negative electrodes is ascribed to the fact that electroless deposits serve as a microcurrent collector and that an Ni-rich surface having high catalytic activity as well as the diffusion path of hydrogen are produced by modification with a reducing agent. A well-defined correlation between J_0 and the high-rate dischargeability could be established, i.e. the rate capability increased with an increase in J_0 .

JAPAN - THIN-FILM ELECTRODES

T. Sakai, H. Yoshinaga, H. Miyamura, N. Kuriyama, H. Ishikawa and I. Uehara (Govt. Indust. Res. Inst., Osaka, Japan), "Metal Hydride Thin Film Electrodes Prepared by R.F. Sputtering," *Journal of Alloys and Compounds*, vol 192, nos 1-2, 1993, pp 182-184, 5 refs, 3 figs, 1 table.

AUTHORS' ABSTRACT

Thin films of mischmetal-based hydrogen storage alloys were prepared by r.f. sputtering. It was found that manganese contained in the alloy significantly changed the crystallographic and electrode properties in good agreement with the results obtained for the bulk alloys.

JAPAN - ELECTRIC AUTO BATTERY STUDY

T. Sakai, H. Miyamura, N. Kuriyama and I. Uehara (Govt. Indust. Research Inst., Osaka, Japan) M. Muta, A Takagi, U. Kajiyama, K. Kinoshita and F. Isogai (Toyoda Automatic Loom Works Ltd., Aichi, Japan), "Nickel-metal Hydride Battery for Electric Vehicles," *Journal of Alloys and Compounds*, vol 192, nos 1-2, 1993, pp 158-160, 4 refs, 4 figs.

AUTHORS' ABSTRACT

When a nickel-powder-mixed alloy electrode using $\text{MmNi}_{3.5}\text{Co}_{0.7}\text{Al}_{0.8}$ (Mm=mischmetal) was held in a complete discharge state at 40°C, a severe capacity decrease due to passivation was observed. This capacity lowering was prevented by a nickel (copper) coating or by a cobalt powder

mixing. The alloy $\text{MmNi}_{3.8}\text{Co}_{0.5}\text{Mn}_{0.4}\text{Al}_{0.3}$ did not cause passivation even for the nickel-mixed alloy. Prismatic nickel-metal hydride batteries (30-60 A h) were constructed using the alloy electrodes and evaluated as an electric vehicle battery.

JAPAN - Ni-METAL HYDRIDE BATTERIES

M. Tadokoro, M. Nogami, Y. Chikano, M. Kimoto, T. Ise, K. Nishio and N. Furukawa (Functional Mat. Res. Cent., Sanyo Electric Co., Ltd., Osaka, Japan), "Development of Hydrogen-absorbing alloys for Nickel-metal Hydride Secondary Batteries," *Journal of Alloys and Compounds*, vol 192, nos 1-2, 1993, pp 179-181, 5 refs, 3 figs.

AUTHORS' ABSTRACT

The effect of the stoichiometry of $\text{Mm}(\text{Ni}_{0.64}\text{Co}_{0.2}\text{Mn}_{0.12}\text{Al}_{0.04})_x$ alloy on the hydrogen absorption capacity, and the reactivity of two-phase alloys in alkaline solution, were investigated. Furthermore, the electrochemical characteristics of non-stoichiometric hydrogen-absorbing alloys with a second phase were investigated. Non-stoichiometric hydrogen-absorbing alloys ($x=4.5-4.8$) with boron added were found to have higher electrochemical capacities and superior electrochemical reactivities that those of stoichiometric alloys without boron added.

AUTHORS' CONCLUSIONS

Non-stoichiometric composition alloy electrodes with boron added had higher electrochemical capacities and showed superior high rate discharge characteristics to those of stoichiometric composition alloy electrodes without boron added. This alloy formed the second phase MmCo_4B in addition to the main phase. The improvement in the discharge rate characteristics is thought to be due to the electrochemical catalytic effect of the second phase.

JAPAN - MISCHMETAL ALLOY POWDERS

K. Takeya, Y. Tsugita and Y. Okajima (Miihama Research Labs., Sumitomo Metal Mining Co., Ehime, Japan) T. Sakai, H. Miyamura, N. Kuriyama, H. Ishikawa and I. Uehara (Govt. Indust. Research Inst., Osaka, Japan), "Hydrogen Storage Alloy Powders Produced by a Reduction-diffusion Process and their Electrode Properties," *Journal of Alloys and Compounds*, vol 192, nos 1-2, 1993, pp 167-169, 7 refs, 4 figs.

AUTHORS' ABSTRACT

Hydrogen storage alloy powders of rare-earth-based alloy-Ni Systems (La-Ni, Mm-Ni-Co-Al, Mm-Ni-Co-Mn-Al; Mm=misch metal) were prepared by a reduction-diffusion

process. The alloy powders were evaluated as a negative electrode in an Ni-metal hydride battery. The results are summarized as follows. (1) The alloy powder was obtained as fine particles of average particle diameter around 30 μm with smooth surface. (2) The alloy powder had uniform composition with a crystal structure of the CaCu_2 type. (3) The alloy powder exhibited good hydrogen absorption-desorption properties. The pressure plateau was very flat, not needing heat treatment. (4) The electrode properties of Mn-containing alloy powders were the same as those of alloys produced by a conventional induction melting and heat treatment process.

RUSSIAN FEDERATION - H(D) DIFFUSION

Courtesy of Sam P. Faile

A.V. Skripov, M. Yu. Belyaev and A.P. Stepanov (Inst. of Metal Phys., Acad. Sci., Ekaterinburg, Russ. Fed.), L.N. Padurets and E.I. Sokolova (Inst. of Gen. & Inorg. Chem., Russ. Acad. Sci., Moscow, Russ. Fed.), "Nuclear Magnetic Resonance Study of the Electronic Structure and Hydrogen Motion in the Random b.c.c.- $\text{TaV}_2\text{H}_x(\text{D})$ System," *J. of Alloys and Compounds*, vol 190, no 2, pp 171-179, 36 refs, 8 figs, 2 table.

AUTHORS' ABSTRACT

Nuclear magnetic resonance measurements of the ^1H , ^2D and ^{51}V spin-lattice relaxation times and Knight shifts in the random b.c.c.- $\text{TaV}_2\text{H}_x(\text{D})$ system ($0.1 \leq x \leq 2.4$) have been performed over the temperature range 11-440 K. The relaxation data are analyzed to obtain the parameters of H(D) diffusion, which is governed by a distribution of activation energies. The long-range diffusion of H(D) in b.c.c.- $\text{TaV}_2\text{H}_x(\text{D})$ is found to be much faster than in C15-type $\text{TaV}_2\text{H}_x(\text{D})$ with comparable H(D) contents. For all the studied samples (including those with mixed isotope composition) there is a distinct isotope effect on the average activation energy: $\bar{E}_a^{\text{D}} > \bar{E}_a^{\text{H}}$. The measured values of the Knight shifts and the electronic (Korringa) contributions to the spin-lattice relaxation rates indicate that the density of d-electron states at the Fermi level decreases with increasing H(D) content.

AUTHORS' CONCLUSIONS

The main results of our NMR measurements in the random b.c.c.- $\text{TaV}_2\text{H}(\text{D})$ system may be summarized as follows:

The density of d-electron states at the Fermi level decreases with increasing H(D) content. In contrast to C15- TaV_2H_x , the effective hyperfine magnetic field at proton sites in b.c.c.- TaV_2H_x is negative (i.e., antiparallel to the external field).

The ^1H and ^2D spin-lattice relaxation data can be satisfactorily described in terms of the BPP model using a gaussian distribution of activation energies. The average value of the activation energy for hydrogen diffusion initially increases with increasing x , but at $x \geq 1.5$ starts to decrease. The long-range diffusion of H(D) in b.c.c.- $\text{TaV}_2\text{H}_x(\text{D}_x)$ is much faster than in C15- $\text{TaV}_2\text{H}_x(\text{D}_x)$. In contrast to the case of C15- $\text{TaV}_2\text{H}_x(\text{D}_x)$, we have not found any signs of low temperature localized hydrogen motion in b.c.c.- $\text{TaV}_2\text{H}_x(\text{D}_x)$.

The average activation energy shows a distinct isotope effect: $\bar{E}_a^{\text{D}} > \bar{E}_a^{\text{H}}$. The same inequality is valid for diffusion of hydrogen and deuterium in a single sample with mixed isotope composition. This is consistent with the absence of strong correlation effects in the motion of H(D).

TAIWAN - TRITIUM PRODUCTION

Courtesy of Peter Glück

Chun-Ching Chien and Theresa Chen Huang (Inst. Nucl. Energy Res., Chem. Div., Lung-Tan, Taiwan), "Tritium Production by Electrolysis of Heavy Water," *Fusion Technology*, vol 22, no 3, 1992, pp 391-394, 9 refs, 4 figs.

AUTHORS' ABSTRACT

Tritium activity values are obtained from the electrolysis of heavy water on palladium and are higher than background values by over three orders of magnitude in at least 10 of 100 experiments. These values are far in excess of those expected from the enrichment of tritium during long-term electrolysis. The pretreatment of palladium, including acid etching and anodic charging and initial mild cathodic charging, seems to play the most important role in the success of the current experiments. Raising the temperature might enhance the rate of reaction, while small voltage increases will trigger the reaction. It is observed that heavy water additions or turbulence of the electrolyte might be a possible cause of the temporary quenching of the reaction.

F. SHORT ARTICLES FROM READERS

NUCLEAR CATALYSIS UP-TO-DATE

By Dr. Peter Glück

There are a lot of very relevant analogies between the nuclear reactions observed in solid state systems and heterogeneous catalysis. The first and most interesting is that both fields are lacking an adequate theory. However, this analogy is somewhat concealed by the formidable technological successes and applications of the catalytic process. (Remember please, even the process of digestion is not known in every detail but we are eating, thank God! without trying to solve in advance all the scientific problems of that field). The difference is that

catalyst people know that active sites are bred and not born and have a great experience in creating those centers on the surfaces where actually the reactions do perform. Actually, the immense practical experience in the fields of heterogeneous catalysis can be summarized in the following essential "molecular ingredients" [1], these are of interest for nuclear catalysis, too.

- ◆ Rough surfaces are more active for catalysis.
- ◆ The catalytically active surface is covered with a strongly chemisorbed layer.
- ◆ High reactivity of oxide / metal interfaces (!).
- ◆ High reactivity of bimetallic systems (see e.g. [2]).
- ◆ Co-adsorbed bonding modifiers and structure modifiers.

A recent discovery [3], promptly reported by Fusion Facts [4] contributes to the understanding of these complex phenomena: "a new mechanism for a surface reaction was documented, a reaction between an adsorbed and an absorbed species, and it demonstrates the importance of bulk species as reactants in heterogeneous catalytic chemistry." This mechanism can be operant in the case of nuclear catalysis, too.

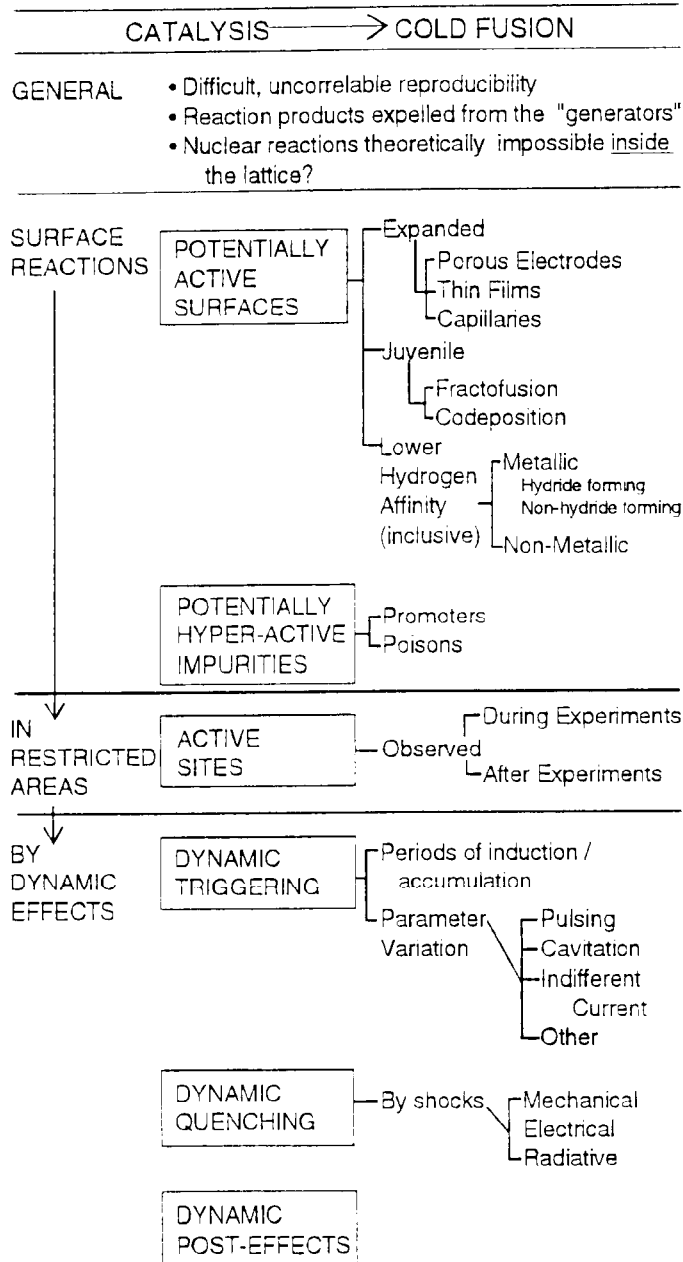
The attached scheme is based on the multitude of experimental data which point out relevant analogies between these two cases of phenomena. Only a profound interdisciplinary analysis, corroborated with a massive transfer of technological experience and know-how from the mature and highly developed field in the emergent one might show how significant are these analogies.

Given that a complete presentation of all data references would go beyond the frame of a short article, I will emphasize only one point--the interpretation of the effect of the most known promoter on the surface of the Pd electrodes: McKubre's Pixie Dust. As far as I know the positive role of glass, i.e. silica and alumina was also mentioned by Fleischmann at Nagoya as well as by Criddle in an excellent short paper in *F.F.* [5-7]. The catalyst people know well that the SiO_2 (or Al_2O_3 or TiO_2) /metal interfaces are vital for the catalytic activity. [8] This can be an alternative explanation of this improvement. For details and a complete bibliography as well as for additional proofs of the nuclear catalysis concept, the readers are asked to write directly to the author.

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Negative opinions are especially welcome. The author became convinced as the knights of the Grail--"The truth is in the seeking, not in the cup."

Relevant Analogies Between the Solid-State Nuclear Processes and Heterogeneous Catalysis



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[8] S.A. Stevenson, J.A. Dumeset, R.T.K. Baker, E. Ruckenstein, Metal Support Interactions in Catalysis, Sintering and Redispersion, Van Nostrand-Reinhold, 1987, 316 pages.

DR. EDMUND STORMS' LECTURE AT MIT

By Mitchell Swartz

Dr. Edmund Storms (Los Alamos National Laboratory) began his lecture at MIT demonstrating further support to the fact that CF, and the heat generated, are real.

He examined the "skeptics" most frequent "reasons" to dismiss cold fusion, and explained the confusion behind each "claim."

He suggested calling the reactions CANR (for Chemically Assisted Nuclear Reactions). After reviewing the state-of-the-art in cold fusion he presented and discussed his own results.

These results include the further defining the two types of palladium samples. Some work, some do not work. Although it is well-known that many palladium samples simply do not work, wisdom is knowing which is which. The ability to distinguish palladium samples which properly function depends in part upon noting that the **good electrodes do NOT increase in volume as much as inactive pieces** upon loading. Dr. Storm's data supports this criterion.

From the *Fusion Technology* paper (3/93, Volume 23, p 230), "Measurement of Excess Heat from a Pons-Fleischmann-type Electrolytic Cell using Palladium Sheet":

"The first [active] sheet contained 0.8% excess volume after having been deloaded from its maximum deuterium/palladium (D/Pd) ratio of 0.82 to 0.73, and the second [inactive] sheet contained 13.5% excess volume while at its maximum ratio of 0.75."

Brief Summary: The excess heats were 20% (of input power) with a peak of 7.5 watts excess. The equipment included sealed calorimeters, stirred, with a spatial distribution of temperature sensors. The distributed cluster of temperature probes confirmed that the heat output was from the cathode. This lecture completed another year of CF seminars arranged by Profs. Smullin and Hagelstein. Like the others, this seminar was well attended. This time, no negative comments

were made. With a relative absence of hot fusioners, the distribution of scientists seemed displaced towards metallurgists, material, environmental, energy, and CF scientists.

G. LETTERS TO THE EDITOR

LETTER FROM SAM P. FAILE CALL TO GUNNERMAN GROUP

I called and asked if the car rally had occurred at Reno with the A-55 fuel. They say this has been delayed until they can do some tests for the German auto company. Dr. Gunnerman is back from Germany but will have to make another trip there. An important test is scheduled for May 12. The A-55 works diesel engines as well as the regular type. A finding of interest is that 10% more water than the A-55 mix produces a substantial power benefit but a 15% addition of water results in an abrupt decline in the power output. They term the performance results as ones that show something is working even though the underlying phenomena is still a mystery. They believe the data that is being obtained will help in understanding the mechanism of the power produced.

LETTER FROM CHIMIFORM DATA S.A. Bucharest, Romania

Dear Hal,

On occasion of the 4th anniversary of the Cold Fusion discovery, we present to the *Fusion Facts* review -- the best information source in the field, and to its chief publisher Hal Fox, a conscientious and fearless champion for the scientific truth -- our sincere congratulations, wishes for health and prosperity.

LETTER FROM MITCHELL R. SWARTZ

Dear Hal,

Thank you for continuing unparalleled coverage of this extensive field. You, and your staff, do so much excellent work integrating and presenting significant lodes of information to starved readers.

To amend page 17 of the January 1993 issue: There is no evidence to support your suggestion that the combination of DLE is "cold fusion electrolysis" as your editorial comment suggests. The correct application of photoabsorptive colligating dyes, subsequent optical irradiation, followed by proper electron charge-transfer from electrode to dye have much to offer antimicrobial therapy, biochemistry, and possibly this field. However, the inactivations are produced

on combinations of noble metal electrodes which, to my knowledge, have never been reported to produce any "cf" reaction in aqueous solutions, to wit: platinum anode and platinum cathode. Furthermore, given the low solubility of the relevant isotopic fuel for platinum, "cf electrolysis" also seems inapplicable with the cited data. On the other hand, Peter Hagelstein has informed me that some cf reactions occur on platinum in gas discharge, and the history of cf should make all of us periodically critically reevaluate our knowledge.

Our very best wishes, Mitchell R. Swartz

H. MEETINGS AND MISCELLANEOUS

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**For more information call the ACS Meetings
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The Adams Pulsed Motor Generator Manual, By Robert Adams of New Zealand, was released in January 1993, and is available from Nexus New Times Magazine, PO Box 30, Mapleton, Qld 4560 Australia (Fax 074-429-381). Cost within USA, Europe, Canada -- USD\$50 includes postage.

4th INTERNATIONAL CONFERENCE ON COLD FUSION December 6-9, 1993 Hyatt Regency Maui, Hawaii

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.

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 subject-organized parallel sessions. 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.

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