MEETING REPORT

SECOND INTERNATIONAL LOW-ENERGY NUCLEAR REACTIONS CONFERENCE, COLLEGE STATION, TEXAS, SEPTEMBER 13–14, 1996

The Second International Low-Energy Nuclear Reactions Conference was held on September 13–14, 1996, in College Station, Texas. Forty-six people from six countries attended the meeting. The conference was chaired by J. Bockris (Texas A&M University) and G. Miley (University of Illinois). The meeting organizer and assistant chair was G. H. Lin (Texas A&M University). The meeting consisted of four sections: "Basic Experimental Studies," "Innovative Approaches," "Theoretical Models," and an open discussion. There were 21 presentations in the first three sections.

Bockris gave the opening statement. He noted the remarkable position of the field of low-energy nuclear reactions. On one hand, his colleagues in the Texas A&M University Department of Chemistry have declared that the field is nonexistent and that any pretext of a conference is a hoax. On the other hand, the work of a number of meeting attendees would, in the opinion of some who know of advances in the field, stand with the great steps in nuclear research—those of Rutherford and Chadwick in 1919 and Hahn and Meitner in 1939. Bockris emphasized that although he thought that more is lost as a result of overskepticism rather than too much credence, we must always first strive to find an explanation for our results in terms of the nuclear chemistry of the textbook.

In the first section, "Basic Experimental Studies," the first presentation was "Nuclear Reaction in Palladium-Hydrogen System," by Miley, who used thin film coated electrodes of palladium and nickel and thin film coated beads with a power cell configuration to obtain a large product yield—up to 40%. The products included silver, silicon, chromium, magnesium, copper, cadmium, and others. Four analysis methods were used: neutron activation analysis, secondary ion mass spectrometry (SIMS), energy-dispersive X rays (EDX), and Auger electron spectroscopy (AES). Radiation was observed in two experiments. Abnormal isotopic abundance was used as a criterion of synthesis. Miley observed a 50% deviation from the natural distribution; however, the results of these measurements are not yet conclusive.

In "Reaction Products Induced by Isotopic Changes Due to Electrolysis," T. Mizuno (Hokkaido University) presented remarkable evidence for new element formation up to a 3-μm depth in palladium at high deuterium fugacity. He used a Teflon-coated stainless steel cell with a platinum mesh anode and a palladium rod cathode. Four analysis methods were used: electron probe microanalysis, AES, EDX, and SIMS. Xenon and many new metals were observed. Impurities from the solution and metal were carefully analyzed. The measurements of isotopic abundances indicated the existence of low-energy nuclear reactions occurring in the Pd-D system.

J. Dash (Portland State University) presented "Excess Heat and Unexpected Elements from Electrolysis of Acidified Heavy Water on a Titanium Cathode." The electrolyte used was 0.01 M H_2SO_4 in a heavy water solution. Platinized Al_2O_3 was used as a recombination catalyst. Energy-dispersive spectroscopy (EDS) and inductively coupled plasma-mass spectroscopy were used to analyze the element formation. He observed a correlation between excess heat and the formation of new elements on the surface. However, isotopic abundance was not measured.

S. Szpak (Naval Control and Ocean Surveillance Center) presented "Nuclear and Thermal Events Associated with Pd + D codeposition." He reported observing X-ray emission, gamma radiation, and excess heat from palladium cathodes evolving D_2.

Z. Minevski (Lynntech) reported on some work carried out in collaboration with Bockris at Texas A&M University. His presentation was "New Elements Formed in the Electrolysis of Heavy Water on Palladium." X-ray photoelectron spectroscopy and EDS were used to observe new element formation at a 1-μm depth, which was distinguished from impurities in the surface layers, correlated with measured impurities in the solution.

M. Swartz (Jet Energy Technology) presented "Deuterium Production and Light Water Excess Enthalpy Experiments Using Nickel Cathodes." Nickel was used as an anode, and gold or platinum was used as a cathode. Excess heat was observed in 25 out of a total of 38 cells. Deuterium production was observed.

R. George (E-Quest Sciences) reported on "Isotopic Ratio Anomalies Induced in Palladium by the Application of Intense Ultrasound." Helium-4 found in palladium electrodes was irradiated with ultrasound. New elements were found at the edge of craters detected on the surface by SIMS analysis.

H. Fox (Fusion Information Center) gave a semi-presentation of an electrochemical method for reducing the activity of nuclear wastes (the method is being patented). The method was said to reduce activity 60 to 95%.

D. Nagel [Naval Research Laboratory (NRL)] presented a review report, " 'Cold Fusion' Experiment, Theory Management at the Navel Research Laboratory." He reviewed NRL work on cold fusion. He admitted privately that part of the effort

was staffed by semiretired persons. He said that various Government agencies, leaden within the U.S. Department of Energy, had not accepted his (division chief's) pleas for funding of cold fusion.

T. Claytor (Los Alamos National Laboratory) reported on a 5-yr successful effort on tritium production. His topic was "Tritium Production from Palladium and Palladium Alloys." He used the high-voltage pulse method to produce plasma. The best tritium yield was observed by using palladium alloys. Tritium production at various conditions and different electrode configurations were studied. The function of the addition of other gases, such as H_2 and CO_2, was also discussed.

T. Ohmori presented a remarkable paper on isotopic distribution of new elements formed as a result of hydrogen diffusion into a gold electrode entitled "Isotopic Distribution of Heavy Metal Elements Produced During Light Water Electrolysis on Au Electrode." Isotopic abundance studies were used as the chief criteria of new material creation. The main elements observed were mercury, silicon, and iron. The isotopic distribution of silicon was different, with a natural abundance of silicon of 50 to 70%. The mercury signal was observed at a 5- to 10-μm depth by using sputtering EDS, which could not be explained by a normal diffusion process.

In the second section, "Innovative Approaches," Lin presented, for the first time, the Philadelphia Project work at Texas A&M University, which was done in 1992. Gold, platinum, palladium, and other elements were formed as a result of explosive heating of a mixture containing lead and mercury salts. The production level was ~100 to 500 parts per million (ppm) for gold and 1 to 10 ppm for the others. The results were confirmed by multiple independent analyses that used different methods and were executed by various organizations. Beta activity decay was observed but was irreproducible and apparently was not always connected to significant new metal production.

Other presenters in the second section were as follows. T. Grotz (Wireless Engineering) reported on a carbon-to-iron experiment in "Synthesis of Iron via Arc Discharge Through Activated Carbon." K. Shoulders presented "Observation on the Role of Charge Clusters in Nuclear Cluster Reactions," in which he discussed charge "clusters," fired at the surface of metals by using a tesla coil to give plasmoid shapes. New elements on the surface were observed by means of X-ray analysis. R. Monti's paper was presented by Bauer, who claimed that the alpha model of the atom could rationalize a huge variety of transmutations in the cold. A. Michrowski (Planetary Clean Energy Association) presented "Advanced Transmutation Processes," in which he attempted a survey of cold transmutations.

In the third section, "Theoretical Models," Y. Kim (Purdue University) presented "Nuclear Physics Mechanisms for Gamow Factor Cancellation in Low-Energy Nuclear Reaction." He demonstrated a theoretical calculation of conditions where the Gamow factor would cancel out, thus allowing nuclear processes in the cold. The physical model involved excitation of nuclei, whereupon they became ellipsoidal and unstable. However, as commented by J. Natowitz (Texas A&M University), his theory did not involve the solid lattice.

Rounding out the third section, A. Cau presented "Natural Nuclear Synthesis of Superheavy Elements," in which he rationalized the formation of noble metals by alchemists. Pitchblende was the basic substance used, and radiations from it caused other nuclear reactions. E. Lewis presented a paper in which he used a plasmoid model to try to explain T. Matsumoto's work. G. Rabzi (Ukrainian International Academy of Original Ideas) presented "Natural Cold Fission—Natural New Energy—Natural New Physics," in which he claimed that his group had success in cold transmutations over 15 yr. Finally, Fox reported speculations on details of proton capture mechanisms.

A fair summary of the first three sections of the conference would be that more than ten papers gave evidence that nuclear reactions take place in solid lattices in the cold. Further confirmation of this evidence would constitute a discovery on a magnitude comparable with that of atomic disintegration with high-energy neutrons [Rutherford (1919)] and nuclear fission by neutron bombardment [Hahn and Meitner (1939)] and would open a new area of great potential. Such confirmation has the potential to change radically ideas of nuclear stability.

The meeting concluded with a 2-h open discussion. Bockris stressed the need for reproducible experiments. J. Redding (CETI) and Dash both claimed 95% reproducibility. Natowitz criticized the work presented for overriding well-known nuclear principles and criticized the reporting of many results seen as impossible with the present paradigm. He asked why no radioactive products had been detected. Mizuno answered this by saying that he had detected ^{197}Pt and its 18-h decay. Few people had sought radioactivity, which in any case had shown up in K. Wolf's work. Natowitz also pointed out that Kim's theory did not involve the solid lattice.

The conference presentations are available in the October 1996 issue of the *Journal of New Energy* (Editor: Hal Fox, Fusion Information Center). The entire meeting was videotaped by a conference service group. To obtain the tape, contact Dr. Guang Lin at 215-860-0902 for details.

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