8. Industrialization and U.S. Patents

This blog provides examples of information in U.S. patents on cold fusion and low energy nuclear reactions (LENR) that can be reviewed and incorporated as appropriate into a program to industrialize cold fusion technology. Information in patents is generally considered to be better thought out than that in technical papers and presentations, although papers in journals are often peer reviewed. The reason is that inventors who develop information for their patents are often subjected to detailed questions of a wide variety from patent examiners during the patent prosecution process, many of which help to ensure technical accuracy of the information. Also, the patent review process is considered arduous, time consuming and costly, all of which support the need for accuracy. Thus, patents about cold fusion (and LENR) can be used as important sources of information to support an industrialization program, for example in finding ways to increase heat output. The following are some U.S. patent examples:

a. 5,318,675, "Method for Electrolysis of Water to Form Metal Hydrides," June 7, 1994, by James A. Patterson. Describes a type of liquid electrolysis device containing microspheres coated with a conductive palladium layer and an electrolyte composed of water or heavy water and a conductive salt (e.g. lithium sulfate). Methods are discussed for making the electrolysis device, electrolyte and microspheres. Test setup and results are also discussed. Patent examiner: Donald R. Valentine. Application was dated July 20, 1993.

b. 5,411,654, "Method of Maximizing Anharmonic Oscillations in Deuterated Alloys," May 2, 1995, by Brian Ahern et al. Developed with U.S. Air Force support. Describes concepts for a liquid electrolysis device containing either deuterium or hydrogen (sublattice) in many small regions on surfaces of a palladium-silver, palladium or nickel cathode (host lattice), at a ratio of at least 5 atoms of the sublattice to 10 atoms in the host lattice and energized by low frequency (5-2000 Hz) voltage. A theoretical discussion is provided on enhancing deuterium or hydrogen oscillation within the small cathode regions. The deuterium or hydrogen is provided to the cathode by electrolysis of

water or heavy water. Methods of making many small regions on host lattice surfaces (e.g., scribing and layering) are also discussed. Patent examiner: Donald R. Valentine. Application was dated July 2, 1993.

c. 6,248,221 B1, "Electrolysis Apparatus and Electrodes and Electrode Material Therefor," June 19, 2001, by Randolph R. Davis et al. Discusses design of a gas or gaseous type of cold fusion device with cathode reaction material comprised of nanocrystalline (e.g., nickel) particles, a porous ceramic reaction vessel between the anode and cathode, a microwave waveguide starter/initiator, and a relatively simple electronic control circuit. A theoretical discussion is provided on the movement of hydrogen into and through the cathode by electrolysis, gas pressure, and electric and thermal diffusion. Spray conversion processing is discussed as a method of making nanocrystalline particles for the cathode. Patent examiners: Kathryn Gorgos and Thomas H. Parsons in USPTO Art Unit P/1729. Application was dated June 1, 1999.

d. 7,244,887 B2, "Electrical Cells, Components and Methods," July 17, 2007, by George H. Miley. Describes concepts for a wet (or dry) electrolysis type of cold fusion device that uses a multi-layer thin film cathode made of palladium, titanium or nickel, for example, or metallic nanoparticles. Cells designs which employ loading of ionic hydrogen from a hydride storage layer are considered. Results from experiments with multi-layer thin films are also included. Patent examiner: Bruce F. Bell. Application (under the international Patent Cooperation Treaty or PCT) was dated February 26, 2001.

e. 7,893,414 B2, "Apparatus and Method for Absorption of Incident Gamma Radiation and Its Conversion to Outgoing Radiation at Less Penetrating, Lower Energies and Frequencies," February 22, 2011, by Lewis G. Larsen and Allan Widom. Describes concepts for a gas type of device to produce heavy electrons within oscillating "surface plasma polaritons (SPPs)" on metal substrate (e.g., nickel) surfaces that can interact by extremely intense electric fields directly with oscillating protons (or deuterons without protons) and be captured by the protons (or deuterons) to form low energy neutrons. The neutrons can be

captured by device construction material (e.g., palladium-lithium alloy) in a low energy nuclear reaction (LENR) process, transmuting the material and producing energy. A theoretical discussion is provided on the manner in which gamma radiation from the LENR reactions, or from outside sources, may be shielded by SPP electrons that absorb gamma ray electromagnetic energy. Methods of making the metallic working surface are also discussed. Patent examiners: Robert Kim and Hanway Chang in Art Unit P/2881. Application was dated September 9, 2005.

f. 8,227,020 B1, "Dislocation Site Formation Techniques," July 24, 2012, by George Miley. Describes concepts for a gas type of cold fusion device to use multi-layer thin films made of palladium, titanium or nickel, for example, or metallic nanoparticles and providing dislocations where reactions would occur. Theoretical discussion on pyconuclear reactions and reaction rate equations are provided. Detailed discussion is provided on results from experiments with multi-layer thin films. Methods are provided to increase the density of dislocations in the thin films. Patent examiner: Brian K. Talbot in Art Unit P/1715. Application was dated March 31, 2008.

g. 8,440,165 B2, "Dislocation Site Density Techniques," May 14, 2013, by George Miley and Xiaoling Yang. Information in this patent is similar to that in 8,227,020 B1. Patent examiner: Frank Lawrence, Jr. in Art Unit P/1776. Application was dated March 7, 2012.

h. 8,419,919 B1, "System and Method for Generating Particles," April 16, 2013, by Pamela A. Boss et al. Developed with U.S. Department of the Navy support. Describes the design of a liquid electrolysis device whose cathode is formed by co-deposition of deuterium and a deuterium absorbing metal, such as palladium. Steps in making and operating the device are discussed, to include the use of CR-39 plastic as a detector. Results are provided from related experiments. Patent examiners: Keith Hendricks in Art Unit P/1773 and Steven A. Friday in Art Unit P/1795. Application was dated September 21, 2007.

i. 8,603,405 B2, “Power Units Based on Dislocation Site Techniques,” December 10, 2013, by George Miley and Xiaoling Yang. Information in this patent is a continuation-in-part and similar to 8,227,020 B1 and 8,440,165, but with additional system design provided for small power units (Figure 16) and gas loaded reaction generator modules (Figure 17). Patent examiner: Frank Lawrence, Jr. in Art Unit P/1776. Application was dated May 13, 2013.

j. 9,540,960 B2, “Low Energy Nuclear Thermoelectric System,” January 10, 2017, by Nicolas Chauvin. Discusses engineering design of a thermal generator to utilize transmutation reactions to produce heat for use in mobile applications. Indicates use of heater and radio frequency energy to energize nickel powder in a reaction chamber and a shield to block any gamma rays emitted by the transmutations. Patent examiner: Jesse Bogue in Art Unit P/3748. Application was dated March 22, 2013.

These examples of patents appear to fall into two categories: those more closely associated with fusion, deuterium, energy and helium; and, those more closely associated to transmutation, hydrogen, energy and transmutation products. All are related to low energy nuclear reactions that was generally unheard of before Pons and Fleischmann in 1989. Patents (a-d), (f-i) are more closely associated with fusion, deuterium, energy and helium; and, patents (e), and (j) appear to be more closely related to transmutation, hydrogen, energy and transmutation products. It is important also to note that some patent examiners in the U.S. Patent and Trademark Office currently hold a view that there has been no reliable evidence that these types of nuclear reactions have been achieved. This impacts the number of patent applications that are approved as patents. Inventors are concerned that this may be due to inappropriate influence on managers in the USPTO. The industrialization process, however, can also look to additional supporting information available both in published U.S. applications and in international patents. For example, a list of published applications is provided in patent 9,540,960 B2. A company called “Nichenergy” [click on www.nichenergy.com] holds at least five

international patents. Reference WO95/20816 (January 27, 1995), WO2010/058288 (May 27, 2010), WO2012/147045 (November 1, 2012), WO2013/008219 (January 17,2013) and WO2013/046188 (April 4, 2013).