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Clean Hydrogen Generation through Mechanism of Hydrogen Embrittlement in Metal Hydride Lattice and Exothermal Reaction of Lenr – Low Energy Nuclear Reaction

Robert Vancina

Hope Cell Technologies, Melbourne, Victoria Australia

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One of the main problems associated with hydrogen production in hydrocarbon conversion process, from chemical point of view, is kinetic limitation. Low feasibility narrowing options of process for conventional thermal conversion. Most common production of hydrogen – Steam Reforming resulting with high energy consumption. Using special high-priced catalysts to attain reasonable productivity and equivalent equipment size without much scalability rate characterize this technology. The necessity to heat the catalyst to the high working temperature (aprox.800 °C) leads also to the problem of 'cold start' and restricting mobile applications. Enormous energy waste in the process accompanied with production of over 8.8 billion tons* of carbon globally, are additional negative aspects of the process. Hydrogen basic physical properties ensure future wide usage as an energy source and carrier of high caloric value. Wide variety of applications can be adapted to hydrogen use as the source or medium of energy. Hydrogen is very reactive element and does not exist in elementary form in natural environment of the Earth. It always comes in molecular arrangement of clusters based on H2 dipole. Stability of those clusters depends of stability of all elements included. Hydrogen is bonded with other elements not only as single molecule bond but rather as oscillating clusters of molecules bonded together (Figure 1).

The substantial cooperative strengthening of the hydrogen bonds is dependent on long range interactions and strength of each bond in the cluster, which encourages larger clusters formation for the same average bond density and potential. Elements isolation can be achieved by exposing cluster to range of high temperatures. An unstable elementary hydrogen in cluster, whose bond with other elements has been broken when exposed to high temperatures, will tend to react with predominantly electrically opposite element in its proximity. In a vacuum environment it will form hydrogen molecule.

Breaking one bond, through exposing cluster to heat, generally weakens those around. If exposed to the oxygen environment, and accompanied with high temperature, hydrogen will violently react in combining with oxygen through combustion. This mechanism would define most common combustion in general, allowing for some untypical exceptions. Exothermic reaction further breaks the hydrogen bond with other elements of the cluster, exposes more hydrogen to run off combustion process. If we take, for example, hydrocarbon case, different hydrocarbon bonds occur in various lengths and structures, comprise various additional elements as well. More complex hydrocarbon cluster can be broken to as many simple hydrocarbons and other components through exposing to different temperatures. Reactivity of metal hydride with hydrogen is known and used in various applications. The phenomenon of hydrogen embrittlement results from the formation of interstitial hydrides. Interstitial hydrides most commonly exist within metals or alloys more closely resembling common alloys. In such hydrides, hydrogen can exist as either atomic or diatomic entity. Mechanical or thermal processing, such as bending, striking, or annealing may cause the hydrogen to precipitate out of solution, by degassing. These systems are usually non-stoichiometric, with variable amounts of hydrogen atoms in the lattice. Hydrides of this type forms according to either one of two main mechanisms. The first mechanism involves the adsorption of dihydrogen, succeeded by the cleaving of the H-H bond, the delocalization of the hydrogen's electrons, and finally, the diffusion of the protons into the metal lattice. The other main mechanism involves the electrolytic reduction of ionised hydrogen on the surface of the metal lattice, also followed by the diffusion of the protons into the lattice. The second mechanism is responsible for the observed temporary volume expansion of certain electrodes used in electrolytic experiments. Those mechanisms do not have any typical side effects of an atomic reaction, supported by strong evidence of lattice transmutation through spectrometry readings, and can't be considered as such. Mechanism initiated through plasma treatment of hydrogen based cluster in presence of metal hydride lattice would present new moment in hydrogen embrittlement and is accompanied with exothermic reaction (Figure 2).

Plasma is a highly – density source of energy, which covering process enthalpy and provide optimal temperature range to eliminate kinetic limitations of hydrogen isolation.

Low electrical conductivity of the medium has been converted in to high conductivity physical properties through interaction of plasma which resulting with change of the state of the matter.

Double Layer plasma mechanism isolates an unstable and highly reactive elementary atomic hydrogen H in cluster, whose bond with other elements has been broken. Exposed atomic hydrogen proton will violently react with surrounding fast moving metal hydride lattice electron and forming additional neutron through isolated but violent exothermic reaction. This additional exothermic reaction – highly energized emission, results in elevated atomic hydrogen isolation by syncing into molecular dipole frequency with resonating effect, where excessive breakage of surrounding cluster bonds is maintained in a run-off process. Breaking one bond, through exposing hydrogen medium cluster to excess heat, bends and weakens bonds around, and process is repeated in surrounding area of metal hydride lattice. Mechanism

***Corresponding author:** Vancina R, Hope Cell Technologies, Melbourne, Victoria Australia, E-mail: robert@hopecell.com

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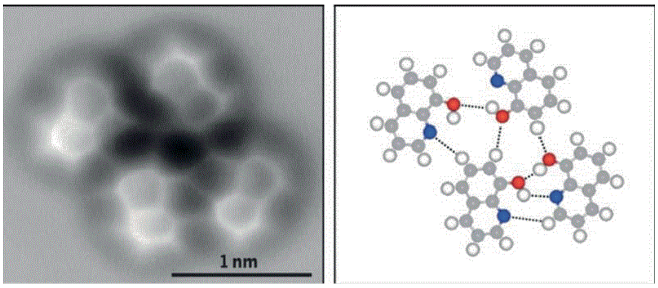

Figure 1: Hydrogen cluster image and schematic of it.

Figure 2: Practical example of hydrogen embrittlement through proposed mechanism in metal hydride lattice

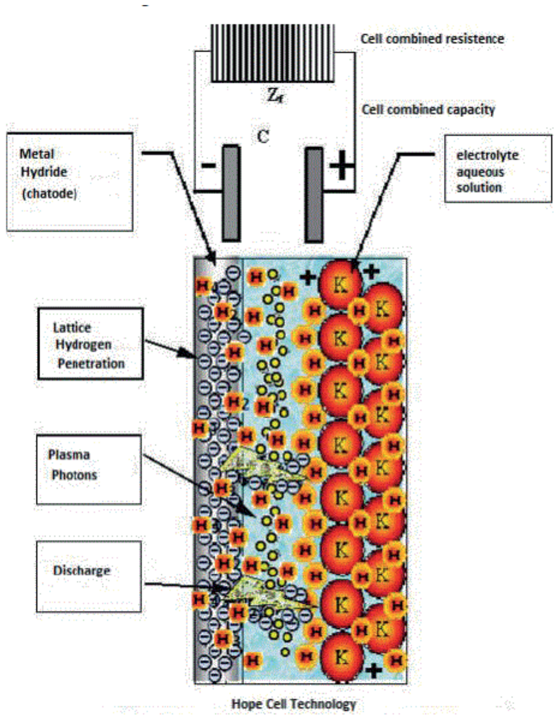

Figure 3: Schematic of Hydrogen embrittlement in metal hydride lattice and conditions of exothermal reaction mechanism LENR.

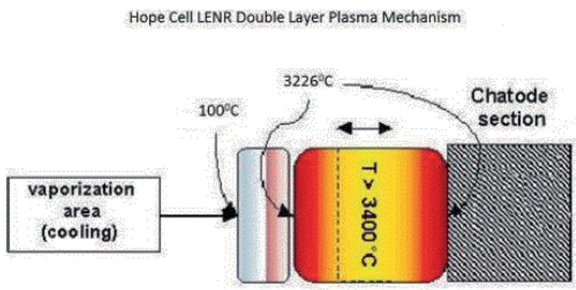

Figure 4: Hope Cell Double Layer Plasma mechanism.

eventually results in forming of H2 Deuterium, which is one neutron heavier, and sheds excess binding energy to the lattice through beta decay, further resulting in nano-dimensional isolated transmutation of surface, with spectrometry detection of numerous new elements. Plasma electromagnetic excitement allows process to continue with the hydrogen proton capture in lattice. Each successive cascade and decay emit significant amount of excess heat energy and result in further isolated metal hydride surface lattice transmutation through this weak nuclear force (Figure 3).

Hydrogen based cluster decomposition through double layer plasma mechanism demonstrates a high specific productivity rate of decomposition comparing with steam reforming or partial oxidation processes.

Employing plasma, as a medium for changing state of the matter of the cluster, change its physical properties. Plasma electrical charge ionizing hydrocarbon and allowing lower temperatures of decomposition from approximately 800 °C in conventional steam reforming to approximately 120 °C with plasma decomposing through resonating bonds in the cluster with high energetic rate.

Process which resulting in more effective and substantially less energy demanding breakage of hydrogen-carbon bond. Enthalpy of the mechanism covering wide range of temperatures where different hydrogen based clusters can be decomposed. Process demonstrates over-unity comparing to electrolysis or steam reforming and is proportionally reflected by lowering final price of the product (Figure 4).

This approach gives numeral advantages of: Lower energy consumption; Higher energy efficiency in production; Starting and stopping process of decomposition close to instantaneous; User friendly control with possibility of instant variable output of the process; Scalability of application; Decomposition approaching 100% under optimal high pressure; Wide variety of hydrogen based cluster compounds can be used in plasma decomposition through proposed method, where carbon, as the by-product is released in solid soot state – it is easy removable and ready for usage in different applications or safe storage. Important characteristic of the process are simplification of the decomposition; no need for catalyst so no catalyst deactivation; scalable size; on demand usage; mobile equipment friendly; low cost applications. Water decomposing would be most obvious application as well (Figure 5).

Unique scalable setup allowing exothermic effect of hydrogen in robust stainless steel enclosure with LENR evidence; Neutron capture and weak interactions explain the surface reactions and excess heat generation. Hope cell have surface interactions spread throughout the

Figure 5: Result of applying mechanism to sea water decomposition.

body of the cell on multiple rate – example of discovery of controlling, directing and magnification.

Process which strongly supporting water dislocation in anomalous over-unity quantity comparing to standard electrolysis. Burned mark on other side of the body showing plasma change of the state of the matter of the water and physical properties as result of it (water can burn)! Using surplus of wind, sun generated energy for conversion to hydrogen for readily available, on demand usage is another innovative example of converting hydrogen to medium or carrier of energy, allowing alternative sources to become mainstream as a major breakthrough in energy consumption. There are many more exciting possibilities.