Deflation Fusion Experiments

Possible Cold Fusion Experiments

Horace Heffner October 15, 2007

PURPOSE

It is intended here to provide some sample device designs and experiments to demonstrate deflation fusion principles[1].

A PROPOSED INITIAL EXPERIMENT

Shown in Figure 1 is an electron fugacity concept experiment, suitable for amateur construction, based on a Szpak cell, or the more current SPAWAR cell design.[2]

A metal plate HV anode 1 is fully enclosed in encapsulating HV insulation 3, an electrolyte submersible high voltage insulating jacket, which extends across the electrolyte level 2. A voltage V_0 is applied to the metal plate HV anode via the insulated HV anode lead 12. A CR-39 detector 4 is adhered to the encapsulating insulation.

A cathode coil 5 consists of a cathode wire wound around the CR-39 detector 4 and insulated ground electrode as a unit, and has a potential V_1 applied to it via the electrolysis cathode lead 11. A good metal for the cathode wire is silver, because, with an electroplated Pd coating, it can be expected to produce some energetic particles even without high deuterium concentrations, i.e. with ordinary water. Very pure (.9999 fine) silver wire is available from jeweler's supplies and online presently for under $8 a foot.[3] High silver content thin gauge solid silver solder might possibly work also.

The electrolysis anode 8 is maintained at a positive electrolysis potential with respect to the electrolysis cathode lead 11 by a floating DC power supply not shown. A voltage V_2 is applied the the electrolysis anode lead 10. The difference $V_2 - V_1$, is set by the floating DC power supply to a voltage sufficient to obtain a good loading current initially, and to sustain loading during live operation. It may be useful to use a 99%+ pure small palladium ingot or coin, available at most coin stores, for the anode.

A magnetic field 9 can be applied across the cell in an "into the page" fashion in Figure 1. A laser beam can be applied to the wire through the electrolyte. The laser beam incidence angle with respect to the CR-39 surface can be adjusted so at least some will hit or reflect toward the side of the wire closest to the CR-39 detector.

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Laser leveling devices provide a cheap source of low power continuous operating lasers. Unfortunately, high powered lasers may be necessary to obtain any noticeable added effect.

The Szpak cell used an electrolyte comprised of 0.03 M PdCl2 and 0.3 M LiCl in D2O. It also worked using KCl instead of LiCl. It is reasonable to expect NaCl will work in place of KCl. Instead of purchasing PdCl2 it may be feasible to use a hydrochloric acid electrolyte (HCl) buffered with table salt (NaCl). The source of the Pd is then the anode itself. Electroplating of the silver cathode wire sufficiently is then a process which may take two or three weeks. It is extremely important to provide excellent ventilation during electrolysis because both hydrogen, which is explosive, and chlorine, which is extremely toxic, evolve. In some circumstances this electrolysis might be best achieved out of doors, using low voltage DC supply wires coming from indoors.

One method of building a floating DC power supply is to drive a car alternator using a belt drive or dielectric drive shaft, and then rectifying the output. The unit should be covered with a grounded metal case and the supply wires should be highly insulated. A useful type high voltage wire is that used in making neon signs. A much more efficient and less noisy method, but probably more expensive method, is to obtain a 120 V high voltage isolation transformer and drive a highly insulated (for safety) but ordinary power supply. A fail-safe mechanism should be provided to cut all power when access to the experiment or power supply is attempted.

The high voltage supply providing the potential difference V_1-V_0 can operate at very low current, at least in DC mode, and thus can be a very safe power supply, .

The voltage V_0 in Figure 1 is zero potential, as defined earlier. The cell must be located in a grounded Faraday cage. One control variation of the experiment is to make the cell cathode wire voltage V_1 highly positive, and thus the electrolysis electrode potential V_2 slightly more positive, leaving V_0 at ground. The experiment then consists of comparing the control, which includes a positive cathode wire, no magnet, and no laser, to a result with the full compliment of electron orbital stressors.

Another variation is to make V_1 ground and apply AC across V_1-V_0. This experiment is in general not designed for back side de-loading, but some may occur

when there is an AC voltage applied across V_1 - V_0. Use of AC avoids surface charge buildup on the CR-39 which diminishes the field applied to the CR-39 side of the cathode wire. The AC V_1-V_0 version of the experiment is considered the most likely version to produce the most CR-39 tracks because it avoids charge buildup on the CR-39, and provides some degree of back de-loading.

Other important variations of the experiment consist of changing the orientation and position of the electrolysis anode, in combination with variations in the potentials V_0, V_1, and V_2 , both during the initial plating phase, and the operation phase where high current is used to generate nuclear activity in the cathode. Recent experiments indicate a high intensity electrostatic field is important during plating but not cell operation, at least in some configurations.[4] The purpose of this experimentation is to determine the effects of fields and electron fugacity on both the front and back sides of the cathode during loading and during operational phases. It is of use to place CR-39 detectors on both sides of the HV anode assembly for this kind of experimentation (under the cathode wire in both cases). There are three orientations of the electrolysis anode. First is as shown in Figure 1, facing one side of the cathode assembly. Here the difference between the two CR-39 is of interest. Next, the anode can be placed in the plane of and adjacent to the Metal HV plate. The effects on both CR-39 detectors should then be the same. What is of interest in this configuration is (1) differences along the width of the CR-39 detectors, and differences between (2) V_1 positive and V_0 ground , (2) V_1 negative and V_0 ground , (3) V_1 ground and V_0 positive. Each of these configurations produce differing fields and electron fugacities throughout the cathode, both during co-deposition and during live runs. Lastly, it may be of interest to place the electrolysis anode to the side of the HV anode plate, but perpendicular to it, so as to increase the electrolysis plate ground screening to one side of the cathode assembly vs the other.

Another important variation of the experiment is to attach a second cathode power lead to the free end of the cathode wire. For this version of the experiment it is of interest to use thin high resistance wire which can adsorb hydrogen, possibly palladium wire, which is readily obtainable, though expensive.[5] For use without co-deposition titanium wire is a good choice due to its low conductivity. To avoid overheating the wire and yet to obtain the largest possible internal field, the power applied through the cathode, which is independent of the other applied powers and the source of which should be isolated from ground, should be pulsed AC with a very

low duty cycle.

There are many combinations of field orientations to test. There are many more, essentially limitless, combinations of materials to test.

One electrolyte of possible interest is distilled water saturated with pickling lime, CaO, available in powdered form from Walmart. However, this electrolyte must be used with a high voltage AC electrolysis potential V2 - V1, so cell operation becomes dangerous unless it is used as an additive to other more conductive electrolytes. The calcium is deposited when an electrode is in cathode state. An alternative experiment of possible interest is, during the initial preparation and plating of the cathode, to alternate plating time between the PdCl2 - NaCl bath and a CaO bath. This will deposit alternating layers of Pd-CaO and Pd, both codeposited with hydrogen. Another variation of possible interest is adding a small amount of boric acid (available at local pharmacies) to the PdCl2 - NaCl electrolyte, or to the CaO bath, possibly creating a calcium borohydride, Ca(BH4), tunneling barrier and/or tunneling target.

Ultimately, a practical device will likely have a gas mode back side, or at least operate partially in gas mode. This experiment should produce particle tracks in the CR-39, at least with the right wire type and electrolyte, because the Szpak cell produced some CR-39 tracks with Pd plated silver cathodes using H2O instead of D2O. If D2O is available all the better. The interesting thing is comparison of tracks for the live run to the control and to HV AC applied to create the V_1-V_0 difference in potentials.

USE OF A CALCIUM OXIDE BARRIER

The cathode high voltage back side, either in gas back side mode, or dielectric back side mode, can be coated with a layer of calcium oxide (CaO) to provide the much needed diffusion barrier. Evidence for this application is provided by Iwamura's work,[6 7] which can be interpreted to show that a thin diffusion barrier is effective at building hydrogen fugacity and thus deflation fusion. There are numerous references to Iwamura at lenr-canr.org.

Hydrogen diffusion in Pd is almost entirely by tunneling. When diffusing through a

CaO barrier, toward the back side, the deuteron leaves behind an electron on the front side, which can simultaneously tunnel across the same barrier, or not. When an electron is left behind on the front side of the barrier, the deuteron would have had to have found a matching electron on the back side of the barrier to make that tunneling event favorable. (Alternatively the deuteron-electron pair could have tunneled while in the deflated hydrogen state, but this state has low probability normally.) This suddenly unveiled electron on the (high hydrogen fugacity) front side then starts a chain of deuteron tunneling events on the backed up high pressure front side of the barrier, progressing away from the barrier toward the front of the cathode, and such tunneling events are the stuff of which deflation fusion is made. Increasing the probability of tunneling by this method greatly increases the probability of dual deuteron tunneling, and thus deflation fusion. The tunneling process in this case is always toward the location of a catalyzing electron left behind in a vacant site. This process is clearly made far more likely in general by providing a source of electrons on the back side of the barrier to initiate the tunneling chains on the front side.

A NEW CATHODE GEOMETRY

This then leads to another possible cathode structure and LENR method. See Figure 2. That method consists of building an electrode in which the CaO layers exist parallel to the direction of electrolysis driven diffusion. This parallel barrier electrode, when used in an electrolysis mode, is used in a triode cell where a separate current can be run through the cathode normal to the direction of the electrolysis current. When the cathode is loaded, such a current normal to the hydrogen flow causes hydrogen diffusion laterally through the cathode, and thus through the CaO barriers. The electrolysis then is merely to keep the cathode loaded. The loading can even be achieved in gas mode, as in the Iwamura experiment, and as shown in Figure 2. The hydrogen fugacity from gas loading is lower than for electrolysis, however, so electrolysis is likely a better alternative for loading.

The major diffusion is driven through the CaO barriers, and is driven by AC current applied normal to the flow, i.e. left to right and vice versa in Figure 2.

Note that in gas mode the low pressure side need not be a vacuum as in the Iwamura experiment, and might even be high pressure to keep the overall fugacity

up. It should be equally as effective to provide the pressure differential via compression of the front side gas as by vacuum on the back side. In purely gas phase form the active element then has only two electrodes and can be purely AC driven.

The waveform used to drive the barrier jumping can consist of a low current set up phase followed by a high voltage pulse to achieve a tunneling phase. Figure 2 is a diagram of a gas phase loaded cell.

The dielectric structural support layer is much thicker than shown in Figure 2 and can be provided by a somewhat porous ceramic. With a highly positive back side HV field (with respect to the AC neutral), and use of slightly conductive barium titanate for the ceramic, the cell then takes on the additional role already characterized for a back side cathode in the region of the backside barrier. A useful configuration would probably include the ability to exchange the Pd-CaO portion, and would require appropriate seals at the edges, and quickly adaptable means of electrical contact. A porous BaTiO3 support layer, or other porous strong dielectric, should be adhered to a gas permeable or porous ground (zero potential as defined above) or positive electrode plate on its back side.

A very thin width cathode of this kind can be prepared for experimental use by the vacuum sputtering methods as used by Iwamura, and then sectioned for use vertically as shown, using appropriate soldering or joining methods to make electrical contact and yet sustain the pressure drop. However, mass production could be by successive layer build up using epitaxial[8] and/or lithographic methods used commonly in chip fabrication, and would likely involve a diffusion barrier other than CaO. An alternative manufacturing method might be to sputter numerous Pd-CaO-Pd layers in a continuous method on a Pd foil roll, with PD on the final surface. The outside layers being Pd, the roll can be cut into strips, joined, and the Pd annealed to bond the assembly into a solid electrode as shown. The ideal metal may not be Pd, but rather silver, or some alloy. Other metals or alloys may also be of interest for producing isotopes using heavy element LENR, which this configuration should produce. Similarly the ideal diffusion barrier material may not be CaO. It might simply be thin layers of cathode material oxide.

Another method of constructing a cathode with similar characteristics is to prepare granules with tunneling barriers, actually half-barriers, adhered to their surfaces, and then compress and heat them in bulk to anneal out pores that permit hydrogen flow without diffusion. This then creates a system of islands of diffusion material

interlaced with tunneling barriers of the right thickness. This should be a high resistance material with active regions throughout.

The type cell in Figure 2 can be expected to produce good results because it is merely an extension of concepts applied to cells already shown to be effective. What is most interesting about this is that the concept can be taken to a logical conclusion. That is, in effect, *the fabrication of the diffusion and barrier layers as a single hybrid material*. This is logically accomplished by making an alloy of palladium or other fusion active metal, like nickel, titanium, or aluminum, with material that decreases conductivity while still permitting hydrogen diffusion, like calcium or calcium oxide. The objective is to maximize diffusion while minimizing electron motion, while still providing free electrons as tunneling targets. Maximizing diffusion is logically accomplished by increasing the internal electrostatic field, which is increased by a combination of larger voltages applied to currents through the cathode, and use of a lower conductivity material. This hybrid material can then be hydrogen charged via a variety of hydrogen charging methods, or possibly may be made using co-deposition, and/or used in a triode configuration, but in any case where, in operation, current is driven through the loaded material in order to increase diffusion and thus fusion. One major advantage of this is that fusion then becomes a volume effect, not an effect limited to a thin near-surface zone.

Figure 3 is yet another version of a deflation fusion cell. This cell has the advantage of fairly simple construction techniques. Based on the fact Iwamura's experiment produces LENR in a fairly reliable manner, the cell in Figure 3 can be expected to work even without the laser or external magnetic fields. Hydrogen loading on the front side can alternatively be accomplished via electrolysis by eliminating the structural support element and using thicker palladium diffusion material and incorporating electrolyte and an electrolysis anode, positive with respect to the HVDC lead, in the front side compartment.

The configurations in Figures 2. and 3. can be hybridized for use with high temperature hydrogen diffusing materials, like iron alloys. A very simple hybrid consists of using the electrode configuration of Figure 2 combined with the CaO-Pd and Pd-H elements replaced by a high temperature iron alloy, heated by the AC power leads, using a porous high permeability ceramic for the permeable H2 insulator, backed by a porous conductive positive HVDC plate on the low pressure side. This approach of using high temperature proton conductors opens a wide range of proton adsorbing lattice materials and concurrently makes available high

electrode resistances. It increases the range of electron excited states in the lattice. It also increases the feasible thermodynamic efficiency of the resulting systems.

BACKSIDE DE-LOADING ISSUES

Backside de-loading is a method which has good rationale within the deflation fusion model. It permits continued high tunneling rates even after high loading is achieved. The problem then is to achieve the backside de-loading in a practical way.

The key is establishing a backside diffusion barrier, and using the right cross-barrier potential in order to match the de-loading and loading rates so as to sustain high hydrogen fugacity. It is also an objective to provide a high electron charge density immediately opposite the de-loading barrier. One means of increasing charge density is to increase field strength by using a high dielectric strength material opposite the barrier. One means of suppressing hydrogen diffusion is to make the potential of the back side surface extremely negative, thus making escape of positive hydrogen nuclei more suppressed. A highly negative cathode back side provides potentially catalytic excess electrons in the conduction bands located between de-loading hydrogen nuclei in adjacent cells. Simultaneously de-loading nuclei thus have a high probability of electron catalyzed fusion in a lateral direction across the electrode surface because there is an optimized probability of a catalyzing electron between the tunneling pair. The potential of the back side can be raised to an almost arbitrarily high negative value by use of high dielectric stength very low conductivity dipole liquids on the back side.

Now for a differing approach to back side de-loading. One way to achieve many of these objectives is to make the back side an anode immersed in water. See Figure 4. The water acts as the dielectric. The field strength across the two layer anode-water interpface is well over 10^6 V/m even at a few volts electrolysis potential.

The anodic diffusion barrier can be deposited and even maintained or healed by anodization. [9] The target for hydrogen tunneling then is OH- molecules in the interphase, and any free electrons that might be ionized off them and attached to the anodized barrier. De-loading hydrogen nuclei in adjacent cells then have a comapartively high probability of fusion in a direction lateral to the anode surface due to surface electron catalysis.

One problem with this approach is keeping the electrons from tunneling across the backside barrier to the hydrogen instead of the hydrogen tunneling through the back side barrier to the electrons. The down side to electron tunneling through the backside barrier is (1) deflation fusion is accomplished best by simultaneous deuteron tunneling to an electron and (2) fusion on the front side of the barrier will cause disruption of the lattice, destruction of the barrier, and possible helium blockage.

Preventing the above problems should be possible by energetically denying them by driving front side electrolysis at a much higher voltage once loading is complete. This can best be accomplished using a coordinated pulsed mode. Operating with a superimposed pulse, applied simultaneously on both the front and back side potentials, to trigger hydrogen barrier tunneling, is efficient because it gives the lattice time to diffuse replacement hydrogen, backside gas a chance to dissipate, and the interphase to recover, while providing maximum fugacity during the pulse.

An alternative, on the back side, is to use pulsed AC on top of a DC trickle current used to sustain the anodized layer. Very high frequency high voltage AC intervals with low duty cycles, on the back side, would cause tunneling directions across the backside of the barrier to switch directions, alternating many times per volume diffused, and thereby increasing fusion prospects per diffused atom. It also increases the probability of OH- de-ionization, loosing free electrons to attach to the backside diffusion barrier.

High voltage AC and DC has been used by the author to anodize aluminum and zirconium electrodes with a barrier driven at over 1000 V.[10] Such a surface barrier tends to self maintain even when used with AC electrolysis. Such a barrier permits the use of very high positive and/or negative potentials that may be of use in generating high electron fugacities at the back side when the back side is in the high voltage cathode phase of the cycle. The negative potential of the back side can increase to a substantial amount, i.e. the point where the substantial barrier can be tunneled by the electrons. The surface layer of the electrode metal thus contains a large electron density in an extreme fugacity condition. Further, due to the use of AC, hydrogen tunneling is ongoing in the lattice, in directions that alternate with the AC current flow. Hydrogen tunneling rates can be further enhanced by application of lateral currents through the electrode. This is an ideal environment for deflation fusion to occur, a high tunneling rate high fugacity excess electron environment.

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FUSION OUTSIDE THE LATTICE

The high probability of a deflated hydrogen state indicates that back side de-loading into any hydrogen dense, high field environment, where the back side is positive, an anode, should generate fusion between the de-loading hydrogen and some of the deflated state hydrogen adjacent to the de-loading back side anode. Though water or a very weak electrolyte should work to some limited degree, a non-conducting back side liquid might be best for this purpose, a hydrogen rich liquid like anhydrous ammonia or benzene might be ideal, possibly augmented by a porous high dielectric constant field concentrating solid dielectric layer. The high field strength increases the probability of de-loading hydrogen atoms making it to deflated state hydrogen in the liquid. A back side surface barrier assists this process by increasing hydrogen fugacity in the lattice and by forcing back side de-loading to occur by a hydrogen tunneling process, with some enhanced probability of being in the deflated state, into the liquid layer adjacent to the anode surface, which is hydrogen rich, and thus has a high probability of containing hydrogen in a deflated state. Key to making this work is establishment of an extreme field on the back side electrode surface. The structure of water near a high voltage anode and possible mechanisms for energy generation therefrom has been described by the author.[11] Though possible excess heat has been observed, this enviroment has not been tested by the author in a back side de-loading mode. It is especially noteworthy that coherent laser light applied normal to a high voltage back side anode should be effective creating liquid mode deflation fusion due to the unusually close proximity of stressed orbital hydrogen in OH and H2O molecules in the electrolyte at the anode surface.

THERMAL CYCLING AND HIGH TEMPERATURE ALLOYS

A powerful means of orbital stressing is cooling a loaded lattice. The lattice contracts and applies enormous pressure on the loaded hydrogen atoms. This approach to orbital stressing has limited utility for electrolysis loaded cells. However, it may be of great utility when applied to high temperature cells, which are better suited for high efficiency energy generation. Operating in high temperature gas mode opens up a vast set of possible cathode materials which are of no use at ordinary electrolysis temperatures.

Figure 5 shows a cell incorporating various of the features of prior cells, plus the

ability to melt the loaded metal periodically to remove helium and rebuild the lattice. This avoids the need for back side de-loading altogether, though not the need for the HV Fugacity Driving Cathode (8), which can be a HV cathode during loading and then driven using AC or pulsed mode to stimulate diffusion on the back side. Similarly it includes a HV loading anode (3) which can use superimposed HF, and assist other means not shown, to aid in loading of the Hydrogen (1) from the front side, and AC and HV Ground leads (6) to further drive diffusion and to assist in melting or annealing the High Temperature Loaded Alloy (5). The Cell Walls (4), especially the bottom one, should have as high a dielectric constant as possible.

Work in hot gas phase loading of metal cathodes in the presence of an electric discharge was achieved, even early on, by Claytor et al. [12] [13] [14] Some alloys were found to be more effective than others at producing tritium. What is suggested by the deflation fusion mechanism is that the critical ingredients should be: adsorbed hydrogen partial orbital stressing, high electron and hydrogen fugacity, high hydrogen concentration, all combined with as high a diffusion rate as possible. Provided all these ingredients can be brought together, the elements in the lattice should be of secondary importance - though without a proper choice of alloy and temperature operating profile, these critical ingredients are in fact not possible. What the deflation fusion model brings to the table is a basis on which to design or select alloys for testing, as well as an emphasis on temperature control and cycling. It also suggests some basic materials science investigations of hydrogen loading characteristics and tolerance of various alloys over a high range of temperatures. High hydrogen loading density and avoidance of embrittlement, or at least achieving fast annealing, are key requirements.

High temperature hydrogen adsorption is feasible using high strength alloys of iron, tungsten, molybdenum, and other metals which are incapable of adsorption at room temperature. Excess heat and nuclear reactions have been observed in gas loaded nickel alloys at high temperatures by Focardi et al, even using ordinary hydrogen. [15] [16] $LiNi_5$ lanthanum-nickel, $LaNi_{4.5}Co_{0.5}$, and mischmetal nickel alloy have been suggested.[17] Another candidate for hot loading might be $Li_xB_yMg_z$.[18] Hot operating alloys can be designed to maximize bond strength, annealing ability, operating temperature range, and hydrogen loading as well as helium de-loading characteristics in a controlled temperature range cycling profile.

This is the probable path for practical cold fusion development - use of hot temperature-cycled cathodes. This path has the obvious advantage of a large Carnot

efficiency.

High temperature cells are loaded in gas phase, by high voltage DC with a high voltage high frequency signal, or microwaves, applied as well for ionization purposes. The lattice temperature is cycled from hot, for loading, to less hot, for high stressing heat generation. X-ray stimulation of the loaded cooled, and thus stressed, cathode may increase the fusion rate by increasing the hydrogen tunneling rate. Before returning to the hot loading phase, various temperature cycles might be used to facilitate helium de-loading, and annealing of cracks, as was achieved by Claytor et al.

A simple version of this cell type could merely consist of a hot wire used as a cathode for gas phase loading and thermal cycling. Nichrome wire is readily available and may provide the needed characteristics. Control circuitry would be required to prevent cascade driven current runaways due to the high electron emission from a hot cathode. A higher DC voltage can be used in the reduced temperature hydrogen compressing phase. Using a design similar to Figure 5, and a readily melted lattice material, the lattice material could be fully melted between some thermal cycles in order to remove helium and restore the lattice.

As in Figure 2, a through-cathode current can be used to simultaneously achieve DC loading while applying AC to the lattice to increase tunneling rates. A low duty cycle through-electrode pulse is of use in the compression phase to promote high diffusion rates while avoiding overheating the electrode. The through-electrode AC capability also has use for heating the lattice for annealing, loading, or other purposes. High pressure hydrogen or high voltage gas loading or a combination can be used. The source of heat for annealing or melting can be through the ceramic compartment walls instead of supplied by electrodes.

SUMMARY

The deflation fusion model provides a set of principles for increasing fusion likelihood: (1) maximize the *combined* hydrogen fugacity and diffusion rate because neither is especially useful without the other, (2) maximize orbital stress to increase the probability of the deflated hydrogen state, (3) maximize the magnetic gradient along an axis chosen to optimize either LENR or CF, and (4) maximize electron fugacity in order to increase the electron quantum states, i.e. aggregate electron

energies, and thus further objectives (1) and (2) as well as provide an energy focusing effect. It further appears providing periodic barriers to conduction band electrons, but through which hydrogen readily diffuses, increases LENR probability.

The backside de-loading scheme, defined here in various forms, was designed to achieve multiple of the above objectives simultaneously. Cycling through high temperature loading and lattice readjustment by diffusion, cooling to some extent to compress the lattice, and then driving diffusion by through-lattice current, is also designed to especially achieve objective (2), while increasing thermodynamic efficiency and providing a broader choice of lattice materials. Engineering high electrical resistance of the hot lattice, combined with a strong through-lattice-current driven diffusion then fulfills various objectives. Inclusion of non-conducting hydrogen diffusion tunneling barriers in the lattice increases the probability of deflated state tunneling, and thus fusion. These are the principal techniques immediately suggested by the existence of the deflated hydrogen state, and thus of deflation fusion.

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FIGURES

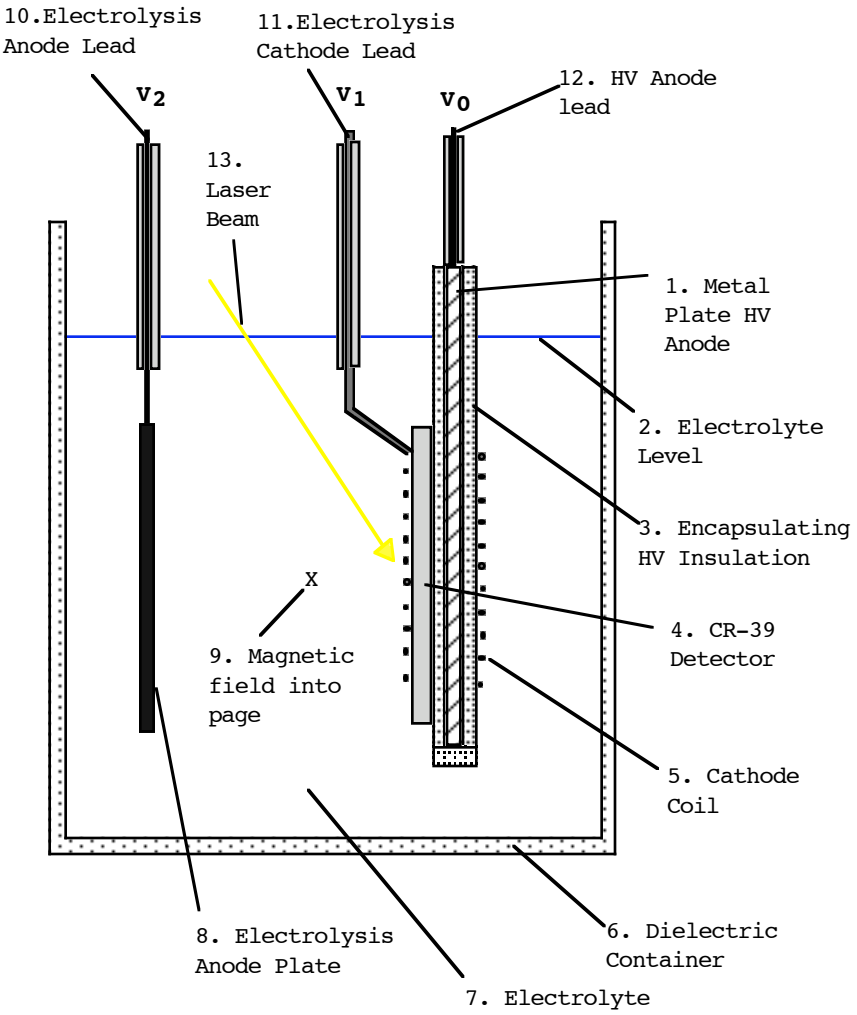

Figure 1 - Cross section diagram of electron fugacity experiment

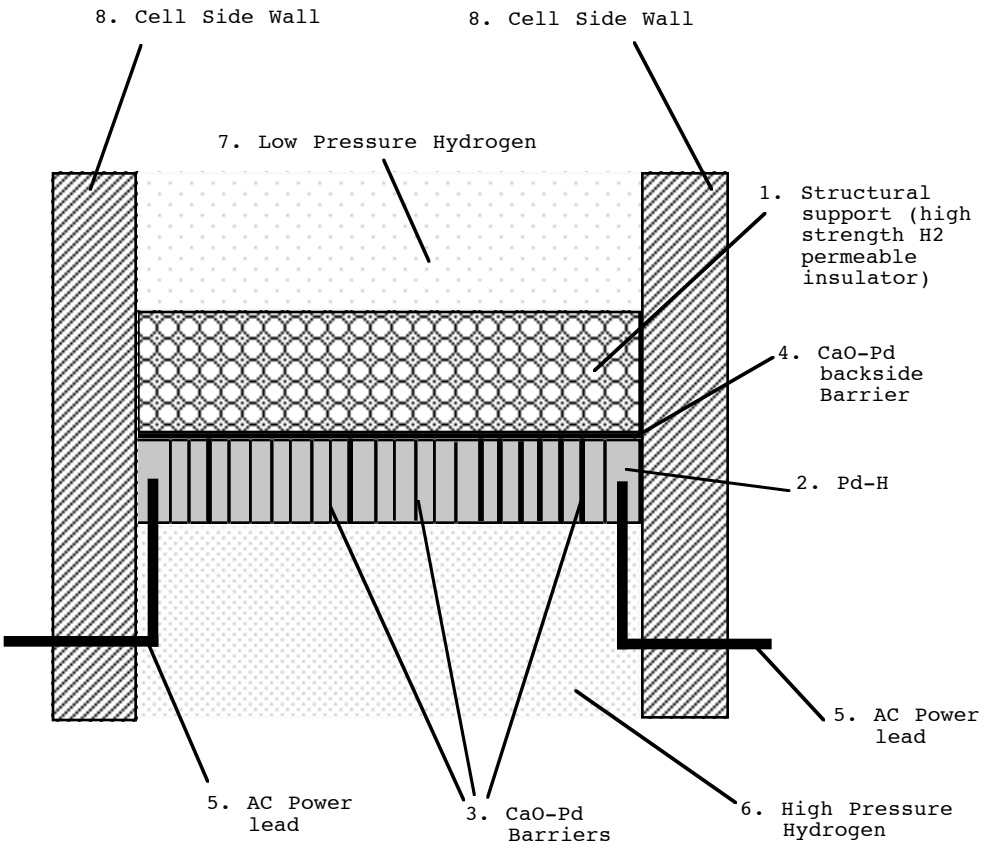

Figure 2 - Diagram of partial cross section of lateral diffusion Iwamura Cell

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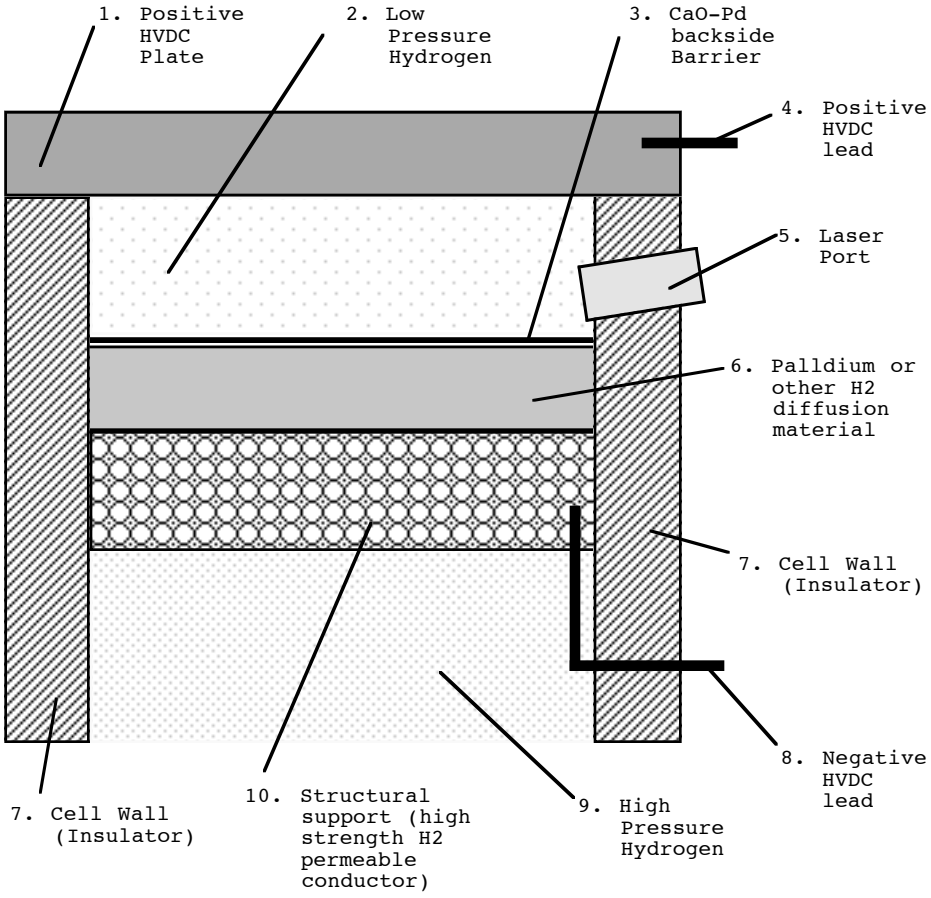

Figure 3 - Diagram of partial cross section of gas phase back de-loading fusion cell

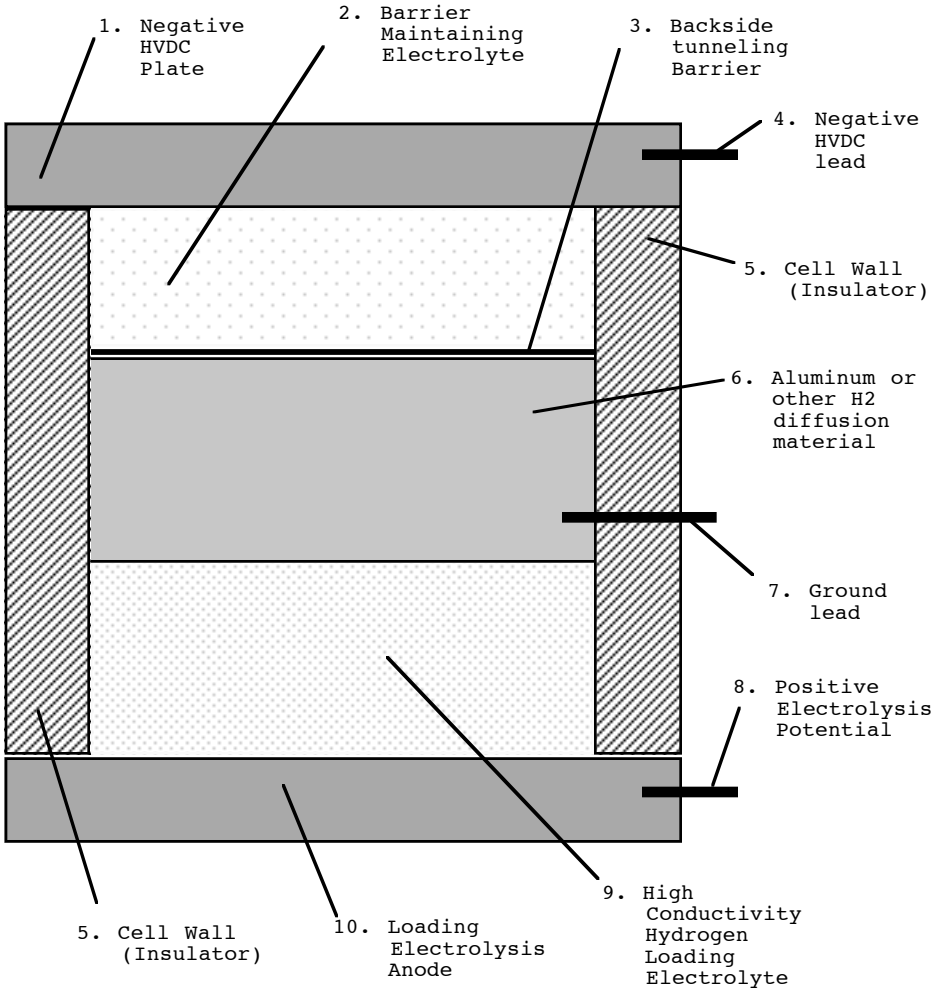

Figure 4 - Diagram of cross section of back-side deloading cell

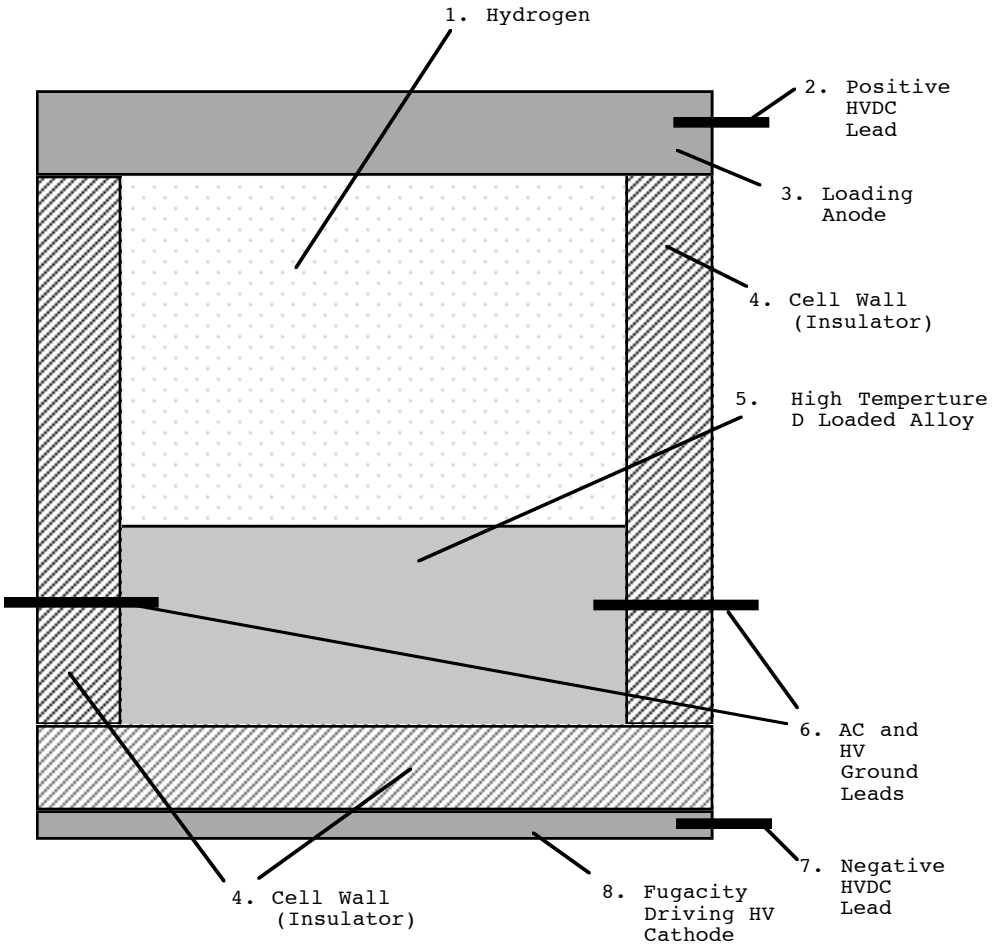

Figure 5 - Diagram of cross section of high temperature annealing cell

[1] Heffner, H., “Deflation Fusion”, October, 2007, http://www.mtaonline.net/~hheffner/DeflationFusion.pdf
[2] P.A. Mozier-Boss et al,”Pd/D CO-DEPOSITION: EXCESS POWER GENERATION AND ITS ORIGIN”,Symposia Papers Presented Before the Division of Environmental Chemistry American Chemical Society, Chicago, IL March 25-29, 2007, http://www.lenr-canr.org/acrobat/MosierBosspddcodepos.pdf
[3] C.C.Silver & Gold, Inc, http://www.ccsilver.com/silver/superfines.html
[4] P.A. Mosier Boss et al, ”Production of High Energy Particles Using the Pd/D Co-Deposition Process”, American Physical Society, March 5, 2007, http://www.lenr-canr.org/acrobat/MosierBossproduction.pdf
[5] Surepure Metals, http://www.surepure.com/products.php?ID=1
[6] Iwamural et al, “OBSERVATION OF LOW ENERGY NUCLEAR REACTIONS INDUCED BY D2 GAS PERMEATION THROUGH PD COMPLEXES”,*The Ninth International Conference on Cold Fusion*, 2002. Beijing, China: Tsinghua University, http://lenr-canr.org/acrobat/IwamuraYobservatioa.pdf
[7] Iwamural et al, “OBSERVATION OF LOW ENERGY NUCLEAR REACTIONS INDUCED BY D2 GAS PERMEATION THROUGH PD COMPLEXES”,*The* E*leventh International Conference on Condensed Matter Nuclear Science,* 2004. Marseille, Francehttp://lenr-canr.org/acrobat/IwamuraYobservatiob.pdf
[8] Wikipedea entry for Molecular beam epitaxy: http://en.wikipedia.org/wiki/Molecular_beam_epitaxy
[9] Horace Heffner, “A Method for Producing Free Energy”, January, 2006, http://www.mtaonline.net/~hheffner/Key2Free.pdf
[10] Horace Heffner,”Blue Glow vs Electrospark”, January, 2006, http://www.mtaonline.net/%7Ehheffner/GlowExper.pdf
[11] Horace Heffner,”Blue Glow vs Electrospark”, January, 2006, http://www.mtaonline.net/%7Ehheffner/GlowExper.pdf
[12] T.N. Claytor, et al,”TRITIUM GENERATION AND NEUTRON MEASUREMENTS IN Pd-Si UNDER HIGH DEUTERIUM GAS PRESSURE”,Second Annual Conference on Cold Fusion, 1991, http://lenr-canr.org/acrobat/ClaytorTNtritiumgen.pdf
[13] T.N. Claytor, et al,”TRITIUM PRODUCTION FROM PALLADIUM ALLOYS”,The Seventh International Conference on Cold Fusion, 1998, http://lenr-canr.org/acrobat/ClaytorTNtritiumprob.pdf
[14] T.N. Claytor, et al,”TRITIUM PRODUCTION FROM A LOW VOLTAGE DEUTERIUM DISCHARGE ON PALLADIUM AND OTHER METALS”,8/9/2002, http://lenr-canr.org/acrobat/ClaytorTNtritiumpro.pdf
[15] Focardi et al,”Large excess heat production in Ni-H systems”,IL NUOVO CIMENTO VOL. 111 A, N. 11 Novembre 1998, http://www.lenr-canr.org/acrobat/FocardiSlargeexces.pdf
[16] Campari, E.G., et al., “Surface Analysis of hydrogen loaded nickel alloys” Eleventh International Conference on Condensed Matter Nuclear Science, 2004, http://www.lenr-canr.org/acrobat/CampariEGsurfaceana.pdf
[17] Private communication from Dr. Dennis Cravens to Horace Heffner, Aug. 8 2007.
[18] Sutula and Wang, “Metal alloy and method of preparation thereof”, US Pat. 5,156,806, Filed May 5, 1975