Notes Regarding
NAE Construction and Maintenance

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It is well known that the creation of a nuclear active environment (NAE) for cold fusion in metal lattices is related to the surface and thus the surface treatment of the lattice in which the hydrogen is adsorbed, and that only specific small surface areas are typically involved in electrolysis based cold fusion. [1] It has long been known that cracking and loss of hydrogen fugacity reduces or eliminates the prospects for excess heat production. [2] It is therefore reasonable to conjecture that surface treatments that inhibit the formation of cracks formed by stress should improve the prospects for or even density of nuclear active environments within a cathode.

It has recently been discovered that proper application of strong electric fields to interfaces where two types of material are joined, or to metal surfaces, when the material is under stress, can "stabilize the surface or interface, inhibiting the formation of cracks and healing cracks that have already started." [3] It is therefore reasonable to expect such surface or interface treatments can be used to create, enhance, or maintain a nuclear active environment, especially in metal cathodes used in electrolysis, because such electrodes are exposed to stress due to high loading conditions. It is also reasonable to conjecture that the success of the methods of Claytor et al [4] [5] [6] in a metal-gas environment may be due in part to creation and maintenance of nuclear active environments in or on the wire cathode metal surfaces by continuous application of a strong electric field.

It may be that a significant effect of a transverse electric field upon a cathode [7], in addition to surface morphology changes and other effects, may be the strengthening of the surface against cracking. It thus can further be conjectured that similar field hardening effects may be related to the improved reliability of cathodes created by codeposition, and this indicates the possible effectiveness of greatly increasing the voltage at which codeposition is accomplished, or the possible effectiveness of shocking the codeposited material during preparation by use of a high current pulse. Such an approach may also be effective in that the active environment may also involve addition of or imbedding of elements from the preparation electrolyte. Similarly, electrodes involving a layering of material, e.g. CaO [8] [9], might be improved by shocking the interfaces by use of momentary high current densities during preparation.

Lastly, it is well known that cryogenic quenching of metals, especially gun barrels and engine blocks, following high temperature annealing, greatly increases their strength and resilience, even at high temperature operation. Such treatment, especially in combination with the above treatments, may be useful in creating more active and more reliable lattice environments for nuclear fusion.

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