A Simple look at the proposed FST Plasma methodology
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Bonded hydrogen

Metal and liquid hydrides and adsorbed carbon compounds are the principal methods of bonding hydrogen chemically. They are the safest methods as no hydrogen will be released in the event of an accident, but they are also bulky and heavy.
Metal hydrides such as FeTi compounds are used to store hydrogen by bonding it to the surface of the material. To ensure that large volumes of hydrogen can be stored it is essential to use small granules of the base material to make a large surface area available. The material is 'charged' by injecting hydrogen at high pressure into a container filled with the small particles. The hydrogen bonds with the material and releases heat in the process, and this heat must be put back in to release the hydrogen from its bond.

Why use plasmas to generate nanocrystallites?
1^{st} Generation
i) High purity
ii) Perfect crystallinity
iii) Very small particles/clusters (nanopowders 1 x 10e-9 m)
iv) Fast screening of metal catalyst candidates
v) Activate the metals (H2)
vi) Easy to produce alloys (control stoichiometry)

2^{nd} Generation
vii) Direct sparying of supports.

Catalysis
Hydrogen absorption and desorption process
The catalyst surface-gas phase interface is the most crucial factor for this process. The nature (purity- perfect metallic crystals with no defects, large surface area, composition structure) of the top layer of atoms determines how fast a catalytic reaction will take place (how readily hydrogen will be absorb/desorb on/off the metal in this case) and small amounts of additives may reduce (poison) or enhance (promote) the reaction.

The surface is an abrupt termination of the bulk structure and so exposes atoms in an asymmetric environment, with neighbouring atoms only in the surface plane and in the bulk direction. This leaves free bonds at the surface which are available for interaction with incoming molecules (hydrogen).

In H2 chemisorption (crystallite size <5nm), it usually assumed that one H atom is absorbed for each exposed metal atom. However, for crystallites of >1nm the ratio of H atoms absorbed per atom may reach 3 (e.g. iridium). Chemisorption involves real bond breaking and making of bonds to the surface. This process is generally "down-hill", at least for the transition metals and is the basis of why catalysis works.

Why "support" a catalyst?

Supports are used for a variety of reasons:

i) Maintains the integrity of the metal phase (stop sintering - fusion of the particles).
ii) Increase surface area and above points in catalysis section.
iii) Change metal catalysts characteristics
iv) Cheaper (less metal waste).
v) Weight reduction.

H_2 Compression

This system is believed to be a viable low pressure alternative. It will hopefully work very well and within the current guidelines set by the US DOE. Pressurising the container will certainly be a benefit (provide lower working temperatures) to the system i.e. desorption/absorption process.