METAL HYDRIDE TECHNOLOGY AND APPLICATIONS

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At present the world is passing through the energy crises for present and future and finding it difficult to sustain development without pollution. Scientific community all over the world is involved in finding out solutions to such a condition, resulting in using various sources of non- conventional energy for our energy requirements. During last couple of years hydrogen has attracted worldwide interest as an energy carrier which has generated comprehensive investigations on the technology involved and how to solve the problems of production, storage and applications of hydrogen. The interest in hydrogen as energy of the future is due to it being a clean energy, most abundant element in the universe, the lightest fuel and richest in energy per unit mass. It will provide, Cheap Electricity, Cook Food, Drive Car, Run Factories, Jet Planes, Hydrogen Village and for all our domestic energy requirements.

The present article deals with the metal hydrides in which hydrogen can be stored safely and in ompact form having density of hydrogen more than gas and liquid hydrogen. Metal hydrides are the materials which are capable of functioning like a “sponge” for absorbing and squeezing out hydrogen. Many metals combine chemically with hydrogen to form a class of compounds known as Hydrides. These hydrides can discharge hydrogen as and when needed by raising their temperature or pressure.

An optimum hydrogen-storage material is required to have various properties viz. high hydrogen capacity per unit mass and unit volume which determines the amount of available energy, low dissociation temperature, moderate dissociation pressure, low heat of formation in order to minimize the energy necessary for hydrogen release, low heat dissipation during the exothermic hydride formation, reversibility, limited energy loss during charge and discharge of hydrogen, fast kinetics, high stability against O_2 and moisture for long cycle life, cyclibility, low cost of recycling and charging and high safety.

So far the most of hydrogen storage alloys e.g. $LaNi_5$, TiFe, $TiMn_2$, have hydrogen storage capacities, not more than 2 wt% which is not satisfactory for practical application as per DOE USA goal of at least 6 wt% of hydrogen in hydrides for commercial applications. Therefore further research work is needed to achieve the goal by improving development on hydrogenation, thermal and cyclic behavior of metal hydrides. In short hydrogen shows the solution and also allows the progressive and non-traumatic transition of today’s energy sources, towards feasible safe reliable and completely sustainable energy chains. In the present article metal hydride technology and its applications have been presented.