Activation enhancement of metal hydrides modified by graphite and other carbonaceous compounds

S. Bouaricha*, J.-P. Dodelet, D. Guay
INRS-Energie et Matériaux, 1650 Boul. Lionel-Boulet, C. P. 1020,
Varennes, Quebec, Canada J3X 1S2

J. Huot, R. Schulz
Technologies Emergentes de Production et Stockage, Institut de Recherche d'Hydro-Québec, 1800 Boul. Lionel-Boulet, C.P. 1000,
Varennes, Quebec, Canada J3X 1S1

Metal hydrides are a secure way to store hydrogen. Hydrides containing magnesium are interesting from many points of view: large storage capacity, lightness of the weight, availability and cost. Nevertheless, these materials need to be activated before routinely used for the hydrogen storage applications. The activation of hydrogen absorbing materials may take from a few minutes to a few days, depending on the material and the extent of its surface contamination.

In this paper, it will be shown that ball milling of a hydrogen absorbing material with a small amount of graphite and other carbonaceous compounds for a short period at the end of the milling step results in a considerable improvement of the activation characteristics of the hydride. These results show that not only the time necessary for carrying out the first hydrogenation of the magnesium based-materials is reduced but also the activation of hydrogen storage could be performed in less drastic conditions of pressure and temperature. This means that there is no more need to design the hydride container to withstand the particular conditions of temperature and pressure that are otherwise requested to activate the material. This should translate in less stringent demands on the design of the reaction vessel (thinner wall for the container, etc) and provide some savings on the overall system.

Presenting author
email: salim.bouaricha@nrc.ca
Presently at National research Canada; Industrial Material Institute, 75 Blvd. De Mortagne, Boucherville, J4B-6Y4 Canada.