MECHANOCHEMICAL SYNTHESIS OF HYDRIDES

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Mechanical milling under dihydrogen gas is a powerful technique for the synthesis of metallic and complex hydrides. We review here the historical advances of this technique and the current state-of-the-art. The synthesis of binary metal hydrides, solid solution BCC hydrides, non-miscible metal hydrides, complex magnesium hydrides, alanates and imides/amides is surveyed. Some particular phenomena such as ball-milling induced amorphisation, formation of metastable phases and multi-step reactions are reported. Influence of mechanical deformations and temperature effects on solid/solid and solid/gas reactions are discussed. The obtained hydrides are typically three-dimensional nanostructured powders exhibiting fast reaction kinetics and deserve increasing interest in the fields of hydrogen storage as well as electrochemical systems.

References


Dr. Fermín Cuevas graduated (1990) and obtained (1996) his PhD in Physics at UAM University of Madrid (Spain). He moved then to the Max-Planck-Institute of Metals Research, Stuttgart (Germany), for a two-years postdoctoral stay. After one year teaching at UAM (1998), he got a Marie Curie Fellowship from the European Commission to continue further postdoctoral training at CNRS in the Laboratoire de Chimie Métallurgique des Terres Rares (France). In 2002, he got a permanent research position at CNRS and in 2007 his Habilitation as PhD supervisor from Paris XII University.