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

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