Improvements of hydrogen storage properties of Mg-based mixtures elaborated by reactive mechanical milling.

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Due to their high hydrogen storage capacity, lightweight, low cost and abundance in the earth's crust [1], magnesium is one of the most promising candidates for hydrogen storage materials. However, the hydriding-dehydriding reaction takes place at high temperature (i.e. 287°C) and is relatively slow. One of the ways to kinetically improve magnesium based hydrogen storage materials is by the (i) addition of metals ,intermetallics, non metals or oxides and or (ii) application of high energy ball milling. The aim of this study was to show the influence of mechanical alloying under hydrogen (Reactive Mechanical Grinding) on the chemical properties (crystallographic and phase composition) and on the hydrogen storage properties of Mg based mixtures.

The use of RMG lead to the in situ hydrogenation of Mg [2] and then, to the suppression of the activation procedure generally requested for Mg. WE compared the effect of a wild variety of additives such as : Co, YNi, YNi_4Al, Cr_2O_3, Al_2O_3, CeO_2, Yb_2O_3, BN,… All this additives lead to an unequal improvement of the hydriding properties. We explain it in term of mechanical properties, chemical affinity and crystallographic structure. For Cr_2O_3 we study the effect of (i) the morphology, (ii) the grain size, (iii) the purity of the oxide, by elaborating Cr_2O_3 by various method (casting, chimie douce, supercritical fluid).

REFERENCES

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