CHANGES OF PHASE COMPOSITION OF $NaAlH_4$ BASED COMPLEX HYDRIDE

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The hydrogenation and dehydrogenation of complex hydride belong to the hot topics of hydrogen storage research. In this paper we present results of study of $AlNaH_4$ alloyed with Fe chloride. We have investigated influence of time of milling and an effect of ambient atmosphere on properties of this material. The complex hydride sample was prepared by dry milling of mixture of pure $AlNaH_4$ and 2 mol % $FeCl_3.H_2O$ powders in the protective atmosphere 90% Ar+10% H_2. The XRD and Mössbauer spectroscopy were applied for characterisation of the structure of the as-prepared (before milling) powder, and after 0.5; 1 and 2.5 hours of milling. Subsequently, changes during contact with ambient atmosphere were investigated.

The dependence on the time of milling was obtained from XRD measurements. It shows presence of phases of both precursors and their progressive amorphisation with time of milling. The sample after 2.5 hours of milling shows an amorphous phase only. The amorphisation is explained as an effect of severe plastic deformation during the milling and as a role of hydrogen atoms released from the hydride precursor and from the protective atmosphere.

The original $AlNaH_4$ and $FeCl_3$ phases disappeared in the sample exposed to ambient atmosphere. They were replaced by new phases resulted from oxidation and hydrogen decomposition.

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