Nanocomposites and nanomaterials

Effects of concentration Ti, Zr, V on deuterium desorption temperature range from Mg-based composite

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Alloys on the basis of magnesium are perspective from the point of view modern requirements to systems hydrogen storage of with the low cost price. However their usages it is accompanied by the difficulties one of which is the hydrogen desorption temperature of alloys which is in limits 500-600 K.

One of ways of reception of materials in nanocrystalline state is introduction of chemical elements which have low solubility or do not co-interaction at all with components. According to the phase state diagrams of systems Mg-Ti, Mg-V and Mg-Zr of interaction of these components do not exist.

To manufacture Mg-based composites the plasma evaporation-sputtering method was used enabling the atom-by-atom component growth. Thus, the composites with a wide range of the ratios of insoluble components were obtained [1]. Deuterium introduction into the samples was performed by the ion implantation method. The deuterium desorption temperature ranges and the deuterium storage levels were determined by the thermo-desorption spectroscopy.

It has been established that the introduction of Zr, Ti or V impurity to magnesium leads to the significant decrease of the deuterium desorption temperature A step-like form of the curve of the deuterium desorption temperature testifies to presence of two various structural conditions at composites Mg-V, Mg-Zr and Mg-Ti depending on the relation of components. The hydrogen desorption data obtained using Mg-based composites can be used for the further investigations into the hydrogen storage materials containing chemical elements with a low solubility in the alloy components. (-400 K) as compared to the release from Mg samples.

1. *Neklyudov I.M., Morozov O.M., Kulish V.G., Zhurba V.I., Lomino N.S., Ovcharenko V.D., Kuprin O.S.*. Threshold character of temperatures on deuterium desorption from the Mg-Zr composite // IOP Conf. Ser.: Mater. Sci. Eng. 23 (2011) 012028.