

Mg-BASED MATERIALS FOR THE APPLICATION IN HYDROGEN SUPPLY DEVICES

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Hydrogen energy arouses great interest as an environment friendly and safe in use technology, being particularly important for autonomous and mobile energy systems applications. This includes development of portable energy supply systems where hydrogen is used to power a fuel cell (FC). The report will provide a review of the works devoted to effective hydrogen storage materials that can be used in hydrogen supply devices. Advantages and disadvantages of different classes of materials and different delivery methods will be analyzed. Main attention will be focused on the metallic/intermetallic hydrogen storage materials and their hydrogen sorption-desorption parameters. Such material class as the hydrides of Mg and Mg-based alloys/composites as well as Mg-based intermetallic compounds will be characterized from the perspectives of practical application. The results of mechanochemical synthesis of MgH_2 with different catalytic additives will be discussed to demonstrate their appropriate potential for practical usage.

One of the solutions to supply the hydrogen for fuel cells is its direct (simultaneous) receipt and use. Of particular importance here is the hydrolysis of the corresponding metals or their hydrides, followed by the flow of the separated hydrogen into FC. Many research groups are developing both portable systems and portable power generators that can be used in different applications. The report will analyze the state of development of one of the most promising classes of materials, namely, magnesium and its hydrides for generation of hydrogen by hydrolysis reaction as well as demonstrate the advantages of devices hydrogen generator– FC compared with other portable energy sources. In our studies the prepared by ball milling $MgH_2 + MgCl_2/AlCl_3/ZrCl_4$ composites were tested in water and citric acid solutions. They demonstrated a much better performance as compared to the pristine materials and their suitability for the efficient hydrolysis reaction. Detailed analysis of the results of the hydrolysis tests performed at different conditions will be given in a conference presentation.