

Hydrogen Storage Properties of TiFe Prepared By Cold Rolling Under Inert Atmosphere

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In this study, TiFe was prepared through the arc melting of Ti and Fe powders in the stoichiometric ratio 50:50, and then submitted to 20 and 40 cold rolling passes under inert atmosphere. The structural characterization of the samples revealed coarse grains after arc melting, formation of small cracked foils and the presence of powder, which was constituted of small particles agglomerated in the process of cold rolling. The local crystal structure was confirmed to be CsCl-type by EXAFS measurements on the initial compound after 20 CR at Fe and Ti K-edges which is expected for the stoichiometry. No absorption of hydrogen was observed in the sample processed by arc melting. On the other hand, the cold rolled material exhibited fast hydrogen absorption without using a thermal activation process. Regarding the hydrogen absorption capacities, around 1.4 wt. % was achieved at room temperature and 20 bar of H₂, for samples in the form of powder or foils. The process of cold rolling under inert atmosphere generated a product free of contamination by oxides, introducing simultaneously a high amount of defects in the material, which contributes for better hydrogen absorption kinetics.