Poster Presentation

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Study of hydrogen storage of the TiFe alloy by neutron powderdiffraction

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Metal hydrides are interesting materials from a fundamental as well as practical point of view. Hydrogen storage applications have been the main driving force of research on these materials but lately, uses such as thermal storage are considered. In this presentation, we will review the use of neutron diffraction for the development of new metal hydrides. A good candidate for hydrogen storage applications is the low cost intermetallic compound TiFe which operates near room temperature (RT) under mild pressure conditions. However, the biggest disadvantage of TiFe alloy synthesized by conventional metallurgical method is it poor activation characteristics [1]. The alloy reacts with hydrogen only after complicated activation procedure involving exposure to high temperature (~400° C) and high pressure for several days. In the '90, some researches showed that the change in the nanocristallinity can modify the sorption property of the TiFe[2]. Other research works found that palladium increase the contaminant resistance. However, addition of palladium is too expansive for practical applications [3]. Recently, we found that, when doping TiFe with Zr and Zr7Ni10, the activation could be easily done at room temperature. We present here a neutron diffraction study of these compounds that shows the structural difference between the activated compound and the one cycled under hydrogen.

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