

## **Ball Milling of TiH<sub>2</sub> and Fe Powders Mixture: An Alternative Route to Synthesize Easily Hydridable TiFe**

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This paper describes an alternative method for TiFe compound synthesis using high-energy ball milling. Strong adherence of milled powders and activation procedure for hydrogen uptake were both avoided.

Mixtures of TiH<sub>2</sub> and Fe powders were dry-milled in a planetary ball mill at variable time ranging from 5 to 40 hours. The amount of sample, number and diameter of the balls were kept constant in all experiments. After milling, samples were heated under dynamic high-vacuum for the synthesis reaction, followed by hydrogen pressurization and cooling. As-milled and heat-treated materials were characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM) and differential thermal analysis (DTA).

As-milled mixtures presented only Fe and TiH<sub>2</sub> phases. TiH<sub>2</sub> was effective for providing low adherence of the powders to the vial and media during milling. Nanocrystalline TiFe compound was obtained after heat treatment, particularly at higher milling times, and was prone to absorb hydrogen during cooling near room temperature, without long and tedious activation procedures.