

ABSORPTION AND DESORPTION PROPERTIES OF THE Mg + X wt.%TiFe COMPOSITE, X = 2.5 AND 40, MANUFACTURED BY HIGH-ENERGY BALL MILLING

R. A. Silva^{1,*,#}, R. M. Leal Neto², G.C.S. Coutinho², D.R. Leiva¹, T.T. Ishikawa¹, C.S. Kiminami¹, W. J. Botta¹

¹Departamento de Engenharia de Materiais, Universidade Federal de São Carlos, Rodovia Washington Luiz, km 235, CEP 13565 – 905, São Carlos, SP, Brasil

²Instituto de Pesquisas Energéticas e Nucleares (IPEN) Av. Lineu Prestes 2242 - Cidade Universitária - CEP: 05508-000 - São Paulo - SP – Brasil

#Corresponding author: rafael.engmet@gmail.com

Abstract

This work compares the absorption and desorption properties of the Mg + TiFe composite with additions of 2.5 and 40 wt. % TiFe. The composite was produced by high-energy ball milling during 36 h at 600 rpm under purified argon atmosphere. The TiFe was previously milled in ethanol absolute to refine the particle size. The composite materials were characterized by X-ray diffraction (XRD), and scanning electron microscopy (SEM). The kinetics of hydrogen absorption and desorption were evaluated by differential scanning calorimetry (DSC) and by a Sievert's type apparatus. For both evaluated compositions, the main results revealed that it was possible absorb H₂ at room temperature. Even a few TiFe content (2.5 wt. %) was enough to obtain kinetic improvements. The TiFe had an important role in the kinetics of H₂ absorption of Mg in a broad range of temperatures, including room temperature.