Thermodynamic study of the eutectic Mg_{49}–Zn_{51} alloy used for thermal energy storage

J. Rodríguez-Aseguinolaza · P. Blanco-Rodríguez · E. Risueño · M. J. Tello · S. Doppiu

Received: 29 August 2013 / Accepted: 4 January 2014 / Published online: 31 January 2014
© Akadémiai Kiadó, Budapest, Hungary 2014

Abstract The eutectic Mg_{49}–Zn_{51} (mass%) alloy has been identified as a suitable material for latent heat thermal energy storage. Within this scope, the exhibited solid–solid and solid–liquid phase transitions have been carefully characterized. A detailed thermodynamic study focused on the specific heat of the investigated alloy is also provided. The $C_p$ behaviour, very important in the thermal energy storage frame, is theoretically modelled and experimentally validated by quasi-isothermal modulated differential scanning calorimetry measurements. Different intermetallic phases of the Mg–Zn binary system have also been successfully described within this approach in the complete temperature range.

Keywords Differential scanning calorimetry (DSC) · Specific heat · Phase transformations · Thermal energy storage · Mg–Zn binary alloys · Thermodynamics

J. Rodríguez-Aseguinolaza (✉) · P. Blanco-Rodríguez · E. Risueño · S. Doppiu
CIC Energigune, Albert Einstein 48, 01510 Miñano, Álava, Spain
e-mail: jrodriguez@cicenergigune.com

M. J. Tello
Depto. Física de la materia condensada, Facultad de ciencia y tecnología, Universidad del País Vasco, Apdo. 644, 48080 Bilbao, Bizkaia, Spain