Effect of heat treatment on the precipitation in Al–1 at.% Mg–x at.% Si (x = 0.6, 1.0 and 1.6) alloys

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Abstract:

The fine-scale precipitates, that occurs during aging, the supersaturated Al–1.0 at.% Mg–x at.% Si (x = 0.6, 1.0 and 1.6) alloys have been investigated by differential scanning calorimetry (DSC), scanning electron microscopy (SEM) and X-ray diffraction (XRD) techniques. The strength of the alloys increases as a high density of very fine β″ coherent and β′ semicoherent precipitates nucleate. The precipitates compositions have been determined by analyzing the X-ray diffraction (XRD) charts, by using Scherrer equation. The obtained results showed that the β″ and β′ precipitates size lies in the nanometer range (from 5 nm to 32 nm). In addition, increasing Si concentration has exhibited an increase in the density of the precipitates, which fortifies the physical properties.

Keywords:

Al–Mg–Si alloys; Supersaturated solid solution; Aging; Coherent precipitates; Scanning electron microscopy; X-ray diffraction

Published In:

Alloys and Compounds, Vol. 477, No. 1-2, PP. 295–300