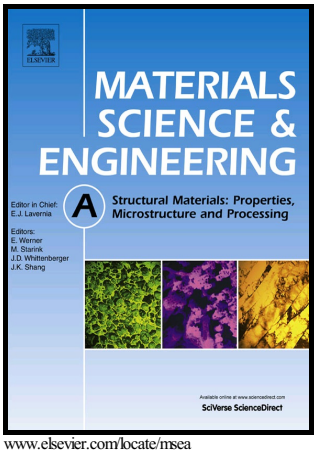
Effect of reinforcing shape on twinning in extruded magnesium matrix composites

G. Garcés, K. Máthis, P. Pérez, J. Čapek, P. Adeva



www.elsevier.com/locate/msea

PII: S0921-5093(16)30395-1
DOI: http://dx.doi.org/10.1016/j.msea.2016.04.028
Reference: MSA33557

To appear in: *Materials Science & Engineering A*

Received date: 13 November 2015
Revised date: 25 February 2016
Accepted date: 8 April 2016

Cite this article as: G. Garcés, K. Máthis, P. Pérez, J. Čapek and P. Adeva, Effect of reinforcing shape on twinning in extruded magnesium matrix composites, *Materials Science & Engineering A* http://dx.doi.org/10.1016/j.msea.2016.04.028

Effect of reinforcing shape on twinning in extruded magnesium matrix composites

G. Garcés[1,], K. Máthis[2], P. Pérez[1], J. Čapek[2].P. Adeva[1].*

[1]Department of Physical Metallurgy. National Centre for Metallurgical Research CENIM-CSIC. Av. De Gregorio del Amo 8, 28040 Madrid, Spain.

[2]Department of Physics of Materials, Faculty of Mathematics and Physics, Charles University, Ke Karlovu 5, 121 16 Praha 2, Czech Republic

[* corresponding author. Tel +34-91-553-8900; fax: +34-91-534-7425;
E-mail address: ggarces@cenim.csic.es]

Abstract

The influence of the shape of the ceramic reinforcement, particles or whiskers, on the twinning mechanism in extruded magnesium matrix composites was investigated using in-situ synchrotron radiation diffraction and acoustic emission spectroscopy during compressive tests. The presence of the ceramic reinforcement hindered both twin nucleation and growth. Twinning in both composites is shifted towards higher applied stress, especially in that reinforced by whiskers. The load transfer capacity of SiC whiskers and the higher tensile residual stress developed in the matrix during the extrusion process in the AZ31-10%SiC_w composite is superior to that of particles due to their higher aspect ratio.

Keywords: Magnesium alloys; Metal matrix composites; twinning; Synchrotron radiation diffraction; Acoustic Emission

1. Introduction