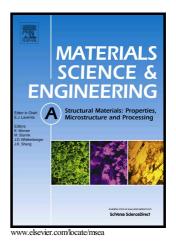
Author's Accepted Manuscript

Texture-dependent character of strain heterogeneity in a Magnesium AZ31 under reversed loading

Enver Kapan, Nima Shafaghi, Sevinċ Uċar, C. Can Aydıner



 PII:
 S0921-5093(16)31591-X

 DOI:
 http://dx.doi.org/10.1016/j.msea.2016.12.085

 Reference:
 MSA34516

To appear in: Materials Science & Engineering A

Received date: 22 August 2016 Accepted date: 20 December 2016

Cite this article as: Enver Kapan, Nima Shafaghi, Sevinċ Uċar and C. Ca Aydıner, Texture-dependent character of strain heterogeneity in a Magnesium AZ31 under reversed loading, *Materials Science & Engineering A* http://dx.doi.org/10.1016/j.msea.2016.12.085

This is a PDF file of an unedited manuscript that has been accepted fo publication. As a service to our customers we are providing this early version o the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain

Texture-dependent character of strain heterogeneity in a Magnesium AZ31 under reversed loading

Enver Kapan^a, Nima Shafaghi^a, Sevinc Ucar^a, C. Can Aydıner^{a,*}

^aDepartment of Mechanical Engineering, Bogazici University, Bebek, Istanbul 34342, Turkey

5 Abstract

3

4

Depending on operational micromechanisms and crystallographic texture, the innate strain localization at microstructural length scales of a polycrystal can spatially coordinate to induce macroscopic strain localization. A challenge for material performance and modeling, this behavior is observed in wrought Magnesium alloys when they deform with heavy tensile twinning. With insitu, multi-surface image correlation, a compression-tension experiment is implemented on samples with extrusion and rolling texture that have a consistent 11 μm grain size. While samples of both textures exhibit a clear twin plateau with close stress levels (90/99 MPa for rolled/extruded samples), the strain localization patterns are vastly different, both in terms of geometric structure and intensity. Rolled sample exhibits sharp shear banding structures with a fixed plane of shear. Extruded sample exhibits strain localization that is not in macroscopic ±45° shear form and much weaker in intensity (by about a factor of 2). Once the load is reversed and the tensile twin is deactivated, strain accommodation largely homogenizes for both textures during detwinning and subsequent high hardening stages.

6 Keywords: strain measurement, magnesium alloys, twinnning, strain heterogeneity, shear

7 banding

8 1. Introduction

The mechanical behavior of textured Magnesium alloys exhibit a very high level of dependence on the loading path [1, 2, 3]. Consequently, highly-distorted stress strain loops result when extruded or rolled components are put under cyclic loading[4, 5, 6]. The primary factor underlying this behavior is the profuse activation of deformation twinning in these hexagonal-close-packed (HCP)

^{*}corresponding author: can.aydiner@boun.edu.tr

Preprint submitted to Materials Science and Engineering A

Download English Version:

https://daneshyari.com/en/article/5456359

Download Persian Version:

https://daneshyari.com/article/5456359

Daneshyari.com