

Author's Accepted Manuscript

Nanoindentation deformation of refine-grained AZ31 magnesium alloy: indentation size effect, pop-in effect and creep behavior

Jiangjiang Hu, Wei Zhang, Taihua Zhang, Yusheng Zhang



PII: S0921-5093(18)30471-4
DOI: <https://doi.org/10.1016/j.msea.2018.03.104>
Reference: MSA36297

To appear in: *Materials Science & Engineering A*

Received date: 15 January 2018
Revised date: 24 March 2018
Accepted date: 26 March 2018

Cite this article as: Jiangjiang Hu, Wei Zhang, Taihua Zhang and Yusheng Zhang, Nanoindentation deformation of refine-grained AZ31 magnesium alloy: indentation size effect, pop-in effect and creep behavior, *Materials Science & Engineering A*, <https://doi.org/10.1016/j.msea.2018.03.104>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of 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.

Nanoindentation deformation of refine-grained AZ31 magnesium alloy: indentation size effect, pop-in effect and creep behavior

Jiangjiang Hu^a, Wei Zhang^b, Taihua Zhang^{a*}, Yusheng Zhang^{b*},

^a*College of Mechanical Engineering, Zhejiang University of Technology, Hangzhou 310014, China*

^b*Advanced Materials Research Center, Northwest Institute for Non-Ferrous Metal Research, Xi'an 710049, China*

*Corresponding authors.

zhangth@zjut.edu.cn

y.sh.zhang@163.com

Abstract

Nanoindentation tests were performed at room temperature, to study the coupling effects of grain size and strain rate on the indentation size effect (ISE), pop-in effect and creep behavior of refine-grained AZ31 alloys. The relatively inconspicuous ISE of the refine-grained AZ31 alloys compared with its coarse-grained (CG) counterpart is the result of more density of statistically stored dislocations involved in the plastic deformation. The gradually disappeared pop-in effects in the nanocrystalline (NC)/ultrafine-grained (UFG) AZ31 are associated with no/few deformation twinning involved in the plastic deformation. For the NC/UFG AZ31, the highly unstable dislocation absorption and interactions between dislocation and high-angle GBs are responsible for the primary and latter nanoindentation creep behaviors, respectively. While for the CG+twinning/CG AZ31, the relevant mechanisms are the relatively stable dislocation motion and interactions between dislocation and low-angle GBs.

Keyword: Indentation size effect; Pop-in effect; Nanoindentation creep behavior; dislocation motion; Grain boundary activities; deformation twinning.

Download English Version:

<https://daneshyari.com/en/article/7972386>

Download Persian Version:

<https://daneshyari.com/article/7972386>

[Daneshyari.com](https://daneshyari.com)