

Accepted Manuscript

Formation and characteristic corrosion behavior of alternately lamellar arranged α and β in as-cast AZ91 Mg alloy

Ying-Chao Zhao, Ming-Chun Zhao, Rong Xu, Long Liu, Jun-Xi Tao, Chengde Gao, Cijun Shuai, Andrej Atrons



PII: S0925-8388(18)32976-1

DOI: [10.1016/j.jallcom.2018.08.103](https://doi.org/10.1016/j.jallcom.2018.08.103)

Reference: JALCOM 47191

To appear in: *Journal of Alloys and Compounds*

Received Date: 13 April 2018

Revised Date: 26 July 2018

Accepted Date: 11 August 2018

Please cite this article as: Y.-C. Zhao, M.-C. Zhao, R. Xu, L. Liu, J.-X. Tao, C. Gao, C. Shuai, A. Atrons, Formation and characteristic corrosion behavior of alternately lamellar arranged α and β in as-cast AZ91 Mg alloy, *Journal of Alloys and Compounds* (2018), doi: 10.1016/j.jallcom.2018.08.103.

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 proof before it is published in its final 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.

Formation and characteristic corrosion behavior of alternately lamellar arranged α and β in as-cast AZ91 Mg alloy

Ying-Chao Zhao^{ab}, Ming-Chun Zhao^{b*}, Rong Xu^b, Long Liu^c, Jun-Xi Tao^b, Chengde Gao^c, Cijun Shuai^c, Andrej Atrens^{d*}

^a, Light Alloy Research Institute, Central South University, Changsha 410083, P.R. China

^b, School of Materials Science and Engineering, Central South University, Changsha 410083, P.R. China

^c, College of Mechanical and Electrical Engineering, Central South University, Changsha 410083, P.R. China

^d, Division of Materials, The University of Queensland, Brisbane, Qld 4072, Australia

*Corresponding authors: Prof. Ming-Chun Zhao, Email: mczhao@csu.edu.cn;

Prof. Andrej Atrens, Email: andrejs.atrens@uq.edu.au;

Abstract: Formation and characteristic corrosion resistance of alternately lamellar arranged α and β in as-cast AZ91 Mg alloy were investigated as an independent micro-constituent identity. As-cast AZ91 presented three microstructural entities, i.e. α -Mg grain, $(\alpha+\beta)$ lamellae and coarse β particle, and each had its own Al content and microstructural morphology. The lamellae occurrence was due to the precipitation of β particle from the divorced eutectic Al-rich- α phase during solidification, because the Al composition can not exceed its maximum solubility. The evidences that were obtained from electrochemical tests, micro-corrosion morphology and hydrogen evolution rate certified that the $(\alpha+\beta)$ lamellae was beneficial to corrosion resistance, which was different from the reported deleterious influence for its original eutectic Al-rich- α phase. This different corrosion behavior was explained to be ascribed to the changes in fine structure and local composition that resulted in combined electrochemical effects of the changes in α and β phases on the corrosion.

Keywords: AZ91 Mg alloy; micro-constituent identity; formation; corrosion; eutectic phase.

Download English Version:

<https://daneshyari.com/en/article/8943340>

Download Persian Version:

<https://daneshyari.com/article/8943340>

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