

## Accepted Manuscript

Fabrication of superhydrophobic coating on magnesium alloy with improved corrosion resistance by combining micro-arc oxidation and cyclic assembly

Dan Jiang, Huan Zhou, Shan Wan, Guang-Yi Cai, Ze-Hua Dong



PII: S0257-8972(18)30105-1  
DOI: <https://doi.org/10.1016/j.surfcoat.2018.02.001>  
Reference: SCT 23072  
To appear in: *Surface & Coatings Technology*  
Received date: 11 October 2017  
Revised date: 28 December 2017  
Accepted date: 1 February 2018

Please cite this article as: Dan Jiang, Huan Zhou, Shan Wan, Guang-Yi Cai, Ze-Hua Dong , Fabrication of superhydrophobic coating on magnesium alloy with improved corrosion resistance by combining micro-arc oxidation and cyclic assembly. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Sct(2017), <https://doi.org/10.1016/j.surfcoat.2018.02.001>

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.

# **Fabrication of superhydrophobic coating on magnesium alloy with improved corrosion resistance by combining micro-arc oxidation and cyclic assembly**

Dan Jiang<sup>1</sup>, Huan Zhou<sup>2</sup>, Shan Wan<sup>1</sup>, Guang-Yi Cai<sup>1</sup>, Ze-Hua Dong<sup>1\*</sup>

1 Hubei Key Laboratory of Material Chemistry and Service Failure, School of Chemistry and Chemical Engineering, Huazhong University of Science and Technology, Wuhan, China, 430074,

2 No.701 institute, China shipbuilding Industry Company Wuhan, China, 430064,

## **Abstract**

A superhydrophobic composite coating was fabricated on AZ91 magnesium alloy by combining micro-arc oxidation (MAO) and cyclic assembly in phytic acid and  $\text{Ce}(\text{NO}_3)_3$  solution. The influences of assembling cycles on surface morphology and wettability were characterized by scanning electron microscopy and atomic force microscopy. It showed that a micro-nano hierarchical structure was constructed after three cycles of assembly, resulting in a superhydrophobic surface with a contact angle of  $159^\circ$ . Compared with the direct cyclic assembly on bare Mg alloy, the prior MAO treatment could notably reduce the cracks caused by hydrogen evolution during assembling process, and the following assembling process could in return repair the porous defects of MAO layer. Electrochemical tests indicated that the superhydrophobic composite coating increased the corrosion resistance of Mg alloy by three orders of magnitude in 3.5 wt. % NaCl solution. Furthermore, 72 h of electrochemical tests revealed that the composite coating could provide long-term corrosion protection for Mg alloy. It indicates that the combination of prior MAO and latter cyclic assembly will be a promising strategy to construct corrosion-resistant composite coating on Mg alloy substrate.

\* Corresponding author. Tel.: +86-27-87543432, E-mail address: [zehua.dong@gmail.com](mailto:zehua.dong@gmail.com) (Z. H. Dong).

Download English Version:

<https://daneshyari.com/en/article/8024171>

Download Persian Version:

<https://daneshyari.com/article/8024171>

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