

# Accepted Manuscript

Full Length Article

In-situ electrochemical-AFM study of localized corrosion of  $\text{Al}_x\text{CoCrFeNi}$  high-entropy alloys in chloride solution

Yunzhu Shi, Liam Collins, Nina Balke, Peter K. Liaw, Bin Yang

PII: S0169-4332(18)30050-3  
DOI: <https://doi.org/10.1016/j.apsusc.2018.01.047>  
Reference: APSUSC 38186

To appear in: *Applied Surface Science*

Received Date: 15 October 2017  
Revised Date: 14 December 2017  
Accepted Date: 5 January 2018

Please cite this article as: Y. Shi, L. Collins, N. Balke, P.K. Liaw, B. Yang, In-situ electrochemical-AFM study of localized corrosion of  $\text{Al}_x\text{CoCrFeNi}$  high-entropy alloys in chloride solution, *Applied Surface Science* (2018), doi: <https://doi.org/10.1016/j.apsusc.2018.01.047>

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.



**In-situ electrochemical-AFM study of localized corrosion of  $\text{Al}_x\text{CoCrFeNi}$   
high-entropy alloys in chloride solution**

Yunzhu Shi<sup>a, c</sup>, Liam Collins<sup>b</sup>, Nina Balke<sup>b</sup>, Peter K. Liaw<sup>c\*</sup>, and Bin Yang<sup>a\*</sup>

- a. Collaborative Innovation Center of Steel Technology, University of Science and Technology Beijing, Beijing 100083, China, [yshi26@163.com](mailto:yshi26@163.com), [byang@ustb.edu.cn](mailto:byang@ustb.edu.cn).
- b. Center for Nanophase Materials Sciences, Oak Ridge National Laboratory, Oak Ridge, TN 37831, USA, [collinslf@ornl.gov](mailto:collinslf@ornl.gov), [balken@ornl.gov](mailto:balken@ornl.gov).
- c. Department of Materials Science and Engineering, The University of Tennessee, Knoxville, TN 37996, USA, [pliaw@utk.edu](mailto:pliaw@utk.edu).

\*Corresponding authors:

Peter K. Liaw, E-mail address: [pliaw@utk.edu](mailto:pliaw@utk.edu), Tel: +1 (865) 974-6356

Bin Yang, E-mail address: [byang@ustb.edu.cn](mailto:byang@ustb.edu.cn), Tel: +86 1062333351

## Abstract

In-situ electrochemical (EC)-AFM is employed to investigate the localized corrosion of the  $\text{Al}_x\text{CoCrFeNi}$  high-entropy alloys (HEAs). Surface topography changes on the micro/sub-micro scale are monitored at different applied anodizing potentials in a 3.5 wt.% NaCl solution. The microstructural evolutions with the increased Al content in the alloys are characterized by SEM, TEM, EDS and EBSD. The results show that by increasing the Al content, the microstructure changes from single solid-solution to multi-phases, leading to the segregations of elements. Due to the microstructural variations in the  $\text{Al}_x\text{CoCrFeNi}$  HEAs, localized corrosion processes in different ways after the breakdown of the passive film, which changes from pitting to phase boundary corrosion. The XPS results indicate that an increased Al content in the alloys/phases corresponds to a decreased corrosion resistance of the surface passive film.

Download English Version:

<https://daneshyari.com/en/article/7835384>

Download Persian Version:

<https://daneshyari.com/article/7835384>

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