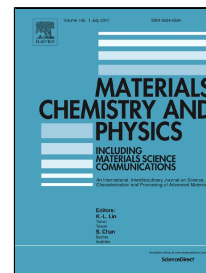


Accepted Manuscript

Study on corrosion behavior of zinc exposed in coastal-industrial atmospheric environment

Y.W. Liu, Z.Y. Wang, G.W. Cao, Y. Cao, Y. Huo



PII: S0254-0584(17)30412-1

DOI: 10.1016/j.matchemphys.2017.05.043

Reference: MAC 19719

To appear in: *Materials Chemistry and Physics*

Received Date: 28 July 2016

Revised Date: 28 March 2017

Accepted Date: 28 May 2017

Please cite this article as: Y.W. Liu, Z.Y. Wang, G.W. Cao, Y. Cao, Y. Huo, Study on corrosion behavior of zinc exposed in coastal-industrial atmospheric environment, *Materials Chemistry and Physics* (2017), doi: 10.1016/j.matchemphys.2017.05.043

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.

Study on corrosion behavior of zinc exposed in coastal-industrial atmospheric environment

Y.W. Liu ^a, Z.Y. Wang ^{a*}, G.W. Cao ^a, Y. Cao, ^b Y. Huo ^b

^a Environmental Corrosion Center, Institute of Metal Research, Chinese Academy of Sciences, Wencui Rd 62, Shenyang, 110016, PR China

^b Liaoning Hongyanhe Nuclear Power Co.,Ltd, Dalian116319, China

ABSTRACT

The corrosion behavior of zinc subjected to Liaoning Hongyanhe nuclear power station (a typical coastal-industrial atmospheric environment) has been investigated by weight-loss measurement, scanning electron microscopy (SEM) observation, x-ray diffraction (XRD), potentiodynamic polarization and electrochemical impedance spectroscopy (EIS). The experimental results reveal that the corrosion kinetics of the corrosion of zinc in coastal-industrial atmospheric environment followed empirical equation $D=At^n$, and with the increase of the exposure time polarization resistance (R_p) and charge transfer resistance (R_{ct}) increased, the corrosion rate decreased gradually. XRD, SEM and EDS indicated that the depth and width of all pits increased with time and the surface corrosion gradually transformed into a uniform corrosion. The components of the rust layers were composed of $Zn_5(CO_3)_2(OH)_6$, $NaZn_4SO_4Cl(OH)_6 \cdot 6H_2O$ and $Zn_{12}(OH)_{15}Cl_3(SO_4)_3 \cdot 5H_2O$. In the initial exposure period, the corrosion products was $Zn_5(CO_3)_2(OH)_6$, while with prolonged exposure, a two-layer structured corrosion products formed, which were comprised of $NaZn_4(SO_4)Cl(OH)_6 \cdot 6H_2O$ and $Zn_{12}(OH)_{15}Cl_3(SO_4)_3 \cdot 5H_2O$, all these products were flaky-structured and compact enough to provide excellent protection.

* Corresponding author. Tel.: +86 24 2389 3544; fax: +86 24 2389 4149. E-mail address: zhywang@imr.ac.cn (Z.Y. Wang).

Download English Version:

<https://daneshyari.com/en/article/5447828>

Download Persian Version:

<https://daneshyari.com/article/5447828>

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