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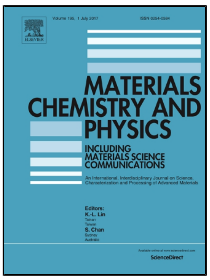


Study on corrosion behavior of zinc exposed in coastal-industrial atmospheric environment

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

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## 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.

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