EIS analysis of the oxide layer formation and localized corrosion of AA5083 at dynamic seawater/air interfacial zone and full immersion zone

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Abstract In this work, oxide layer formation and localized corrosion of the aluminium alloy AA5083-H111 in a simulated dynamic seawater/air interfacial zone and a full seawater immersion zone was investigated with electrochemical impedance spectroscopy (EIS), focused ion beam, transmission electron microscopy and energy dispersive x-ray spectroscopy. As compared with the full immersion zone, the interfacial zone showed higher oxide film thickness and charge transfer resistance, which was attributed to the high oxygen flux in that zone. Localized corrosion arose from IMPs that posessed an Al-Fe phase and a Ti enriched phase. The EIS data were fitted by power law model, which allowed to plot the resistivity profiles of the oxide films.

Keywords AA5083, EIS, power law model, oxide layer, localized corrosion.

Reference

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[3] Journal of The Electrochemical Society, 2023, 170, 041505