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A Cerium-based nanocoating for corrosion protection of Clad on AA 2024-T3 Alloy

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Abstract

Aluminum alloys are susceptible to localized corrosion resulting in a major risk for aircrafts due to the extensively use of this material in their structures. Therefore, the surface protection of these alloys against corrosion is fundamental. In this work, an eco-friendly surface pretreatment cerium based for corrosion protection alternatively to chromate based ones was developed and applied on the clad of the 2024-T3 aluminum alloy. The corrosion resistance of the modified surface was evaluated by electrochemical impedance spectroscopy, polarization and Scanning Vibrating Electrode Techniques. The results obtained were compared to a chromium based conventional treatment and revealed that the coating layer resulting from the tested treatment resulted in a film composed by spherical nodular nanostructures of cerium that improved the corrosion resistance of the alloy studied and it was comparable to the effect of treatment with hexavalent chromium showing it is an promising alternative to replacing treatments based on environmental harmful treatments.

Keywords: AA1230; Surface treatment; Corrosion; Clad 2024.

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