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(Digital Presentation) The Effect of Tartaric-Sulfuric Acid (TSA) Anodizing on the Corrosion Resistance of the AA7475-T761

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ECS Meeting Abstracts, Volume MA2022-02, LC: Late C - Late Presentations in Corrosion Science and Technology

Citation João Victor Araujo *et al* 2022 *Meet. Abstr.* **MA2022-02** 2475

DOI 10.1149/MA2022-02142475mtgabs

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Abstract

The microstructure of the high strength aluminum alloy, AA7475–T761, in the as-received condition was characterized by optical microscopy, scanning electron microscopy and transmission electron microscopy, and statistical analyses of grain size and micrometer precipitates distribution and density were performed. An anodic aluminum oxide (AAO) film was potentiostatically grown on the alloy in tartaric sulfuric acid (TSA). The anodizing behavior of the alloy and the mechanisms of localized corrosion initiation and propagation in bare (not anodized) and anodized conditions were discussed. The alloy corrosion behavior was investigated in sodium chloride solutions using electrochemical techniques (cyclic potentiodynamic polarization) and the morphology and extent of corrosion propagation was investigated through optical microscopy, optical profilometry and scanning electron microscopy analyses. It was observed that the two alloy surface conditions (bare and anodized) play different roles in the propagation of the localized corrosion process. The bare alloy presented lower localized corrosion potentials and the propagation of the localized corrosion was shallower, but more heavily distributed, than in the anodized condition. However, the alloy in the anodized condition, presented lower repassivation potentials due to the deeper pits formed. In addition, the variability of pitting potentials for the anodized condition was high, due to the heterogenous structure of the AAO film formed, and dependent on the time and drying storage conditions previous to electrochemical characterizations. The electrochemical results were correlated with the microstructural characteristics of the oxide surface film of the alloy in both conditions, bare (not anodized) and anodized.

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