

Work presented at the 30th International Conference on Surface Modification
Technologies, 29th June – 1st July, Milan, Italy

EIS study of the microstructure influence on the corrosion behaviour of AA 2198-T3
compared to AA 2198-T851 alloy.

¹ J.V.de S.Araújo; ^{1,2}F.M.Queiroz; ²M.Terada; ³A.Astarita; ¹I.Costa

¹Instituto de Pesquisas Energéticas e Nucleares – IPEN/CNEN – São Paulo – Brazil;

²Escola Politécnica da Universidade de São Paulo – EPUSP – São Paulo – Brazil;

³University of Naples Federico II, Department of Chemical, materials and Industrial
Production engineering, Naples – Italy

Abstract

This paper deals with the study of the influence of the temper state on the electrochemical behavior of an high strength aluminum-lithium alloy. In particular the corrosion resistance of the AA2198 alloy in both T3 and T851 temper condition, has been evaluated by immersion tests as a function of immersion time in NaCl 0.01 mol.L⁻¹. The evolution of the electrochemical behavior was monitored by electrochemical impedance spectroscopy (EIS) and surface observation by optical microscopy and Field Emission Gun- Scanning Electron Microscopy. The results indicated a higher electrochemical activity associated to the T851 treatment comparatively to the T3 one and this was ascribed to the more heterogeneous microstructure related to the first treatment. Severe localized corrosion was seen on the AA2198-T851 alloy after only few hours of exposure to the test medium. This type of corrosion was of the crystallographic type and was related to T1 (Al₂LiCu) which is more electrochemically active than the matrix leading to localized attack. Pitting attack was seen on the AA2198-T3 alloy along the surface and it was located at the matrix-precipitates interface. The EIS results supported a faster kinetics and lower impedances associated to the AA2198-T851 comparatively to the AA2198-T3 alloy according to the surface observation along the test period.