

**CAPACITANCE AND PHOTOELECTROCHEMICAL STUDIES
FOR THE ASSESSMENT OF ANODIC OXIDE FILMS ON ALUMINIUM**

**J.C.S. Fernandes^{a*}, R. Picciochi^a, M. Da Cunha Belo^a, T. Moura e Silva^b,
M.G.S. Ferreira^{a,c,1}, I.T.E. Fonseca^{d,1}**

^aInstituto Superior Técnico, Department of Chemical Engineering, 1049-001 Lisboa, Portugal

^bInstituto Superior de Eng. de Lisboa, Department of Mech. Eng., 1950-062 Lisboa, Portugal

^cUniversity of Aveiro, Dept of Ceramics and Glass Engineering, 3810-193 Aveiro, Portugal

^dCECUL, Faculty of Sciences, University of Lisbon, 1749-016 Lisboa, Portugal

Abstract

Photoelectrochemical spectroscopy and capacitance measurements were used in this work to assess the electronic properties of the oxide films formed on 99.5% aluminium and 2024-T3 aluminium alloy by anodising in a sulphuric-boric bath. The morphology of these films was also studied by transmission electron microscopy cross-section observations.

The results obtained indicate that the oxide films formed on aluminium show a n-type semiconductive behaviour, with bandgap energies that are identical for the oxides studied, despite their different characteristics.

It was found out that capacitance measurements may be used as a valuable technique for the assessment of the quality of anodised layers, allowing the distinction between an efficient and an inefficient sealing. Therefore, they may be used to predict the corrosion resistance of these materials.

Key words: Aluminium, anodising, semiconductivity, capacitance, photoelectrochemistry

* Corresponding author: Phone: +351 218417964, Fax: +351 218404589, E-mail: joao.salvador@ist.utl.pt

¹ ISE Member