

Accepted Manuscript

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PII: S0257-8972(16)31356-1
DOI: doi: [10.1016/j.surfcoat.2016.12.068](https://doi.org/10.1016/j.surfcoat.2016.12.068)
Reference: SCT 21925
To appear in: *Surface & Coatings Technology*
Received date: 30 October 2016
Revised date: 14 December 2016
Accepted date: 19 December 2016

Please cite this article as: Leticia F. Mendes, Ariana S. Moraes, Janaina S. Santos, Fábio L. Leite, Francisco Trivinho-Strixino , Investigation of roughness and specular quality of commercial aluminum (6061 alloy) for fabrication of nanoporous anodic alumina films. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Sct(2016), doi: [10.1016/j.surfcoat.2016.12.068](https://doi.org/10.1016/j.surfcoat.2016.12.068)

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Investigation of roughness and specular quality of commercial aluminum (6061 alloy) for fabrication of nanoporous anodic alumina films

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Abstract

Nanoporous anodic alumina (NAA), obtained via aluminum anodization, have been used as template for fabrication of nanostructure materials and photonic devices. In order to promote the formation of regular porous and to control the desired properties, high-purity aluminum and pretreatment of Al surfaces are mandatory. This procedure consists in electrochemically removing the external irregular layer of the metal promoting a flat, bright and smooth metallic surface. In this study, the effect of electropolishing parameters on commercial aluminium samples (6061 alloy, 97%) was investigated. This procedure was performed at constant potential in a mixture of perchloric acid and ethyl alcohol solution in different experimental conditions. A factorial design was used to investigate the effect of applied potential, electropolishing time and electrolyte temperature on roughness and specular quality of Al substrates. These samples were characterized by Atomic Force Microscopy (AFM) and Diffuse Reflectance Spectroscopy (DRS). All variables presented significant effects on

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