Congresso Brasileiro de Engenharia e Ciência dos Materiais
24 a 28 de Novembro de 2024 | Fortaleza - CE - Brasil

Data e hora: 27/11/2024 | 18:00
Sessão: Sessão de Poster 5
Tipo: poster

Ref.: MceSi32-018

Synthesis of nanoporous anodic alumina on AA 1050 alloy

Apresentador: Leandro Da Silva Oliveira

Autores (Instituição): Oliveira, L.D.(Instituto de Pesquisas Energéticas e Nucleares); Cotinho, S.P.(Instituto de Pesquisas Energéticas e Nucleares); dos Santos, T.F.(Instituto de Pesquisas Energéticas e Nucleares); dos Santos, D.R.(Instituto de Pesquisas Energéticas e Nucleares); Correa, O.V.(IPEN/CNEN-SP); Bento, R.T.(Universidade São Judas Tadeu); Pillis, M.F.(IPEN/CNEN);

Resumo:
The field of nanotechnology has been the focus of development in various areas to improve the properties of materials. Applications for nanoscale materials have been applied in the microelectronics, tool coatings, biomedical and aeronautical industries, among others. Nanoporous anodic alumina (NAA) has attracted much interest due to the regular arrangement of nanopores and can be used in applications such as filtration processes, biosensors, biomaterials, catalysis, photocatalysis and moisture sensors, or even as mold for components as nanotubes and nanowires. The present work aimed at obtaining a layer of NAA and the analysis of the influence of the process parameters during the anodization of the AA 1050 aluminium alloy using sulfuric acid as electrolyte. The time-concentration-related variables were studied, and samples were anodized in two stages by 2, 4, 5, 6 and 8 h in electrolytes of 0.35 M H2SO4, 0.40 M H2SO4 and 0.45 M H2SO4. The films obtained were characterized by XRD, SEM, EDS spectroscopy and AFM techniques. It was observed that the

electrochemical polishing performed before the anodization stage produced good surface finish with RMS roughness of 2 nm, suitable for the anodization process. The increase in the time of the second stage of anodization provided the formation of nanopores of larger diameters, independently of the concentration, i.e. 0.35 M, 0.40 M or 0.45 M H_2SO_4. Regardless of the concentration of the electrolyte, after 8 h of anodization, the barrier-type layer was detached due to the mass limitation of aluminum oxide generated in the first stage of anodization. The average diameter of nanopores ranged between 38 and 54 nm. Results shown that the obtained films were amorphous and grow perpendicular to the surface of the sample. Finally, there is a direct relationship between the thickness of the oxide and the diameter of the nanopores, considering the same process time. However, in more concentrated electrolytes, structures with less dimensional stability were obtained.