High Frequency Anodising of Aluminium-TiO2 Surface Composites: Anodising Behaviour and Optical Appearance

High frequency anodising of Al–TiO2 surface composites using pulse reverse pulse technique was investigated with an aim to understand the effect of the anodising parameters on the optical appearance, microstructure, hardness and growth rate of the anodic layer. Friction stir processing was employed to prepare the Al–TiO2 surface composites, which were anodised in a 20 wt.% sulphuric acid bath at 10 °C as a function of pulse frequency, pulse duty cycle, and anodic cycle voltage amplitudes. The optical appearance of the films was characterized and quantified using an integrating sphere-spectrometer setup, which measures the total and diffuse reflectance from the surface. The change in optical reflectance spectra from the anodised layer was correlated to the applied anodising parameters and microstructure of the anodic layer as well as the Al–TiO2 substrate. Change in hardness of the anodised layer was also measured as a function of various anodising parameters. Anodic film growth, hardness, and total reflectance of the surface were found to be highly dependent on the anodising frequency and the anodic cycle potential. Longer exposure times to the anodising electrolyte at lower growth rates resulted in lowering of the reflectance due to TiO2 particle degradation and low hardness due to increased dissolution of the anodised layer during the process. [All rights reserved Elsevier].

General information
Publication status: Published
Organisations: Department of Mechanical Engineering, Materials and Surface Engineering, Department of Photonics Engineering, Optical Microsensors and Micromaterials, Technical University of Denmark, Universite Catholique de Louvain
Contributors: Gudla, V. C., Bordo, K., Jensen, F., Canulescu, S., Yuksel, S., Simar, A., Ambat, R.
Pages: 67-73
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Surface and Coatings Technology
Volume: 277
ISSN (Print): 0257-8972
Ratings:
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 2.46 SJR 0.852 SNIP 1.37
Web of Science (2015): Impact factor 2.139
Web of Science (2015): Indexed yes
Original language: English
Keywords: High frequency anodising, Aluminium–TiO2 surface composite, Microstructure, Hardness, Reflectance, TEM
Electronic versions:
Accepted Manuscript.pdf. Embargo ended: 15/09/2017
DOIs: 10.1016/j.surfcoat.2015.07.035 10.1016/j.surfcoat.2015.07.035
Source: PublicationPreSubmission
Source-ID: 112913499
Research output: Contribution to journal › Journal article – Annual report year: 2015 › Research › peer-review