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Increasing thickness and protective properties of PEO-coatings on aluminum alloy

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Abstract. The paper presents results of the study aimed at assessing the effect of duty cycle (*D)* during plasma electrolytic oxidation (PEO) on morphology, composition, and protective properties of the coatings produced on 5754 aluminum alloy in a mixed electrolyte. It is shown that increasing the duty cycle of a microsecond current pulses leads to a decrease of porosity and an increase of thickness of the PEO-layers, which are composed of γ-Al_2O_3, β-Al_2O_3, $AlPO_4$, and Al_2Mo_3C. This improved the barrier properties and microhardness of the coating. The Young's modulus increased with an increase of the quantity of electricity due to the changes of morphological and chemical structure of the coatings. The PEO-coatings produced at a higher duty cycle and longer oxidation time are more wearproof as compared to ones formed at a shorter oxidation time and lower *D* values. The obtained data allowed confirming the hypothesis on phase formation mechanism.

Keywords: Plasma electrolytic oxidation, Protective coatings, Chemical composition, Aluminum, Duty cycle