

Abstract Submitted
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High Frequency Plasma Electrolytic Oxidation (PEO): Diagnostics and Control of Microdischarges¹ PATRICK HERMANNNS, VERA BRACHT, SIMON BOEDDEKER, PETER AWAKOWICZ, Institute of Electrical Engineering and Plasma Technology — Plasma Electrolytic Oxidation of aluminum is a promising approach for three dimensional coatings with high growth rates. Individual lifetime, size and current density per microdischarge changes with processing time and oxide layer thickness. Due to the microdischarges being the main reason for coating growth, it is desirable to understand and control their properties. In this work, the lifetime of microdischarges is estimated by wavelet transform of the electrical current signal. Results show a rise in lifetime from 10 us to 100 us with processing time. Therefore, a pulsing frequency between 2 kHz and 100 kHz was chosen. Fast optical measurements, with multiple ICCD cameras triggered individually, show the intensity evolution of microdischarges during individual pulses. Increasing the pulse pause leads to a smaller probability of discharge reignition on the same spot and a further decay of microdischarge intensity during the pulse off time. As a result, the mean current and energy per discharge is reduced. These findings are implemented in a control loop setup, where duty-cycle and current density are used as control values to control the mean discharge size and discharge number density.

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