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**Plasma electrolytic oxidation induced ‘Local over-growth’ characteristic
across substrate / coating interface: effects and tailoring strategy of
individual pulse energy**

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Abstract

Plasma electrolytic oxidation (PEO) coatings fabricated on 6061 aluminum alloy under different applied voltages (400V, 500V and 600V) were used to investigate the plasma discharge induced ‘Local over-growth’ characteristics across substrate / coating interface. The instant microdischarges across the local plasma channels induce the ‘micro molten pool’ products and then solidify rapidly to form ‘over-growth’ oxides region extending into substrate. A thin bonding layer composed of nanocrystalline and amorphous Al₂O₃ with a constant thickness of ~600 nm is always forming on the interface. The intact interface structure of the “local over-growth” characteristic patterns was presented perfectly by both microdischarge-sculpted substrate side ‘pits’ and electrochemically detached coating side ‘protrusions’. The patterns demonstrate that the over-growth ‘pits’ and ‘protrusions’ gradually

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