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Influence of electrolyte concentration and additives on the plasma electrolytic oxidation treatment of Ti-6Al-4V alloyBih-Show Lou¹, Feng-chuan Chang², Chaur-Jeng Wang², Jyh-Wei Lee³

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Recently, the plasma electrolytic oxidation (PEO) treatment has been widely applied on Ti alloys to create functional oxide layers. In this work, the PEO process on the Ti-6Al-4V alloy was studied using six electrolytes containing different concentrations of NaAlO₂ and K₃PO₄ under a duty cycle of 50% and a frequency of 1000 Hz. The , Sodium dodecyl sulfate (SDS, NaC₁₂H₂₅SO₄) and s were also added to explore the influence of additives on the PEO process. The structures of PEO coating was determined by the X-ray diffractometer (XRD). The surface and the cross-section morphologies and chemical compositions of the PEO coatings were examined by scanning electron microscopy (SEM) and energy dispersive spectrometer (EDS), respectively. The nanoindentation, pin-on-disc wear test and scratch test were used to evaluate the hardness, wear resistance and adhesion property of the coating, respectively. Effects of and additives on the microstructure and mechanical properties of PEO grown oxide layers were discussed in this work.

Keywords

Plasma electrolytic oxidation

Ti-6Al-4V

electrolyte concentration

cationic surfactant

MoS₂ nanoparticle