Effect of electrolyte type on phase composition and corrosion behavior of nano crystalline coating produced on Ti by PEO technique

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Abstract:
In this research, ceramic oxide coatings were produced on Ti in the different electrolytes of Aluminate and carbonate base by micro-arc oxidation. This process was conducted under Constant voltage condition. The effect of KOH and NaF in aluminate base solution was also studied. The surface morphology, growth and phase composition of coatings were investigated using scanning electron microscope and X-ray diffraction. Corrosion behavior of the coatings was examined by Potentiodynamic polarization and electrochemical impedance spectroscopy. It was found that the voltage breakdown had a significant effect on the form and properties of coatings. Coatings obtained from Aluminate-potass base solution had lower breakdown voltage, higher surface homogeneity and a better corrosion resistance than carbonate base solution. Addition of NaF instead of KOH had improper effects on the homogeneity and adhesion of coatings which in turn caused a poor corrosion protection behavior of the oxide layer. AC impedance curves showed two time constants which is an indicative of the coatings with an outer porous layer and an inner compact layer.

Keywords
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