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Tailoring of antibacterial and osteogenic properties of Ti6Al4V by plasma electrolytic oxidation

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Abstract

Bioactive coatings were formed on alloy Ti6Al4V by plasma electrolytic oxidation (PEO) in two different electrolytes; a conventional Ca/P-based electrolyte and its modified version with added F and Si. Coatings formed after PEO for 90 s, 180 s, 300 s and 600 s were characterized with respect to their composition, structure, and morphology (SEM, EDX, XRD). Release of Ti, Al, V, Si, P and Ca ions was analyzed after 60 days of immersion in 0.9% NaCl solution. Coatings formed after PEO for 180 s and 600 s, with considerable differences in surface roughness and chemical composition (Ca/Ti, P/Ti, F/Ti ratios), were selected for further biological investigations. These involved Actin and Hoechst staining for monolayer formation evaluation, metabolic activity (Alamar Blue), evaluation of the osteoblastogenesis process (early osteogenic ability, ALP Assay, and collagen secretion) and biofilm formation (*Staphylococcus*

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