Corrosion Resistance Investigation of Titanium Alloy as Tissue Engineered Bone Implant

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This work used electrochemical impedance measurements and anodic polarisation to study the corrosion susceptibility of Ti, Ti–6Al–4V and TZNT in a buffered saline solution (PBS). The impedance characterization model was obtained under open-circuit conditions and was a double-oxide film model consisting of an inner-barrier oxide layer and a porous, outer layer. Low-pitting potentials were obtained for TZNT. The property of the outer layer depended on the presence of phosphate anions in the saline-buffered solution (SBS) and the electrode material. The typical, low resistances of the porous layers generated on TZNT with phosphate anions ranged from 10 to 70 $\Omega \text{ cm}^2$. Ti, TZNT and Ti–6Al–4V all displayed much higher porous layer resistances without phosphate anions.

Keywords: Titanium alloy; Bone implant; Corrosion resistance; Electrochemical impedance spectroscopy; Medical application

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