Abstract

Effect of Sandblasting on the Long-Term Corrosion Resistance of Ti G4 in Artificial Saliva [†]

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Abstract: Titanium Grade 4 (G4) is the most commonly used material for dental implants due to its excellent biocompatibility and mechanical properties. However, titanium implants require a rough surface that can increase the biomechanical potential of implant–bone contact and affect protein adsorption speed. In this work, the effect of sandblasting of the Ti G4 surface on the long-term corrosion resistance in artificial saliva of pH = 7.4 at 37 °C was studied. The X-ray diffraction (XRD) single-{hkl} $\sin^2\psi$ method was used to measure the sandblasted Ti residual stress. In vitro corrosion resistance tests were conducted for 21 days using the open circuit potential method, polarization curves, and electrochemical impedance spectroscopy. Using the Kelvin scanning probe, the electron work function was determined. Analysis of the obtained results showed an improvement in the corrosion resistance of the sandblasted Ti G4 compared to Ti with the machine surface. The increase in corrosion resistance was related to the residual compressive stress of 324.7 MPa present in the sandblasted Ti surface. Sandblasting caused plastic deformation of the Ti surface, which resulted in the improvement in mechanical properties, as evidenced by the increase in the hardness of the sandblasted Ti compared to Ti with the machine surface.

Keywords: corrosion resistance; sandblasting; titanium

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