



ELECTROCHEMICAL CHARACTERISTICS OF Ti6Al7Nb ALLOY IN RINGER'S SOLUTION

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Abstract

Titanium alloys show attractive properties for biomedical applications where the most important factors are biocompatibility, corrosion resistance, low modulus of elasticity, very good strength-to-weight ratio, reasonable formability and osseointegration. The aim of present study was to evaluate the electrochemical behaviour of Ti6Al7Nb alloy in Ringer's solution of different pH. This evaluation was carried out through the analysis of the potentiodynamic polarization curves, and electrochemical impedance spectroscopy (EIS) tests. Very low current densities were obtained from the polarization curves, indicating a typical passive behaviour. All EIS measurements were carried out at different potentials (zero current potential (ZCP), open circuit potential (OCP) after one hour of immersion, and 400 mV). The EIS results exhibited capacitive behaviour (high corrosion resistance) with high impedance values (order of $10^5 \Omega \text{ cm}^2$) at low and medium frequencies, which are indicative of the formation of a highly stable film on this alloy in the test solutions. The EIS spectra of the Ti6Al7Nb alloy exhibiting two-time constants indicating the formation two layers only at higher potentials (OCP and 400 mV). The high corrosion resistance, displayed by this alloy in electrochemical polarization test is due to the dense inner layer, while the osseointegration ability can be ascribed to the presence of the outer porous layer.

Key words: Ti6Al7Nb alloy, corrosion current, potentiodynamic polarisation curves, polarization resistance, EIS

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