

CORROSION INVESTIGATION OF A FERRITIC STAINLESS STEEL FOR USE AS IMPLANTABLE DENTAL DEVICES WITH MAGNETIC CONNECTIONS

Costa, I.(1); Rogero, S.(1); Terada, M.(2); Marques, R.A.(1); Barbosa, L.P.(3);
(1) IPEN; (2) USP; (3) ;

Palavra chave: Corrosion, cytotoxicity, dental prosthesis, ferromagnetic stainless steels

Resumo:

Ferritic stainless steels might be used for applications as biomaterials when their magnetic properties are useful for fixing prostheses by means of magnetic attachments. The AISI 444 stainless steel (SS) is a non-cytotoxic ferromagnetic stainless steel but its application as biomaterial has not been extensively investigated. In this study, the corrosion resistance and cytotoxicity of the AISI 444 ferritic stainless steel, with low nickel content, extra-low interstitial levels (C and N) and with the addition of Ti and Nb as stabilizers, were investigated to evaluate its potentiality for biomaterials fabrication. The corrosion resistance was studied by anodic polarization methods and electrochemical impedance spectroscopy (EIS), in a saline phosphate buffered solution (PBS) at 37 °C, naturally aerated. The results were compared to that of the ISO 5832 SS. This last steel is the most used metallic material for orthopedic prostheses fabrication. The electronic properties of the passive film formed on AISI 444 SS were evaluated by the Mott-Schottky approach. All tested materials showed passivity in the PBS medium and the passive oxide film presented a duplex nature. In aerated condition, the resistance to pitting corrosion associated to AISI 444 SS was similar to that of the ISO 5832 SS. The AISI 444 stainless steel showed a high potential for use as a biomaterial, especially for the manufacture of prosthetic components with magnetic attachment.