A NEW MATERIAL FOR NEURAL STIMULATING PROSTHESES

T. Moura e Silva[*a] J.C.S. Fernandes[b], M. Da Cunha Belo[b] and M.G.S. Ferreira[b,c]

[a] Instituto Superior Eng. Lisboa - Dept. Mechanical Engineering, 1950-062 Lisboa, Portugal
[b] Instituto Superior Técnico - Dept. Chemical Engineering, 1049-001 Lisboa, Portugal
[c] University of Aveiro, Dept. of Ceramics and Glass Eng., 3810-193 Aveiro, Portugal

Publicado em: CD de Comunicações e Actas do Congresso Europeu de Corrosão "Eurocorr 2005" p. 584, 4-8 de Setembro 2005, Lisboa, Portugal

Abstract

The last few decades have seen the development of electronic devices for chronic stimulation of the nervous system. Among them are the neural stimulating electrodes, used to replace or supplementing lost functions in the neurological handicapped, such as treatment of spinal injury, epilepsy or auditory disorders.

Artificial stimulation of the nervous system requires the transfer of a certain amount of charge from the implanted electrodes to the nerve cells, which can be accomplished by electrochemical processes occurring at the electrode/solution interface. Progress in these devices are therefore dependent on the provision of new and more efficient materials capable of transfer high values of charge and that allow for miniaturization of the implanted electrodes in order to enhance selectivity in neuronal activation.

This work aims at preparing a new material, to be used as neural stimulating devices that combine these two characteristics. For that purpose Ir was ion implanted on Ti-6Al-4V alloy and the material was subsequently surface enriched in Ir by chemical etching. The enrichment process was controlled by Auger depth profile and the charge injection capability of the material was assessed by cyclic voltammetry.

It was found out that this new material combines the good charge storage properties of iridium with the mechanical properties of the titanium alloy, therefore making it prone to be used as neural stimulating electrode.