RECOVERY OF TITANIUM WITH POLYCAPROLACTONE FOR POTENTIAL APPLICATION IN HEART VALVES

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Heart diseases affect a large part of the world population. In Brazil, they were the second cause of death, killing more than 85,000 in 2013. Most of the heart diseases involves the functioning of the valves. As a treatment, repair or replacement of these valves are widely used techniques, although replacement is currently being the most common procedure. The choice between synthetic or natural/biological originated valves depends on several factors since both types have advantageous characteristics and negative points. Synthetic implants, usually made of pure titanium and other alloys, have the benefit of greater durability, without the need for short-term retroaction when compared to biological implants. However, the body can reject them, whereas biological implants are more biocompatible. Thus, the present work proposes the use of polymeric coating on the commercially pure titanium metal surface, in order to increase biocompatibility and overcome a possible rejection of the synthetic prosthesis. Among several polymers with potential application as biomaterials that have been studied, polycaprolactone (PCL) has demonstrated greater efficacy for applications due to its biocompatibility and bioabsorption characteristics. It can easily form films and recovery surfaces by casting and immersion techniques. In this work, titanium discs (grade 4) were pre-prepared by alkaline and thermal treatments and then coated with 1% PCL (chloroform as solvent) by immersing the discs in the polymeric solution. The samples were dried in an oven at 37°C for 24 hours. Subsequently, samples were characterized by Scanning Electron Microscopy (SEM), X-ray diffraction (XDR) and Infrared Spectroscopy (IR) to evaluate morphological and chemical properties. Moreover, the effects of PCL-coating on the bioactivity and corrosion resistance of the samples were evaluated by bioactivity/SEM and electrochemical tests. From these results, we demonstrated the effectiveness of PCL as coating material for titanium surface, with potential application for cardiac valves. The authors thank FAPEMIG, CNPq, CAPES and FAPESP for the support they have received in their research.