IIIa02-007

Development and characterization of ti-10mo-30zr beta alloy for biomedical aplications

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Titanium is one of the most utilized metals as a manufacturing element for orthopedic implants [1]. This element has very interesting aspects as excellent mechanical and biological properties, reason of its interest in biomedical applications. Titanium, as a pure element, have dimorphism, that is, has a hexagonal compact structure, alpha phase (?), stable until 862°C and for temperatures above it, reveals a body centered cubic structure, beta phase (?). Molybdenum makes part of a elements set, called ? stabilizers. These elements, when mixed with titanium, reduce the transition temperature of ? to ? phase. Zirconium when inserted in the alloy increase the corrosion resistance and decreases the melting point, in addition to improving the biocompatibility of the alloy. In the presence of another ?-stabilizer element, it also helps to stabilize the ? phase. The alloys with predominance of beta phase are the most desirable for biomedical application, due to its higher mechanical compatibility with the bone tissue [2]. The present work presents the preparation and characterization of the Ti-10Mo-30Zr(wt%) alloy, by measurements of density, optical emission spectrum (OES), energy dispersive spectrometry (EDS), x-ray diffraction, optical and scanning electron microscope (SEM), Vickers hardness and elastic modulus. The density values of the alloy were higher than that of pure titanium, due the addition of the zirconium and molybdenum. The EDS measurements reveals a good stoichiometry of the elements and no impurities contamination. In the x-ray diffraction measurements, it was observed only peaks characteristics of beta phase. In the optical and scanning electron micrographs it was observed the grains which are characteristic of the ? phase. The Vickers hardness and the elastic modulus measurements showed a high hardness and low elasticity modulus which are an advantage over the implant tissue mechanical compatibility, decreasing the stress shielding effect. No cytotoxic effects were observed in the measurements. Acknowledgements The authors acknowledge CNPq and FAPESP by the financial support. References [1] LEYENS, C.; PETERS, M. Titanium and titanium alloys –Fundamentals and applications. Wiley-VHC: Weinheim. 2003. [2] OLIVEIRA, N.T.C. et al. Materials Science and Engineering A, v.452-453, p.727-731, 2007.