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DEVELOPMENT OF A NEW BETA Ti-BASED ALLOY FOR BIOMEDICAL APPLICATIONS

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Ti is one of the most used 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. Ti, 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. Mo makes part of a elements set, called ? stabilizers. These elements, when mixed with Ti, reduce the transition temperature of ? to ? phase. Previous studies have argued that the concentration of molybdenum above 10% in weight has a beta phase structure [2]. Zr 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 [3]. The work presents the preparation and characterization of the Ti-10Mo-xZr (x = 30, 40 and 50 wt%) system, by measurements of density, optical emission spectrum (OES), energy dispersive spectrometry (EDS), X-ray diffraction (XRD), optical (OM) and scanning electron microscope (SEM) aiming to observe the presence of the beta phase in the alloys. The density values of the alloy system were higher than that of pure titanium, due the addition of the Zr and Mo. In the XRD measurements, it was observed only peaks characteristics of beta phase. In the OM and SEM micrographs it was observed the grains which is characteristic of the ? phase. The EDS measurements reveals a good stoichiometry of the elements and no impurities contamination, which means that the alloy system agrees with the literature in the presence of beta phase structure even changing the concentration of zirconium element. 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] HO, W.F. et al. J Mater Sci Mater Med, v. 19, p. 3179-3186 2012. [3]CORREA, D.R.N. et al. Mat Sci Eng C, v. 91, p. 762-771, 2018.