NEW TITANIUM ALLOYS FOR BIOMEDICAL APPLICATIONS: EFFECT OF SUBSTITUTIONAL SOLUTES

Grandini, C.R.(1); Silva, M.R.(2); Donato, T.A.G.(1); Araújo, R.O.(3); Kuroda, P.A.B.(1); Lourenço, M.L.(1); Suárez, G.P.S.(3); Quadros, F.F.(4);
UNESP - Univ. Estadual Paulista(1); Instituto Federal de São Paulo(2); UNESP - Univ. Estadual Paulista(3); UNESP - Universidade Estadual Paulista(4); UNESP - Univ. Estadual Paulista(5); UNESP - Univ. Estadual Paulista(6); UNESP - Universidade Estadual Paulista(7); UNESP - Universidade Estadual Paulista(8);

Ti alloys include a series of advantageous properties for biomedical applications, such as high mechanical strength, wear and corrosion resistance, hardness and elastic modulus. However, the Young's modulus of these alloys is still about 2 to 4 times higher than the human bone, and may cause stress shielding effect. To solve this problem, new titanium alloys are being developed, with the addition of different elements, usually the beta-stabilizers. These new alloys, with predominance of body centered cubic structure (beta phase) have lower elastic modulus than other structures as hexagonal compact (alpha phase), preventing stress shielding effect, very interesting for biomedical applications. In this paper, the development and chemical, structural, microstructural and mechanical characterization of new titanium alloys containing niobium, magnesium, molybdenum, tantalum and zirconium is presented. The alloys were prepared in arc-melting furnace. The structure and microstructure of alloys were evaluated by x-ray diffraction, optical and scanning electron microscopy, whose results indicated the presence of alpha’, alpha’’ and beta phase, depending of substitutional element used. The results of Vickers microhardness and elastic modulus suffered a strong influence regarding the processing and the substitutional element content. (Financial support: Capes, CNPq and FAPESP).