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Biofunctionalization of Ti-Nb-Sn / Mg Modified Alloy for Biomedical Application, by Powder Metallurgy Technique.

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Background, Motivation and Objective. Current trends in tissue replacement for implants include the structural, mechanical and physico-chemical modification of biomaterials using nanotechnology tools and bioengineering principles, in order to improve their performance when implanted, corroborating with a better biological response. This work aims at the development of new biomedical titanium alloys with better mechanical and biological compatibility through the addition of non-toxic elements (Sn, Nb and Mg). A particular approach will be given with respect to thermal, mechanical and surface properties. In general, it is to introduce Mg as space support in the Ti-Nb-Sn alloy, to confer it on controlled amounts of pores and to use as a framework to serve as anchoring cells, and possible carrier of key biological substances.

Methods. First, we determine the size of Mg powder (250-600µm). Since the size of the spacer determines the final pore, size reached. After, the powders were sieved and weighed in order to obtain the percentage of 60% Ti-34% Nb-6% Sn. Then, the grinding was performed in order to homogenize the powder mixture. We did in four different times 01h, 02h, 04h and 06h (room temperature). Then they were compacted at 500MPa and finally submitted to the heat treatment, first at 450ºC (1h) and after, at 700ºC (2h).

Results. With respect to grinding, we found that the best time was 1 hour. At 2, 4 and 6 hours the powders became very reactive and burned. The compaction and the sintering process were effective in the production of porosity in the material.

Discussion and Conclusions. Thus, the powder metallurgy technique has been effective with low cost of production and large quantities of materials can be manufactured in short periods of time. It is expected that this modified alloy will have attractive properties for the cells, and corroborate in the future, for their diffusion in the market.

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