PROPERTIES AND PROSPECTS OF THE Ti-Sn POWDER METALLURGICAL ALLOYS FOR THEIR BIOMEDICAL APPLICATION

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☒ Oral presentation ☐ Poster presentation

ABSTRACT

Commercially pure titanium (CP-Ti) provides excellent corrosion resistance and has a wide range of applications, with Ti6Al4V being the most widely used alloy in the field of biomedicine. However, despite their characteristics and corrosion behavior, titanium and its alloys have a high price due to their complicated extraction and processing. Besides, aluminum and vanadium are very toxic, the addition of other, more neutral alloying elements is being investigated [1, 2]. Powder metallurgical techniques can provide an inexpensive way to process titanium alloys for biomedical applications. Although the studies of the addition of tin in titanium to obtain alloys by powder metallurgy have been limited [3-6], it is interesting to study their behavior due to their good biocompatibility and their mechanical properties in contrast to Ti6Al4V since, when used for implants in bone, it has been proven that there was considerable wear on the bone. In this study TiSn alloys with 1, 2 and 4 wt.% of Sn using conventional powder metallurgy techniques. Their mechanical properties have been studied using four-point bending, microhardness and impulse excitation tests. Their microstructure has also been studied using optical, scanning electron microscopy and electron backscatter diffraction, as well as their chemical properties through ion release and electrochemical corrosion tests. The results obtained demonstrate the influence of tin content on the key properties of these alloys and their viability for their possible use as biomedical implants.

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