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Tem and properties of aged Ti-12Mo-13Nb alloy

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Mechanical properties of Metastable beta-Ti alloys are highly dependent of the final microstructure which is controlled by the thermomechanical treatments, in particular the Young's modulus. These alloys for biomedical application require high mechanical strength and a low Young's modulus to avoid stress shielding. Previous work on the development of Ti- 12Mo –13Nb alloy showed than the better properties were obtained in the aging at 500 °C after cold swaging. The aim of this study is to analyze the microstructure and properties of Ti- 12Mo –13Nb alloy hot swaged and aged in different conditions for biomedical applications aiming to replace Ti-6Al-4V alloy currently used. The Ti-12Mo-13Nb alloy was produced by arc-melting, then homogeneized, hot swaged and aged at 500 °C for 10 min, 4h and 24h. The microstructure was analyzed by X-ray diffraction and transmission electron microscopy. Mechanical characterisation was based on Vickers microhardness tests and Young's modulus measurements. According to the results, the aging at 500 °C/24h, carried in bimodal alpha distribution in the beta matrix in the cold swaged alloy, while the hot swaged alloy resulted in a fine and homogeneous alpha phase in the beta matrix. The higher hardness to the Young's modulus ratio corresponds the sample that was aged at 500 °C for 24h. This value was higher than those obtained for the Ti-6Al-4V alloy and cp Ti.