

Effect of Nb glue atom in the cluster formula on the microstructure and mechanical properties of Ti-Mo alloy

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Abstract

The effect of Nb in the glue site of the cluster-plus-glue atom model formula on the microstructure and mechanical properties of Ti-Mo alloy was investigated. Phase and microstructural analysis were performed by X-ray diffraction and electron backscatter diffraction. Tensile properties were also examined. A small amount of secondary martensitic α'' and α nano particles were precipitated in the β matrix of both alloys, due to the inhomogeneous distribution of Mo and/ or Nb caused by segregation, which formed local regions with high- and low-stability of the β phase. The elastic modulus was significantly reduced to 56.9 ± 3.08 GPa, while the elastic admissible strain was substantially improved. The increased β stability and suppression of the α phase led to no significant change in both the yield and ultimate tensile strengths, and the brittle fracture behavior. The alloy can be a potential alternative of the conventional orthopedic implant materials in orthopedic applications.