



REVIEW: RECENT ADVANCES AND TENTATIVE APPLICATIONS OF NEW TITANIUM ALLOYS

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Abstract: The use of Ti and its alloys for medical devices gained momentum in Europe and specifically in the United Kingdom. Subsequently, as the metals that form the Co-Cr alloys became highly strategic, the United States also started to use this metal. Its low density, 4.507 g/cm³, compared to

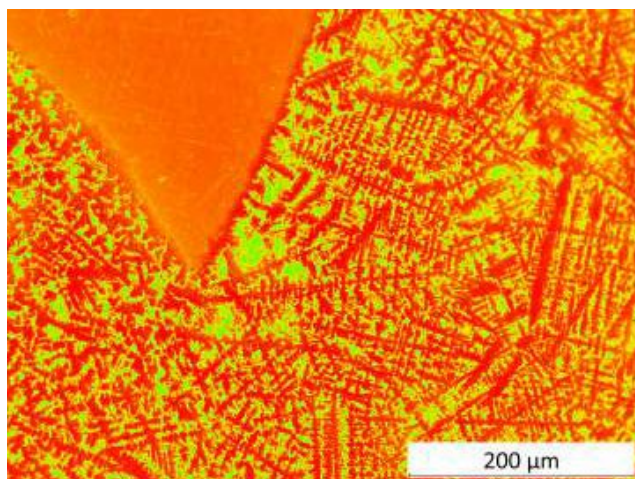


Fig.1. New HEA with Ti

7.9 for stainless steel, 8.3 for the Co-Cr-Mo alloy and 9.2 for Co-Ni-Cr-Mo, together with its good mechanical properties and excellent corrosion resistance, give this metal excellent potential as an implantable material. From all the metallic alloys used in prosthesis, probably the most used one is Ti-6Al-4V alloy. However, this alloy presents cytotoxicity problems and causes nervous disorders, produced respectively by the vanadium and aluminum ions released from the alloy when in contact with body fluids or tissues.

These effects were the driving force for recent development of new titanium alloy compositions with corresponding ASTM (American Society for Testing and Materials) standards: Ti-6Al-7Nb (ASTM F-1295), Ti-3Al-2.5V (ASTM F-2146), Ti-13Nb-13Zr (ASTM F-1713), Ti-12Mo-6Zr-2Fe (ASTM F-1813), Ti-15Mo (ASTM F-2066) and Ni-Ti (ASTM F-2063, 2005, 2082 and 2004). Recent research on new Ti alloys has been developed, such as Ti-Nb-Ta-Zr, Ti-Mo-Zr-Fe and Ti-Nb-Zr-Si and new HEA (high entropy alloys) with titanium. A review of the new titanium alloys from the last five years and tentative applications of them is presented.

Selective references:

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