Microstructure properties of Ti based alloys for processing of bulk metallic glasses

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Ti alloys having high strength-to-weight ratio, good corrosion resistance and biocompatibility are important materials applied in traumatology. Alpha and alpha-beta titanium alloys currently used in traumatology have the Young's modulus (105-110 GPa) much greater than that of human cortical bone (10-30 GPa) [1, 2]. Implants with higher stiffness than bone prevent the needed stress being transferred to adjacent bone that results in bone resorption around the implant and consequently to implant loosening. The alloys in glassy form show lower modulus of elasticity, better corrosion properties and higher strength comparing their crystalline form, which makes them promising candidates to serve as traumatology nails and plates.

Experimental work was focused on characterization of Ti based alloys for processing bulk metallic glasses: Ti60Nb15Zr10Si15, Ti65Ta10Zr10Si15 a Ti45Zr40Si15 (in at.

The titanium alloys doped by refractory metals and Si were prepared by plasma melting technology. Microstructure properties of the prepared alloys were determined using metallographic observation, microhardness measurement and EDX microanalysis. The microstructures of all three alloys were composed of intermetallic phases and eutectics characteristic for polycrystalline conditions.

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