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Ti-Si biocompatible materials for orthopedic applications

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Titanium alloys are widely used in biomedical applications because of their higher biocompatibility, excellent corrosion resistance, low elastic modulus in comparison to other metallic biomaterials. However, they commonly contain aluminium, vanadium, chromium, cobalt, manganese etc., which ions cause damage human tissues. We decided to develop a low-density alloy with a high hardness that will be biocompatible and cost-effective. Ti and Si are biocompatible elements, moreover Si support bone calcification. We prepared and characterized five Ti-Si alloys. One of the five is monophasic alloy, consisting of sole Ti₅Si₃. Microstructure was examined by synchrotron X-rays diffraction and high resolution transmission electron microscopy. This alloy is almost 300% harder compared with the implants used today. Mass density of the alloy is 4.27 g/cm³, while modulus of elasticity is 187 GPa. All Ti-Si alloys are biocompatible ascertained in respect to MC3T3E1 mouse preosteoblastic cells. In the poster I will present preparation, phase composition, microstructure morphology, biocompatibility and basic mechanical properties of five Ti-Si intermetallic alloys.

Biography

Šulíková M is pursuing her second year of PhD at the Faculty of Science, the Pavol Jozef Šafárik University in Košice, Department of Condensed Matter Physics. She graduated in Physics and Biology and completed her Master's degree at the P J Šafárik University in Košice. She has 5 publications and currently is studying new type of biocompatible alloys. Her first results were presented at ISMANAM 2017 in the form of a poster. Now, her results will be presented at 4th Annual Conference on Biomaterials.

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