



Forging of Ti-Nb-Ta-Zr-O alloy —new material for hip implant

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Abstract:

Nowadays, the life time of hip joint implants is limited to 15-20 years which is not sufficient because of prolonged human lives and activity. This is due to a big difference in elastic modulus of an implant and a bone where the bone degrades in the area of non-loaded bone in a vicinity of too tough metal implant (stress-shielding). So the demand for new material for metal implants is increasing. The utilization of beta Ti- alloys is discussed in scientific literature for two decades. The advantages include using biocompatible elements and lower elastic

modulus. A new developed beta titanium alloy (Ti-Nb-Ta-Zr-O) was prepared by sequential plasma arc melting but was prepared only in the as-cast condition. The main task is to specify and optimize the process of implant manufacturing. The current issue is to prepare the forging state of the alloy with sufficient fatigue resistance. Cold rotary swaging of this material with different degrees of deformation (40-80%) was successfully performed and recrystallization of the material was studied. Process optimization regime was selected and applied on bigger part of the material. Mechanical and fatigue properties were tested and were found to reach better results compared with the cast-state of the material.

Biography:

Kristyna Halmesova has started her research in the field of thin films, now she works in applied research. She got a lot of experience in the field of magnesium alloys and their treatment. Now, she has begun to be one of the team that develops new biomaterial for hip implants. She has some experience in thermo-physical measurements.