

NOVEL TITANIUM BASED ALLOY FOR BETTER ORTHOPEDIC IMPLANTS

Technology Overview

Selective Laser Melting (SLM) is an additive manufacturing (AM) technique that is capable of fabricating complex functional three-dimensional (3D) metal parts of high relative density with the complete melting and fusion of powders. As a powder bed fusion technology, SLM has the potential in expanding the materials library by formation of alloys that were previously difficult to achieve from metal powder mixtures that can be customised according to the application requirements.

Titanium-Tantalum (TiTa) is a potential material for biomedical applications due to its high strength to modulus ratio. However, it is still not widely used due to the difficulties in obtaining this alloy. SLM is chosen as the method to form this alloy due to its versatility in processing metallic materials and good results obtained from commercially pure titanium (cpTi) and Ti6Al4V.

Potential applications

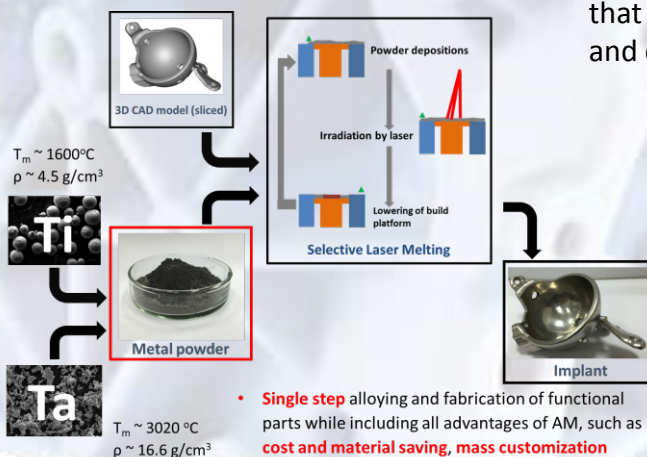
Titanium-Tantalum (TiTa) is targeted for use in orthopedic implants, such as knee, hip and spinal implants. Due to its lower modulus and relatively high strength, it has the potential to replace commercial materials such as Ti6Al4V and CoCrMo as the new age implant material.

Customer Benefits

- In situ formation of alloy
- Single step formulation of implants and alloying
- Cost-effective and mass customization

Features and specifications

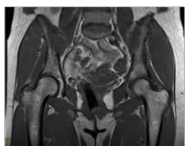
The TiTa Young's modulus is 75.77 ± 4.04 GPa and has yield strength of 882.77 ± 19.60 MPa, ultimate tensile strength of 924.64 ± 9.06 MPa and elongation of 11.72 ± 1.13 %. It is found that SLM TiTa parts have lower Young's modulus and comparable strength to Ti6Al4V and cpTi.



Product Designs



Patient Specific Designs



New Process



If you are interested in this technology, please contact the BD Manager: edmund.lim@ntu.edu.sg