

Development of new powders for metals 3d printing

Summary

This PhD project involves developing a viable technological route for fabrication of porous structures from tantalum (Ta). In this work, we aim to develop additively manufactured (AM) novel tantalum scaffolds in collaboration with an industrial enterprise specialized in the production of rare and rare-earth metals.

Research field:	Mechanical Engineering
Supervisors:	Prof. Dr. Renno Veinthal Lauri Kollo
Availability:	This position is available.
Offered by:	School of Engineering Department of Mechanical and Industrial Engineering
Application deadline:	Applications are accepted between May 03, 2021 00:00 and May 31, 2021 23:59 (Europe/Zurich)

Description

Applications are invited for a doctoral degree (PhD) position in Tallinn University of Technology. The project involves developing a viable technological route for fabrication of porous structures from tantalum (Ta). Recently, extensive research has proven that additive manufacturing is a versatile technique for the fabrication of porous materials with well-designed and highly controlled architectures. In this work, we aim to develop additively manufactured (AM) novel tantalum scaffolds. There is a need for the development of tantalum powder manufacturing technologies suited specifically for additive manufacturing applications.

The development of Ta powders will be carried out in collaboration with an industrial enterprise specialized in the production of rare and rare-earth metals. In the later stage of the project, porous structures and 3D shapes, AM trabecular tantalum scaffolds will be designed and fabricated using selective laser melting technology (SLM 280 3D printing system). The new trabecular materials will be characterized using different characterization techniques (mechanical, optical, tomography) to understand the link between structure and properties, allowing their performance to be optimized.

The PhD study aims to develop feasible contaminant free technology for fabrication of spherical powders from high-purity bulk tantalum. For powder preparation, various mechanical and chemical processing technologies will be used. The powders' morphology and composition will be studied and they have to meet industry standards. Powders will be used for fabrication of trabecular structures by SLM. 3D design of the porous structures, fabrication and characterization are responsibilities of the PhD student.

Applicants should fulfil the following requirements:

- A Master's degree in industrial engineering, materials engineering, mechanical engineering, or related disciplines with ICT background
- Prior experience with engineering software
- Verifiable evidence of capability to write technical reports and scientific papers in high quality journals

The PhD student is expected to adopt a professional approach, including good timekeeping, observing deadlines, reading and responding to communications from the supervisory team and other members of the University and taking responsibility for their own skills and career development.



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