

Additive Manufacturing of Functional Materials

Summary

This PhD project focuses on the fabrication of functional materials with enhanced properties for industrial applications using the laser powder-bed fusion (LPBF) process. Particular attention will be paid to alloy design, parameter optimization, and the interplay between microstructure properties and the LPBF technique. Key aspects of the project will include the: (1) Development of novel and next generation functional materials for LPBF process (process-specific design) (2) Optimization of the LPBF process parameters to achieve desired microstructure and material properties, (3) In-depth materials, and property testing and (4) Prototype development and integration of functional materials in real-world applications. Fundamentals of the microstructural development will be studied in detail to fabricate sustainable and high-performance functional materials by the LPBF process.

Research field:	Production and materials engineering, robotics, transport and logistics
Supervisor:	Prashanth Konda Gokuldoss
Availability:	This position is available.
Offered by:	School of Engineering Department of Mechanical and Industrial Engineering
Application deadline:	Applications are accepted between June 01, 2025 00:00 and June 30, 2025 23:59 (Europe/Zurich)

Description

- A detailed literature survey on the different functional materials, their metallurgy, microstructure, and processability via LPBF process.
- Functional materials alloy design for the LPBF process.
- Functional material feedstock preparation for the LPBF process
- Process optimization for the fabrication of functional materials by LPBF with the desired microstructure and without defects
- A detailed microstructural characterization, property testing, and failure analysis on the LPBF-processed functional materials
- A detailed investigation on the post-processing necessity and thermal treatment of the LPBF-processed functional materials
- Use of AI/ML and numerical simulation to optimize the microstructure-properties in the functional materials fabricated by the LPBF process
- Optimization of microstructure and properties based on the studies carried out
- Function material prototype development with desired functional properties

The applicants should fulfil the following requirements:

- Master's degree in Metallurgy / Materials Science / Mechanical or equivalent
- Experience in any/all of the following fields: alloy design, powder metallurgy, additive manufacturing, thermodynamics, materials characterization, and materials testing
- High level of scientific integrity, rigor, and excellence in experimental methodology, analysis of data, and scientific/technical reporting.
- Ability to work autonomously while being a good team player willing to perform and develop with the team.



- Creative and innovative mindset



To get more information or to apply online, visit <https://taltech.glowbase.com/positions/949> or scan the the code on the left with your smartphone.