Next generation materials for additive manufacturing

Summary

Since the introduction of the SLM process, either existing materials are fabricated or their compositions are altered. As the next step, the aim of this project is to design and develop SLM-specific materials with remarkable properties for various applications. Supervisor: professor Prashanth Konda Gokuldoss. Co-supervisor: senior researcher Lauri Kollo

Research field:	Mechanical Engineering
Supervisors:	Lauri Kollo 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 November 16, 2020 00:00 and December 16, 2020 23:59 (Europe/Zurich)

Description

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The aim of this research is to develop next-generation materials for additive manufacturing (AM), especially selective laser melting (SLM). Immiscible alloys (are characterized by the presence of a miscibility gap in their phase diagrams) have gained considerable attention in the last decade due to their valuable properties and potential applications. Non-equilibrium processes like mechanical milling / alloying (MM/MA) were used to process immiscible alloys and to impact a kind of solubility in these alloys. Since SLM is also a non-equilibrium process that can process metallic materials, the focus is to develop next-generation immiscible alloys by SLM.

Responsibilities:

- Selection of suitable immiscible systems for the SLM process
- Parameter optimization, microstructure, and property correlation in the solidified immiscible systems
- Careful tuning of local microstructures during the SLM processing to attain the defined combination of strength-toughness-ductility

Result
A deeper understanding of the processing of the immiscible systems and their family using SLM will be realized.

The applicants should fulfill the following requirements:

- Masters in Metallurgy / Materials Science or equivalent
- Experience in any / all of the following fields:
  - alloy design
  - powder metallurgy
  - additive manufacturing
  - thermodynamics
  - materials characterization
  - testing
- Knowledge of working with CALPHAD / Thermocalc (advantageous but not desirable)
- High level of scientific integrity, rigor, and excellence with regard to 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 a team
- Creative and innovation mindset
- Fluency in English (working knowledge of Estonian and / or Russian may be advantageous).

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