WGF
Wissenschaftliche Gesellschaft Fügetechnik e.V. im DVS

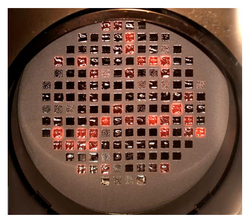
Lehrstuhl für Werkstofftechnik der Additiven Fertigung

Technische Universität München

Fields of Competence

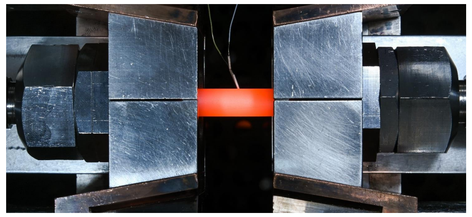
Materials Processing

- Additive Manufacturing (DED-Arc, DED-LB, PBF-EB)
- Arc and beam welding

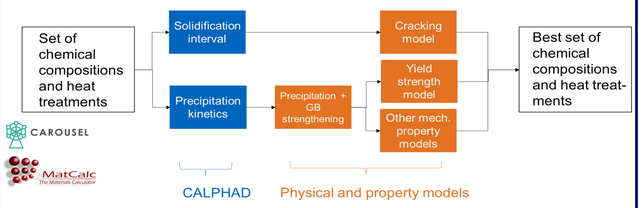
Materials Performance

- Advanced determination of material properties and in-service performance



Materials Computation

- Integrated Computational Materials Engineering (ICME)



Kontakt

Univ.-Prof. Dr. Peter Mayr
Lehrstuhl für Werkstofftechnik der Additiven Fertigung
Freisinger Landstrasse 52
85748 Garching
Tel.: +49 89 289 55340
E-Mail: peter.mayr@tum.de

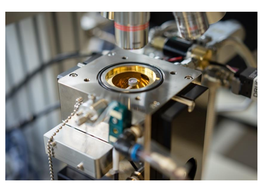
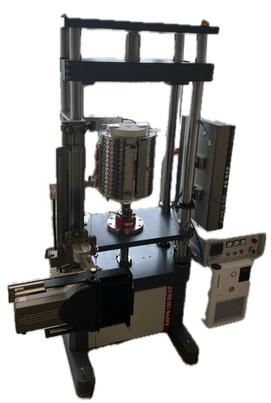
Equipment

Welding and AM

- PAW + GMAW power sources
- Multiple industrial robots + positioners
- TruLaser Cell 7020 + 6kW disk-laser
- Jeol JAM-5200 EBM system
- Amazemet Ultrasonic Powder Atomizer


Testing and Analysis

- Gleeble 3800-GTC system for thermo-physical simulation
- High-temperature confocal laser-scanning microscope + tension & compression unit
- Multiple optical microscopes
- ZwickRoell Kappa 100 SS-CF for tensile-, creep and fatigue testing
- QATM automatic micro hardness tester

Key Aspects of Research

Process-Structure-Property Relationships in AM

Motivation

- Determination of the influence of AM process characteristics, including the distinctive thermal cycles on the microstructure and performance of additively manufactured components.

Approach to solution

- Regulate the thermal cycle by implementing heating and/or cooling strategies to stabilize the process conditions

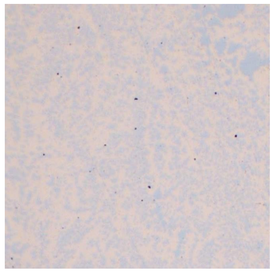
Multi-material Additive Manufacturing

Motivation

- Optimize the use of (super)alloys by restricting their application to critical areas of a component where their properties are essential, thereby reducing overall material costs.

Approach to solution

- Investigate the mechanism and interactions of powder mixing to assure precise transitions and gradients
- Overcome the process-related and microstructural challenges by implementing advanced process control and monitoring systems


MM-microstructure
(Cu + 316L)

Computational Materials Design

Motivation

- Develop high-performance materials optimized for AM through advanced computational methods, aimed at refining alloy compositions and heat treatment parameters to meet the specific requirements of advanced applications.

Approach to solution

- Utilize CALPHAD-based simulations and kinetic modeling to predict phase stability, precipitation behavior and strength
- Guide material design and propose optimized heat treatment cycles