



The Chair of Materials for Additive Manufacturing at the University of Wuppertal is now assigning a Master thesis:

★ Laser-Synthesized Nanoparticles for Copper-Based Composites in 3D Printing ★

Introduction

At the Chair of Materials Science and Additive Manufacturing, we combine laser processing, nanoparticle synthesis, and metal 3D printing to develop new material systems. Copper is known for its excellent thermal and electrical conductivity, while the incorporation of nanoparticles offers opportunities to tailor its microstructure and properties. Within the framework of this Master's thesis, silver (Ag) and yttrium-based (Y) nanoparticles will be synthesized using Laser Ablation in Liquids (LAL) and deposited onto copper powders, both individually and in combination. The aim is to optimize nanoparticle synthesis and deposition parameters to achieve a homogeneous distribution of nanoparticles on the copper powder surfaces. The resulting composite powders will then be processed using Laser Powder Bed Fusion (LPBF) to produce solid specimens and investigate the influence of nanoparticle additions on printability, microstructure, and resulting material properties.

1) Your role

- Synthesize silver and yttrium-based nanoparticles using the existing LAL setup.
- Prepare copper composite powders with individual and combined nanoparticle additions.
- Investigate and optimize nanoparticle incorporation and distribution within the copper powders.
- Conduct metal 3D printing experiments using the prepared composite materials.
- Characterize nanoparticles, composite powders, and printed specimens using techniques such as SEM, EDX, XRD, and other available characterization methods.
- Evaluate the influence of different nanoparticle additions on the microstructure, processability, and resulting material properties.

2) What we're looking for

- Background in materials science, nanoscience, mechanical engineering, or a related field.
- Interest in experimental laboratory work, material development, and data analysis.
- Good communication skills in English and a careful, reliable work style.
- Ideally, some prior knowledge of additive manufacturing, powder metallurgy, or laser-based processes.

3) What you'll gain

- Close guidance and supervision throughout the project.
- Access to modern laser facilities and advanced characterization equipment.
- Flexible working hours in a collaborative and supportive team.
- Freedom to explore and implement your own ideas, with results that contribute directly to ongoing additive manufacturing research.

Apply Now: Be part of our additive manufacturing research and explore how nanoparticles can shape future materials. We look forward to hearing from you.

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