

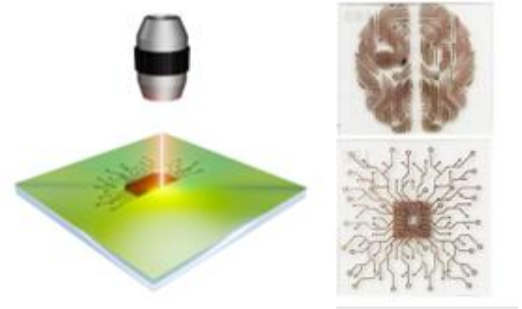
Master Thesis

High-Speed Laser Writing of Copper Micropatterns from DES-Based Inks

Are you passionate about laser technology, materials science, and green manufacturing?

The future of electronics manufacturing demands fast, flexible, and eco-friendly methods to create conductive microstructures on various substrates. Traditional lithography-based metallization processes are expensive, slow, and require vacuum systems.

In this master's thesis, you will explore an innovative single-step technique: Direct Laser Writing (DLW) of copper micro-contacts using DES-based inks. Deep Eutectic Solvents (DES) represent a new class of environmentally friendly and low-cost precursors, making them especially attractive for sustainable manufacturing.



This method enables fast metallization with excellent conductivity, avoiding post-processing like sintering. The work will focus on optimizing laser parameters, studying the effect of DES-based ink film thickness on structure quality, and fabricating demonstration devices such as flexible circuits or LED connections. You will gain experience in laser fabrication, material characterization, and contribute to applications in flexible electronics and sensors.

Task assignment:

- Preparation of homogeneous precursor films via spin-coating and thermal treatment.
- Optimization of laser parameters (pulse energy, scan speed, film thickness).
- Structural, chemical, and electrical characterization of microstructures using modern methods (SEM, XRD, etc.).
- Fabrication and testing of functional devices, such as LED circuits, using the laser-written copper patterns.

Contact:

Dr. Ilya Tumkin

Raum: ID 05/645

E-Mail: ilia.tumkin@ruhr-uni-bochum.de

**Die Masterarbeit kann auch auf
Deutsch verfasst werden.**