

Bachelor/Master Thesis

Electrohydrodynamic Precision Printing System for Patterning of Flexible and Stretchable Sensor Structures

We are looking for students who like to work interdisciplinary and intend to realize their bachelor or master thesis at the Professorship of Microsensors and Actuators in close cooperation with Heilbronn University of Applied Sciences. Therefore, the working environment would be partly located at Kuenzelsau Campus of Heilbronn University.

Topic

With regard to a continuing trend in transformation of planar and rigid sensors towards flexible, stretchable and conformable devices, particularly in the field of health monitoring applications, the development of emerging technological approaches in micro- and nanofabrication is of great importance. In this context, the so-called electrohydrodynamic (EHD) printing constitutes a novel non-contact and cost-efficient method which is based on an electric-field-induced fluid flow through a capillary nozzle for precise patterning of functional sensor structures. Contrary to established additive methods such as inkjet printing, EHD printing has the potential to overcome previous limitations in writing resolution significantly. However, EHD printing is a complex process and strongly influenced by a conglomerate of material parameters, process-specific factors and environmental aspects.

Within this thesis, you will expand and optimize an existing setup of an EHD printing system on laboratory scale for patterning of microscaled conductive sensor structures on stretchable substrates like thermoplastic polyurethane (TPU) to obtain an automated system which allows a precise and reproducible printing. Moreover, you will implement systematic studies to investigate the influence of affecting parameters such as the flow rate, working distance or the applied electric potential.

Work Packages

- Detailed literature research for thorough understanding of physical interrelations
- Familiarization with the existing printing setup
- Integration of new system components and commissioning
- Data collection and evaluation
- Written elaboration and presentation of the results

Requirements

Background in one of the following fields:

- Electrical or Mechanical Engineering
- Physics
- Materials Science
- Related fields of study

Schedule

The thesis can be started immediately.

Contact

Nadine Philippin, M.Sc.

Doctoral Candidate

Phone: +49 7940 1306-307

Email: nadine.philippin@hs-heilbronn.de

