Karlsruhe Institute of Technology

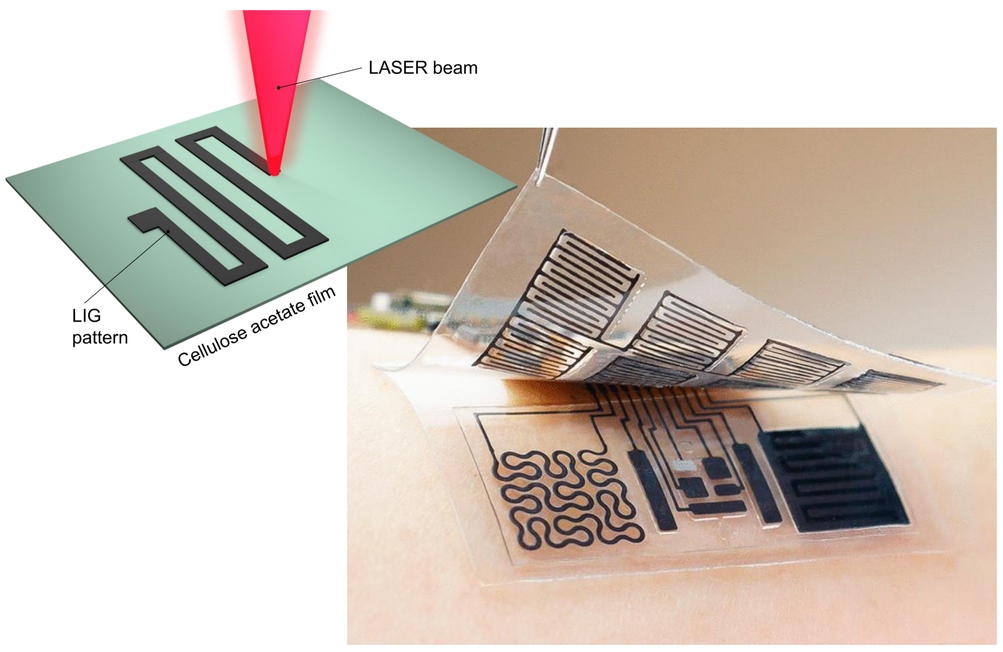
Institute for Automation and Applied Informatics (IAI)

Master Thesis

Laser Induced Graphene-based Eco-friendly Sensors

Wearable technologies and electronic skins are revolutionizing healthcare, soft-robotics, and human-machine interaction, driving the need for flexible and sustainable electronics. Laser-induced graphene (LIG) has emerged as a promising material due to its simple fabrication process via laser scribing on carbon-based materials. Recent advancements enable LIG production on eco-friendly substrates like paper, wood, and textiles, reducing environmental impact while maintaining graphene-like electrical conductive properties. Thereby these biodegradable materials can also be upcycled into LIG-based electronic devices, supporting a circular economy and advancing sustainable electronics.

This project aims to develop LIG-based physical sensors, like temperature sensors, by laser scribing on eco-friendly cellulose acetate substrates. The objectives focus on optimizing laser parameters such as power, speed, and focus distance to enhance electrical properties and pattern quality, ultimately realizing eco-friendly wearable technologies.



LIG-based Sensors [1]

LASER System [2]

Your Tasks:

- Conduct literature research to familiarize with state-of-the-art LIG research.
- Experiment with laser scribing to create conductive patterns on eco-friendly substrates.
- Optimize laser parameters for electrical performance and pattern fidelity.
- Design, fabricate, and characterize the LIG-based physical sensors using the developed technique.

This sounds exciting? Then get in touch!

We are happy to answer any questions you might have. If you are interested, please send us your application package via email (Nitheesh.Nair@kit.edu) including your current transcript of records and academic CV

[1] Yu Song *et al*., Sci. Adv., 9, eadi6492 (2023).
[2] ACSYS Piranha (https://acsyslaser.com/)

Advisors:
Dr. Nitheesh Mukundan Nair
Prof. Dr. Gerardo Hernandez-Sosa

Research Field:
Eco-friendly Electronics

Work Place:
Campus Nord, IAI (Gebäude 445)
Practical work in Laboratory

Education, Experience, and Skills:

- Interest for Research
- Background in Physics, Material Science, Electrical or Mechanical Engineering

Language(s):
English

Starting date:
As soon as possible

For more information, please contact:
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