Technische Universität Chemnitz
Professur für Mess- und Sensortechnik
Prof. Dr.-Ing. O. Kanoun

Master Research Project

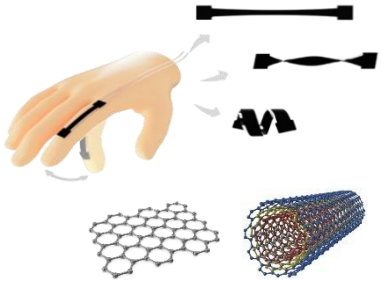
Enhanced Sensitivity and Temperature Stability of Epoxy-Based Strain Sensors with Hybrid Nanofillers

Project Description:

This project aims to significantly improve epoxy-based flexible strain sensors' sensitivity and temperature-independent performance by incorporating hybrid nanofillers composed of carbon nanotubes (CNTs) and graphene. Traditional metallic strain gauges often exhibit flexibility, temperature sensitivity, and durability limitations under harsh conditions. By leveraging the synergistic properties of CNTs and graphene, this research seeks to overcome these limitations, achieving enhanced sensitivity, uniform dispersion, and consistent sensor performance across varying temperatures.

Key objectives include:

- Determine the optimal ratio of CNTs and graphene to maximize sensor sensitivity and temperature stability.
- Develop efficient dispersion methods for uniform nanofiller distribution within the epoxy matrix.
- Evaluate sensor performance comprehensively, focusing on gauge factor, mechanical integrity, and thermal stability.



Tasks:

- Conduct a focused literature review on epoxy-based hybrid nanofiller strain sensors.
- Prepare and characterize CNT/graphene-epoxy composites with varying filler ratios.
- Fabricate and rigorously test sensors under mechanical, electrical, and thermal conditions.
- Optimize sensor formulations based on experimental results and iterative improvements.
- Document and analyze experimental findings systematically in reports and presentations.

Requirements:

- Engineering or materials science background.
- Analytical skills and ability to independently conduct research.
- Flexibility and Adaptability

Supervisor:

Ahmed Attaoui Chair of Measurements and Sensors Technology Reichenhainersstr. 70, Weinholdbau, C25.283 (alt: 2/W283) Email: ahmed.attaoui@etit.tu-chemnitz.de	Amoog Lakshmanan Chair of Measurements and Sensors Technology Reichenhainer Straße 70, Weinhold-Bau, C25.218 (alt: 2/W218) amoog.lakshmanan@etit.tu-chemnitz.de