Compound Semiconductor Technology | RWTH AACHEN UNIVERSITY

Open (Project +) Master Thesis

at Compound Semiconductor Technology (CST)

Fabrication of novel electronic devices based on 2D materials

Research activities at CST include state-of-the-art (wafer-scale) metal-organic chemical vapor deposition (MOCVD) of 2D materials and investigation of novel electronic 2D devices. Our special focus is on transition metal dichalcogenides (TMDC), i.e., MoS_2 or WSe_2. In the monolayer limit, 2D materials are single molecular sheets (1L) with a thickness of just 0.3-0.6 nm and leading candidates for the next generation of CPU (field-effect transistors, FET) and computing-in-memory (memristors) technologies. The aim of this work is to investigate novel device architectures based on 2D materials: FET and/or memristors.

Your task

In order to fabricate these devices, you will be first introduced to different nanofabrication technologies available at ZMNT (Campus Melaten): photolithography, electron beam evaporation, reactive ion etching (RIE), wet/dry transfer of 2D materials. You will also learn to perform electrical measurements, atomic force microscopy, Raman spectroscopy, scanning electron microscopy and others.

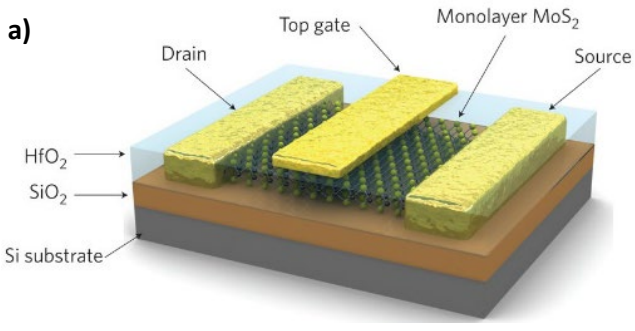
Your project/master task will be to optimize a specific aspect of either FET or memristor devices. For example, investigation of different contact (electrode) metals for FET (memristor) devices. The exact topic will be determined jointly by you and the supervisor.

Your profile:

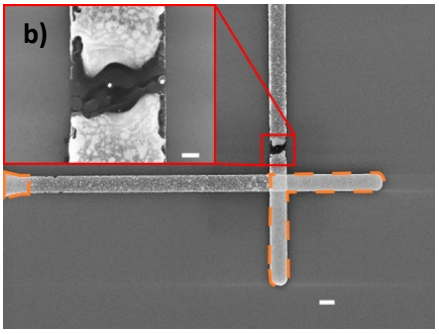
- Master student in Electrical Engineering, Physics, Material Science with good study performance
- First experimental and/or theoretical knowledge in the field of semiconductors
- Motivated and independent working style; readiness to work in the cleanroom
- Fluent in German and/or English language

What we offer:

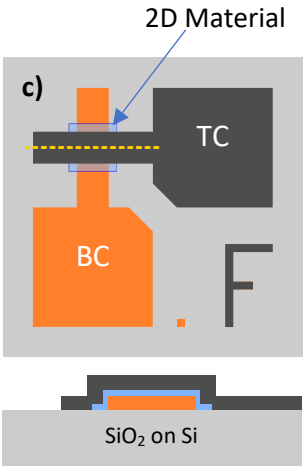
- Fascinating work in a highly relevant field with contacts to industry and academia
- Excellent supervision with regular feedback
- Hands-on experience with variety of fabrication and evaluation techniques
- Motivated and friendly working environment in a multi-national team
- Introduction and preparation can be combined with a student assistant position at CST



a) Schematic representation of a MoS_2-based field-effect transistor. Radisavljevic, B., Radenovic, A., Brivio, J. et al. Single-layer MoS2 transistors. Nature Nanotech 6, 147–150 (2011)



b) Top-view SEM image of a cross-point memristor structure damaged after application of excessive current.



c) Schematic representation of a cross-point memristor structure.

Thinking the Future
Zukunft denken

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