TECHNISCHE UNIVERSITÄT WIEN

Institut für Festkörperelektronik

Diploma/Master Thesis

Title: **Device Integration and Electrical Characterization of Hyperdoped Ge-based Nanowires**

Institute: Institute of Solid State Electronics

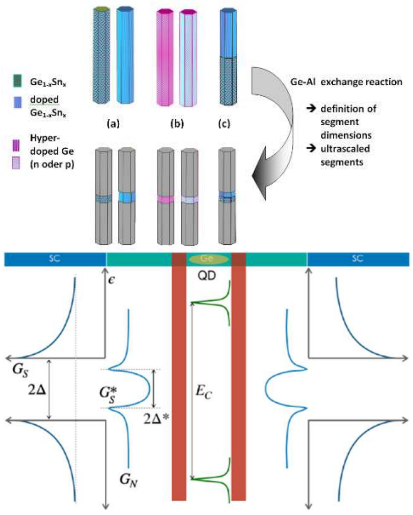
Supervisor: Prof. Walter M. Weber

Languages: German, English

Description:

This project aims for the device integration of non-trivial Ge-based nanomaterials by metal incorporation exceeding the thermodynamic limit and the investigation of associated changes in the materials properties. The targeted nanowire (NW) morphology allows for unconventionally high crystal growth rates during the crystal growth while retaining a single crystalline nature of the material. The NW synthesis will be carried out by our strategic partner Dr. Sven Barth from the Goethe-Universität Frankfurt.

The scope of this master thesis is to investigate the electrical transport of novel $Ge_{1-x}Sn_x$, $Ge_{1-x}Ga_x$ and $Ge_{1-x}As_x$ based ultra-scaled devices. In this respect, the physical properties enabling a new generation of tunable Ge-based devices by leveraging band structure modifications due to quantum confinement, field effect modulation and combination with superconductor contacts, will be explored. Low-temperature investigations with these new Ge-based materials will be compared with intrinsic Ge NWs above and below the Al and Nb-Al contacts metal- superconductor transition temperature and the influence of magnetic fields on superconductivity.



The duration of the master thesis is 6 months with a payment according to the FWF scholarship (438,05 €/month).

Scope of the work:

- Nanowire device integration in various transistor architectures (clean-room fabrication).
- Advanced electrical characterization at room-temperature and cryogenic-temperature to extract contact barrier heights, resistivity and gating effects. Thereto, the electrical transport phenomena in $Ge_{1-x}Sn_x$, $Ge_{1-x}Ga_x$ and $Ge_{1-x}As_x$ based ultra-scaled devices will be investigated with and without magnetic fields.

Who can apply:

The cross-disciplinary nature of the project invites students with background in microelectronics, physics, material science and chemical engineering.

Contact:

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