TECHNISCHE UNIVERSITÄT WIEN

Institut für Festkörperelektronik

Diploma/Master Thesis

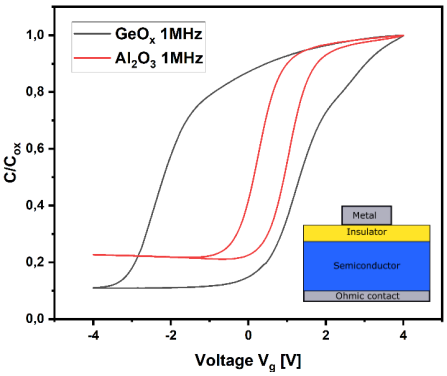
Title: **Passivation of Ge Surfaces for Next-Generation Nanodevices**

Institute: Institute of Solid State Electronics

Supervisor: Prof. Walter M. Weber

Languages: German, English

Description:



With a high and almost symmetric electron and hole mobility, Ge is considered to be a key material extending device performances beyond the limits imposed by miniaturization. Nevertheless, the deleterious effects of charge trapping are still a severe limiting factor for applications of Ge-based nanoscale devices. In this respect, one major problem concerning the application of Ge based devices is the influence of the Ge/GeOx and Ge/high-k interface, as they give rise to a high density of electronic defects due to broken bonds. This severely influences the electrical characteristic due to a complex charge carrier trapping and de-trapping dynamics and deteriorates device parameters such as the sub-threshold slope and leads to a compromised carrier channel mobility for MOSFETs. Therefore, it is an important task to properly clean the Ge surface and find an interface oxide/nitride between the Ge-surface and a dielectric material with a low interface trap density. The scope of the master thesis is the fabrication of metal-oxide-semiconductor capacitors (MOSCAPs) with different dielectric layers and the electrical characterization of the fabricated devices including I/V and C-V measurements.
The duration of the master thesis is 6 months with a payment according to the FWF scholarship (438,05 €/month).

Scope of the work:

- Clean-room fabrication of MOSCAPs (plasma ALD, UHV annealing, lithography, electron-beam evaporation, sputter deposition, rapid thermal annealing).
- Electrical characterization (I/V measurements, C/V measurements to characterize leakage currants and the capacitance of the fabricated MOSCAP structures.

Who can apply:

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

Contact:

Prof. Walter M. Weber
Institute of Solid State Electronics, TU Wien
Email: walter.weber@tuwien.ac.at

Dr. Masiar Sistani
Institute of Solid State Electronics, TU Wien
Email: masiar.sistani@tuwien.ac.at