

Diploma/Master Thesis

Title: Germanium based Reconfigurable Transistors and Circuits

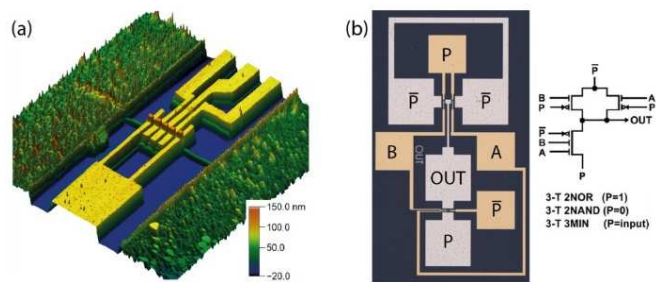
Institute: Institute of Solid State Electronics

Supervisor: Dr. Masiar Sistani / Prof. Walter M. Weber

Languages: German, English

Description:

The “Emerging Nanoelectronics Devices Group” of Prof. Weber has a strong experience in the fabrication of Ge reconfigurable field-effect transistors (RFETs) based on monolithic metal-semiconductor junctions. RFETs enable the runtime switching between n-type and p-type MOSFET operation in a single device. The Ge channel enables higher drive currents, lower power consumption and improved switching speeds. Applying the concept of reconfiguration to the circuit level allows analog and digital gates with multiple functionality.



(a) Atomic force microscope image of an in-house built multi-gate RFET, resembling a wired-AND with three inputs. (b) Microscope image and schematic of a reconfigurable logic cell, switchable between NAND and NOR operation.

Scope of the work:

- Clean-room fabrication of SiGe and Ge RFETs (evaporation, sputter deposition, laser lithography,...)
- Realization of analog and digital circuits, such as current mirrors, differential amplifiers or reconfigurable NAND/NOR gates and XOR based full-adders, exploiting the advantages of multi-gate transistor architectures, offering additional logical inputs.
- Temperature dependent electrical characterization (I/V-, C/V and Hall-measurements)

Who can apply:

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

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