TECHNISCHE UNIVERSITÄT WIEN

fke Institut für Festkörperelektronik

Diploma/Master Thesis

Title: **Investigation of the Transport Properties of Ultra-Thin Monocrystalline Al Nanosheets**

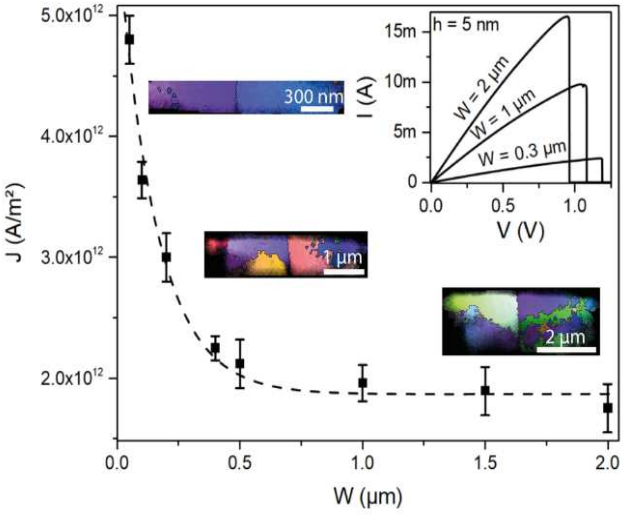
Institute: Institute of Solid State Electronics

Supervisor: Prof. Walter M. Weber

Languages: German, English

Description:

Investigating the transport properties of ultra-thin monocrystalline Al nanosheets is highly interesting to explore electrical transport phenomena such as ballistic conduction. Moreover, monocrystalline metals bear enormous potential to reduce electromigration and thus are highly anticipated for contacts in next-generation monolithic metal-semiconductor-metal heterostructure devices. This is related to the crystalline nature of these devices and their maximum current density before failure, which correlates with their sheet height. Thinner Al nanosheets are tolerating significantly higher current densities due to efficient heat dissipation and the reduced lattice heating in structures smaller than the electron-phonon scattering path. In this respect, the main objective of this master thesis is to synthetize ultra-thin monocrystalline Al nanosheets and systematically characterize their electronic properties at room- and cryogenic temperatures down 4 K.



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

Scope of the work:

- Synthesis of ultra-thin (< 10 nm) Al nanosheets (clean-room fabrication, lithography, electron-beam evaporation, sputter deposition, rapid thermal annealing).
- Electrical characterization at room- and cryogenic-temperature to extract the resistivity and current densities.

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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