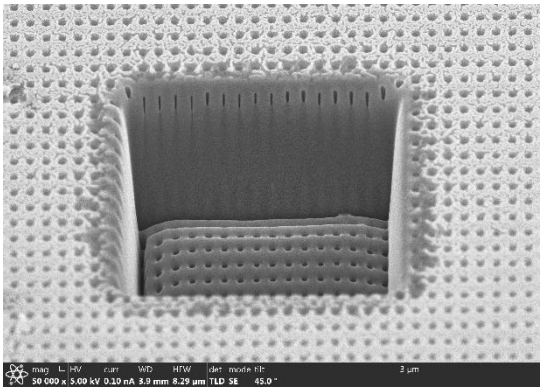
Institute of Solid-State Electronics

PhD Position – 3D FIB Simulation



Rectangular box milled into a semi-processed vertical NAND memory

funded by a large semiconductor company.

Objective:
With the trend towards 3D integration in semiconductor technology, metrology of buried devices requires the removal of an increasing amount of material. Industry has responded to this need by the commercialization of **Xe plasma focused ion beam** (FIB) microscopy tools. Compared to Ga ions used in conventional FIBs, Xe beams provide higher currents and, therefore, higher milling speeds, but cause more disorder in the target. The purpose of this project is to develop a **3D simulation tool** capable of predicting desired and unwanted topography and compositional changes to the samples. The tool will couple state-of-the-art Monte Carlo simulation of ion-target interaction with continuum simulation of stress relaxation, diffusion, and heat transport. Challenges include quantitative modeling of the various physical mechanisms, dealing with statistical fluctuations and reducing numerical artifacts in the stress relaxation module, and the optimization of simulation efficiency.

Tasks:

- Develop the **simulation software**, based on an already developed (in-house) Monte Carlo framework (see https://fke.tuwien.ac.at/forschung/process_simulation/) and an available proof-of-concept model for 2D stress relaxation via radiation induced viscous flow.
- **Model development and calibration** using data from the literature.
- Planning and performing **experiments** and/or collaborating with experimentalists for further model refinement and verification.

What we offer:

- Collaborating with a large **semiconductor company**.
- Networking and experimental access within the institute, TU Wien, and the EU COST project FIT4NANO, and with the industry partner.
- Sponsored visits to **international partners** and **conferences**.
- Working in the center of **Vienna** (near Karlsplatz) with excellent connection to public transport.
- Salary according to FWF rules (gross monthly salary of **EUR 2.300,30**, 14x per year for 30 hours/week; upgrade to 40 hours/week is possible).

What we expect:

- High motivation for doing research.
- MSc. in Computational Science and Engineering, or in a related field (Physics, Materials Science, Electrical Engineering, Applied Mathematics) with a background in numerical simulation.
- Programming skills preferably in C/C++, Fortran, and/or Python. Experience with parallelization is a bonus.
- Interest in performing experiments and/or collaborating with experimentalists (background in experimentation is a bonus but not a mandatory requirement).

Start date: immediately; we aim at filling this position no later than **September 2022**.

Contact: Please send your application including a short motivation letter and your CV to

Ao. Prof. Dr. Gerhard Hobler
Institute of Solid-State Electronics, TU Wien
gerhard.hobler@tuwien.ac.at