

Technology Computer-Aided Design of microscopic electrical heaters

The group of Prof. Salinga at the Institute of Materials Physics is researching novel materials for neuromorphic computers. In particular, phase change materials (PCMs) are promising candidates for non-volatile memory elements due to their ability to be switched between crystalline and amorphous states with different properties.

Such memory elements can be used for so-called in-memory computing, where - in contrast to the von Neumann computing architecture - calculations and memory are not separated. This efficient way of computing can be performed with electronic signals, made possible by the contrast in electrical resistance of crystalline and amorphous states of PCMs. Equally excitingly, their contrast in refractive index enables their use for photonic in-memory computing.

Here, a thin (10 nm) pad of PCM is deposited on a photonic waveguide made of silicon or silicon nitride. The transmission through the waveguide is high (low) when the PCM is amorphous (crystalline). Such pads can be switched by high-intensity optical pulses or a microscopic electrical heater. We investigate electrical heaters based on (1) pin junctions and (2) nanocrystalline graphite. It is helpful to perform finite element simulations of these heaters in order to better understand their behavior and find suitable device parameters.

Therefore, our group is looking for highly motivated and committed students, who help to build, run and analyse such simulations. We offer a position as a

Student assistant (5-10h/week).

We expect...

- interest in device physics
- interest in finite element simulations
- personal initiative and high motivation

Your benefits

- Acquisition of skills in state-of-the-art Technology Computer-Aided Design
<https://www.synopsys.com/silicon/tcad.html>
- Acquisition of knowledge about applications of novel devices in computing and the relationship between materials physics and device behavior
- Support from experienced staff from the working group
- Collaboration in a young, dynamic team

Have we attracted your interest?

Then contact Prof. Salinga (martin.salinga@uni-muenster.de).