

## PhD Student in Integrated Photonics of Nanolasers

fixed-term (3+ years / 13 TV-L) starting 2022

The **Semiconductor Quantum Nanomaterials Group** at the Walter Schottky Institute (WSI), Technical University of Munich (TUM) is looking for a doctoral student (m/f/d) in the field of integrated photonics of semiconductor-based nanolasers. The position is for a limited period of 3 years with possible extensions, and the candidate is expected to develop and explore photonic functionalities of novel III-V nanowire-based lasers on Si integrated photonic circuits.

### Project background

Recent technological advances in the physics and engineering of semiconductor nanostructures offer the promise of novel on-chip integrated photonic devices. With heterogeneous integration possibilities of nanoscale lasers, the full spectrum of low-loss Si-based photonic hardware could become accessible to provide energy-efficient on-chip optical links with low power consumption, large bandwidth and added functionalities. The holy grail for realizing such future on-chip optical links lies in the realization of high-performance, monolithically integrated nanolaser sources on silicon-on-insulator (SOI) nanophotonic circuits.

### Job description

This PhD project aims to develop miniature vertical-cavity nanolasers in the form of III-V nanowires integrated on SOI nanophotonic circuits. This involves the design, simulation, fabrication as well as characterization using the extensive research capabilities and methods available in our group at the Walter Schottky Institute and Center for Nanotechnology and Nanomaterials. Key tasks aim at the monolithic, site-selective growth of III-V nanowire lasers onto lithographically designed SOI-based waveguides and resonators, the numerical simulation and optical characterization of photonic properties using custom-built setups, and the development of integrated photonic devices for telecom-band (1.3-1.55  $\mu\text{m}$ ) applications. The scope of this project is at the interface of semiconductor physics, photonics, materials science and electronic device engineering, where you are embedded in a multidisciplinary team.

### Candidate profile:

Candidates are expected to hold a M.Sc. degree in physics, electrical engineering, materials science or similar with outstanding academic record and should possess exceptional motivation and creativity combined with very good communications skills and proficiency in English (oral and written). A strong background in optics and photonics of semiconductor-based nanostructures both experimentally and theoretically is an advantage. Knowledge of advanced optical spectroscopy, state-of-the-art nanofabrication and electro-optical simulation is considered an asset. Hiring will start immediately (01/2022).

Interested applicants should submit their application including cover letter (motivation), CV, list of 3 references and relevant documentation (transcripts, certificates) to the PI of the project by **Email: [Gregor.KoblmueLLer@wsi.tum.de](mailto:Gregor.KoblmueLLer@wsi.tum.de)**  
PD Dr. Gregor Koblmüller, Walter Schottky Institut, TUM, [www.wsi.tum.de](http://www.wsi.tum.de)

