

PhD Student in Advanced Nanothermoelectrics

fixed-term (3+ years / TV-L E13) 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 nano-thermoelectrics based on advanced semiconductor nanostructures. The position is for a limited period of 3 years with possible extensions, and the candidate is expected to develop new nanoelectronic devices to explore enhanced thermoelectric performance via quantum effects.

Project background

Low-dimensional semiconductor nanostructures have emerged as promising materials for enhanced thermoelectric energy conversion, due to a unique combination of modified electronic properties and size effects, that overcome current limitations of bulk semiconductors. Especially, one-dimensional (1D) semiconductors are predicted to offer increased thermopower by exploiting quantized charge carrier conduction and pronounced phonon scattering processes. Development of suitable 1D-semiconductor heterostructures that combine these beneficial effects in an experimental setting are still to be demonstrated in this emerging research field.

Job description

This PhD project aims to develop novel core-shell type 1D-semiconductor heterostructures for advanced nano-thermoelectric device fabrication and characterization. Using 1D-systems with high carrier mobility and tailored phonon spectra, the goal is to combine heat and carrier transport spectroscopy in regimes of quantum transport to elaborate thermoelectric performance advancements via nano-fabricated device structures. Key roles will thereby focus on design and clean-room fabrication of nanoelectronic devices, their electrical and thermoelectric characterization in custom-built low-noise, temperature-dependent transport setups and correlated optical spectroscopy techniques, all available at the Walter Schottky Institute and the Center for Nanotechnologies and Nanomaterials. The project interfaces electronic device engineering, condensed matter physics and materials science in a unique interdisciplinary setting.

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 nanoelectronics and nanofabrication of semiconductor-based materials is an advantage. Knowledge of advanced transport spectroscopy, state-of-the-art cleanroom fabrication and simulation of carrier transport 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.Koblmueeller@wsi.tum.de**
PD Dr. Gregor Koblmüller, Walter Schottky Institut, TUM, www.wsi.tum.de

