Technical University of Munich (TUM)
Walter Schottky Institute & Department of Physics
Chair of Semiconductor Nanostructures & Quantum Systems

PhD Student in Atomically Thin 2D-Nitride Materials

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 emerging 2D-layered semiconductors for solid-state lighting and light harvesting applications. The position is for a limited period of 3 years with possible extensions, and is jointly co-supervised by the Multifunctional van-der-Waals Materials Group. The candidate is expected to develop new synthesis approaches for unexplored classes of 2D-materials and to perform in-depth structure-property investigations of optical and excitonic effects.

Project background

Group-III nitride materials are well known for their important roles in energy-efficient solid-state lighting, high-power electronics and photovoltaic/-catalytic energy conversion. Fascinating new properties of these materials were recently proposed in the limit of only few atomic layers, where strong quantum confinement, reduced carrier screening, and excitonic effects come into play. With giant absorption properties, huge tunability of exciton binding energies, and carrier lifetimes, the atomically thin nitrides could offer intriguing performance in light-emitting & -harvesting technologies - yet experimental demonstrations are completely missing.

Job description

The aim of this PhD project is to explore the synthesis of ultrapure 2D-layered group-III nitrides via far-from-thermal equilibrium methods, and to interrogate their novel electronic and optical properties. A sophisticated molecular beam epitaxy (MBE) / in-situ analytics cluster reactor, now established in the laboratories of the Walter Schottky Institute, will allow extensive synthesis experiments, including real-time structure observations, and the in-situ characterization of optical and vibrational properties. Besides synthesis-structure-property correlations, other key goals will involve advanced light scattering and time-resolved photoluminescence spectroscopy methods to study exciton and carrier dynamics. The experimental work will be supported by a computational materials theory group via the Cluster of Excellence e-conversion.

Candidate profile:

Candidates are expected to hold a M.Sc. degree in physics, 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 semiconductor-based materials synthesis and processing is an advantage. Knowledge in structure-property studies, state-of-the-art nanoanalytical methods, and optical spectroscopy 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 or co-PI of the project by **Email: Gregor.Koblmueller@wsi.tum.de** or **Eugenio.Zallo@wsi.tum.de**
PD Dr. Gregor Koblmüller / Dr. Eugenio Zallo, Walter Schottky Institut, TUM, www.wsi.tum.de