

PhD Position (67% TV-L E13) for Scanning Tunneling Microscopy and Reactivity Investigations of Cluster Catalysts

The Functional Nanomaterials group at the Technical University of Munich is engaged in cutting-edge research on chemical and structural surface dynamics. With our state-of-the-art microscopy and spectroscopy techniques, we obtain unprecedented insights into small oxide-supported metal clusters. We are pleased to announce a PhD position within our DFG Collaborative Research Center TrackAct, in collaboration with the Karlsruhe Institute of Technology.

Project Description

Size-dependent structural and electronic effects make sub-nm clusters extremely interesting for highly selective and sustainable catalysis in emission control. We investigate the sintering and chemical dynamics of model catalysts by depositing clusters produced with atomic size selection onto single crystalline oxide supports and follow their evolution in reactive gas environments with video-rate scanning tunneling microscopy (STM), both in ultra-high vacuum (UHV) and under near-ambient pressures (NAP). We thus obtain unique insights into the elusive structural dynamics of a working catalysts. X-ray photoelectron spectroscopy [(NAP-)XPS] provides complementary information on chemical composition and oxidation state, while a Sniffer reactivity setup determines catalyst activity.

After a comprehensive induction, you will prepare the samples, perform and analyze STM, XPS and Sniffer experiments and maintain the UHV apparatus as well as measurement scripts. In addition, you will be involved in collaborative projects with KIT, e.g. comparing the activity of our models with powder catalysts, and occasionally join beam-times at international facilities. You will benefit from membership in the TUM Graduate School and an active international scientific network within TrackAct. You will participate in meetings with international collaborators, present your results at national and international conferences, and write publications for internationally renowned journals.

Required Qualifications

You should have an above-average degree in chemistry, physics, or a related field and be highly motivated to work on sophisticated physicochemical experimental setups. You show a strong interest in scientific questions within physical chemistry, enjoy solving technical challenges and bring along programming skills for data acquisition, processing and analysis (Python, Matlab, LabVIEW,...). After a training period, you shall be able to use and maintain a state-of-the-art ultra-high vacuum (UHV) instrument and contribute your own ideas to the project. We are looking for a team player with good communication skills in English, who collaborates closely with other researchers while also working independently. Experience in STM, UHV technology, surface chemistry and synchrotron techniques is advantageous.

Our offer

We offer a stimulating research environment in a multidisciplinary laboratory at one of Europe's highest-ranked universities, with targeted training and individual supervision. The position is available immediately and fully funded, based on the Collective Agreement for the Civil Service of the Länder (TV-L). We are committed to equal opportunities and value diversity. We therefore welcome applications from all individuals who feel addressed. TUM strives to raise the proportion of women in its workforce and encourages qualified women to apply. On-campus childcare and flexible working hours are available. The position is suitable for applicants with disabilities, who will be given preference if their suitability, qualifications and professional performance are otherwise substantially equal.

Application

Please send your CV, letter of motivation (max. 1 page) and two letters of reference to Prof. Dr. Barbara A. J. Lechner (recruitment.lechner@tum.de). Only complete applications will receive full consideration. The position is open until 31/03/2024 or until filled. Further information on our research group is available at www.ch.nat.tum.de/nanomaterials.