Technical University of Munich
TUM School of Natural Sciences
Department of Chemistry
Chair of Physical Chemistry

Doctoral/PhD Position: Atom-Scale Dynamics of Electrocatalysts by Fast Scanning Tunneling Microscopy

The Chair of Physical Chemistry at the Technical University of Munich (TUM) investigates chemical and structural surface dynamics of supported atoms and size-selected clusters. Using **cutting-edge microscopy and spectroscopy**, we obtain unprecedented insights into their **atom-scale catalytic activity**.
We invite applications for a **DFG-funded PhD position**.

Project
Current catalytic challenges – including water splitting, ammonia synthesis, and carbon dioxide reduction – require highly selective and sustainable catalysts. We investigate these reactions at the **solid–liquid interface** on **single-atom catalysts and supported clusters** derived from ligand-stabilized, atomically precise precursors. Using our **unique *fast* electrochemical scanning tunneling microscope (ECSTM)**, we resolve the structural dynamics of working catalysts ***in situ*** **at atomic resolution**, with **up to video-rate time resolution under electrochemical potential control**. These local measurements are complemented by electrochemical studies with our rotating disk electrode (RDE) setup and additional characterization methods such as XPS and Raman spectroscopy.
After an initial training period, the successful candidate will:

- prepare supported nanocatalysts and perform advanced ECSTM and RDE in situ experiments
- develop measurement protocols and analyze data
- contribute to the maintenance and development of the experimental setups
- participate in collaborative research projects.

The candidate will join the **TUM Graduate School** and collaborate within the **e-conversion Cluster of Excellence**. The project includes opportunities to present results at international conferences and publish in leading journals.

Requirements
You hold an **above-average Master's degree** in Chemistry, Physics, or a related field and have basic knowledge of electrochemistry. You are strongly interested in scientific questions in physical chemistry and enjoy experimental work in a chemical laboratory with advanced, in-house-developed instrumentation. Programming skills for data acquisition and analysis (e.g., **Python or LabVIEW**) are highly desirable. After a training period, you will operate and maintain the fast ECSTM system and contribute your own ideas to the project. We are looking for a team-oriented and motivated researcher with strong English communication skills who can work both independently and collaboratively. Experience with **scanning tunneling microscopy or electrochemical experimentation** is advantageous.

What we offer
We offer a stimulating research environment in a **multidisciplinary laboratory at one of Europe's leading universities**, with dedicated training and close scientific supervision. The position is available **immediately** and funded according to the Collective Agreement for the Civil Service of the Länder (67% TV-L E13). TUM is committed to **equal opportunities and diversity** and welcomes applications from all qualified candidates. TUM aims to increase the proportion of women in its workforce and therefore strongly encourages qualified women to apply. Flexible working hours and on-campus childcare are available. Applicants with disabilities will be given preference if equally qualified.

Application
Please send your **CV, a motivation letter** (max. 1 page), and **the names of two references** to apl. Prof. Dr. Friedrich Esch (recruitment.pc@ch.tum.de). Only complete applications will receive full consideration. The position is open **until 30.06.2026 or until filled**. Further information about our research group is available at: www.ch.nat.tum.de/pc.