SFB 1249 *N*-HETEROPOLYZYKLEN ALS FUNKTIONSMATERIALIEN

UNIVERSITÄT HEIDELBERG ZUKUNFT SEIT 1386

SFB 1249 – Kolloquium

07. Mai 2025

16:15 Uhr, Hörsaal West

Prof. Dr. Katharina Kaiser

(Universität Göttingen)

Single-molecule chemistry optoelectronics at the atomic scale

How do chemical reactions proceed on the atomic scale? How is energy converted within a single molecule, and how do structure and geometry influence molecular properties? These questions are central to advancing our understanding of molecular function and to tailoring materials for specific applications.

In this talk, I will present scanning probe microscopy (SPM) as a versatile tool to investigate such processes, focusing on high-resolution non-contact atomic force microscopy (ncAFM) and scanning tunneling microscopy (STM). Two examples will illustrate their capabilities:

First, using ncAFM to selectively trigger chemical reactions with single-bond precision and image the resulting structures. I will show how we synthesized and stabilized the purely *sp*-hybridized carbon allotrope cyclo[18]carbon on NaCl, and how high-resolution imaging and simulations revealed two possible ground-state structures.

Second, I will discuss STM-induced electroluminescence of single ZnPc molecules. Here, the tunnel current is used to drive the molecule into an excited state that then decays in a single-photon emission process. By accessing higher charged and excited states, we can tune the photon statistics and probe the underlying population dynamics.

Pretalk:

Gabriel Sauter

(B06 - Tegeder)

Nonlinear optical properties of open-shell systems