



Open position for LMU-CSC scholarship candidates 2027

Department/Institute: Chemistry

Subject area: Physical Chemistry

Name of supervisor: Prof. Philip Tinnefeld

Number of open position: 1

Project title: optical dynamic structural biology of DNA-protein interactions

Project description:

This PhD project will develop a new single-molecule platform for dynamic structural biology at graphene interfaces. Building on our recent work (1, 20), the project will exploit vertically oriented DNA molecules on graphene to study the structure and dynamics of protein–DNA complexes with nanometre spatial and millisecond-to-second temporal resolution.

The central concept is to use graphene energy transfer (GET) as a highly distance-sensitive reporter of molecular motion perpendicular to the graphene surface, complemented by pMINFLUX for precise lateral localization. By combining these orthogonal dimensions of information, the project aims to reconstruct conformational changes, binding geometries and dynamic interaction pathways of individual protein–DNA complexes in real time. The work will range from the development and quantitative calibration of the new imaging methodology to its application to biologically relevant protein–DNA interactions.

The PhD candidate will work at the interface of single-molecule biophysics, nanophotonics, DNA nanotechnology and advanced fluorescence microscopy. The project offers the opportunity both to establish a fundamentally new methodology and to use it to address mechanistic questions that are difficult to access with conventional structural biology - moving from static molecular structures toward a quantitative description of their dynamics and functional transitions.

1. A. M. Szalai *et al.*, *Nat Methods* **22**, 135-144 (2025).
2. F. Cole *et al.*, *Nature Photonics* **18**, 478-484 (2024).

Project time plan:

➤ Full Doctoral Study-Model: 48 months

Language requirements: English

Academic requirements:

Master's degree in physics, chemistry, biochemistry or similar with excellent performance

Contact information of supervisor:

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To applicants:

➤ please attach resume and research motivation letter