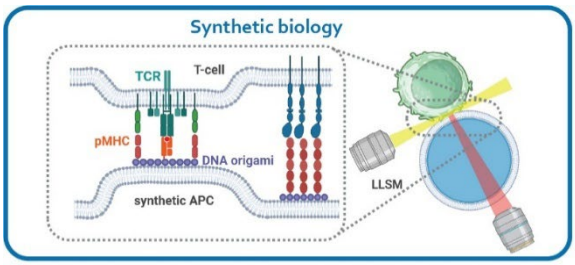
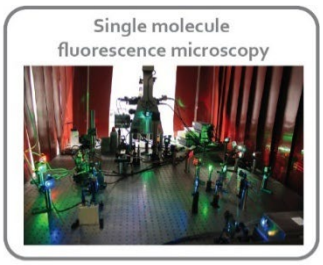
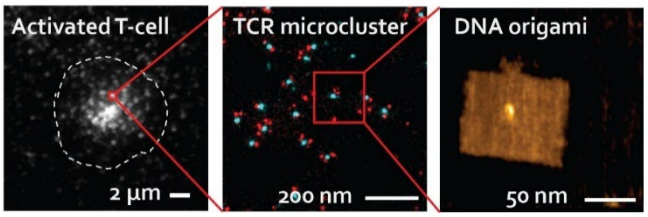
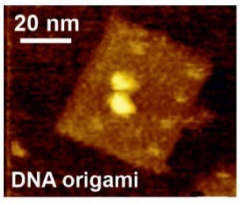
PhD/PostDoc Positions:

Designing Synthetic Antigen-Presenting Cells for T-cell Antigen Recognition









Recreating biological phenomena in model systems with defined components and properties has proven to be a powerful means for dissecting molecular mechanisms. Recent advances in fluorescence microscopy and DNA nanotechnology have made it possible to **reconstitute, observe and physically manipulate cellular processes down to the single molecule level.** We have recently developed a cell-responsive biomimetic interface based on laterally mobile **ligand-functionalized DNA origami platforms** that allows to manipulate the organization of signaling molecules in a live cell environment (https://doi.org/10.1021/acsnano.1c05411). Using this system to mimic an antigen-presenting cell (APC), we were able to determine the spatial requirements for ligand and receptor organization that control **T-cell activation** (https://doi.org/10.1073/pnas.2016857118).

In this project, we will **recreate the 3D nanoenvironment of T-cell antigen recognition** using this DNA origami-based biointerface and transplant this onto polymer microparticles to **create synthetic antigen-presenting cells** with cell-like mechanical properties. By combining this with state-of-the-art fluorescence microscopy (LLSM, lattice light sheet microscopy) we aim to **dissect the biochemical and physical parameters contributing to sensitized T-cell antigen recognition** and obtain a quantitative description of the underlying molecular mechanisms. The project is an interdisciplinary research effort at the interface of biophysics, immunology and DNA nanotechnology, requiring close collaboration with our synthetic polymer chemist partners in the Baudis lab.

Requirements

- Master's/PhD degree in (Bio)physics, (Bio)chemistry, Biomedical Engineering (or related)
- PhD position: Experience with **fluorescence microscopy, cell culture, Python**
- Postdoc position: **profound experience in single molecule fluorescence microscopy**, ideally LLSM
- Excellent written and verbal communication skills in English
- Personal skills: independence, creative thinking, systematic and structured work approach, hands-on mentality, team spirit

Contact

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Micro- and Nanostructured Biointerfaces Group
Application deadline: May 30th, 2025
PhD position (3 years) apply here: https://forms.gle/EbGHc7AE2PDSS1uK9
Postdoc position (2 years) apply here: https://forms.gle/tythgdBiygzMQodU7