



Building immunity from the bottom-up with synthetic cells

Dr. Oskar Staufer

INM Leibniz-Institut
für Neue Materialien

Friday, October 4, 2024

12:15 PM - CiQUS Seminar Room

Dr. Oskar Staufer

INM – Leibniz Institute for New Materials

www.stauferlab.com

Abstract

The immune system is carefully balanced between activation and suppression, a dynamic that determines health and disease outcomes. To gain control over this equilibrium and offer new ways to study it, we are developing innovative synthetic cell-based methods to regulate and examine immune responses. Using model membrane systems and in vitro reconstitution techniques inspired by bottom-up synthetic biology, we create controlled cellular environments that stimulate immune reactions in T cells and cancer cells.

This approach allows us to investigate how biophysical and biochemical signals direct cancer-immune interactions, with the goal of enhancing next-generation immunotherapies. In my talk, I will present two examples of synthetic cells designed to activate and suppress immune components. The first focuses on the bottom-up construction of synthetic lymph nodes, while the second involves the creation of synthetic immune cells to explore cancer-immune interactions.

Biosketch

Since 2023, Oskar Staufer has been leading the Immuno Materials group at the INM - Leibniz Institute for New Materials as an Emmy Noether Research Group Leader. He holds a PhD in Synthetic Biology and Biophysics from the Max Planck Institute for Medical Research and completed his postdoctoral training in Immunology at the University of Oxford. His research intersects synthetic biology, immunology, and biomaterials, focusing on advancing immunotherapy and enhancing the understanding of immune signaling.