

GRK 2516 Soft Matter Seminar

Nov. 24, 2022 at 2:30 p.m.
Minkowski Room, 05-119, Staudingerweg 7

Research seminar of the DFG Research Training Group GRK 2516 (<https://grk2516.uni-mainz.de>).

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Building a cell from the bottom-up: Spatiotemporal control in synthetic cells using light

Bottom-up synthetic biology aims to construct cell-like systems starting from molecular building blocks. These synthetic cells give insight into the molecular details and principles that give rise to cell function. Many functions in cells arise directly from the spatial and temporal regulation of cell-matrix and cell-cell interactions. In this talk, I will present strategies of how such spatiotemporal control over adhesions of synthetic and natural cells can be achieved with visible light and functions that arise from these. The photoswitchable adhesions allow us recapitulate cell migration, to self-assemble and self-sort cells into multicellular functional architectures with high precision, regulate their interactions with synthetic materials, program cell to cell communication and to study the underlying biology. Synthetic minimal cells, which reduce complexity and yet capture key features of natural cells, allow us to quantify and correlate cell behavior with molecular information. Further, complementary approaches pursued with synthetic minimal cells as well as bacterial and mammalian cells allow translating concepts between different systems and integration into hybrid structures. Overall, our work on one hand provides insight into underlying design principles of life and on the other hand engineer new synthetic cell biology.