CFEL SCIENCE

SEMINAR

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CFEL – Building 99, seminar room IV (1st floor)

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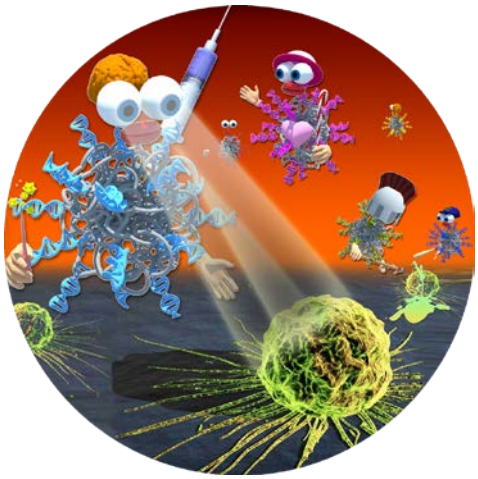
Nanostructures from DNA and Supercharged Polypeptides for Biomedicine and Beyond



DNA is a superb material for the fabrication of nanostructures. One fabrication procedure relies on amphiphilic oligonucleotides that self-assemble into DNA nanoparticles and can be conveniently functionalized by hybridization.[1] When equipped with targeting units by Watson-Crick base pairing and incorporation of a hydrophobic drug, they kill cancer cells in vitro.[2] Similarly, they were loaded with antibiotics by hybridizing them with drug-binding aptamers. These DNA based carriers adhere to the ocular surface and were successfully employed for ophthalmic drug delivery in vivo. Beside micelle systems, our group incorporated DNA amphiphiles into the phospholipid bilayer of vesicles. DNA specific aggregation and payload release from these nanocontainers were demonstrated.[3] In addition to potential therapeutic use, DNA amphiphiles were utilized as probes in Si-nanowire field effect transistors[4] and when oligonucleotides are complexed with cationic surfactants they form the first thermotropic biomacromolecular liquid crystals.[5] Complexes of nucleic acids with natural products act as supramolecular protective groups and enable the highly chemo- and regioselective derivatization of complex drug molecules in a single synthetic step.[6] Besides DNA hybrid materials, our group developed supercharged polypeptides that represent unfolded protein polyanions and polycations with high charge density. Besides forming thermotropic liquid crystals,[7] they were used to stabilize saliva conditioning films to improve biolubrication in patients with Sjögren's syndrome.[8]

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Hosts: Henry Chapman + Carolin Seuring / Coherent Imaging Division