Nanobiotechnology

Lipophilic Oligonucleotides for Design of Multifunctional Lipid vesicle Coated Layer-by-Layer Particles

(BA, MA thesis)

Because of DNA sequence-specific recognition properties, the reversibility of the hybridization and facility of manipulation, e.g. with restriction enzymes, it is used as a tool for the formation of nanoassemblies. We are using lipophilic oligonucleotides that are anchored in lipid vesicles to built layers of the vesicles on Layer-by-layer (LbL) particles carrying complementary oligonucleotides. The vesicles are intact on the surface of the particles. Fusion of their membranes and a release of contents can be triggered. This assembly could serve as a nanoreactor or a carrier for reactants/chemicals, which can be set free at a destined time and place. To characterize the system and develop applications further investigations are required:

- Quantification of vesicle binding
- Characterization of melting of DNA oligonucleotides that are involved in vesicle-particle and vesicle-vesicle binding
- Characterization of membrane fusion
- Study of kinetics of content release

The work on includes the fabrication of lipid vesicles, coating of LbL particles with the vesicles and analysis of the particles using fluorescence spectroscopy, fluorescence lifetime and fluorescence microscopy measurements. It is appropriate for students of biophysics, biology, biochemistry or physical chemistry.


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