Donnerstag 09. Februar 2017
16:15 Uhr, Hörsaal H3

Hierarchically Structured Polymer Colloids & Nanomaterials: Combining Chemical Functionality with Control over Morphology and Shape

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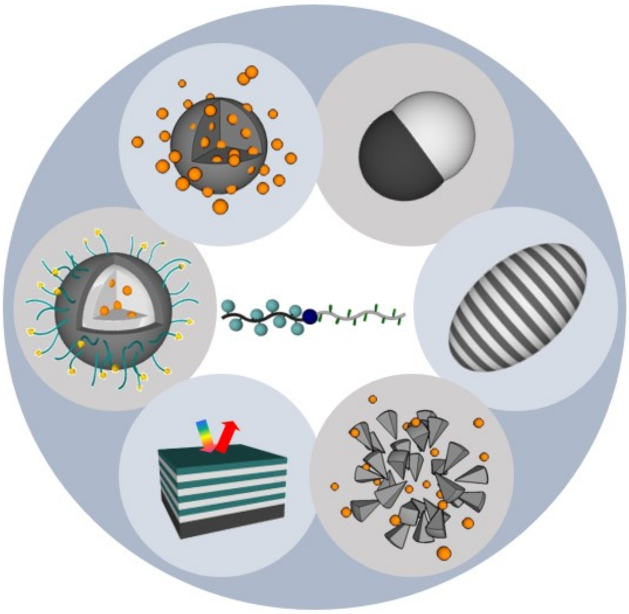

Polymer Colloids & Nanomaterials

Nature offers the most sophisticated examples of how selectively tailored polymers, polymer assemblies, and interfaces provide well-defined nanoscopic architectures that result in specific (macroscopic) functions. This outstanding ability of property control via molecular and structural design has long motivated researchers to strive for similar power in synthetic nano-materials. While polymers represent a promising class of materials that allows realizing specific chemical functionalities, dynamic properties and flexibility, simultaneously controlling internal morphology, overall shape, and chemical functionality in a single nanoscopic system remains a challenge. Hence, the ability to realize effective multifunctionality is still in its infancy and unfortunately current examples concentrate on each aspect separately: cooperative dynamic systems are not being fully realized. To address this need, research in the Klinger Lab focuses on the concurrence of chemical functionality and morphological control in polymer colloids and nanomaterials. Following a hierarchical design concept that combines the development of tailor-made macromolecular building blocks with polymeric self-assembly, colloidal chemistry, and interfacial physics, we are developing artificial nanomaterials that will serve as building blocks for advanced technologies such as photonics, drug delivery, catalysis and lithography.

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