Seminars

Day and Time: 15:30 – February 4, 2011
Place: Meeting Room, Building No. 1 (大学院会議室)

Seminar 1

Professor Ulrich S. Schubert

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"Tailor-made macromolecules:
From synthesis to function"

The molecular engineering of complex supramolecules and macromolecules can be performed nowadays using advanced organic reactions like "click chemistry" as well as living and controlled polymerization methods. The detailed characterization of the resulting advanced materials can be performed by combinations of state-of-the-art techniques, such as MALDI-TOF-MS/MS, analytical ultracentrifugation, SPM and cryo-TEM. Moreover, the application of parallel synthesis methods, combinatorial approaches as well as high-throughput characterization techniques opens versatile opportunities to establish systematic libraries of compounds in order to elucidate structure-property relationships. The combination with microstructuring and -deposition methods as well as nanolithography allows the precise preparation and utilization of functional nanostructures and -materials. The lecture will provide an overview on the current state of design, synthesis, characterization and strategies for the preparation of nanomaterials performed in Jena.
"Tailor-made polymeric nanocontainers: Design, synthesis, and detailed characterization"

Polymers are promising materials for drug delivery systems since well-defined macromolecules can be provided with precise properties according to the specific requirements. For the manifold tasks of nanocontainers in vivo, specific challenges have to be fulfilled by the polymeric carrier, like biocompatibility, active and passive targeting, controlled drug release, or sensing properties to gain online in vivo information. Contemporary polymer synthesis strategies/methods enable polymer scientists to create smart materials that respond to the specific challenges met in in vivo applications. Promising systems range from star-shaped amphiphilic polymers to polypelexes and polymeric nanocontainers based on synthetic as well as natural polymers (polyseccharides). Defined synthesis strategies in combination with a selection of formulation techniques allow the design of well defined containers in the nanoscale range. Multiple functionalities can be introduced to reach additional targeting functions by introducing directing moieties like sugar molecules. Furthermore, the attachment of sensitive dyes to the polymeric carrier allows the monitoring of processes on a subcellular level. In summary, controlled polymerization and functionalization routes are applied to design a toolbox of polymers with adjusted properties to improve the possibilities of drug carriers in order to affect only at the site of disease without harming the healthy tissue.

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