TECHNISCHE UNIVERSITÄT CHEMNITZ

Institut für Physik
Physikalisches Kolloquium

Mittwoch, 16.05.2018, um **16:00 Uhr**

Ort: Reichenhainer Str. 90;
Zentrales Hörsaal- und Seminargebäude,
Raum 2/N013

Prof. Dr. Tobias Kraus

INM – Leibniz Institute for New Materials Saarbrücken

Protein-inspired material design with hybrid nanoparticles

Proteins form superstructures that move living cells, convert their energy, and translate genetic information, among many other tasks. Protein assembly is due to interactions between charged and hydrophobic patches on the proteins that direct precise registration. It gives our cell exquisite control over molecular motion and charge transfer.

Here, I will discuss how to use this principle for the synthesis of new materials with defined microstructures. Instead of proteins, we synthesize inorganic nanoparticles with soft shells. Metal or semiconductor cores are covered with organic molecules that interact with the solvent. I will use results from molecular modeling, X-ray scattering, and colloidal analysis to show how such „soft" molecular shells affect the interactions between the „hard" cores of „hybrid" particles.

We design the interactions of hybrid particles to create new materials. To control charge transport, we have created „hybrid electronic inks" that contain nanoparticles with soft, π-conjugated shells that become electrically conductive immediately after drying, without the need for a sintering step. The problem of percolation is addressed using ultrathin gold wires with organic shells that spontaneously form bundles. We use them to print electrically conductive, optically transparent grids. Finally, I will discuss how supraparticles combine different nanoparticles into regular structures that are defined by the interactions between the soft shells.

Prof. Dr. Tobias Kraus:
is a chemical engineer and materials scientist trained at TU Munich, MIT, and the University of Neuchatel. He obtained his PhD at ETH Zurich and the IBM Research Laboratory. His interests span physical chemistry, surface science, and process engineering of materials. He has been head of the Program Division "Structure Formation" since 2014 and is deputy head of the Innovation Center INM. In 2016, he became full professor for colloid and interface chemistry at Saarland University.

Alle Zuhörer sind ab 15:45 zu Kaffee und Tee vor dem Hörsaal eingeladen.

Informationen zum Vortrag erteilt:
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