TECHNISCHE UNIVERSITÄT CHEMNITZ

Institut für Physik
Physikalisches Kolloquium

Mittwoch, 29.06.2016, um **16:00 Uhr**

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

Prof. Dr. Regine von Klitzing
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Institut für Chemie

Swelling behaviour and mechanical properties of smart hydrogels at interfaces

For fabrication of stimuli responsive coatings one of the challenges is to generate stable films which are still mobile and sensitive to outer parameters. These two properties are often counteracting. The talk will focus on films formed by deposition of multiresponsive hydrogel microparticles.

During the last decades microgels made of N-isopropylacrylamide (NIPAM) [1] were studied by several techniques like microscopy and light scattering. These polymer particles show thermoresponsive behaviour and can therefore be classified as “smart” materials. By copolymerisation with organic acids like acrylic acid the temperature of the volume phase transition as well as the swelling ratio can be influenced. Moreover charged copolymers are sensitive to changes in pH and ionic strength. To design microgels with fast switching properties external fields like light or magnetic fields are more appropriate than changing temperature or pH.

Our work focuses on the fabrication of stimuli responsive films and on the effect of geometrical confinement on the phase volume transition of these microgel particles [2]. The effect of type and amount of cross-linker and co-monomers on the swelling behaviour and on the elasticity is presented [3]. Strong hydrophobic effects are the basis for shrinking/swelling cycles triggered by light via a surfactant with an azobenzene group [4]. Other light-sensitive microgels can be fabricated by embedding gold nanoparticles. Using the thermosensitive response of the PNIPAM matrix we tune the distance and therefore the plasmon coupling between Au nanoparticles [5]. Local heating and shrinking of the gel matrix has an impact for actuatoric and the transformation of light into mechanical energy. Other functionalities can be induced via incorporation of magnetic nanoparticles [6].

The microgel particles are used for embedding proteins to protect them against mechanical and chemical stress. By solvent transfer from water to an organic solvent [7] even proteins which are not soluble and inactive in organic solvents become catalytically active.

Recently we designed a first prototype for a gel based touch screen with haptic functionality [8].

[1] Y. Deng, R. Pelton, *Macromolecules* **28** (1995) 4617.
[2] S. Schmidt et al., *Polymer* **49** (2008) 749.
[3] A. Burmistrova et al., *Polymers* **3** (2011) 1575.
[4] Y.Zakrevskyy et al., *Adv. Funct. Mater.* **22** (2012) 5000.
[5] K. Gawlitza et al.,*PCCP* **15** (2013) 15623.
[6] S. Backes et al., *J. Phys. Chem. B* **119** (2015) 12129.
[7] K. Gawlitza et al., *Phys. Chem. Chem. Phys.* **14** (2012) 9594.
[8] V. Miruchna et al.: UIST Symp. 2015, DOI: 10.1145/2807442.2807487

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

Informationen zum Vortrag erteilt:
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