Stimuli Sensitive Polymer Coatings with different film architectures triggered by light

For fabrication of stimuli responsive coatings one challenge is to generate stable films which are still mobile and sensitive to outer parameters. The talk will focus on 2 different types of thin polymer films at solid interfaces: 1) films formed by deposition of hydrogel microgels and 2) polymer brushes. Both architectures have in common that they consist of N-isopropylacrylamide (NIPAM) monomers. During the last decades microgels made of N-isopropylacrylamide (NIPAM) have attracted much interest and 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 such as acrylic acid (AAc) 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. 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 [1]. The effect of cross-linker and co-monomers on the swelling behaviour and on the elasticity is presented [2]. The second example is coating with PNIPAM brushes synthesized via ATRP and grafting from method [3].

Beside pH, temperature or solvent [4] light is a very efficient stimulus, since it can trigger quite fast and local the volume phase transition. Therefore additives like surfactants with azobenzene groups [5] and gold nanoparticles [6,7] are embedded within both microgels and brushes. In case of gold nanoparticles, the change in optical properties of microgels and brushes and the impact of gold nanoparticles as hot spots is studied.

Selected Publications: