

CPP 23: Interfaces and Thin Films III

Time: Tuesday 15:00–16:00

Location: ZEU 114

CPP 23.1 Tue 15:00 ZEU 114

Core/Shell Microparticles by Direct Thiol-Ene Photocoating — ●CHRISTIAN KUTTNER¹, HELMUT SCHLAAD², and ANDREAS FERY¹ — ¹Physical Chemistry II, University of Bayreuth, 95447 Bayreuth, Germany — ²Max-Planck Institute of Colloids and Interfaces, Colloid Chemistry, 14424 Potsdam, Germany

Many technical applications utilize composite materials, which require specific interfacial properties between their constituents for good performance. Thus polymeric modifications are desirable for interface engineering. We developed a photocoating process based on surface-initiated thiol-ene photochemistry without the need for additional photoinitiator. By this photocoating, we prepared different core/shell composite particles consisting of polymeric shells and polyorganosiloxane cores with narrow size-distributions. [1]

Thiyl radicals at the particle surface are generated upon irradiation with UVA light. [2] The initiation process was studied by a dye degradation experiment revealing continuous formation of radicals in a timeframe of 24 hours. [1] Our approach allows for a rapid and versatile modification of surfaces and the preparation of tailored core/shell particles by both *grafting-onto* deposition of copolymers and *grafting-from* polymerization. [1-3]

[1] Kuttner, C. *et al.* *Langmuir* (accepted), DOI: 10.1021/la4039864.

[2] Kuttner, C. *et al.* *ACS Appl Mater Interfaces* **2012**, *4*, 3485-3492.

[3] Kuttner, C. *et al.* *ACS Appl Mater Interfaces* **2013**, *5*, 2469-2478.

CPP 23.2 Tue 15:15 ZEU 114

Optically triggered release from a molecular container: Photoswitching in thin films of metal-organic frameworks — ●LARS HEINKE¹, MURAT CAKICI², STEFAN BRÄSE², and CHRISTOF WÖLL¹ — ¹Institute of Functional Interfaces (IFG), Karlsruhe Institute of Technology (KIT), Karlsruhe — ²Institute of Organic Chemistry (IOC), Karlsruhe Institute of Technology (KIT), Karlsruhe

The remote control of surface properties is one of the key challenges in interfacial science. Here, we are going to show the great potential of thin porous films of metal-organic frameworks (MOFs) containing linkers with photoswitchable azobenzene side groups. The state of the azobenzene side groups can be switched by UV light from trans to cis and vice versa by visible light. This photoswitching influences the mass transfer of the guest molecules in the pores, i.e. the pores are ideally opened and closed by light. By means of liquid-phase epitaxy, SURMOFs (surface mounted metal-organic framework) with vertical compositional gradients can be synthesized. This enables the preparation of thin porous films with a passive bottom layer, which serves as a storage container, and a photoswitchable top layer serving as a valve, which opens and closes the container. After loading the porous coating with guest molecules, its release is initiated by illumination with visible light and monitored by a quartz crystal microbalance (QCM).

CPP 23.3 Tue 15:30 ZEU 114

Role of the external field on solidification process of conjugated polymer and oligomer systems — BAKIROV ARTEM¹, SHCHERBINA MAXIM¹, GRODD LINDA², MIKAYELIAN EDUARD², FRATODDI ILARIA³, VENDITTI IOLE³, RUSSO MARIA VITTORIA³, CHVALUN SERGEI¹, and ●GRIGORIAN SOUREN² — ¹Institute of Synthetic Polymeric Materials RAS, Moscow, Russia — ²Department of Physics, University of Siegen, Germany — ³Department of Chemistry and Center for Nanotechnology for Engineering (CNIS), University of Rome Sapienza, Rome, Italy

Conjugated polymers and oligomers have received an increased attention in recent years being promising materials for organic electronics. Recently many fabrication protocols have been developed in order to enhance structural properties which in many cases have a strong influence on final device performance. We propose a non-contact way to modify structural properties during organic film solidification under external field. First a series of in situ x-ray studies using grazing incidence geometry were realized under external electric field up to 3 keV. Here a macroscopic flow is among different experimental constraints which hinders local order. Alternatively, in situ studies were performed under external magnetic field of 1.2 T. In this case a pronounced anisotropy induced by external magnetic field was found for oligomers and polythiophene-gold nanoparticle blends.

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CPP 23.4 Tue 15:45 ZEU 114

Confined semiflexible chains in a good solvent: A Monte Carlo test of scaling concepts — ●HSIAO-PING HSU^{1,2} and KURT BINDER² — ¹Max-Planck-Institut für Polymerforschung, Mainz, Germany — ²Institut für Physik, Johannes Gutenberg-Universität Mainz, Mainz, Germany

Single semiflexible polymer chains under good solvent conditions are described by self-avoiding walks (SAWs) on the square and simple cubic lattices with an additional bending energy penalty ε_b at each 90° kink along the chains. Employing the pruned-enriched Rosenbluth method (PERM), chain lengths of polymers confined in nanoslits between two hard walls that are apart from each other at a distance D are up to 10^5 [1,2]. With our large-scale Monte Carlo simulations of confined semiflexible chains, the scaling laws predicted in Flory, Daoud-de Gennes, and Odijk regimes are checked. While under weak confinement ($D \gg l_p$) the model (for very long chains) still is compatible with the Daoud-de Gennes scaling theory, for strong confinement ($D \leq l_p$) strong deviations from the predictions based on the Kratky-Porod model are found. However, Odijk's deflection length plays no role for semiflexible chains with discrete bond angles.

[1] H.-P. Hsu and K. Binder, *Soft Matter* **9**, 10512 (2013).

[2] H.-P. Hsu and K. Binder, *Macromolecules* **46**, 8017 (2013).