



Polymers under Multiple Constraints

Kolloquium

Thursday,

6th June
2013

at: 5.00 pm

Hörsaal für
Theoretische Physik
Linnéstr 5
04103 Leipzig



Coffee will be
served from 4.30
pm.

Prof. Dr. Martin Möller

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From hierarchical selforganisation towards polymer systems with functional and active properties

Polymer science focuses more than ever on mastering increasingly complex molecular structures and supramolecular assemblies for advanced functionalities such as nanoprogrammed structure formation, molecular recognition, meta- and multistability, adaptive structures, shape memory properties, self-healing properties, molecular motility, molecular energy conversion systems and replication.

The work presented here focuses on the spontaneous formation of functional monolayers with a high charge carrier mobility and a high tolerance on the substrate structure. These polymers can also form single and multilayer vesicles and hierarchically ordered ultrathin films with well defined lateral nanopattern and a thickness corresponding to that of lipids. With a focus on switchability, we will present examples on switchable adhesion properties, switchable stabilisation of emulsions based on the variation of pH, temperature and solvents. Moreover we will present examples where small objects can be switched between different states by NIR-light. This way it has been possible to design a light driven microfluidic pump. For this purposes we take advantage of the fact that hydrogels and microgels respond critically to the change of pH, temperature and solvent, but also that the state of ordering of liquid crystal can be switched and used to achieve actuation. A key aspect of the light-driven molecular devices is that beyond photoisomerisation, it has been possible to effect fast and highly localized temperature jumps in a material by incorporation of suitable nanoscopic IR-antennae.

- [1] J. Wang et al., *Soft Matter* **2013**, DOI: 10.1039/C2SM27209A
- [2] L. Li et al. , *Angew. Chem., Int. Ed.* **2012**, *51*, 11616
- [3] M. Defaux et al. , *Advanced Materials* **2012**, *24*, 973