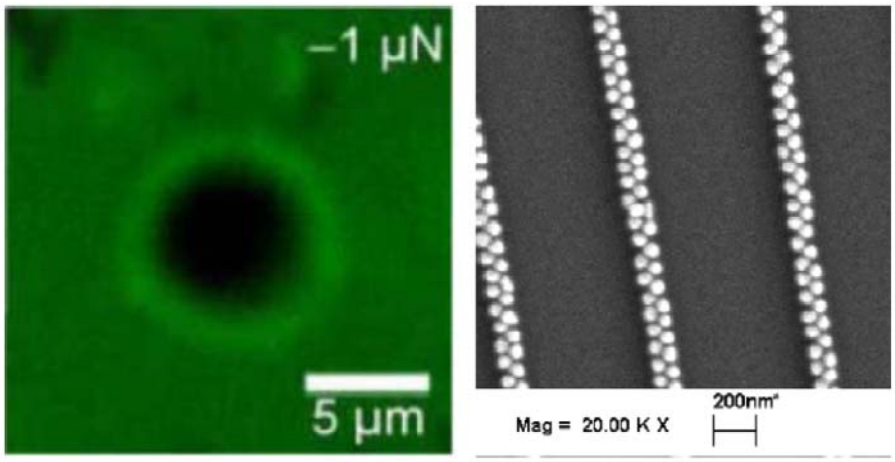
Seminar

Prof. Andreas Fery

Department of Physical Chemistry II, University of Bayreuth, Germany

Functional polymeric/colloidal assemblies: Novel approaches from a nano-mechanics perspective



Left: Pressure induced fluorescence quenching: the pressure distribution of a particle pressed against the "artificial skin" can be visualized (dark: brush compression, bright: brush stretching) Right: Plasmonic nanoparticle assembly created wrinkle assisted self assembly

The assembly of molecular or colloidal building-blocks into functional macroscopic-structures is one of the most active areas of materials research. Mechanical concepts can provide interesting perspectives for both characterization and assembly of these materials.

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In the first part, we discuss recent developments in AFM force spectroscopy: The combination of colloidal-probe AFM with state-of-the-art optical microscopy is a powerful tool for quantifying mechanics, adhesion and optical properties of ultrathin coatings and deformable colloidal particles . Especially mechano-sensitive systems, which translate mechanical stimuli into optically detectable response, can be investigated. We discuss the example of “artificial skins” based on pressure induced fluorescence quenching in brush systems in detail.

In the second part, we introduce controlled wrinkling as a “low tech”-alternative to techniques like e-beam lithography for surface patterning. We show that sub-micron topographical and chemical patterns can be achieved on large areas using these mechanical instabilities. The assembly of colloidal particles into optically functional structures is one of the most promising applications of this concept . We demonstrate first examples of plasmonic nanoparticle assemblies and discuss their application to surface enhanced Raman spectroscopy.

Friday, November 11th, 13h15

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