SFB 608

Einladung zum Kolloquium

Ort: Universität zu Köln
II. Physikalisches Institut, Seminarraum 201

Zeit: 27. April 2005, 15 Uhr c.t.

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Thema: Macroscopic transport by synthetic molecular machines

Biological motors, both singularly and cooperatively, are capable of transporting objects many times more massive than themselves and have been used to power prototypical hybrid mechanical devices. However, performing macroscopic mechanical tasks with the rudimentary early generations of wholly synthetic molecular machines has proved more elusive. Here we shall report on the macroscopic (millimeter scale) transport of a droplet on a photo-responsive surface created using the nanometer displacement of the components of light-switchable molecular shuttles to expose or conceal fluoroalkane residues and thereby modify surface tension.
Stimuli-responsive molecular shuttles are rotaxanes (see figure below) in which the macrocycle can be translocated from one position (station) on the thread to a second site through an external trigger (e.g. light, electrons, temperature, pH, nature of the environment, reversible covalent bond formation etc.). When the rotaxanes are grafted onto the surface and a drop is deposited on this surface, one can change the wettability of the surface in front of the drop by light-induced movement of the macrocycles. The collective operation of a monolayer of the shuttles is sufficient to power the movement of a microlitre droplet of diiodomethane up a twelve degree incline.

Gez. Prof. H. Tjeng