CPP 12 Selforganized and supramolecular assemblies I

Zeit: Montag 09:45–11:00 Raum: TU C243

CPP 12.1 Mo 09:45 TU C243

Liquid manipulation via morphological transitions — •Jean-Christophe Baret[1], Michel Decré[1], Stephan Herminghaus[2], and Ralf Seemann[2] — [1]Philips Research Laboratories, NL-5656AA Eindhoven — [2]MPI for Dynamics and Self-Organization, D-37073 Göttingen

In microfluidic applications, on-demand manipulation of small volumes of fluids is a basic need. Among the possible actuation systems for liquid structures, electrowetting is one of the most promising solutions. It has been shown recently that liquid deposited on rectangular grooves with rectangular cross section, has a variety of possible liquid morphologies determined by the contact angle of the drop on the planar substrate and the aspect ratio of the liquid channel (i.e. ratio of depth to width of the channel) [1]. In our experiments, electrowetting is used to tune the contact angle of the liquid reversibly from 100 to 50 degrees, leading to a reversible transition between a droplet morphology at large contact angles and extended liquid filaments for small contact angles. The transition is capillarity-driven but the behavior of the liquid above the transition is influenced by the electrical properties of the liquid. The length of the liquid filament is a function of the applied Voltage and could be explained by a simple electrical model. This gives us a precise handle to manipulate liquid on-demand in open microfluidic microchannels.

[1] Matching surface topography and wettability: a new route to open microfluidic systems, R. Seemann, M. Brinkmann, E. J. Kramer, F. F. Lange and R. Lipowsky, submitted.

CPP 12.2 Mo 10:00 TU C243

Scanning tunneling microscopy and spectroscopy of molecular stacks — •Frank Jäckel[1], Paolo Samori[1,2,3], Nikolai Severin[1], Mark D. Watson[4,5], Klaus Müllen[4], and Jürgen P. Rabe[1] — [1]Humboldt-Universität zu Berlin, Institut für Physik, Newtonstr. 15, 12489 Berlin, Germany — [2]ISOF-CNR, Via Gobetti 101, 40129 Bologna, Italy — [3]IS-ULP, 8 Allee Gaspard Monge, 67083 Strasbourg, France — [4]Max-Planck-Institut für Polymerforschung, Ackermannweg 10, 55128 Mainz, Germany — [5]University of Kentucky, Department of Chemistry, Lexington KY 40506-0055, USA

We present a scanning tunneling microscopy and spectroscopy study at the solid-liquid interface of hexa-*peri*-hexabenzocoronenes (HBC) in different three-dimensional stacked geometries, namely covalently bound as HBC-cyclophanes and physisorbed in double layers consisting either of HBC only or of a mixture of HBC and an electron acceptor. Tunneling bias dependent imaging and tunneling spectroscopy are applied to demonstrate the sensitivity of the electronic coupling between the HBCs to the relative orientation of the molecules with respect to each other.

CPP 12.3 Mo 10:15 TU C243

Röhrenförmige J-Aggregate auf festen Substraten — •Stefan Kirstein[1], Jens-Thorsten Ollek[1], Hans von Berlepsch[2] und Christoph Böttcher[2] — [1]Institut für Physik, Humboldt-Universität zu Berlin — [2]Zentrum für Elektronenmikroskopie, Freie Universität Berlin

Eswurde vielfach gezeigt, dass eine Reihe von amphiphil substituierten Benzimidacarbocyanin-Farbstoffen (sog. Amphipipes) in wässrigen Lösungen röhrenartige Aggregate bilden, die aufgrund ihrer spektroskopischen Eigenschaften zu den J-Aggregaten gehören. Dabei können die Morphologien dieser Aggregate durch die chemische Struktur der Substituenten stark beeinflußt werden. In diesem Beitrag wird der Einfluß der geladenen Gruppen auf die Morphologie der Aggregate gezeigt. Neben der Charakterisierung der Aggregate in Lösung mit Hilfe der cryo-Elektronemikroskopie wird insbesondere die Adsorption der Aggregate auf feste Substrate mit Hilfe der Rasterkraftmikroskopie untersucht.

CPP 12.4 Mo 10:30 TU C243

Spectroscopy of Individual J-Aggregates — •Erwin Lang[1], Sasha Sorokin[2], Yuri Malyukin[2], and Jürgen Köhler[1] — [1]Experimental Physics IV, University of Bayreuth, Germany — [2]Institute for Single Crystals, National Academy of Science, Ukraine

It is well known that J-aggregates, consisting of hundreds of noncovalently bound molecules in linear or cylindrical arrangement, show strong optical transitions in the visible spectral range. This feature makes them promising candidates for artificial light-harvesting systems and strongly luminescent nanoparticles.

We will present fluorescence-excitation spectra of individual J-aggregates from amphiphilic-carbocyanine molecules. The spectra, recorded at various temperatures and as a function of the polarisation of the incident radiation, show a pronounced temporal and spatial heterogeneity. In combination with structural data obtained from cryo-electron microscopy we will discuss different models for the electronic structure of the investigated J-aggregates.

CPP 12.5 Mo 10:45 TU C243

Orientation effects in EPR PPI Cu(II) - dendrimer complexes induced by a high magnetic field — •N. Domracheva[1], A. Mirea[2], M. Schwoerer[2], G. Lattermann[3], and L. Torre Lorente[3] — [1]Kazan Physical-Technical Institute of RAS, Kazan, 420029, Russia — [2]Experimentalphysik II, Universität Bayreuth, D-95440 Bayreuth — [3]Makromolekulare Chemie I, Universität Bayreuth, D-95440 Bayreuth, Germany

The poly (propylene imine) (PPI) dendrimers of the 1st and 2nd generations coordinated to Cu(II) and exhibiting liquid crystalline properties were studied by means of EPR for different copper content per dendrimer ligand L ($0.3 \leq \mathrm{Cu/L} \leq 6.3$). Orientation effect of a high magnetic field was used to obtain structural information for the metal ion complexed in the dendrimer. Using of this effect allowed us, for the first time, to resolve the anisotropic superhyperfine structure due to amide nitrogen ligands in dendrimers and to give the geometric information on the Cu(II) complex sites. At lowest content ($\mathrm{Cu/L}=0.3$) the Cu(II) complexes have an approximately square-planar geometry, where each Cu(II) ion is bounded to two nitrogen and two carbonyl oxygen atoms from the amide groups in the outer core of the dendrimers. For intermediate concentrations, two kinds of Cu(II) complexation geometry exist: 1) a N_2O_2 pseudotetrahedral geometry (the distortion angle is $\gamma = 56°$) with two amide nitrogen and two carbonyl oxygen coordination and 2) a five-coordinated, square-pyramidal geometry, presumably, N_3O_2 via additional bridging with a tertiary amine nitrogen from the dendrimer's inner core. Higher Cu(II) "loadings"lead to the increase of exchange couplings between the sites.