alytics, TU Chemnitz, 09107 Chemnitz

The photoinduced decay of fluorescence of organic dyes (photobleaching) is usually discussed in terms of irreversible photochemical modifications of the dye molecules (often photooxidation). We can show now, that the fluorecence decay from a number of dyes is mostly reversible in the initial part. The reversible decay is due to fluorescence intermittency with power law distributed on- and off- intervals (blinking) [1,2].

By measuring the recovery of the initially bleached lumincescence after a given waiting time as a function of the bleaching time we are able to discriminate the reversible and irreversible fraction of the luminescence decay. The finding, that an intermittency induced photophysical bleaching process dominates the initial stages of photobleaching may shine new light on the puzzling variety of data on nonexponential photobleaching kinetics which has been published in the literature on photobleaching during the past decades. Once deconvoluted, the irreversible photochemical bleaching kinetics follows a simple single exponential decay. The photophysical bleaching is assigned to the photoejection of charges into the polymer. This reversible photoionisation process takes place on time scales from milliseconds to minutes.

[1] Schuster et al., Appl. Phys. Lett. 87 (2005), 051915
[2] Schuster et al., J. Luminescence, in press

CPP 18.4 Wed 15:15 H40

Molecular tracer diffusion in thin azobenzene polymer layers — •Norman Mechau[1,3], Marina Saphiannikova[2], and Dieter Neher[1] — [1]Institute of Physics, University of Potsdam, Am Neuen Palais 10, 14469 Potsdam, Germany — [2]Leibniz Institute of Polymer Research, Hohe Straße 6, 01069 Dresden, Germany — [3]Forschungszentrum Karlsruhe, Institut of Nanotechnology, 76021, Karlsruhe, Germany

Translational diffusion of fluorescent tracer molecules in azobenzene polymer layers is studied at different temperatures and under illumination using the method of fluorescence recovery after photo-bleaching. Diffusion is clearly observed in the dark above the glass transition temperature, while homogenous illumination at 488 nm and 100 mW/cm^2 does not cause any detectable diffusion of the dye molecules within azobenzene layers. This implies that the viscosity of azobenzene layers remains nearly unchanged under illumination with visible light in absence of internal or external forces.

CPP 18.5 Wed 15:30 H40

Ortsaufgelöste Messung der thermischen Leitfähigkeit in Flüssigkeiten* — •Judith Schwesyg, Helge Eggert, Dirk Apitz und Karsten Buse — Physikalisches Institut, Universität Bonn, Wegelerstr. 8, 53115 Bonn

Bildgebende Verfahren sind in vielen Bereichen der Wissenschaft und Technik von fundamentaler Bedeutung. Hierbei werden verschiedenste Kontrastmechanismen benutzt, z. B. Absorptions-, Brechungsindex- und Temperaturunterschiede. Ein neuer Ansatz ist, als Kontrast Inhomogenitäten der Wärmeleitfähigkeit in Flüssigkeiten oder Festkörpern zu messen und bildlich darzustellen. In diesem Vortrag wird ein pulsholographisches Verfahren vorgestellt, mit dem es gelingt, die thermische Leitfähigkeit in Flüssigkeiten ortsaufgelöst zu messen. Es basiert auf der Tatsache, dass vom Zerfall thermischer Gitter, die durch Beleuchtung mit zwei interferierenden Nanosekundenlichtpulsen erzeugt wurden, auf die thermische Leitfähigkeit geschlossen werden kann. Als Beispielsystem dient das Zweikomponentensystem Toluol-Wasser. Es werden Messergebnisse sowie die aus diesen erstellten zweidimensionalen Bilder präsentiert. Des Weiteren tritt durch die Pulsbeleuchtung ein Grenzflächeneffekt auf: Von der Grenzschicht gehen aufgrund unterschiedlicher Material-Kompressibilitäten Schallwellen aus, die durch Beugung nachgewiesen werden. Dieser Effekt kann ebenfalls zur Bildgebung genutzt werden.

*Wir danken der Deutschen Forschungsgemeinschaft (BU 913/17), der Deutschen Telekom AG und der Deutschen Telekom Stiftung für die finanzielle Unterstützung.

CPP 19: POSTER: Micro and Nano Fluidics

Time: Wednesday 16:00–18:30 Location: Poster B

CPP 19.1 Wed 16:00 Poster B

Cantilever micro rheometer for measurement of sugar solutions — •Marc Hennemeyer and Robert Stark — Dept. Geo und Umwelt, Ludwig-Maximilians-Universität, Theresienstr. 41, 80333 München

Measurement of rheological properties of liquids is of high interest in many areas like medicine and biology. As traditional measurement techniques require relatively big amounts of sample fluid, the last years have seen an increased interest in the miniaturization of measurement tools. Micro mechanical sensors as used in atomic force microscopy are ideally suited as sensors in micro fluidic devices. Although the vibration of cantilevers does not respond to viscosity changes of fluids on macroscopic scales, micrometer scaled plates are affected by the viscous properties of the surrounding fluids. In this work a simple measurement tool for the rheological measurements on arbitrary Newtonian liquids is presented which is based on the analysis of stochastic cantilever oscillations. The system can be operated with standard consumer computer hardware, which dramatically reduces the costs for the system. The system presented in this work is a very cost effective set up that can be used for a wide range of experiments in cost sensitive environments. It could be shown, that for viscosity measurements on basis of the method introduced by Sader, standard computer hardware can be used to substitute expensive data acquisition hardware. The measurements on sugar solutions could evaluate the viscosity and density of the solutions to an accuracy of about 10%.

CPP 19.2 Wed 16:00 Poster B

Dewetting dynamics of thin polymer films on topographic and elastic substrates — •Konstantina Kostourou, Krishnacharya Khare, Martin Brinkmann, Stephan Herminghaus, and Ralf Seemann — Max Planck Institute for Dynamics and Self-Organization, D-37073 Göttingen, Germany

Dewetting dynamics of polymer films in triangular grooves and on elastic substrates are studied experimentally and theoretically. Liquid filaments, in triangular grooves, with convex liquid-vapor interface are unstable and undergo dynamic instability resulting in equally spaced individual droplets with a preferred distance. This instability is driven by the local variation of the Laplace pressure with filament width and resembles a generalized Rayleigh-Plateau instability. From the time scale of the dynamic instability we extract slip properties of the polymer/substrate interface. Additionally we study the dewetting dynamics of thin polymer films on rubber elastic substrates. Here, the dynamics are additionally determined by the dissipative properties of the elastic substrate. We compare the flow behavior of liquid polymer films on substrates of different visco-elasticity and constant wettability. Our experiments show that dewetting is faster on substrates with larger elastic modulus.

CPP 19.3 Wed 16:00 Poster B

Raman spectroscopy on periodic mesoporous organosilica with different pore sizes — •Martin Andreas Schreiber[1], Martin Güngerich[1], Wolfram Heimbrodt[1], Torsten Henning[2], Peter Jens Klar[2], Vivian Rebbin[3], Michael Fröba[3], Lutz Eichhorn[4], Jürgen Brandner[4], and Klaus Schubert[4] — [1]Dept. Physics and WZMW, Philipps University of Marburg, Germany — [2]1. Physics Institute, Justus-Liebig-University of Gießen, Germany — [3]Institute of Inorganic and Analytical Chemistry, Justus-Liebig-University of Gießen, Germany — [4]Forschungszentrum Karlsruhe, IMVT, Eggenstein-Leopoldshafen, Germany

Periodic mesoporous organosilica (PMOs) are organic-inorganic hybrid materials with regular pore systems and well-defined pore sizes in the range of 3 to 15 nm yielding inner surfaces of about $1000\,m^2/g$. Two-point attached organic units within the silica matrix in the pore walls are a genuine part of the 3D pore wall framework. These organic functionalisations is very versatile making these hybrids interesting for applications in catalysis and micro-reactor technology.

Here we study the adsorption and desorption behavior in dependence of the pore-size of benzene-functionalized and ethane-functionalized PMOs in the temperature range between 20 and 140°C by Raman spectroscopy. We find significant differences in the adsorption-desorption