

amined by scanning electron microscopy, mechanical spectroscopy and nano-indentation measurements, will be discussed.

CPP 27.13 Thu 17:00 P2

Faster dynamics in thin polymer films? — ●ANATOLI SERGHEI¹, LUTZ HARTMANN¹, YULIA MIKHAILOVA², KLAUS-JOCHEN EICHORN², BRIGITTE VOIT², and FRIEDRICH KREMER¹ — ¹Leipzig University, Institute for Experimental Physics I, Leipzig, Germany — ²Leibniz Institute of Polymer Research, Dresden, Germany

The molecular dynamics in thin films of polymers with different macromolecular architectures (linear and hyperbranched structures) are investigated by Broadband Dielectric Spectroscopy. Pronounced confinement-effects are detected: the average relaxation rate of the dynamic glass transition increases with decreasing film thickness, indicating a faster dynamics in thin films. The molecular mechanism of these effects is revealed by the quantitative determination of the relaxation time distribution in dependence on the confinement size. It turns out that: a) the increase in the average relaxation rate is caused by a gradual suppression (freezing-out) of the slower relaxation modes in confinement; b) at a molecular level no polymer segments are found to relax faster in thin films than in the bulk.

L. Hartmann et al., Eur. Phys. J. E 8, 145 (2002). A. Serghei et al., Eur. Phys. J. E 17, 199 (2005).

CPP 27.14 Thu 17:00 P2

Mechanical Properties of Free Standing Liquid Filaments — ●ALEXANDRU NEMES, ALEXEY EREMIN, and RALF STANNARIUS — Institute of Experimental Physics, University of Magdeburg, Universitätsplatz 2, D-39106 Magdeburg, Germany

Stable free standing filaments with slenderness ratios (length to diameter ratio) of more than 1000 can be prepared in some mesophases of liquid crystals. In our work, the mechanical properties of such structures are described. With a special excitation technique, we pluck the filaments and excite damped oscillations. Experimental relaxation times and oscillation frequencies of such liquid chords are discussed within a model that describes the damped vibrations of a liquid string under the influences of surface tension, inertial, viscous, and elastic forces. Reference: R. Stannarius, A. Nemes and A. Eremin, Phys. Rev. E, 72 020702(R) (2005)

CPP 27.15 Thu 17:00 P2

AFM-Nanolithography on self-assembled monolayers — ●HARALD GRAAF¹, MAIK VIELUF¹, MASATO ARA², and HIROKAZU TADA² — ¹Optische Spektroskopie und Molekülphysik, Institut für Physik, Technische Universität Chemnitz, 09107 Chemnitz — ²Division of Materials Physics, Graduate School of Engineering Science, Osaka University, Osaka 560-8531 JAPAN

We report on the anodic oxidation of self-assembled monolayers (SAM) on silicon surfaces by Atomic Force Microscopy (AFM). These SAM are prepared by heat-induced chemical reaction of an alkene with a hydrogen terminated silicon surface. They are characterized by a high order of the molecules and a strong physical as well as chemical stability. By varying the headgroup of the alkenes the properties of the surface can be easily tuned, e.g. from hydrophobic to hydrophilic. By anodic oxidation the SAM can be locally degraded and the below silicon oxidized leading to silicon oxide nanostructures. These silicon oxide structures can either be modified by attaching different silane molecules or can be selectively removed by chemical etching followed by chemical modification of the formed ditch.

CPP 27.16 Thu 17:00 P2

Molecular Editing of Polymer Brushes with the Tip of an AFM — ●ROLAND GROEGER¹, INGO SAMERSKI¹, THOMAS SCHIMMEL^{1,2}, and STEFAN WALHEIM¹ — ¹Institute for Nanotechnology, Forschungszentrum Karlsruhe, 76021 Karlsruhe (Germany) — ²Institute of Applied Physics, University of Karlsruhe, 76131 Karlsruhe (Germany)

Polymer brushes prepared from low molecular-weight carboxyl-functionalized polystyrene and polybutadiene were prepared on silicon oxide surfaces. Their topography and their adhesion properties are investigated by Atomic Force Microscopy (AFM). We describe how these ultra-thin polymer films can be mechano-chemically removed by the tip of an AFM at pre-defined locations and subsequently replaced by another polymer species. In this way it was possible to generate polymeric surfaces with a pre-defined chemical pattern. This opens perspectives for generating specifically functionalized nano-scale patterns, e.g. for

nano-biology.

CPP 27.17 Thu 17:00 P2

Thin Films of Crystalline Diblock Copolymers — ●CHARLES DARKO¹, I. BOTIZ², G. REITER², and C. PAPADAKIS¹ — ¹Physik Department E13, Technische Universität München, James-Frank Str. 1, 85748 Garching — ²Institut de Chimie des Surfaces et Interfaces, CNRS, Mulhouse, France

In thin films of diblock copolymers having one crystallizing block, a number of surface structures have been observed, e.g. edge-on or flat-on lamellae with high persistence lengths, spirals and dendrites, allowing the structuring of organic surfaces on a large range of length scales. The crystallization growth process in thin films of lamellar poly(styrene-*b*-ethyleneoxide) diblock copolymer was followed by in-situ optical microscopy. Using grazing-incidence small-angle X-ray scattering (GISAXS) and grazing-incidence X-ray diffraction (GIXD), we investigate the orientation of the mesoscopic structures with respect to the substrate as well as the orientation of the crystalline chains with respect to lamellar interfaces. This information on the structure inside the film is compared to the surface texture obtained by atomic force microscopy with the focus on the effect of crystallization temperature.

CPP 27.18 Thu 17:00 P2

Electrostatic field induced patterning: a method for controlling the anisotropy of films of polar organic molecules — ●SVEN VERPOORT¹, ANSGAR DRAUDE¹, RAFAEL MEINHARDT¹, HILMAR FRANKE¹, and ROGER A. LESSARD² — ¹Fachbereich Physik / Angewandte Physik, Universität Duisburg-Essen, Lotharstr. 1, D-47048 Duisburg, Germany — ²COPL, department de physique, génie physique et optique, Université Laval, Québec, Canada G1K7P4

The presence of electrostatic charges on the surface of electrically isolating substrates like glass or polymers is able to control the orientation of vapor deposited polar organic molecules.

Different methods for the fabrication of charge patterns have been used with inorganic glass: friction, Corona, contact charging, e-beam charging...

Optically anisotropic layers of the azo dye DR1 have been prepared. The anisotropy is detectable by a change in the optical transparency and the pattern reflects the previously recorded charge distribution.

CPP 27.19 Thu 17:00 P2

AFM as a Tool for Observation and Nanomanipulation — ●ALEXANDER SCHMATULLA¹, DIETER MEINHARD², BERNHARD RIEGER², and OTHMAR MARTI¹ — ¹Department of Experimental Physics, University of Ulm, 89069 Ulm, Germany — ²Department of Anorganic Chemistry II, University of Ulm, 89069 Ulm, Germany

We show the possibility of a custom built Atomic Force Microscope (AFM) as an useful tool for observation and nanomanipulation in material science. In particular we have analysed spin coated polymer networks. First we demonstrate an appropriate preparation of the polymer sample. Using the AFM, particular polymer strains have been pulled over several well defined distances. Further we will compare our results with SEM images, GPC results and other methods. Finally the corresponding changes on the sample will be discussed.

CPP 27.20 Thu 17:00 P2

Solvent Effect in NMR Spectra of Nucleic Bases from Hybrid QM-MM Simulations — ●SITTIPONG KOMIN and DANIEL SEBASTIANI — Max Planck Institute for Polymer Research, Ackermannweg 10, D-55128 Mainz, Germany

We present a study of structural properties and ¹H NMR chemical shifts of nucleic bases in aqueous solution using hybrid quantum mechanics/molecular mechanics(QM/MM) molecular dynamics simulations. The purpose of this work is to study the solvent effect in NMR shifts. We benchmark our computational setup by applying it to water dimer, methanol dimer and ethanol-water dimer, which is particularly relevant to the development and validation of model in QM scheme comparing with QMMM scheme. The method is used to compute the ¹H NMR chemical shifts of Adenine, Guanine, Adenine-9methyl, Guanine-9Methyl in aqueous solution.