DS 24 Poster presentation

Time: Tuesday 15:00–17:30 Room: P2

DS 24.1 Tue 15:00 P2

Argon: bulk, sheets and nanotubes — •Karin Schmalzl[1,2], Maikel Rheinstaedter[2], and Dieter Strauch[3] — [1]Forschungszentrum Juelich, 52425 Juelich, Germany — [2]Institut Laue-Langevin, BP 156 - 38042 Grenoble, France — [3]Institut fuer Theoretische Physik, Universitaet Regensburg, Germany

Condensed matter in geometrical confinement like nanoporous matrices allows to study the change of dynamics due to spatial restrictions. We investigated ^{36}Argon adsorbed in nanoporous Gelsil Glass by inelastic neutron scattering. At low filling fractions the atoms form an amorphous adsorbate film on the pore walls. At higher fillings, a capillary condensate forms in the pore center. The preparation of single or of several monolayers were possible what permitted the study of, e.g., the dynamical interaction between the third and second layer.

We compare the measured density of states of different fillings with the ones calculated with ab initio calculations . The calculations were done with LDA and GGA pseudopotentials. We studied rods and hollow cylinders with different number of atoms to appraoch the different fillings of the pores.

We also investigated the dynamics of a 2D system like a monolayer, double layer and several layers of atoms and followed in this way the transition to the bulk state.

DS 24.2 Tue 15:00 P2

Self-Organized Surface Patterning — •Michael Hirtz[1,2], Xiaodong Chen[1,2], Harald Fuchs[1,2], and Lifeng Chi[1,2] — [1]Physikalisches Institut WWU Münster, Wilhelm-Klemm-Straße 10, 48149 Münster — [2]CeNTech, Gievenbecker Weg 11, 48149 Münster

Surface patterning is of great importance in modern science and technology. Patterning is usually achieved by top-down strategies, such as optical and e-beam lithography, soft-lithography, scanning probe lithography, and nanoimprint lithography. In contrast, the concepts of self-assembly and self-organization provide another interesting route toward the formation of patterned structures via a bottom-up approach. Here, we present the formation of regular striped patterns in a self-organized manner by means of Langmuir-Blodgett (LB) technique, and their applications.

DS 24.3 Tue 15:00 P2

Reorganisation of ultrathin PEO films by water exposure — •Evelyn Meyer and Hans-Georg Braun — Leibniz Institute of Polymer Research, Max-Bergmann Center of Biomaterials, D-01069 Dresden, Hohe Strasse 6

Ultrathin PEO films (thickness < 5 nm) which are prepared by dip-coating can crystallize in highly branched lamella structures which are caused by a diffusion controlled growth process within the thin polymer layer. The water soluble polymer can rearrange on the surface by water exposure. We used a inkjet based microdroplet generator to deposit small (≈ 80 micrometer) sized water droplets on the ultrathin film. Dissolution of the PEO film within the water droplet impact zone results in micropatterned PEO films. The morphological features resulting from the water droplet impact give information about the size of the impact zone on the surface and about the dissolution and reorganisation processes of the PEO molecules. Within the impact zone dewetting layers were observed and dendritic PEO lamellae growing from the rim inside the impact zone are identified and discussed. An experimental setup in which a thin water layer entrapped in a slit between a truncated pyramidal made and an ultrathin PEO layer can be moved with defined velocities across the PEO film will be used to demonstrate the reorganisation processes of (partly) dissolved PEO films both on homogeneous and heterogeneous surfaces.

DS 24.4 Tue 15:00 P2

Domain shape dynamics and local viscosity in stratifying foam films — •Peter Heinig — MPI für Dynamik und Selbstorganisation, Bunsenstr. 10, 37073 Göttingen

For the development of microfluidic devices (the lab on a chip) the effect of an interface on bulk parameters, as viscosity, is an issue of great importance. Nevertheless experimental results on local viscosity are rare and partially contradictory. We studied the domain shape dynamics in a foam film composed of oppositely charged surfactant and polyelectrolyte. These films thin in stepwise fashion: circular domains of lower film thickness are formed, expand and coalesce until they cover the whole film surface. On the one hand we analyzed the shape relaxation of coalescing domains and retreating stripes, on the other hand the dynamics of domain growth. Both kinds of dynamic events represent independent ways for measuring local film viscosity. We found consistent results and an increase of film viscosity of almost two orders of magnitude compared to bulk. The effect can be explained by strong interactions between surfactant and polyelectrolyte.

DS 24.5 Tue 15:00 P2

Calculation of the Evolution of Surface Area and Free Volume During the Infiltration of Fiber Felts — •Andreas Pfrang[1], Katja Schladitz[2], Andreas Wiegmann[2], and Thomas Schimmel[1,3] — [1]Institute of Applied Physics, University of Karlsruhe, D-76128 Karlsruhe, Germany — [2]Fraunhofer Institut für Techno- und Wirtschaftsmathematik, D-67653 Kaiserslautern, Germany — [3]Institute of Nanotechnology, Forschungszentrum Karlsruhe, D-76021 Karlsruhe, Germany

Carbon-carbon composites offer a unique combination of excellent mechanical properties, high thermal stability and low mass density. For the chemical vapor infiltration of pyrolytic carbon the ratio of surface area to free volume A/V plays a crucial role in understanding and modeling the deposition process. Here, the evolution of surface area and free volume during the infiltration of fiber felts was calculated quantitatively, using both an analytical approach and numerical calculations.

A/V was obtained analytically with a Boolean model using the approximation of overlapping fibers. For this model, we find that A/V increases linearly with the radius of the fibers. The model also allows to estimate surface area and free volume for felts with non-overlapping fibers for low initial filling factors.

In addition, numerical calculations of the evolution of A/V were performed. Models of felts with randomly distributed, non-overlapping fibers with different degrees of orientation anisotropy, including parallel fibers and isotropic orientation of the fibers, were generated. It is shown that A/V increases nearly linearly.

DS 24.6 Tue 15:00 P2

Growth of axially textured Bismuth layers on amorphous substrates — •Christian Patzig[1], Ingo Uschmann[2], Frank Schmidl[1], Ortrud Wehrhan[2], Matthias Grube[1], and Paul Seidel[1] — [1]Institut für Festkörperphysik, Friedrich-Schiller-Universität Jena, Helmholtzweg 5, 07743 Jena, Germany — [2]Institut für Optik und Quantenelektronik, Friedrich-Schiller-Universität Jena, Max-Wien-Platz 1, 07743 Jena, Germany

The growth of thin bismuth layers on floatglas was investigated. Thermal evaporation and Pulsed Laser Deposition (PLD) were used as deposition techniques, and X-ray diffraction by means of the Bragg-Brentano-geometry was used to investigate the crystalline structure of the layers. It could be observed that the evaporated layers show an out-of-plane - texture, in contrast to the layers grown on glas by using PLD, which in general are of polycristalline nature. The layers deposited by thermal evaporation show the c-axis as preferred direction of growth. By deposition of a thin evaporated seed layer followed by PLD, homoepitaxy could be induced, leading to a reduction of the FWHM of the rocking curves of the (003) - and respectively (006) - peak, depending on layer thickness and substrate temperature. It was possible to grow layers with an FWHM (003) $< 1°$ on amorphous floatglas. Possible applications of those layers are discussed.

DS 24.7 Tue 15:00 P2

Method of Crystallization Mechanism Control During Epitaxy from Solution-Melt — •Yewgen Baganov, Stanislav Shutov, Vladislav Kurak, and Olena Andronova — Kherson National Technical University, 24, Berislavske shose, Kherson, 73008, Ukraine

Liquid phase heteroepitaxy difficulties appeared due to chemical potentials of solution-melt and substrate are differ and lattice constants of epitaxial layer and substrate are usually mismatched lead to violation of crystallization interface. As a result, it leads to deviation of epitaxial layer thickness and composition from needed ones for realization of planar device structure based on heterojunctions.