

diffraction measurements and atomic force microscopy that the lying-down configuration is suppressed if a small amount ($\leq 2\text{ML}$) of an additional molecule, i.e. PTCDI- C_8 (N,N*-dioctyl-3,4,9,10-perylene tetracarboxylic diimide), is deposited onto the pentacene prior to the F_{16}CuPc growth. Forcing the molecular arrangement exclusively to the upright-standing phase is essential for optimal charge carrier transport along the film plane as required in ambipolar transistors or the recently demonstrated organic light-emitting transistors (OLETs).

[1] D. G. de Oteyza *et al.*, Chem. Mater. **18**, 4212 (2006).

SYOE 8.35 Tue 18:00 Poster B

Evolution of structure and morphology of perylene films with different thicknesses and deposition rates — ●MARYAM BEIGMOHAMADI, PHENWISA NIYAMAKOM, AZADEH FARAHZADI, STEPHAN KREMER, CHRISTIAN EFFERTZ, PHILIP SCHULZ, THOMAS MICHELY, and MATTHIAS WUTTIG — Institute of Physics (IA), RWTH Aachen University of technology 52056 Aachen, Germany

A systematic study of the growth of highly ordered perylene films deposited on amorphous substrates is presented. The dependence of the structure and morphology of the films on thickness and deposition rate is characterized by Atomic Force Microscopy (AFM) and X-ray Diffraction (XRD). Atomic force microscopy reveals that every grain contains at least one screw dislocation. An analysis of the XRD peak profiles allowed us to determine the microstrain and vertical grain size. The changes of grain size and dislocation density with thickness and deposition rate have been analyzed.

SYOE 8.36 Tue 18:00 Poster B

Highly ordered phthalocyanine films on polycrystalline gold foil - on the — ●BISWAS INDRIO¹, SCHUSTER BRITT-ELFRIEDE¹, PEISERT HEIKO¹, NAGEL MATHIAS¹, CASU MARIA BENEDETTA¹, SCHUPPLER STEFAN², NAGEL PETER², PELLEGRIN ERIC^{2,3}, and CHASSÉ THOMAS¹ — ¹Institut für Physikalische und Theoretische Chemie, Universität Tübingen, Auf der Morgenstelle 8, 72076 Tübingen, Germany — ²Forschungszentrum Karlsruhe, Institut für Festkörperphysik, P. O. Box 3640, 76021 Karlsruhe, Germany — ³Consorcio para la Construcción, Equipamiento y Explotación del Laboratorio de Luz de Sincrotrón, P. O. Box 68, 08193 Bellaterra (Barcelona), Spain

The orientation of phthalocyanines in thin-films has been reported earlier to be determined by the possibility of "locking in" the growth mode to an orientation parallel to the substrate, and in the case of relatively rough substrates, no "lying" orientation has been observed at film thicknesses of more than a few nanometres. [1] The detailed preparation conditions however may significantly affect the substrate morphology. In particular, the parameters of the argon ion sputtering procedure may be varied, which can lead to various results. The orientation of evaporated copper phthalocyanine thin-films on differently prepared gold foils was examined by NEXAFS and Raman spectroscopy. Argon ion sputtering at higher energies leads to weakly ordered films with perpendicular orientation, while lower energies lead to highly ordered films of parallel molecules. Thus, the morphology of the substrate has to be viewed in detail for each preparation procedure.

[1] Peisert *et al.*, Surf. Sci. **600** (2006) 4024.

SYOE 8.37 Tue 18:00 Poster B

Interface Morphology Snapshots of Vertically Segregated Thin Films of Semiconducting Polymer / Polystyrene Blends — ●JAKOB HEIER¹, FERNANDO CASTRO², and ROLAND HANY¹ — ¹Empa, Swiss Federal Laboratories for Materials Testing and Research, Laboratory for Functional Polymers, Dübendorf, Switzerland — ²Departamento de Física e Matemática, Universidade de São Paulo, Ribeirão Preto, Brazil

Significant progress has been made in the photovoltaic energy conversion using organic semiconducting materials. One of the focuses of attention is the morphology of the donor-acceptor heterojunction at the nanometer scale, to ensure efficient charge generation and loss-free charge transport at the same time. Here, we present a method for the controlled, sequential design of a bilayer polymer cell architecture that consists of a large interface area. We used surface-directed demixing of a donor conjugated/guest polymer blend during spincoating to produce a nanostructured interface, which can, after removal of the guest polymer with a selective solvent, be covered with an acceptor layer. Our experimental results indicate that length-scales of interface topographical features can be adjusted from the nanometer to micrometer range.

SYOE 8.38 Tue 18:00 Poster B

Structure and unusual thermal behaviour of a prototype organic semiconductor (Diindenoperylene) — ●BERND MAIER, JÖRG IHRINGER, and FRANK SCHREIBER — Institut für Angewandte Physik, Auf der Morgenstelle 10, 72076 Tübingen

A recently suggested model for the bulk structure is compared with X-ray powder data collected at $18 < T < 298\text{ K}$ in steps of $\Delta T = 10\text{ K}$ with a modified image plate Camera (Huber) and at room temperature with an automated X-ray powder diffractometer, both in Guinier-geometry. The unit cell agrees well with the suggested model. Refinement of lattice constants (program SIMPRO) yield $b = 13.08$ (0.016), $c = 15.09$ (0.008) at 298 K and $b = 12.97$ (0.020), $c = 14.94$ (0.009) at 18 K . The thermal dependence at $18 < T < 298\text{ K}$ will be given. Due to pseudo symmetry the lattice constants (space group $P\bar{1}$) correlate strongly with atomic coordinates. A profile refinement with the Rietveld Method would solve the problem, however, there is some more work needed to evaluate a first set of approximate atomic coordinates.

In addition, a highly irreversible phase transition to high temperature phase occurs. Upon heating with a rate of 0.2 K/min the high temperature phase appears at around 370 K . The high temperature phase remains stable when cooling to 50 K . However, only part of material undergoes this transition, as both phases coexist in the whole temperature range.

SYOE 8.39 Tue 18:00 Poster B

High charge carrier mobility in organic semiconductor diphenylanthracene (DPA) — ●ASHUTOSH TRIPATHI and JENS PFLAUM — 3. Physikalisches Institut, Pfaffenwaldring 57, Universität Stuttgart, 70550 Stuttgart

In this work we focus on the growth and the electronic properties of the organic semiconductor 9,10-diphenylanthracene (DPA). DPA consists of two phenyl groups attached at the opposite (9,10)-positions of the anthracene backbone and may be considered similar to rubrene, which shows high field-effect mobility in its (ab)-plane crystal surface. Advantageously, DPA has a substantially low vapor pressure at RT, has a relatively high melting point ($\approx 430\text{ K}$) and is thermally stable upon melting.

We have grown DPA single crystals from zone-refined material and analyzed their temperature dependent electronic transport behavior. These ultra-pure single crystals exhibit both electron and hole transport. The high charge carrier mobilities measured by Time-of-Flight (TOF) at RT for electrons ($\approx 13\text{ cm}^2/\text{Vs}$) and holes ($\approx 3.7\text{ cm}^2/\text{Vs}$) make this material a prominent candidate for ambipolar device applications if one overcomes the barrier for charge carrier injection occurring at the metal-DPA-interface. The mobility behavior of holes follows a band-like transport in the high temperature regime (200K - 400K). Assuming a pure band-like conduction in the low temperature regime, the saturation of the mobility yields a valence bandwidth of the order of 2 meV, which demands for a more sophisticated approach to describe the electronic behavior of DPA.

SYOE 8.40 Tue 18:00 Poster B

Tunneling in organic thin films — ●KERSTIN KELLER, FLORIAN ROTH, and MICHAEL HUTH — Physikalisches Institut, University Frankfurt, Max-von-Laue-Str. 1, 60438 Frankfurt am Main

BEDT-TTF (ET)- and Cu-phthalocyanine (CuPc)-based organic thin films are prepared by organic molecular beam deposition (OMBD). Using an in-situ shadow mask technique planar tunnel junctions in cross-junction geometry are fabricated. This device structure is used to investigate the electronic properties of the organic thin film at low temperatures employing tunneling spectroscopy.

SYOE 8.41 Tue 18:00 Poster B

Investigation on thin films of new substituted quarterthiophene — ●KINGA ZELENETSKAYA¹, EVELIN JÄHNE¹, HANS-JÜRGEN ADLER¹, CHRISTIAN LOPPACHER², LUKAS ENG², JÖRG GRENZER³, and ANDREA SCHOLZ³ — ¹Professur für Makromolekulare Chemie und Textilchemie, Fachrichtung Chemie und Lebensmittelchemie, Technische Universität Dresden, Mommsenstrasse 4, D-01062 Dresden, Germany — ²Institut für Angewandte Photophysik, Fachrichtung Physik, Technische Universität Dresden, George-Bähr-Strasse 1, D-01062 Dresden, Germany — ³Institut für Ionenstrahlphysik und Materialforschung, Forschungszentrum Rossendorf, Bautzner Landstrasse 128, D-01328 Dresden, Germany

α,ω -dicyano substituted β,β^* -dibutylquarterthiophene (DCND-ButQT) was synthesized and fully characterized by $^1\text{H-NMR}$ and $^{13}\text{C-NMR}$, elemental analysis, UV-visible spectroscopy, DSC, TGA