in bulk heterojunctions and characterized by standard methods like current-voltage characteristics and spectral photocurrent.

SYOE 8.48 Tue 18:00 Poster B

Formation of metallic indium-phase from indium tin oxide-nanoparticles under reducing conditions and its influence on the electrical properties — •Gerrit Günther[1], Gabi Schierning[1], Ralf Theissmann[1], Robert Kruk[1], Charsten Bähtz[2], and Roland Schmechel[1] — [1]Institute of Nanotechnology, Forschungszentrum Karlsruhe, D-76021 Karlsruhe — [2]HASYLAB at DESY, D-22603 Hamburg

Tin doped indium oxide (ITO) acts as a transparent electrode in numerous organic electro-optical devices. Thin films of ITO-nanoparticles were heat-treated under reducing atmosphere. A significant improvement in conductivity of three orders of magnitude was hereby observed in the range between 350°C to 650°C, where no sintering took place, yet. This is a well known but little discussed fact for this electrode material thus motivating the investigation of ITO-nanoparticles in different gaseous atmospheres. Insitu synchrotron-XRD experiments were conducted in argon-, oxygen- and hydrogen-gas at temperatures between 25°C and 450°C. Complementary exsitu susceptibility measurements were carried out with reduced samples which were kept under inert conditions after preparation. The results revealed the formation of a metallic indium-tin-phase even under weakly reducing conditions. This metallic phase is expected to have a crucial influence on the thin films electrical and optical properties. It most likely explains the drastic increase of conductivity in the temperature region between 350°C and 650°C.

SYOE 8.49 Tue 18:00 Poster B

Influence of chamber pressure and deposition rate on structural properties and surface morphology of amorphous OVPD processed films — •Phenwisa Niyamakom[1], Maryam Beigmohamadi[1], Azadeh Farahzadi[1], Frank Jessen[2], Holger Kalisch[2], Rolf Jansen[2], Nico Meyer[3], Dietmar Keiper[3], Martin Kunat[3], Michael Heuken[2,3], Christian Effertz[1], Philip Schulz[1], Holger Schwab[4], Thomas Michely[1], and Matthias Wuttig[1] — [1]Institute of Physics (IA), RWTH Aachen University of Technology, 52056 Aachen, Germany — [2]Institute of Electromagnetic Theory, RWTH Aachen University of Technology, Kopernikusstr. 16, 52074 Aachen, Germany — [3]AIXTRON AG, Kackertstr. 15-17, 52072 Aachen, Germany — [4]Philips Technologie GmbH, Philipsstr. 8, 52066 Aachen, Germany

For Organic Light Emitting Devices (OLEDs), the absence of long-range order in amorphous films results in smooth surfaces and efficient radiative recombination, allowing for the realization of high performance organic optoelectronic devices. To tailor structure and morphology of these organic films, an understanding of the influence of deposition parameters, controlling film properties, is necessary. In this study, the Organic Vapor Phase Deposition (OVPD) was selected as the deposition technique. The influence of chamber pressure and deposition rate on α-NPD films on Si substrates has been investigated by Atomic Force Microscopy and X-Ray Reflectometry. A remarkable dependence of film roughness on these parameters has been observed. Models to account for this behavior will be presented.

SYOE 8.50 Tue 18:00 Poster B

Systematic studies on the morphology of OVPD processed films upon substrate temperature and deposition rate — •Azadeh Farahzadi[1], Phenwisa Niyamakom[1], Maryam Beigmohamadi[1], Chritian Effertz[1], Nico Meyer[2], Dietmar Keiper[2], Michael Heuken[2,4], Holger Schwab[3], Mohammad Reza Rahimi Tabar[5,6], Thomas Michely[1], and Matthias Wuttig[1] — [1]Institute of Physics (IA), RWTH Aachen University of Technology, 52056 Aachen, Germany — [2]AIXTRON AG, Kackertstr. 15-17, 52072 Aachen, Germany — [3]Philips Technologie GmbH, Philipsstr. 8, 52066 Aachen, Germany — [4]Institute of Electromagnetic Theory, RWTH Aachen University of Technology, Kopernikusstr. 16, 52074 Aachen, Germany — [5]CNRS UMR 6529, Observatoire de la Côte d'Azur, BP 4229, 06304 Nice Cedex 4, France — [6]Department of physics, Sharif University of Technology, 11365-9161 Tehran, Iran

In order to tailor and modify thin film properties to be suitable for organic light emitting devices (OLED) it is necessary to study and understand the influence of deposition parameters on thin film growth. The chosen material is α-NPD processed by organic vapor-phase deposition (OVPD). Film growth in OVPD is controlled by three independent parameters which are deposition rate, substrate temperature and chamber pressure. Our study is focused on the influence of deposition rate and substrate temperature on the film morphology. A remarkable dependence of the film morphology upon deposition parameters has been observed. A detailed quantitative morphology analysis provides excellent description of the growth mechanism of OLED films.

SYOE 8.51 Tue 18:00 Poster B

Phase separation in vacuum co-deposited pentacene/6,13-pentacenequinone thin films — •Ingo Salzmann[1], Ricarda Opitz[1], Siegfried Rogaschewski[1], Jürgen Rabe[1], Norbert Koch[1], and Bert Nickel[2] — [1]Humboldt-Universität zu Berlin, Institut für Physik, Newtonstraße 15, D-12489 Berlin, Germany — [2]Ludwig-Maximilians-Universität, Department für Physik and CeNS, Geschwister-Scholl-Platz 1, D-80539 München, Germany

Pentacene (P) and 6,13-pentacenequinone (PQ) have been vacuum co-deposited onto SiO_2 in order to control phase separation in thin films for the application as bulk heterojunctions in organic photovoltaic devices. Structural investigations by means of scanning electron microscopy (SEM) and atomic force microscopy (AFM) revealed pronounced phase separation of the two materials at length scales that turned out to be tuneable by the variation of the deposition rate. X-ray diffraction (XRD) provided evidence for polymorphism in pure films of P and PQ on SiO_2. While pure films exhibited both the bulk and thin film phase, the bulk phase is mainly suppressed within the co-deposited films (P+PQ). This was corroborated by Fourier-transform infrared spectroscopy (FT-IR) results. SEM investigations of pure and co-deposited films indicated that PQ bulk crystallites of up to 200nm height form continuous paths to the substrate and grow within a matrix formed of P and PQ thin film phases. The obtained heterojunction morphologies thus appear interesting for the application in organic-based photovoltaic cells.

SYOE 8.52 Tue 18:00 Poster B

Utilization of pentacene as a photoactivator and an exciton transporter in organic solar cells — •Ziruo Hong, Bert Maennig, Martin Pfeiffer, and Karl Leo — Institut für Angewandte Photophysik, Technische Universität Dresden, Dresden, Germany

Power conversion efficiency (ηE) of organic solar cells based on pentacene/C60 heterojunctions is mainly limited by open circuit voltage (Voc), although the extremely long exciton diffusion length (LD) of pentacene among organics is of advantage for solar cell applications.

In this work, pentacene/zinc phthalocyanine (ZnPc)/C60 multi-heterojunctions were introduced to increase Voc. Here, Voc is dominated by ZnPc/C60 interface. Excitons in pentacene layer diffuse into ZnPc layer via energy transfer, and contribute to photocurrent. Thus ηE was improved. According to quenching effect of ZnPc on luminescence from pentacene, exciton diffusion from pentacene to ZnPc was determined by efficiency of pentacene-to-ZnPc energy transfer, not LD.

Currently, we are seeking possibility of taking advantage of long LD and high hole mobility in pentacene films, to overcome two of critical shortcomings of organic solar cell materials, namely short LD and low charge carrier mobilities, by imbedding organic nanoclusters in pentacene films. The only role that the nanoclusters play pentacene matrix is as a sensitizer, i.e. transferring photon energy they absorb to pentacene, and the rest part of the photovoltaics is as same as pentacene based heterojunctions. Therefore, the limitation of short LD and low hole mobilities of some organic absorbers can be removed. The related experiment is being carried out.

SYOE 8.53 Tue 18:00 Poster B

Efficient Platform for Characterisation and Data Analysis of Organic Solar Cells — •Moritz K. Riede[1,2], Markus Glatthaar[1], Michael Niggemann[1,2], Kristian O. Sylvester-Hvid[2], Tobias Ziegler[1], Birger Zimmermann[2], Andreas W. Liehr[2], Andreas Gombert[1], and Gerhard Willeke[1] — [1]Fraunhofer Institute for Solar Energy Systems, Heidenhofstr. 2, 79110 Freiburg, Germany — [2]Material Research Center Freiburg, Stefan-Meier-Str. 21, 79104 Freiburg, Germany

Organic Solar Cells (OSCs) present a new and interesting approach to photovoltaic energy conversion with the prospects of low cost fabrication. Efficient dissociation of the photo-generated excitons and consequent charge collection is achieved by blending electron donor and acceptor materials. The resulting composite, called a „bulk-heterojunction“, acts as photovoltaic absorber. The currently most investigated donor:acceptor composite consists of the conjugated polymer poly(3-hexylthiophene) (P3HT) and the fullerene derivative 1-(3-methoxycarbonyl)-propyl-1-1-phenyl-(6,6)C_{61} (PCBM).