DS 4 Halbleitende, amorphe und organische Schichten

Zeit: Freitag 14:45–15:45 Raum: TU H107

DS 4.1 Fr 14:45 TU H107

Präparation und Charakterisierung photokatalytisch aktiver Zinndioxid-Titandioxid-Komposite — •H. Stuhldreher[1], P. Meisterjahn[1], K.-H. Müller[2] und H. Paulus[3] — [1]HTW Südwestfalen, Iserlohn — [2]HTW Südwestfalen, Soest — [3]TWS, Soest

Bei der Photokatalyse an TiO_2 werden toxische Abwässer in Anwesenheit des halbleitenden Photokatalysators mit UV-Licht bestrahlt. Dabei können photogenerierte Ladungsträger in angrenzender Phase Redoxreaktionen ausführen oder es tritt unerwünschte Rekombination auf. Durch Verwendung von SnO_2-TiO_2-Kompositen kann die Rekombination inhibiert werden und so eine Steigerung der photokatalytischen Aktivität erzielt werden. Nach Applikation des Komposits auf optisch-transparente leitfähige Elektroden (OTE) und anodischer Polarisation lässt sich die photokatalytische Aktivität zusätzlich steigern.

Als OTE werden dotierte SnO_2-Schichten eingesetzt (R= 200Ω ;T= 85%). Oberflächenanlytische Untersuchungen (SNMS) zeigen, dass die dotierten Schichten eine homogene Elementverteilung aufweisen. Antimonanreicherung an Oberfläche oder Interface tritt nicht auf.

Zur Herstellung der Komposite werden kolloidale TiO_2-Nanopartikel in ein Zinn-Sol eingearbeitet und auf der OTE appliziert. Die Kompositschichten sind sowohl elektrisch leitfähig als auch photokatalytisch aktiv. An der Oberfläche sind sowohl SnO_2 als auch TiO_2 zu erwarten, was durch Schichtanalysen mit SNMS bestätigt wird. Die photokatalytische Aktivität wurde durch Mineralisierung von Modellschadstoffen nachgewiesen und durch den Einsatz des Kompositsystems und durch Anlegen einer anodischen Spannung an die OTE zusätzlich gesteigert.

DS 4.2 Fr 15:00 TU H107

Correlation of plasma parameters and diamond-like carbon films properties — •Oleksiy Filipov, Nicolas Wöhrl, Stephan Reuter, and Volker Buck — Thin Film Technology Group, Dept. of Physics, University of Duisburg-Essen, Universitätsstr.3-5, 45141 Essen, Germany

Diamond-like carbon films such as amorphous hydrogenated a-C:H and non-hydrogenated a-C films, are amorphous materials characterized by attractive mechanical, chemical and optical properties. In order to adjust their properties to tribological and biomedical applications, DLC films were deposited onto different types of substrates by using different deposition methods such as DC-anodic arc and RF-plasma source. The films were deposited on polished (100) Si and glass substrates. The variation in process parameters such as substrate bias and gas admixture is used to influence the film properties. The plasma parameters were monitored during deposition by Langmuir probe and mass-spectrometer. The pulsed bias was applied to substrate in two modes: unipolar and bipolar. The operating gas was H_2 at different flow rates. The surface morphology of the deposited films was analysed using Scanning Electron Microscopy (SEM). Residual stress was monitored by SSIOD technique. The structural properties of the films, mostly sp^3/sp^2 ratio, were characterized by Raman Spectroscopy and by FTIR, their optical properties were ex-situ examined by UV-IR Spectroscopy.

DS 4.3 Fr 15:15 TU H107

Energy level alignment at inorganic/organic interfaces: Si(111):H/ZnPc, F_4ZnPc, F_8ZnPc and F_{16}ZnPc — •Thomas Mayer[1], Ulrich Weiler[1], Wolfram Jaegermann[1], Christian Kelting[2], Derck Schlettwein[2], Sergey Makarov[3], and Dieter Wöhrle[3] — [1]Institute of Materials Science Darmstadt University of Technology, D-64287 Darmstadt — [2]Institute for Applied Physics Justus Liebig University Gießen, D-35392 Gießen — [3]Institute of Organic and Macromolecular Chemistry, University Bremen, D-28334 Bremen

Interfaces of ZnPc and its F substituted derivatives on Si(111):H have been investigated with UPS and SXPS as model systems of a bulk composite absorber material for photovoltaic applications. Combining good absorptivity of dye molecules with good transport properties of Si is expected to result in high efficiency. A systematic variation of the energy level alignment at inorganic/organic interfaces is expected by substitution of an increasing number of hydrogen atoms of the organic molecule by fluorine atoms. Using calculated ionisation potentials, the HOMO energy levels are expected in the Anderson approximation at 0.6,1.0,1.3 and 1.7 eV below the valence band maximum of Si(111):H for ZnPc, F_4ZnPc, F_8ZnPc and F_{16}ZnPc respectively. Combining SXPS and UPS we find the experimental HOMO levels at 0.45, 1.0, 1.0 and 1.55 eV respectively below the valence band maximum, mirroring the expected general trend. Interface dipoles are considered as the cause of the discrepancies to the Anderson line up. The consequences of the line up on expected charge transfer processes will be discussed.

DS 4.4 Fr 15:30 TU H107

Organic thin films on different inorganic substrates — •Helmut Sitter[1], Andrei Andreev[1], Harald Hoppe[2], Thomas Haber[3], Detlef Smilgies[4], Niyazi Serdar Sariciftci[2], and Roland Resel[3] — [1]Institute for Semiconductor and Solid State Physics, University Linz, A-4040 Linz, Austria — [2]Linz Institute for Organic Solar Cells (LIOS), Physical Chemistry, University Linz, A-4040 Linz, Austria — [3]Institute of Solid State Physics, Graz University of Technology, Austria — [4]CHESS G-line, Cornell University, Ithaca NY 14853, USA

Recently we reported that a self-organization of para-sexiphenyl (PSP) molecules occurs during Hot Wall Epitaxy (HWE) on mica, resulting in very long crystalline, parallel oriented nano-fibers emitting blue light with dichroic ratios up to 14. In this work we use Atomic Force Microscopy and X-ray diffraction to study comparably HWE grown PSP layers on different crystalline substrates like mica and KCl. Substrate temperature, substrate type and symmetry are decisive parameters for the growth mode. In particular, while PSP grows on mica in needle-like fashion with only one preferential direction, the growth on KCl(001) is characterized by co-existence of the needles and 3D-islands. The former are the initial growth stage of the films, generating a rectangular network in accordance with substrate surface symmetry. We investigated also the growth of PSP on other crystalline substrates: MoSe2, GeS, GaN and TiO2.