DS 26: Poster II

Time: Wednesday 9:30–12:30 Location: P5

DS 26.1 Wed 9:30 P5

Glancing angle deposition on differently patterned substrates: influence of pattern period — •Christian Patzig[1], Joachim Zajadacz[1], Klaus Zimmer[1], Renate Fechner[1], Bodo Fuhrmann[2], and Bernd Rauschenbach[1] — [1]Leibniz-Institut für Oberflächenmodifizierung e.V., Permoserstraße 15, 04318 Leipzig — [2]Interdisziplänäres Zentrum für Materialwissenschaft, Martin-Luther-Universität Halle, Heinrich-Damerow-Straße 4, 06120 Halle

If in a physical vapour deposition process the substrate is tilted with respect to the particle source, the particle flux reaches the substrate under a highly oblique angle to the substrate normal, thus leading to self-shadowing of the particles on the substrate surface on a shadowing length $l = h \cdot tan(90° - \beta)$ (h... seed height, β... deposition angle). As a result, arrays of needle-like structures, slanted towards the particle flux grow, that can be tailored with a suitable substrate rotation. If the deposition is performed on patterned substrates, the template acts as an array of artificial seeds with period s, giving the possibility to grow periodically arranged nanostructures. If $s \leq l$, no inter-seed- growth should occur, resulting in a layer of periodically arranged structures. Here, the growth of Si nanostructures by ion beam sputter glancing angle deposition on bare and patterned substrates will be compared, and the influence of the patterns on the growth of the structures will be discussed. Additionally, a method to overcome the geometrical restriction $s \leq l$, by using a two-step lithography process will be shown. This method allows the growth of isolated structures with arbitrary periods that are independent from the shadowing length l.

DS 26.2 Wed 9:30 P5

Amorphous / nanocrystalline metal-silicide films prepared by surfactant sputtering with low energy ion-beam — •Kun Zhang, Hans Hofsäss, and Hayo Zutz — II. Physikalisches Institut , Universität Göttingen, Friedrich-Hund-Platz 1, 37077 Göttingen

The self-aligned silicide process have been widely applied to very large-scale integrated metal-oxide semiconductor devices due to their important properties such as low resistivity and low contact resistance to Si as well as excellent process compatibility with the standard Si process technology. Nickel-silicide is gradually replacing $TiSi_2$ and $CoSi_2$ (the most commonly used silicides), due to its low temperature of formation and less Si consumption. Platinum-silicide has relatively low Schottky barrier of 0.3 eV to p-type Si and excellent thermal stability. Surfactant sputtering is a novel, versatile sputter technique utilizing the steady state coverage of a substrate surface with up to 10^{16} /cm^2 of foreign or self atoms simultaneously during sputter erosion by combined ion irradiation and atom deposition. These surfactant atoms give rise to a steady state surface coverage of the substrate and strongly modify the substrate sputter yield on atomic to macroscopic length scales. In this study, surfactant sputtering was used to form nickel-silicide and platinum-silicide films. Si(100) substrates were eroded using 5 keV Xe-ions and 10 — 20 keV Ar ions under continuous deposition of platinum and nickel from surfactant targets, which were sputtered simultaneously by the same ion-beam. The surface topography, the composition, and the microstructure of the silicide nanocomposites have been analyzed via RBS, XRD, AFM and TEM.

DS 26.3 Wed 9:30 P5

Spectroscopic ellipsometry on large-area metamaterials — Julia Braun[1], •Bruno Gompf[1], Martin Dressel[1], and Georg Kabiela[2] — [1]1.Physikalisches Institut, Universität Stuttgart — [2]4.Physikalisches Institut, Universität Stuttgart

Metamaterials characterized by a negative refractive index form a promising new class of artificially structured materials with a large number of potential applications. In the near-infrared and visible region, the needed structures exhibit dimensions in the 100 nm range and can only be produced by electron beam lithography up to an area of some tenths of a mm^2.Unfortunately, a comprehensive ellipsometric study of their complex optical properties is not possible on such small areas.Therefore, we fabricated a large area „fishnet“ nano structure showing a periodicity of 300 nm and characterized it by variable angle spectroscopic ellipsometry and reflection Fourier-transform infrared spectroscopy in the frequency range of 4400 to 37000 cm^{-1}. As expected for a square lattice, the measured reflectance spectra are isotropic and resemble the optical behaviour of a thin gold layer with additional resonance features due to the nanostructure. A comparison of the measured reflection spectra with calculated scattering parameters S_{11} gives reasonable agreement. Contrary to this the ellipsometric data show a strong anisotropy, which can be modelled presuming an in-plane anisotropy of the sample within a multisample analysis.

DS 26.4 Wed 9:30 P5

Compositionally and structurally modified $SrTiO_3$ thin films prepared by chemical solution deposition — •Dirk Spitzner[1], Emanuel Gutmann[1], Boris Mahltig[2], Marianne Reibold[1], and Dirk C. Meyer[1] — [1]Institut für Strukturphysik, Technische Universität Dresden, D-01062 Dresden, Germany — [2]GMBU e.V., Arbeitsgruppe Funktionelle Schichten, PF 520165, D-01317 Dresden, Germany

For electronic and architectural design of functional electroceramic devices, materials with a perovskite-type of structure play a major role. For high-k dielectric, sensing and thermal switching applications the introduction of Barium into $SrTiO_3$ (STO) allows tuning the electrical properties by tuning the paraelectric-to-ferroelectric transition temperature. For thin film preparation a classic sol-gel route was modified by refluxing as well as solvothermal treatment of the as-synthesized sols. For treated sols the decomposition, phase evolution and transition behaviour differed and from X-ray diffraction (XRD) we observed a supression of foreign phases and a higher degree of compositional homogeneity. In this context also the homologous series of perovskite-related Ruddlesden-Popper (RP) phases promise an engineering of electrical properties by selecting a specific member. Exemplarily we realised the chemical solution deposition of epitaxial thin films of $SrO(SrTiO_3)_n$ RP phases ($n = 1, 2, 3$) on STO substrates [1]. Structural characteristics of the films were analysed by means of XRD and HRTEM. An application as buffer layers exhibiting tuneable dielectric properties is conceivable.

[1] E. Gutmann et al. J. Solid State Chem. **179**, 1864 (2006)

DS 26.5 Wed 9:30 P5

Erzeugung von Kupfer-Polypyrrol-Kompositschichten durch simultanen PVD/PECVD-Prozess — •Christian Walter und Volker Brüser — INP Greifswald e.V. - Germany

Nanokompositschichten aus Metallen und Polymeren haben vielfältige Eigenschaften wie beispielsweise antibakterielle Wirkung, Supraleitfähigkeit, Schutzwirkung gegen atomaren Sauerstoff sowie katalytische Aktivität und sind deshalb von sehr großem technologischen Interesse[1]. Polypyrrol-Metall-Kompositschichten sind dabei besonders interessant, da Polypyrrol durch Dotierungen mit z.B. PF_6 eine Leitfähigkeit von bis zu 1000 Scm^{-1} erreicht und an Luft sehr beständig ist[2]. Solche Polypyrrol-Schichten können mit plasmaunterstützter chemischer Gasphasenabscheidung (PECVD) erzeugt werden[3]. Durch eine Kombination dieses Verfahrens mit einer Magnetron-Sputterquelle wird es möglich, Metalle (hier Kupfer) in die Polymerschicht einzubringen. Auf diese Weise können verschiedenste Komposite erzeugt werden. Das Spektrum reicht hierbei je nach Leistung der Plasmaquellen von im Polymer eingebetteten Kupferpartikeln bis zu einer Größe von 50nm, über Kupfer(I)oxid Nanopartikel (Größe ca. 2nm) bis hin zu an das Polymer gebundenen Kupferatomen. Der Metallanteil variiert dabei von 3-30%. Gezeigt werden sowohl XPS, XRD, Cyclovoltammetrie und IR-Messungen als auch REM und AFM-Bilder.

[1]A. Malinauskas *et al.*; Nanotechnology **16** (2005) R51*R62
[2]A.B. Kaiser; Reports on Progress in Physics **64** (2001) 1-49
[3]G.J.Cruz *et al.*; Thin solid films **342** (1999) 119-126

DS 26.6 Wed 9:30 P5

Low temperature aligned deposition of carbon nanotubes for nanoscale interconnects and NEMS applications — •Sascha Hermann[1], Sergei Loschek[1], Jens Bonitz[1], Liu Ping[2], and Stefan E. Schulz[1,3] — [1]Chemnitz University of Technology, Center for Microtechnologies, 09126 Chemnitz, Germany — [2]Shanghai Jiao Tong University, Shanghai 200030, PR China — [3]Fraunhofer ENAS for Electronic Nanosystems, 09126 Chemnitz, Germany

The outstanding physical properties of carbon nanotubes (CNTs) propose a variety of new applications but so far the direct integration of CNTs in electronic devices is very challenging as high tempera-

ture is necessary for the growth of high quality CNTs. In this work we demonstrate a scalable approach for aligned deposition of SWNT arrays with the AC-dielectrophoresis technique at room temperature. For that purpose, we developed a special experimental setup where removable microfluidic channels are applied to guarantee definite and reproducible deposition parameters. Dispersions with highly purified Arc-SWNTs and dispersing agents like sodium dodecylsulfate (SDS) or sodium deoxycholate (DOC) were prepared and characterized by AFM and UV-Vis spectrometry. Electrode structures with different geometrics were fabricated and deposition of CNTs under variation of dispersion- and AC-field-parameters was performed. SEM studies showed very homogeneous, selective and aligned CNT deposition between the electrodes. I-V measurements verify good and reliable contacts with comparatively low resistances. Furthermore, we show a possible routine for the effective removal of dispersing residuals after deposition.

DS 26.7 Wed 9:30 P5

Micrometer-sized Isolated Patterns of Conductive ZnO derived by Micromoulding — •Ole F. Göbel, Johan E. ten Elshof, and Dave A. H. Blank — Inorganic Materials Science, Mesa+ Institute for Nanotechnology, University of Twente, 7500 AE Enschede, the Netherlands

We succeeded in the fabrication of large-area patterns with micrometer-sized, isolated features of a simple oxide by a technically simple patterning method.

By micromoulding a polymeric precursor solution for ZnO with an elastomeric (PDMS) mould, and a subsequent heat treatment, patterned ZnO films could be obtained. The features of the various patterns, including parallel or crossed lines and arrangements of dots, were several micrometers in diameter, and so were the spaces between them. The features were nearly isolated from each other, as the micromoulding process left behind a thin residual layer of ZnO of only about 15 nm thickness. By applying a tempering step, the transparent films could be rendered conductive. The process was applied successfully also to other oxide materials such as Bi2212 or CoFe2O4.

DS 26.8 Wed 9:30 P5

Design and construction of a novel type of magnetron sputtering deposition system for the growth of multi-component thin films with advanced properties — •Michael Austgen, Dominik Köhl, and Matthias Wuttig — I. Institute of Physics (IA), RWTH-Aachen, D-52056 Aachen

A technical realization of a novel type of magnetron sputtering deposition system is presented, which is based on a technique known as "serial co-sputtering". The enormous advantages of this technique for the deposition of multi-component materials will be outlined. The concept of serial co-sputtering is based on the possibility of dynamic material mixing during a sputter process. Therefore the system utilizes two separate sputter cathodes, whereof at least one is a rotatable. The geometry of the system is such that the surface of the primary rotatable cathode can be doped with the material of the secondary cathode independently during the main deposition process. Therefore, serial co-sputtering allows e.g. the deposition of new and tunable binary (or even ternary, if more than one secondary cathode is utilized) compositions, which for technical reasons cannot be fabricated by standard magnetron sputtering sources. Other promising applications are the fabrication of TCOs with variable dopant concentration or sputtering with an increased deposition rate achieved by intentionally implanting adequate recoil centres into the surface of the primary target.

DS 26.9 Wed 9:30 P5

Deposition and physical properties of thin TiO_2 and N-doped TiO_2 films prepared by High Power Impulse Magnetron Sputtering — •Vitezslav Stranak[1], Marion Quaas[1], Hartmut Steffen[2], Robert Bogdanowicz[3], Harm Wulff[1], Zdenek Hubicka[4], and Rainer Hippler[1] — [1]Institute of Physics, University of Greifswald, Greifswald, Germany — [2]Leibniz Institute for Plasma Science and Technology, Greifswald, Germany — [3]Gdansk University of Technology, Gdansk, Poland — [4]Institute of Physics, Academy of Science of the Czech Republic, Prague, Czech Republic

The chemical composition, optical, photocatalytic and crystallographic properties of TiO_2 and N-doped TiO_2 thin films prepared by High Power Impulse Magnetron Sputtering are studied. The phase formation on the films -anatase, rutile or amorphous TiO_2 - is adjusted by the pressure ($p \sim 0.75$ - 15 Pa) in the deposition chamber. The different crystallographic phases were determined by grazing incidence X-ray diffractometry (GIXD). XPS measurements revealed nearly stoichiometric TiO_2 composition with a small amount of incorporated N in the films. The photocatalytic activity was determined from decomposition of methylene blue. Optical parameters (n+ik, transmittance T, reflectance R and absorbance A) are measured as function of the photon energy in the UV-Vis range with spectroscopic ellipsometry (SE).

DS 26.10 Wed 9:30 P5

Preparation of dye-sensitised ZnO on textile electrodes by pulsed electrodeposition from nitrate-based aqueous solutions — •Melanie Rudolph[1], Thomas Loewenstein[1], Yvonne Zimmermann[2], Andreas Neudeck[2], and Derck Schlettwein[1] — [1]Justus-Liebig-Universität Gießen, Institut für Angewandte Physik, Heinrich-Buff-Ring 16, 35392, Gießen, Germany. E-mail: schlettwein@uni-giessen.de; Fax: +49 641 9933409; Tel: +49 641 9933400 — [2]Textilforschungsinstitut Thüringen-Vogtland e.V., Zeulenrodaer Straße 42, 07973, Greiz, Germany. E-mail: y.zimmermann@titv-greiz.de; Tel: +49 3661 611382

Metallized textile filaments were coated with ZnO/eosinY hybrid thin films by pulsed electrodeposition from aqueous mixed solutions containing zinc nitrate and eosinY. The applied potential, the pulse length and the time between two pulses were varied systematically to control the conditions of mass flow and to suppress parasitic currents. The current-time behaviour was analysed as a direct monitor of electrodeposition. The films were characterised in their structure and morphology by means of confocal laser microscopy, scanning electron microscopy and X-ray diffraction. Homogeneous and crystalline films with nanoporous structure were obtained. The variation of the pulse parameters allowed to modify the film morphology. Photoelectrochemical measurements revealed that the deposited films worked as photoelectrodes in dye-sensitised solar cells and their technical applicability as part of an energy supply of textile microelectronic systems was discussed.

DS 26.11 Wed 9:30 P5

Deposition of SiO_x thin films by microwave excited plasma jet — •Manuela Janietz and Thomas Arnold — Leibniz-Institut für Oberflächenmodifizierung, Leipzig

Thin silicon suboxide (SiO_x) films are deposited on silicon substrates using an atmospheric-pressure plasma jet that consists of two coaxial tubes. The feeding gases helium and oxygen in the inner capillary and nitrogen with small admixtures of hexamethyldisiloxane (HMDSO) vapor in the outer tube are excited by a pulsed microwave (2.45 GHz) and directed onto the substrate. Typical deposition rates range from $2{\cdot}10^{-5}$ to $1.5{\cdot}10^{-4}$ mm^3/s depending on plasma parameters. Stable and smooth films of several hundred nanometers thickness and refraction indices from 1.40 to 1.43 are grown and characterized using ellipsometry, Fourier transform infrared spectroscopy (FT-IR), X-ray photoelectron spectroscopy (XPS) and atomic force microscopy (AFM). FT-IR spectra show the presence of few Si-CH_3 and Si-H groups besides dominating Si-O-Si absorption bands. XPS confirms the low carbon content in film composition.

DS 26.12 Wed 9:30 P5

Influence of defects on the properties of the conductivity of the LAO/STO interface — •Felix Gunkel, Keisuke Shibuya, Regina Dittmann, and Rainer Waser — Forschungszentrum Jülich, Institut für Festkörperforschung, Elektronische Materialien, 52425 Jülich

The interface between $LaAlO_3$ (LAO) and $SrTiO_3$ (STO) is the most prominent example for the realization of highly conducting interfaces between two insulating oxides (e.g. [1],[2]). At least, two approaches have been made to explain the local accumulation of charge. On the one hand, STO/LAO interfaces possess a polarity discontinuity chasing electrons to move into the interface; on the other hand, oxygen vacancies are known to provide conductivity in STO. We have grown LAO thin films on (001)-STO single crystal substrates by RHEED controlled LASER-MBE. Clear RHEED intensity oscillations as well as thickness oscillations in the XRD-spectra indicate layer-by-layer growth mode and a smooth surface. For a wide range of process conditions, the STO/LAO interface is found to be conducting. The impact of stoichiometry variation in the cation or rather in the oxygen sublattice is addressed by the variation of deposition energy density and oxygen background pressure during growth. We will discuss the influence of point defects as well as extended defects on the electrical properties of the interfaces.

[1] H.Y. Hwang, A. Ohtomo, Nature 427, 423-426, 2004
[2] J. Mannhart, S. Thiel, G. Hammerl, A. Schmehl, C.W. Schneider, Science 313, 1942-1945, 2006

DS 26.13 Wed 9:30 P5

Multilayers as optical elements for X-ray microscopy — •Tobias Liese, Andreas Meschede, and Hans-Ulrich Krebs — Institut für Materialphysik, Universität Göttingen, Friedrich-Hund-Platz 1, 37077 Göttingen

Soft X-ray imaging with high amplitude contrast in the water window regime (2.3 - 4.4 nm) has become an established technique for *in-vivo* investigation of biological structures e.g. in cytology. For soft X-ray wavelength all materials have a refractive index n close to 1, so that significant refraction cannot be accomplished by conventional lenses. Therefore multilayer interference coatings formed by depositing alternating layers of two materials of differing refractive index are applied as optical elements. Requirements for optimal film reflectance are a high difference in absorption coefficient as well as high quality interfaces. For this purpose, MgO/Ti and ZrO_2/Ti multilayers with double layer periods in the nanometer range were deposited by pulsed laser deposition (PLD) on Si(111) substrates in ultrahigh vacuum. The interface structures were studied by X-ray reflectometry (XRR), transmission electron microscopy (TEM) and *in-situ* stress measurements. In this contribution, the underlying growth processes and their influence on the interface roughnesses are presented.

DS 26.14 Wed 9:30 P5

Towards understanding the structure formation of dc magnetron sputtered TiO_2 thin films — •Azza Amin, Dominik Koel, and Matthias Wuttig — RWTH University, Aachen

TiO_2 thin films are applied in a wide range of applications comprising e.g. anti-bacterial coatings that utilize the excellent photocatalytic properties of the films or optical coatings where the high refractive index enables e.g. the production of highly effective AR layer stacks. The physical properties exploited for the different applications strongly depend on the crystal structure of the films. Crystalline TiO_2 thin films typically exhibit a mixture of the anatase and the rutile phase. The challenge in thin film production, therefore, is to tailor the structure composition with the aim to enhance the specific physical property needed for the targeted application. It is therefore highly desirable to develop a comprehensive understanding of the principle mechanisms that drive the nucleation of the film into the separate crystal structures. However, especially in the case of a magnetron sputter discharge, which is preferentially used in the industries large area coating tools, there is a large set of parameters determining e.g. growth velocity and energetic impact and thereby influencing structure formation. Consequently, the growth of sputtered TiO_2 thin films at the present time is only partially understood. We will present new approaches that are aimed to establish a growth model on an atomistic scale. Special emphasis is put on the investigation of the impact of energetic particles, both during the nucleation and the post-coalescence regime of film growth.

DS 26.15 Wed 9:30 P5

***In-situ* experimental approach to the study of atomic layer deposition with atomic force microscope, X-ray photoelectron and X-ray absorption spectroscopy** — •Massimo Tallarida, Konstantin Karavaev, Krzysztof Kolanek, and Dieter Schmeisser — Brandenburgische Technische Universität, LS Angewandte Physik-Sensorik, Konrad-Wachsmann-Allee, 17, 03046, Cottbus, Germany

We describe our experimental approach to the investigation of atomic layer deposition (ALD). ALD is a powerful deposition technique for growing conformal thin films of composite materials with atomically accurate thickness on large area [1]. Despite the enormous industrial interest growing around ALD, its fundamental properties were not yet properly studied. We developed an ALD reactor for the *in-situ* investigations using XPS, XAS and AFM as experimental techniques. We studied the chemical-physical properties of the growing thin films after each deposition cycle. Here, we illustrate the recent results concerning the ALD of HfO_2 obtained using different Hf-precursors on various substrates [2]. We show how the *in-situ* investigations could deliver an important insight into the fundamental characteristics of ALD and how these information could be used to modify and optimize the deposition parameters.
[1] M. Leskelä, M. Ritala, Thin Solid Films, **409**, 138, 2002; **[2]** M. Tallarida, K. Karavaev, and D. Schmeisser, J. Appl. Phys. **104**, 064116 (2008).

DS 26.16 Wed 9:30 P5

Crystallization kinetics of ternary germanium-antimony-tellurium phase change alloys — •Malte Linn, Michael Klein, and Matthias Wuttig — I. Physikalisches Institut (IA), RWTH Aachen University, Aachen, Germany

Phase change materials, such as $Ge_2Sb_2Te_5$ and other pseudo-binary alloys, are widely used as optical storage media, especially in rewriteable DVDs or Blue Ray Disks. In the upcoming future, phase change RAMs will be competing with today's DRAM-cells and phase change memory cells replacing common Flash devices will enter the market soon. To understand and to control the optical writing and the electrical switching process in optical and electrical storage media, it is crucial to investigate the kinetic parameters, which are characteristic for each phase change alloy and which strongly depend on stoichiometry.

By isothermal annealing with a differential scanning calorimeter (DSC) and ex-situ atomic force microscope (AFM) measurements, nucleation and growth parameters can be determined and conclusions about growth velocity, activation energy and long term stability can be made. To find new and promising phase change alloys for applications, a comparison between well studied $Ge_2Se_2Te_5$ and rather unexplored materials like $Ge_8Sb_2Te_{11}$ is performed to investigate stoichiometric trends.

DS 26.17 Wed 9:30 P5

Gold work function reduction by 2.2 eV with an air-stable molecular donor layer — •Benjamin Bröker[1], Ralf-Peter Blum[1], Johannes Frisch[1], Antje Vollmer[2], Oliver T. Hofmann[3], Ralph Rieger[4], Klaus Müllen[4], Jürgen P. Rabe[1], Egbert Zojer[3], and Norbert Koch[1] — [1]Institut für Physik, Humboldt-Universität zu Berlin, Newtonstrasse 15, D-12389 Berlin, Germany — [2]Berliner Elektronenspeicherring-Gesellschaft für Synchrotronstrahlung mbH, D-12489 Berlin, Germany — [3]Institut of Solid State Physics, Graz University of Technology, Petersgasse 16, A-8010 Graz, Austria — [4]Max Planck Institut für Polymerforschung, Ackermannweg 10, D-55128 Mainz, Germany

Ultraviolet photoelectron spectroscopy was used to investigate neutral methyl viologen (1,1'-dimethyl-1H,1'H-[4,4']bipyridinylidene, MV0) deposited on Au(111) surfaces. As a result of molecule-to-metal electron transfer, the work function of Au(111) was decreased from 5.5 eV to 3.3 eV. The energy levels of electron transport layers deposited on top of modified Au surfaces were shifted to higher binding energy compared to layers on pristine Au, and the electron injection barrier was reduced by 0.8 eV for tris(8-hydroxyquinoline)aluminum (Alq3) and by 0.7 eV for C60. The air-stable donor MV0 can thus be used to facilitate electron injection into organic semiconductors even from high work function metals.

This work is financially supported by European Community project "IControl" (EC-STREP-033197).

DS 26.18 Wed 9:30 P5

Surface modification of Silicon-Based Light Emitters for smart Biosensing — •Charaf Cherkouk, Lars Rebohle, Wolfgang Skorupa, and Manfred Helm — Institute of Ion Beam Physics and Materials Research, Forschungszentrum Dresden Rossendorf, POB 510119, D-01314, Germany.

A new concept for measuring the concentration of estrogen in drinking water by using Si-based integrated light sources for direct fluorescence analysis is presented.

One of the main steps for this sensor concept is the chemical modification of the chip surface. A novel Method to derivatize the surface of a silicon dioxide layer serving as a passivation layer for the sensor with N, N-Bis (3-aminopropyl)-2-butene-1, 4-diamine (APS), and N-(3-(Trimmethoxysilyl)-propyl)-diethyl (Det-APS) has been developed and optimized. This method uses a special chamber and is based on spin coating and spraying in nitrogen atmosphere. The electroluminescence measurements showed that there is no loss of transparency of the silicon dioxide layer due to the surface modification. The structure of the SiO_2 surface, the APS and the Det-APS layers was characterized by Infrared spectroscopy (FTIR) and X- ray photoelectron spectroscopy (XPS). Atomic force microscopy was used to investigate the roughness of the surface. The results give proof of a dense coverage with enough functional groups such as NH_2 for the adsorption of the estrogen receptor.

DS 26.19 Wed 9:30 P5

Titanium Oxynitride films by Unfiltered Arc Deposition — •Andreas M. Zoll and Roger Thull — Lehrstuhl und Abteilung für Funktionswerkstoffe der Medizin und Zahnheilkunde, Universitätsklinikum Würzburg, Pleicherwall 2, D- 97070 Würzburg

The presented titanium onynitride films are deposited using unfiltered arc sputtering technique on polycrystalline titanium and glass surfaces. The substrate temperature varied between 130 and 160 °C.

Starting with titanium oxide films an increasing fraction of oxygen was substituted with Nitrogen. Thereby the total pressure was kept constant for all coating processes.

While the titanium oxide film consisted mainly of anatase with only a small amount of rutile, titanium oxynitride films show an increasing amount of rutile although temperature was kept at the same level. Diffraction peaks orohinating from osbornite could not be detected.

Resistance measurements by means of the four-point probe show a nearly exponential decreasing of the electric resistance in terms of the fraction of Nitrogen.

A reduction of the band gap energy could also be determined by means of photoreflectance and electroreflectance spectroscopy.

DS 26.20 Wed 9:30 P5

Gold Nano-Dot Matrices for Light-Coupling into Wave-Guided Modes of Thin Membranes — •Susanne Perlt, Marisa Mäder, Thomas Höche, and Bernd Rauschenbach — Leibniz Institute of Surface Modification, Permoserstrasse 15, D-04318 Leipzig, Germany

Well-ordered gold dot arrays on membranes possess surface plasmons capable of interacting with optical waveguides underneath [1].

Such matrices can be obtained by Diffraction Mask Projection Laser Ablation (DiMPLA) [2]. A thin metal film is illuminated by a laser pulse (Excimer laser, 248 nm (KrF) and 193 nm (ArF), 25 ns and 10 ns, respectively) with a laterally modulated intensity distribution. The pattern is created by phase-mask projection interference and gets demagnified by passing through a Schwarzschild reflective objective. Parts of the thin film are ablated whereas the remaining material forms dot structures of minimized surface energy within the heat sinks.

The correlation between film thickness, dot size, and laser fluence, respectively, is studied here. Furthermore, the dependency between structure size of the phase mask and parameters of the ablated film (like dot size and distance of the dots) are discussed. This investigation is an important precondition to proceed with further studies of well-ordered gold nanostructures on thin membranes and their utilization to couple light into wave-guided modes of these membranes.

References

1) L. Eurenius et al., Nature Photonics 2 (2008) 360

2) M. Mäder et al., J. Laser Micro/Nanoeng. 3, 9 (2008)

DS 26.21 Wed 9:30 P5

A Silver Containing Liquid Alloy Ion Source — •Paul Mazarov[1], Lothar Bischoff[2], Wolfgang Pilz[2], and Andreas D. Wieck[1] — [1]Lehrstuhl für Angewandte Festkörperphysik, Ruhr-Universität Bochum, 44780 Bochum — [2]Institut für Ionenstrahlphysik und Materialforschung, Forschungszentrum Dresden-Rossendorf, PF 51 01 19, 01314 Dresden

A Silver-Germanium Liquid Alloy Ion Source (LAIS) was developed and is available. Good beam performance was obtained for application in any commercial focused ion beam (FIB) system. Emission current dependent measurements were carried out of the mass spectra and energy spreads of all ion components. The ratios of doubly- and single-charged clusters to single-charged monomer ions were determined.

The AgGe-LMAIS can be very helpful for controlled formation of silver quantum wires.

[1] Thibaut Capron et.al. Phys. Rev. **B77**, 033102 (2008).

DS 26.22 Wed 9:30 P5

Alloy Liquid Metal Ion Sources for new FIB applications — •Lothar Bischoff[1], Wolfgang Pilz[1], Paul Mazarov[2], and Andreas Wieck[2] — [1]Forschungszentrum Dresden-Rossendorf, Institut für Ionenstrahlphysik und Materialforschung,PF 510119,01314 Dresden, Germany — [2]Lehrstuhl für Angewandte Festkörperphysik, Ruhr-Universität Bochum, 44780 Bochum, Germany

Recently, mass separated focused ion beams (FIB) become an increasing interest for local doping in nano-devices for optical, electrical or magnetic applications [1]. So on the basis of very stable metallic glass alloys like AuSi or AuGe with a low melting point at 365°C different ion sources were developed and tested due to their performance in FIB systems. In detail, $Au_{68}Ge_{22}B_5Ni_5$, $Au_{80}Si_{12}Sb_8$, $Au_{68}Ge_{28}Mn_{10}$ alloys were analysed concerning the on-set and emission behaviour and the mass spectra. Among clusters, molecular ions, single and doubly charged species such important ions like boron for p-doping in silicon, antimony for n-doping in silicon or manganese for quantum dot fabrication in II-VI semiconductors (CdSe, CdS, ZnS) could be extracted.

[1] L. Bischoff, NIM B266 (2008) 1846.

DS 26.23 Wed 9:30 P5

Statistical slip step evaluation in CrMn and CrNi cold worked steels by atomic force microscopy — •Nurdogan Gürkan[1], Gregor Hlawacek[1], Christian Teichert[1], Robert Sonnleitner[2], and Gregor Mori[2] — [1]Institute of Physics, University of Leoben, 8700 Leoben, Austria — [2]Christian Doppler Laboratory of Localized Corrosion, 8700 Leoben, Austria

Austenite stainless steels like CrMnN 18-21-0.66 and CrNiMoN 27-30-3-0.3 are sensitive to stress corrosion cracking (SCC). To obtain the required strength this steel type has to be cold worked which will also influence their resistance against SCC. In this investigations solution annealed, 14%, and 27% cold worked samples are used. The samples are dynamically loaded with R=0.5 at 20 Hz. Reference samples are cycled in Glycerin and a corrosive environment is simulated with a 62% $CaCl_2$ solution at 120°. The resulting slip step patterns close to the crack initiation point are statistically evaluated using atomic force microscopy (AFM) in intermittant mode under ambient conditions. Height of the slip steps as well as their distance and distribution are analyzed. The results are compared and demonstrate the importance of slip steps for the corrosive attack.

DS 26.24 Wed 9:30 P5

Pulsed laser interference lithography — •Stephen Riedel, Matthias Hagner, Paul Leiderer, and Johannes Boneberg — Universität Konstanz, Fachbereich Physik, LS Leiderer, 78457 Konstanz

Laser interference lithography with a single ns-pulse is used to structure different substrates in a single illumination step. In constrast to the common cw-laser interference lithography no resists or other preparation steps are needed. For that purpose we use a frequency doubled Nd:YAG laser (FWHM = 13ns, λ=532nm) and intensities between 50-200mJ. We split the beam into several parts and redirect them onto the sample surface. We compare results for metal and semiconductor thin films as well as for bulk surfaces. We find distinct differences between silicon, germanium and bismuth films on the one hand and gold and tantalum films on the other hand. From these results we propose a model for the ongoing processes.

DS 26.25 Wed 9:30 P5

Optical, electrical and structural characterization of novel phase change materials — •Anja Herpers, Michael Woda, and Matthias Wuttig — 1. Physikalisches Institut IA, RWTH Aachen University, Aachen, Germany

Phase Change Materials (PCM) are alloys, which can be used in a variety of applications in information technology. Information is stored using the transformation of small regions of a thin film between the crystalline and amorphous state. This phase change is accompanied by a remarkable change of properties such as the electrical resistivity and the optical reflectivity. Furthermore the transition between both states is extremely fast at elevated temperatures but negligible at room temperature. This property portfolio is attractive for storage applications. The corresponding materials are already used in rewriteable optical data storage media such as DVD and Blu-Ray-Discs, and are promising candidates for novel non-volatile electronic memory devices such as Phase Change Random Access Memories.

In this study the structural, optical and electrical properties of two materials, i.e. $Ag_4In_3Sb_{67}Te_{26}$ and GeSe are investigated. X-Ray diffraction and X-Ray reflection measurements reveal changes in the crystal structure and the film density upon crystallization. DSC measurements provide the crystallization temperature. The optical properties in an energy range of 0.025-5.3 eV are determined combining ellipsometry and FTIR experiments. Sheet resistance measurements in the van-der-Pauw-geometry enable the measurement of the electrical properties between 300 and 600 K.

DS 26.26 Wed 9:30 P5

Electronic properties of phase change materials — •Karl Simon Siegert, Carl Schlockermann, Hanno Volker, and Anja

Herpers — 1^{st} Institute of Physics 1A, RWTH Aachen University, Aachen, Germany

Phase change materials such as $Ge_2Sb_2Te_5$ or GeTe offer unique physical properties that make them interesting for several technical applications. These materials show significant changes in optical and electrical properties upon an atomic rearrangement such as crystallization. The technological use of $Ge_2Sb_2Te_5$ in DVD-RAMs, for instance, is already well established. It is due to the profound optical contrast between the amorphous and the crystalline cubic phase as well as the fast crystallization kinetics. Because of their electronic properties, e.g. a high resistivity contrast between the different states, phase change materials are promising candidates for a new non volatile computer memory. Although some companies have already presented prototypes of new memory chips using this technology, the electronic properties of this class of materials are not well understood and are still subject of intensive research. Our work focuses on electronic properties of phase change materials. We have analyzed thin films of phase change material deposited by sputtering. The determination of the electrical resistance of the films and its dependence on several different parameters such as the temperature and thickness of the film was the object of our investigation. To determine the relevant properties, the van-der-Pauw method to obtain geometry-independent sheet resistance data was employed together with XRR measurements for film thickness determination.

DS 26.27 Wed 9:30 P5

Condensation of silicon monoxide studied by infrared spectroscopy — •Steffen Wetzel, Markus Klevenz, Elin Granas, and Annemarie Pucci — Kirchhoff-Institut für Physik der Universität Heidelberg, INF 227, 69120 Heidelberg

Silicon oxides are materials of big interest from microelectronics to astronomy; their dielectric properties determine emission spectra of stellar objects and the use as insulators in semiconductor industry. The condensation and annealing processes of silicon monoxide (SiO) under ultra-high vacuum (UHV) conditions have been studied in situ by infrared (IR) spectroscopy. The optical properties obtained from transmission and reflectance measurements will be presented and compared to the latest literature data. Upon annealing a temperature and time dependent shift of the main vibrational frequency was observed which will be discussed in detail.

DS 26.28 Wed 9:30 P5

Conductivity of ion tracks in doped tetrahedral amorphous carbon. — •Hans-Gregor Gehrke[1], Anne-Katrin Nix[1], Johann Krauser[2], Christina Trautmann[3], Alois Weidinger[4], and Hans Hofsäss[1] — [1]Georg-August Universität, Göttingen, Deutschland — [2]Hochschule Harz, Wernigerode, Deutschland — [3]Gesellschaft für Schwerionenforschung, Darmstadt, Deutschland — [4]Helmholtz-Zentrum Berlin für Materialien und Energie, Berlin, Deutschland

Conductive ion tracks in tetrahedral amorphous carbon (ta-C) are created by swift heavy ion irradiation. The aspect ratio of the nanosized filaments with a diameter of about 8 nm depends on film thickness. Our group has studied the electrical conduction behavior in the past. The dominant transport mechanism of the ion tracks at low temperatures is variable range hopping. The conductivity of the ion tracks can be altered by doping the ta-C matrix with impurities. These new defects increase the number of hopping sides.

In this work we analyzed the conductance of ion tracks in doped ta-C. The films were prepared with Mass selected ion beam deposition (MSIBD), co-depositing carbon and the desired dopend, such as copper. The dopent concentration is kept below 2 at% ensuring the high sp^3 bond content of the ta-C matrix. The tracks were analyzed individually by atomic force microscopy (AFM) applying a conductive cantilever and by macroscopic measurements using metal pads to contact ensembles of tracks simultaneously. The macroscopic measurements were conducted between $20-300$ K. First results comparing the conduction behavior of different impurities are presented.

DS 26.29 Wed 9:30 P5

Time dependency of electric transport in epitaxial PCMO thin films — •Björn-Uwe Meyer, Peter Moschkau, Malte Scherff, Jörg Hoffmann, and Christian Jooss — Georg-August-Universität Göttingen, Göttingen, Germany

The great diversity of electrical properties in perovskite manganites vary from insulating to metallic behaviour. Depending on doping, temperature, magnetic- and electric field the insulating manganite $Pr_{1-x}Ca_xMnO_3$ (PCMO) shows colossal resistance effects like CMR and CER. Furthermore PCMO reveals the electric pulse induced resistance (EPIR) change effect at room temperature. These pronounced resistance changes are acompanied by structural transitions i.e. polaronic order-disorder transitions. The relevant timescales of these changes are observable by the transient behaviour of the electrical conductivity and range from 20ns to several minutes, whereas long timescales are typical for low temperature switching. By means of pulsed voltage biases we investigated the time dependence of conductivity at different temperatures and applied external magnetic fields. The patterned PCMO thin films were prepared on MgO and STO substrates by ion beam sputtering and pulsed laser deposition. In addition, the samples were characterized by X-ray diffraction and, with respect to electronic phase seperation, by TEM.

DS 26.30 Wed 9:30 P5

Seebeck and Hall measurements on p- and n-TCOs — •Wilma Dewald[1], Christina Polenzky[1], Volker Sittinger[1], and Stefan Götzendörfer[2] — [1]Fraunhofer IST, Bienroder Weg 54E, 38108 Braunschweig, Germany — [2]Fraunhofer ISC, Neunerplatz 2, 97082 Würzburg, Germany

For development in the field of transparent electronics, it is necessary to synthesize transparent n- and p-conducting materials. Possible applications are transparent diodes or transparent solar cells in the future.

To characterize the thin films, we started to build up a four-coefficent-setup after Young et al. for determining the conductivity, mobility, effective mass and carrier density in semiconductors by measuring conductivity, Hall, Seebeck, and Nernst-Ettinghausen effect. Furthermore, it is possible to determine the major conducting species of the thin films for classification in p- and n-TCO.

With this poster, we present our current four-coefficent-setup including temperature-dependent Seebeck and Hall measurements on p-conducting delafossites and n-conducting ZnO:Al that were synthesized by different deposition methods like sol-gel and magnetron sputtering. The measurements show dependencies of the Hall and Seebeck coefficients on process parameters and doping.

DS 26.31 Wed 9:30 P5

Transport properties and electronic structure of Al-doped ZnO/Ag/Al-doped ZnO multilayer systems — •Martin Philipp[1,2], Christian Hess[1], Hartmut Vinzelberg[1], Martin Knupfer[1], Bernd Büchner[1], Hadia Gérardin[2], and Jacques Jupille[3] — [1]Leibnitz-Institute for Solid State and Materials Research IFW Dresden, 01171 Dresden, Germany — [2]Saint-Gobain Recherche, F-93303 Aubervilliers Cedex, France — [3]Institut des NanoSciences de Paris, Université Pierre et Marie Curie - Paris 6, France

Al-doped ZnO/Ag/Al-doped ZnO layer stacks are widely used as low-emissivity coatings for building glazing due to their high reflectance in the infrared and high transmittance in the visible spectrum. For a fundamental understanding of their physical properties, the layer stacks, which were produced by magnetron sputtering, have been investigated regarding the transport properties and the electronic structure of the silver layer. As the conductivity of the film is proportional to the reflectance in the infrared, a higher conductivity also means an improvement of the low-emissivity properties. In order to investigate the electronic structure of the multilayer stack and to observe changes in the structure by changing the interface properties, electron energy-loss spectroscopy (EELS) was performed in the low energy region (0 - 14eV). Furthermore, crystallographic characteristics of the system were determined by measuring the angular dependent elastically scattered electron pattern.

DS 26.32 Wed 9:30 P5

Charge transient spectroscopy measurements of Metal-Oxide-Semiconductor structures — Markus Arnold[1], •Axel Fechner[1], Joachim Bollmann[2], Bernd Schmidt[3], Heidemarie Schmidt[3], and Dietrich R.T. Zahn[1] — [1]Chemnitz University of Technology, Semiconductor Physics, 09107 Chemnitz, Germany — [2]Freiberg University of Mining and Technology, Institute of Electronic und Sensor Materials, 09596 Freiberg, Germany — [3]Research Center Rossendorf, Institute of Ion Beam Physics and Materials Research, 01314 Dresden, Germany

Charge transient spectroscopy (QTS) is an electrical measurement method related to deep-level transient spectroscopy (DLTS) developed originally by Lang [1]. Using QTS it is possible to measure fast charge reloading processes even in the absence of depletion regions as a func-

tion of time and temperature with different pulse voltages and pulse widths. As a result, one can determine the number and the energetic position of the traps.

Here, we will present QTS measurements on Metal-Oxide-Semiconductors structures $Al/SiO_2/Si$ Metal-Oxide-Semiconductor structures and the influence of manganese implantation into p- and n-doped silicon. The results will be compared to C-V and DLTS measurements on the same samples.

[1] D. V. Lang; Deep-level transient spectroscopy: A new method to characterize traps in semiconductors; J. Appl. Phys. 45, 3023 (1974).

DS 26.33 Wed 9:30 P5

VUV Ellipsometry of $BiFeO_3$ thin films grown by pulsed-laser deposition — •Cameliu Himcinschi[1], Ionela Vrejoiu[2], Li Ding[1], Marion Friedrich[1], Cristoph Cobet[3], Norbert Esser[3], Marin Alexe[2], and Dietrich R.T. Zahn[1] — [1]Chemnitz University of Technology, Semiconductor Physics, D-09107 Chemnitz, Germany — [2]Max Planck Institute of Microstructure Physics, Weinberg 2, D-06120 Halle, Germany — [3]Institute for Analytical Sciences, Department Berlin, D-12489 Berlin, Germany

The interest in ferroelectric and magnetoelectric multiferroic epitaxial films arises from their interesting properties and is stimulated by the potential applications in non-volatile ferroelectric memories or novel multiple state memories and devices based on magnetoelectric effects. Epitaxial thin films of bismuth ferrite, $BiFeO_3$, were deposited by pulsed laser deposition (PLD) on Nb-doped $SrTiO_3$ (100) and $DyScO_3$ (110) substrates, at Tg=650°C and 0.14 mbar O_2. Ellipsometry is a non-destructive and very sensitive surface and thin film measurement technique which can determine film thickness, surface roughness and dielectric properties of such materials with a very high precision. These materials absorb in the UV close to the end of the energy domain available in commercial ellipsometers, while the VUV range is hardly explored at all. By means of the BESSY ellipsometer, the complex dielectric constant of $BiFeO_3$ films is determined up to 9.8 eV. The optical gap of $BiFeO_3$ was determined to be 2.77 eV from a linear extrapolation of the $(\alpha E)^2$ to zero in the plot: $(\alpha E)^2$ vs. energy.[1]

[1] A. Kumar et. al, Appl. Phys. Lett. 92, 121915 (2008)

DS 26.34 Wed 9:30 P5

Determining the thermal conductivity of thin film single- and multilayers via the 3ω-method — •Erik Mehner[1], Sebastian Winkler[1], Stefan Braun[2], and Dirk C. Meyer[1] — [1]Nachwuchsgruppe Nanostrukturphysik, Institut für Strukturphysik, Technische Universität Dresden, D-01062 Dresden, Germany — [2]Fraunhofer Institut für Werkstoff- und Strahltechnik, Röntgen- EUV-Optik Dresden, Germany

Since thin thermal barrier coatings are important for applications such as microelectronics, gas turbine engines or solar-cells, nanometer-multilayer structures consisting of metals and oxides, promising extremely low thermal conductivity are of interest. A large total thermal resistance can be reached by thermal boundary resistance combined with high interface density. [1]

Thermal conductivity measurements on thin films are complex and error-prone. The 3ω-method [2], an ac-technique, shifting the measurement into the frequency domain, provides a useful method for measuring the thermal conductivity.

The nanolaminates were made of W, Al, Zr and their oxides and deposited on different substrates employing ion beam sputtering.

[1] R. M. Costescu, David G. Cahill, F. H. Fabreguette, Z. A. Sechrist, and S. M. George. Science, 303(5660), 989-990, (2004)

[2] David G. Cahill. Rev. Sci. Instrum., 61(2), 802-808, (1989)

DS 26.35 Wed 9:30 P5

Tranport properties of ultrathin AlO_x interfaces — •Miroslava Dieskova[1], Peter Bokes[1], and Andrea Ferretti[2] — [1]Physics Department FEI STU, Bratislava, Slovak Republic — [2]INFM-S3 and Physics Department,University of Modena and Reggio Emilia, Modena, Italy

We study transport properties of the ultrathin AlO_x interfaces between aluminum electrodes. We employ combination of the Landauer formulation of the electronic transport within the framework of the maximally localized Wannier functions, implemented in the computational package WanT [1][2]. Furthermore, the knowledge of Wannier functions allows direct connection between electronic transport properties and the nature of chemical bonds. We characterise two different geometrical and chemical arrangements of the oxide interface with different local electronic structure and hence with different transmission spectra. Our results indicate how transport measurements can complement experimental structural studies of these technologically important interfaces.

The work has been performed under the Project HPC-EUROPA++ (RII3-CT-2003-506079) with the support of the European Community - Reaserch Infrastructure Action under the FP6 "Structuring the European Research Area"Programme.

[1] www.wannier-transport.org

[2] A. Calzolari, N. Marzari, I. Souza, and M. Buongiorno Nardelli, Phys. Rev. B , **69**, 035108, (2004).

DS 26.36 Wed 9:30 P5

Hydrogenated diamond-like carbon films deposited on UHMW-PE — Annett Dorner-Reisel[1], Guido Reisel[2], Gert Irmer[3], and •Christian Röder[3] — [1]Förderung der Materialentwicklung und Technologie Chemnitz e.V., Germany — [2]Sulzer Metco WOKA GmbH, Barchfeld, Germany — [3]Institut für Theoretische Physik, TU Bergakademie Freiberg, Germany

The wear resistance of ultrahigh-molecular weight polyethylene (UHMW-PE) can be increased by an optimized hydrogenated amorphous diamond-like carbon coating (DLC, a-C:H). Possible applications are inlays in endoprosthetics (artificial finger, knee or hip joints, etc.). The deposition of the hydrogenated DLC coatings with thicknesses between 1 μm and 3 μm was carried out by plasma enhanced chemical vapour deposition (r.f.-PECVD). In order to verify the cohesive and adhesive adherence of the DLC films, several tribological tests were performed (scratch test, pin-on-disk-test, simulated knee prostheses wear test, etc.). The microstructure of the coatings was analysed with scanning electron microscopy, atomic force microscopy and Raman spectroscopy.

DS 26.37 Wed 9:30 P5

Transport mechanisms in magnetron sputtered transparent conducting oxide thin films: Correlating electrical properties with deposition conditions and film structure — •Michael Wassen, Dominik Köhl, and Matthias Wuttig — 1. Institute of Physics (IA), RWTH Aachen University, Germany

For industrial applications, such as the fabrication of highly efficient thin film solar cells, one of the key points is to develop transparent conducting electrodes with exceptional optical and electrical properties. Typically ITO or ZnO:Al thin films are employed for this purpose.

The influence of deposition conditions on the structure of these films has already been comprehensively investigated. An equally detailed understanding of the influence on the electrical transport properties has not been achieved as yet. Hence, the major aim of our investigation is to enhance this knowledge by developing a thorough understanding of the electrical transport properties as a function of film structure and process conditions. This goal is achieved by combining optical and electrical measurements in a wide temperature range (4K to RT) in addition with investigations of the film structure. Advanced dispersion models are utilized to describe the optical spectra in a range of 400 to 50.000 cm^{-1}. Electrical parameters are extracted from the model parameters as well as Hall, Seebeck and van-der-Pauw measurements. These approaches lead to a comprehensive understanding of the transport mechanisms. First results are shown for ZnO:Al and ITO thin films deposited by reactive magnetron sputtering using both metallic as well as ceramic targets.

DS 26.38 Wed 9:30 P5

New microfocus source for X-ray diffractometry of thin films and nano-sized materials — •Jörg Wiesmann, Steffen Kroth, Bernd Hasse, and Carsten Michaelsen — Incoatec GmbH, Max-Planck-Strasse 2, 21502 Geesthacht

The increasing importance of X-ray diffractometry with 2-dimensional detectors for materials research has lead to a rising demand for highly intense X-ray sources enabling the analysis of small, weakly scattering samples in the home-lab. Therefore, various microfocusing sealed tube X-ray sources with focal spot sizes below 100μm are available. We present the new high-brilliance microfocus source IμS. The source incorporates a combination of an extremely bright stationary air-cooled 30 W microfocus source and the newest type of 2-dim beam shaping multilayer optics, the so called Quazar optics. Measurements of thin films and nanosized materials demonstrate the possibilities of new microfocus solutions for XRD. The comparison of IμS with typical sealed tube systems shows data of outstanding quality. Especially for mea-

surements of powders in transmission geometry the IμS delivers very promising results. For small angle scattering a factor of 5 in comparison to a typical sealed tube instrument was observed when using an IμS with optics for a parallel beam.

DS 26.39 Wed 9:30 P5

GIXRD and XRD studies on epitaxial magnetite ultra thin films on MgO(001) — •Florian Bertram[1], Oliver Hoefert[1], Martin Suendorf[1], Bernd Zimmermann[1], Carsten Deiter[2], Daniel Bruns[1], Timo Kuschel[1], Lars Boewer[3], Christian Sternemann[3], Michael Paulus[3], and Joachim Wollschlaeger[1] — [1]Fachbereich Physik, Universität Osnabrück, Barbarastr. 7, D-49069 Osnabrück, Germany — [2]HASYLAB at DESY, Notkestr. 85, D-22607 Hamburg, Germany — [3]DELTA, Universität Dortmund, Maria-Goeppert-Mayer-Str. 2, D-44227 Dortmund, Germany

In recent years there is an increase in interest for ultra thin magnetic films. Magnetite films are promising candidates for room temperature spintronic devices, because magnetite is a semi-metallic material with full spin polarization on the Fermi level E_F. For such applications it is necessary to produce films of high crystal quality. MgO(001) is a good candidate as a substrate, due to the small lattice mismatch (0.31%). The samples were grown under UHV conditions and have been pre-characterized in situ by LEED and XPS.

Here we present the structure analysis of magnetite films on MgO(001) by kinematic diffraction theory to characterize the tetragonal distortion and relaxations of the magnetite films.

The GIXRD measurements were performed at HASYLAB/DESY at beamline BW 2 and at DELTA at beamline BL 9. The XRD measurements were carried out at HASYLAB/DESY at beamline W 1.

DS 26.40 Wed 9:30 P5

A Computer Program for the Analysis of High Resolution Rutherford Backscattering Spectra — •Christian Borschel[1], Martin Schnell[2], Carsten Ronning[1], and Hans Hofsäss[2] — [1]Institute for Solid State Physics, University of Jena, Max-Wien-Platz 1, 07743 Jena — [2]II. Institute of Physics, University of Göttingen, Friedrich-Hund-Platz 1, 37077 Göttingen

A variety of ion beam analysis software for simulation and fitting of Rutherford backscattering spectra (RBS) is available, however, there are different reasons motivating us to develop a new simulation and fitting program for high resolution RBS spectra recorded with an electrostatic analyzer (ESA). We use an ESA for high resolution RBS analysis of thin films and their interfaces, providing a depth resolution down to 1 nm. ESA spectra exhibit various differences compared to conventional RBS spectra, necessitating special care in the data analysis, in particular the energy resolution ΔE scales with the energy E. The analysis of concentration gradients in thin films on the nanometer scale is an interesting application of high resolution RBS. A diffusion-like Monte Carlo fit algorithm suitable to find complex concentration gradients was developed.

We present our program and demonstrate its functionality on metal-carbon multilayer thin films prepared by mass selected ion beam deposition and on the analysis of concentration gradients in Gd/Ni bilayers.

DS 26.41 Wed 9:30 P5

Phase-contrast imaging in soft x-ray scanning transmission microspectroscopy — •Stephan Wenzel[1], Jörg Raabe[2], George Tzvetkov[1], Andreas Späth[1], and Rainer H. Fink[1] — [1]Physikal. Chemie 2, Universität Erlangen, Egerlandstr.3, 91058 Erlangen — [2]Paul Scherrer Institut, SLS, Villigen, Switzerland

Scanning transmission soft x-ray microspectroscopy (STXM) has proven excellent spatial resolution (down to 20 nm) in combination with spectroscopic information to investigate ultrathin samples. The superior information relies on photon-energy specific absorption which offers high contrast in the obtained images. However, in some cases - often in soft condensed materials (e.g. mixtures of polymers) - local absorption does not exhibit sufficient contrast. It has been demonstrated in hard x-ray microscopy that phase contrast imaging enhances egdes although absorption may be small and negligible. In the soft x-ray regime, phase contrast usually plays a minor role, however, in distinct cases it may give additional information to improve image contrast. In the present PolLux-STXM (installed at the Paul Scherrer Institut, Villigen, Switzerland), we have implemented a 2D detection system (fast read-out CCD), which monitors the angular differences of the transmitted x-rays for each sample spot. Thus, vertical and horizontal phase contrast images can be generated. We will show first examples from various samples to demonstrate the advantages in phase contrast imaging in STXM. The work is funded by the BMBF under contract 05 KS1WE7.

DS 26.42 Wed 9:30 P5

Electron Spectroscopy for Chemical Analysis of Copper Oxide thin films — •Andreas Laufer, Thomas Leichtweiss, Swen Graubner, Daniel Reppin, and Bruno K. Meyer — I. Physikalisches Institut, Justus-Liebig-Institut Giessen, Germany

The copper oxide thin films (Cu_2O and CuO) have been prepared by radio frequency sputter deposition using a sintered ceramic Cu_2O target and a metallic Cu target with oxygen as reactive gas, respectively. Electron spectroscopy for chemical analysis (ESCA) of the sputtered Cu_2O and CuO thin films was performed. In contrast to Cu_2O the (Cu) $2p$ photolines of CuO show satellite structures. The satellite lines are emitted with kinetic energies lowered by about 9 eV compared to the (Cu) $2p$ photolines. Furthermore we investigated and compared the valence band regions of the Cu_2O and CuO thin films. The quantification of the copper oxide thin films using the atomic sensitivity factors (ASF) has been done.

DS 26.43 Wed 9:30 P5

Deposition of magnesium films using an anodic arc plasma source — •Oleksiy Filipov and Volker Buck — Thin Film Technology Group, Dept. of Physics, University of Duisburg-Essen, Lotharstrasse 1, 47057, Duisburg, Germany

Mg films were obtained by anodic vacuum arc technique in UHV chamber with and without hydrogen atmosphere. The films were deposited on steel substrates in order to investigate their structural properties. The variation of process parameters such as substrate bias (from 0V to 200V) and hydrogen admixture (from 0 sccm to 1000 sccm) is used to influence the film properties. The plasma parameters (electron and ion energies) were monitored during deposition by Langmuir probe, retarding field energy analyser and mass-spectrometer. The surface morphology and the grain size of the deposited films were analysed using scanning electron microscopy (SEM). The structural properties of the films were ex-situ investigated by X-ray diffraction method (XRD) and Energy dispersive X-ray spectroscopy (EDX). It is shown that the grain size in the deposited films can be varied down to 1.8 nanometers just by variation of the deposition parameters.

DS 26.44 Wed 9:30 P5

XPS and UPS investigations of Cs_2Te photo cathodes — •Mike Sperling[1], Ruslan Ovsyannikov[1], Nadja Kath[1], Sara Canzio[1], Hermann Duerr[1], Antje Vollmer[1], Sven Lederer[2], Siegfried Schreiber[2], Frank Stephan[2], Paolo Michelato[3], Laura Monaco[3], Carlo Pagani[3], and Daniele Sertore[3] — [1]HZB-BESSY II, Berlin, Germany — [2]DESY, Hamburg and Zeuthen, Germany — [3]INFN Milano, LASA, Milano, Italy

Caesium Telluride (Cs_2Te) photo-cathodes are used as sources for electron beams because of their high Quantum Efficiency (QE) and their ability to release high peak current electron bunches in a high gradient RF-gun. A rapidly unexpected decrease of the initially QE, from 10

DS 26.45 Wed 9:30 P5

Ultrathin magnetite and pure iron films on MgO(100) studied by XRR and XPS — •Bernd Zimmermann[1], Oliver Höfert[1], Florian Bertram[1], Martin Suendorf[1], Carsten Deiter[2], Lars Böwer[3], Michael Paulus[3], Christian Sternemann[3], and Joachim Wollschläger[1] — [1]Fachbereich Physik, Universität Osnabrück, Barbarastr. 7, D-49069 Osnabrück, Germany — [2]HASYLAB at DESY, Notkestr. 85, D-22607 Hamburg, Germany — [3]DELTA, TU Dortmund, Maria-Goeppert-Mayer-Straße 2, D-44227 Dortmund, Germany

Thin magnetic films offer a wide range of technological applications and are of current interest in the field of spintronics. Here iron should be used used as an example. Iron oxide as a transition metal oxide has a pool of geometrical configurations. Our films were prepared by molecular beam epitaxy on MgO (100) substrates at different temperatures. Magnesiumoxide was used as substrate to study these films on an insulator. We produced these films in UHV at above room temperature from Molecular Beam Epitaxy (MBE). For this purpose, pure iron was evaporated from a rod in low pressure oxygen atmosphere at 10^{-6} mbar and adsorbed on the substrates. We did this at room temperature and at 600K. Comparison of the significant XPS peak intensities gave us an estimation of the adsorbat thickness. Its crystallinity was verified by LEED. All films were protected by a silicon capping. The samples were studied with both X-Ray Reflectometry

(XRR) at beamlines HASYLAB W1, BW2 and DELTA BL 9 with an energy of 10 keV respectively 15.5 keV and XPS at Osnabrück.

DS 26.46 Wed 9:30 P5

Surface Electronic Structure Of Perovskite Oxides — •Christoph Raisch[1], Robert Werner[2], Reinhold Kleiner[2], Dieter Koelle[2], and Thomas Chassé[1] — [1]Universität Tübingen, Institut Für Physikalische Chemie, Auf der Morgenstelle 8 — [2]Universität Tübingen, Experimentalphysik II, Auf der Morgenstelle 14, 72076 Tübingen

We report on x-ray absorption (XAS) and photoemission spectroscopy (PES) on $La_{0.7}Ce_{0.3}MnO_3$ (LCeMO) and $La_{0.7}Ca_{0.3}MnO_3$ (LCMO) films with varying oxygen content grown by PLD on $SrTiO_3$ substrates. Our previous work[1] focused on bulk properties, but also showed how important the near-surface region is for the complete understanding of the electronic structure of the films. The samples have thus been further examined by PES and photoelectron diffraction (PED). To investigate effects of varying oxygen contents, the samples were heated in vacuum or in oxygen to adjust the amount of manganese valences, which were determined by PES. The experiments are supported by multiple scattering cluster calculations and atomic multiplet calculations. The simulations reveal the termination of the films, which is important considering all kinds of charge/spin injection experiments. Finally, the electronic structure of the surface also explains the behaviour of the XMCD signal, showing antiferromagnetic ordering at the surface and ferromagnetic coupling in bulk.

[1]Werner,R., Raisch,C., Leca,V. et al., 'Transport, magnetic, and structural properties of LCeMO thin films: Evidence for hole-doping' submitted to Phys. Rev. B.

DS 26.47 Wed 9:30 P5

Effect of annealing on surface morphology and mechanical properties on electroplated copper thin films — •Anastasia Moskvinova[1], Olena Chukhrai[1], Michael Hietschold[1], Inna Schuebert[2], and Ramona Ecke[2] — [1]Institute of Physics, TU Chemnitz , Germany — [2]Center for Microtechnologies, TU Chemnitz, Germany

The annealing influences on the morphological and mechanical properties in a copper interconnect layer deposited by electroplating (EP) were investigated. EP Cu films show a microstructural transformation at room temperature, known as self-annealing. That leads to the texture changes due to the recrystallization. The 500nm EP Cu films were deposited on the seed Cu(100nm)/TiN(20nm)/SiO_2/Si(100). Local mechanical properties were measured by nanoindentation. It was found that yield strengths of ECD Cu films are 500-600MPa. Microstructural evolution during self-annealing and annealing at different temperatures of copper thin films were investigated by electron backscattered diffraction (EBSD). Changes of the crystallographic texture of ECD Cu films were observed as a consequence of multiple twinning during self-annealing and annealing at different temperatures. It was found that texture formations depend strongly on the annealing temperatures. Increasing temperature leads to decreased sheet resistance and increased grain size and randomly oriented grains.

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Formation of metal hydrides of 8b elements under plasma exposure — Marion Quaas[1], Heiko Ahrens[2], Oxana Ivanova[2], •Harm Wulff[1], and Christiane A. Helm[2] — [1]Ernst-Moritz-Arndt Universität Greifswald, Inst. f. Biochemie, F.-Hausdorff-Str. 4, 17487 Greifswald — [2]Ernst-Moritz-Arndt Universität Greifswald, Inst. f. Physik, F.-Hausdorff-Str. 6, 17487 Greifswald

We have found a new reaction pathway to form stable 8b (Ni, Pd) metal hydride compounds under soft plasma conditions (working pressure 50 Pa, substrate temperature 450 - 550 K) The applied bias voltage was varied from 0 to -100 V.

The films were investigated by x-ray diffraction, x-ray reflectometry and atomic force microscopy.

The hydrogen incorporation takes place discontinously. To understand the phase formation we performed synchrotron investigations (Hasylab, Hamburg "Surface layers in reactive plasmas" project I-20080137).

The macroscopic kinetics of formation and decomposition processes is complex. A modified isoconversional method was used to describe the competitive reactions.

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In situ noise measurements on ion bombarded thin films: 1/f-noise as a fingerprint for amorphization — •Matthias Noske, Moritz Trautvetter, and Paul Ziemann — Institut für Festkörperphysik, Universität Ulm, D-89081 Ulm

As has been experimentally demonstrated, the crystalline binary alloy In_2Au can be transformed into an amorphous state by low temperature ion irradiation[1]. This transformation can be followed by measuring the ion induced increase of the electrical resistance as a function of the ion fluence. While this increase can be attributed to the built-up of static disorder, fluctuating atomic configurations may be present as well leading to resistance fluctuation and, as a consequence, to 1/f noise. To test such a possibility, patterned $AuIn_2$ films were irradiated with 350 keV Ar^+ ions of various fluences up to 10^{15} ions/cm^2 at 85 K. During the stepwise amorphization noise density SR spectra of the 1/f noise were taken by applying a correlation measurement technique[2] allowing detection of signals below the thermal noise. It could be shown that the spectral noise density is maximal at the percolation limit whereas the resistance approaches its final value.

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DS 26.50 Wed 9:30 P5

Atom Probe Tomography (APT) on Ti-based Silicide Contact Materials — •Kirsten Wedderhoff[1], Ahmed Shariq[1], Clemens Fitz[2], and Steffen Teichert[2] — [1]Fraunhofer Center for Nanoelectronic Technologies, Koenigsbruecker Strasse 180, 01099 Dresden — [2]Qimonda Dresden GmbH Co. & OHG, Koenigsbruecker Strasse 180, 01099 Dresden

APT is based on the field evaporation of atoms from a needle. A position sensitive detector provides the spatial information of the ions, while, the elemental information is obtained by measuring the time of flight of these ionized atoms. The introduction of the laser assisted field evaporation extends the application of this method to semiconducting or insulating materials. However, there is a significant need for data demonstrating the reliability of the method for typical material systems used in the microelectronics due to the complex nature of laser assisted field evaporation.

In this contribution, APT is applied to Titanium based layer structures which are typically used for direct transistor contacts. The examined layer stack consists of a $TiSi_2$ layer with a TiN layer on top grown by PVD followed by an annealing on a p+ - doped Si(001) substrate. Such layer stacks are well known to the microelectronic community. Hence, this sample type can be used to evaluate the opportunities and limits of APT. Particularly, the usage of unstructured samples allows the direct comparison to more common analytical methods as TEM and SIMS.

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Investigations on the relaxation behavior of metastable tensile strained Si:C alloys — •Ina Ostermay[1], Andreas Naumann[1], Felix Ulomek[2], Thorsten Kammler[3], and Volker Mohles[2] — [1]Fraunhofer-Center Nanoelektronische Technologien, Königsbrücker Straße 180, D-01099 Dresden — [2]Institut für Metallkunde und Metallphysik, RWTH Aachen — [3]AMD Saxony LLC & Co. KG, Wilschdorfer Landstraße 101, D-01099 Dresden

In order to enhance the performance of CMOS transistors, embedded epitaxial layers of Si:C and SiGe are being investigated. It is crucial to the application to avoid strain relaxation of those layers. In this work, a comparative study of the relaxation behavior of tensile strained Si:C layers as well as compressive strained SiGe due to thermal treatment is conducted. For both material systems, the relaxation phenomena were investigated by means of high resolution x-ray diffraction, reciprocal space maps around the 004 and 224 reflexes, as well as AFM and TEM analysis. The relaxation behavior of Si:C was found not to rely on the formation of dislocations as it is the case for SiGe alloys, but on the transition of substitutional carbon to interstitial carbon, or - if the thermal budget is sufficient - the precipitation of Carbides. Although the out of plane lattice constant decreases during the strain relaxation of Si:C layers, the in-plane lattice constant was found to remain unchanged from the as-deposited ones. For both alloys, models to describe the relaxation behavior are proposed.

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Interfacial effects between thin PMMA-films and solid substrates — •Andreas Weber[1], Roland Klein[2], and Bernd Stühn[1] — [1]TU Darmstadt, Experimentelle Physik kondensierter Materie,

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Interfacial effects in thin polymer films affect applications of these films in nanotechnology. Hence there has been much research on this field. One observation is that there may be a few nanometer thick interfacial layer between the polymer and the supporting substrate. Many factors influence the development of these layers: chemical composition of the polymer, characteristics of the polymer as tacticity and molecular weight, character of the substrate and preparation method of the thin film.

X-ray reflectivity measurements allow to investigate the density profiles normal to the surface of such systems at the nanometer scale. The well-known Fresnel reflectivity of the subtrate is superposed by "Kiessig fringes" which are caused by interference due to the thin layer on top of the substrate. Periodicity and amplitude of these fringes are related to the thickness and density of the layers.

We investigate reflectivity data of thin PMMA-films of different tacticity on silicon wafers, glass substrates and polycarbonate discs to study which of the above mentioned factors lead to an interfacial layer. The polymer films are spin-coated onto the substrates. Data analysis is performed by means of a method proposed by Sanyal et al. which bases upon the distorted wave born approximation.

DS 26.53 Wed 9:30 P5

Electrical characterization of USJs in Boron doped Si — •Marcel Ogiewa[1], Michael Zier[2], and Bernd Schmidt[2] — [1]Fraunhofer Center for Nanoelectronic Technologies, Koenigsbruecker Strasse. 180, D-01099 Dresden, Germany — [2]Forschungszentrum Dresden-Rossendorf, Bautzner Landstraße 128, D-01328 Dresden, Germany

The demand for higher performance and better productivity in semiconductor industry causes device sizes to shrink continuously. The reduction in transistor area is achieved by shortening the length of the gate oxide. Due to the well-known scaling rules, this affects other size parameters as well, e.g. demands for ultra shallow dopant profiles to form the junctions. This in turn allows for shorter reaction times. Here, the dopant concentration is higher than the solubility in the substrate and thus the ion implantation dose only cannot yield sufficient information about the dopant behavior, e.g. the spatial profile and electrical activation.

Hence there is a need for techniques to determine these parameters in ultra shallow junctions (USJs). Due to the thin layers, conventional SPM methods cannot yield all the necessary information. We developed a measuring station to determine a depth profile by stepwise oxidation (SWOP) with nanometer resolution of electrical parameters, e.g. the sheet resistance. The dopant concentration can be obtained by hall measurements, where we also aim to obtain a depth profile. The feasibility of this technique is shown by calibration data and first measurement results on relevant doped samples.

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Real-time STM growth observations of Mo/Si multilayer systems — •Vincent Fokkema, Jan Verhoeven, and Marcel Rost — Kamerlingh Onnes Laboratory, Leiden University, P.O.Box 9504, 2300 RA, Leiden, The Netherlands

For the very first time, in situ, real-time STM studies are performed on the formation of Mo/Si multilayer systems. These multilayers will be used as mirrors in the next generation extreme UV and X-ray lithography. An important figure of merit of these mirrors is the reflectivity, which scales with the Mo/Si interface smoothness. When Mo grows on Si, the formation of Mo_xSi_y at the interface degrades its sharpness and thus diminishes the reflectivity. In addition, it is suggested that the Mo-silicide introduces roughness by influencing the growth of the polycrystalline Mo layer. Little is known of the atomic details that govern the silicide formation and the growth processes that determine the Mo layer morphology. We have developed an STM that is capable of imaging film growth during deposition enabling a unique look on these processes. We present first results of our new STM when applying it to the Mo nucleation and growth on Si.

DS 26.55 Wed 9:30 P5

Monte Carlo simulations for focusing elliptical guides — •roxana valicu[1] and peter böni[2] — [1]FRM2, Garching,München — [2]E20, TU München

The aim of the Monte Carlo simulations using McStas Programme was to improve the focusing of the neutron beam existing at PGAA (FRM II) by prolongation of the existing elliptic guide (coated now with supermirrors with m=3) with a new part. First we have tried with an initial length of the additional guide of 7,5cm and coatings for the neutron guide of supermirrors with m= 4, 5 and 6. The gain (calculated by dividing the intensity in the focal point after adding the guide by the intensity at the focal point with the initial guide) obtained for this coatings indicated that a coating with m=5 would be appropriate for a first trial. The next step was to vary the length of the additional guide for this m value and therefore choosing the appropriate length for the maximal gain. With the m value and the length of the guide fixed we have introduced an aperture 1 cm before the focal point and we have varied the radius of this aperture in order to obtain a focused beam. We have observed a dramatic decrease in the size of the beam in the focal point after introducing this aperture. The simulation results, the gains obtained and the evolution of the beam size will be presented.

DS 26.56 Wed 9:30 P5

Electrochromic properties of WO_x thin films on ZnO:Al (AZO) substrates — •Thomas Leichtweiss, Jennifer Stiebich, Angelika Polity, and Bruno K. Meyer — Justus- Liebig- Universität Gießen, I. Physikalisches Institut, Heinrich-Buff-Ring 16, 35392 Gießen

Electrochromic materials such as tungsten oxide in contact with a suitable electrolyte change their optical transmission upon the application of a potential due to ion intercalation. Technical applications include switchable mirrors and smart windows. The latter are made up of several thin-film layers containing at least one electrochromic active material and make it possible to control the light- and energy-input of a building. In such a device the electrochromic layer is deposited on top of a transparent conductive oxide film (TCO) for electrical connection.

In this work we report on the deposition of optical active tungsten oxide layers on aluminum-doped zinc oxide films by sputtering. The effect of the deposition parameters on the electrochemical and optical properties of the films is discussed and layers with optimized coloration efficiency are presented.

Non stoichiometric WO_x layers have been therefore deposited by radio-frequency magnetron sputtering on aluminum-doped zinc oxide substrates. The electrochemical behavior of these films has been characterized by cyclic voltammetry and the Li^+-ion chemical diffusion coefficients have been evaluated by GITT (galvanostatic intermittent titration technique). Optical spectra have been recorded in-situ when charging the layers in order to calculate their coloration efficiency.

DS 26.57 Wed 9:30 P5

Influence of TCO substrate on electrochromic properties of WO_x thin films — •Jennifer Stiebich, Thomas Leichtweiss, Angelika Polity und Bruno K. Meyer — Justus- Liebig- Universität Gießen, I. Physikalisches Institut, Heinrich-Buff-Ring 16, 35392 Gießen

Electrochromic tungsten oxide thin films in contact with a suitable electrolyte change their optical transmission upon the application of a potential. A smart window device consists of an optical active and an ion storage layer which are seperated by an ion conducting electrolyte. Both electrodes are deposited on top of a transparent conductive oxide film (TCO).

In order to increase the optical tranmsission of uncoloured smart windows the substitution of the commonly used flourine-doped tin oxide (FTO) TCO by a more transparent material should be considered.

This work concerns the influence of the interface between the TCO and the electrochromic WO_x film on the switching properties. Non stoichiometric tungsten oxide layers have been deposited by radio-frequency magnetron sputtering on flourine-doped tin oxide (FTO) and on aluminum-doped zinc oxide (AZO) substrates. The electrochemical behavior of these electrodes has been characterized by cyclic voltammetry and the Li^+-ion chemical diffusion coefficients have been evaluated by GITT (galvanostatic intermittent titration technique). The morphology of TCO- and WO_x-Layers has been analyzed by scanning electron microscopy (SEM) and atomic force microscopy (AFM).

The influence of the TCO's morphology on the electrochemical and optical properties of the tungsten oxide layers is discussed.

DS 26.58 Wed 9:30 P5

Measurements of structural and electrical properties of a pentacene layer in field effect transistors under bending stress — •vitalij scenev[1], nikolaj severin[1], Jörn-Oliver Vogel[1], Zhanh Jian[1], Stefan eilers[1], Jürgen Rabe[1], piero cossedu[2,3], analisa bonfiglio[2,3], and e orgiu[2,3] — [1]HU-Berlin, Newtonstr. 15, GErmany — [2]University of Cagliari, , Piazza di Armi, Cagliari, Italy —

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The increasing interest in organic thin-film transistors (OTFTs) for low cost flexible electronic devices has stimulated research into strain induced changes of OTFT's electrical characteristics. A pronounced sensitivity of the device characteristics to the organic layer deformation has been attributed to strain induced morphological changes. However, we are not aware of any in-situ measurements which would demonstrate the assumed morphological changes of the organic layer. Here we demonstrate an experimental setup and first results of simultaneous measurements of electric properties and surface morphology employing scanning force microscopy for a pentacene based OTFT. The strain of the device is induced in a controlled and reversible manner with a special grip construction.

DS 26.59 Wed 9:30 P5

Production and characterisation of periodic and chirped La/B_4C-multilayer-mirrors for the reflection of ultra short XUV-pulses — •Maike Lass[1], Stefan Hendel[1], Florian Bienert[1], Marc D. Sacher[1], Wiebke Hachmann[1], Franz Schäfers[2], and Ulrich Heinzmann[1] — [1]Molecular and Surface Physics, Bielefeld University, D-33615 Bielefeld — [2]Helmholtz-Zentrum Berlin für Materialien und Energie, Elektronenspeicherring BESSY II

The applicability of reflective optical components for the soft X-Ray region depends upon the existence of multilayer-optics. For the photon energy range of 100-190eV Lanthanum (La) is favoured as the absorber material and Boroncarbide (B_4C) as the spacer material. Thin periodic and aperiodic (chirped) layer systems of those materials with double layer periods of 3.5nm have been produced by UHV Electron Beam Evaporation combined with Ion Polishing to decrease the interface roughness and thus to increase the reflectivity. In-situ layer thickness control is done by X-Ray Reflectometry and single-wavelength Ellipsometry. The characterisation of the layer purity is done by ex-situ Sputter Auger Spectroscopy, whilst structural analysis is performed by X-Ray Diffraction, Transmission Electron Microscopy and at-wavelength reflectivity measurements with Synchrotron radiation at the BESSY II facility. We report on reflectivities of periodic and aperiodic multilayer-mirrors.

DS 26.60 Wed 9:30 P5

Properties of hydrogenated amorphous silicon thin film solar cells deposited at high base pressure — •Jan Woerdenweber[1], Tsvetelina Merdzhanova[1,2], Aad Gordijn[1], Wolfhard Beyer[1,2], Helmut Stiebig[2], and Uwe Rau[1] — [1]Forschungszentrum Juelich, Germany — [2]Malibu GmbH & Co. KG, Bielefeld, Germany

In thin film silicon solar cell technology, the base pressure of the process appears as an important cost factor. The intention of this study is to investigate to what degree deposition conditions like total process gas flow and deposition rate allow the preparation of solar cells with high stable efficiencies at high base pressures (up to 10^{-4} Torr). Series of solar cells with various oxygen contaminations were prepared using an intentional oxygen leak. A high total gas flow and high deposition rate (via high RF power) are found to favor the suppression of oxygen incorporation. Thus, the tolerated oxygen flow can be increased by two orders of magnitude. The increase in deposition rate (from ≈ 0.2 nm/s to ≈ 0.5 nm/s) reduces the oxygen incorporation in the intrinsic absorber layer only for low total gas flows (e.g., by a factor of 10 at 10^{-5} Torr). At high total gas flows no significant change of the incorporation probability with increasing deposition rate is observed. Degradation losses (1000 h of light-soaking at 100 W/cm^2 irradiation and at 50°C) in efficiency for uncontaminated cells are ≈ 18

DS 26.61 Wed 9:30 P5

Photoluminescence Properties of Thin Films of Nanoporous Alumina — •Piotr Hamolka, Igor Vrublevski, Vitaliy Sokol, Dmitriy Shimanovich, and Vladimir Parkoun — Hybrid Technology Lab, Department of Nano and Microelectronics, Belarussian State University of Informatics and Radioelectronics, P.Brovki str. 6, 220013, Minsk, Republic of Belarus

Thin nanoporous alumina films for this study were formed using anodizing of Al foils (99.999% purity) with thickness of 25.0 microns in 0.3M oxalic acid solution at 18 °C. The luminescence properties of as-anodized and annealed porous alumina films were investigated using a fluorescence spectrophotometer. Xe lamp was the excitation light source. Annealing of specimens was carried out in air at temperatures from 100 up to 600 °C. Based on photoluminescence (PL) measurements, it has been revealed that the observed blue PL band is asymmetrical. It can be divided into two sub-bands by Gaussian fit. Our experiments have shown that intensity of blue PL band increases with elevation of annealing temperature and reaches maximum for specimens annealed at temperature of about 500 °C.