assisted biaxially textured substrates) [1], epitaxially grown ceramic buffer layers and also textured ceramic buffer layers like YSZ (yttria stabilized zirconia), which were deposited with the so-called IBAD technology (ion-beam assisted deposition) [2]. Our measurements will be compared to the results using conventional sealed-tube setups.

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Keywords: texture studies; two-dimensional diffraction; thin films

FA2-MS06-P09

Effect of Sn Dopant on the Crystalline Structure of Sol-Gel Coated ZnO Film. Yasemin Caglar[a], Mujdat Caglar[a], Saliha Ilican[a]. [a]*Anadolu University, Department of Physics, Eskisehir, Turkey.*
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Undoped and Tin doped zinc oxide (ZnO and ZnO:Sn5%) films have been prepared by sol-gel process using spin coating method. Zinc acetate dehydrate was used as starting materials. 2-methoxyethanol and monoethanolamine were used as a solvent and stabilizer, respectively. The dopant source is tin cloride. The coating solution was dropped into glass substrate, which was rotated at 3000 rpm for 30 s using a spin coater. After the spin coating, the film was dried at 300 oC for 10 min in a furnace to evaporate the solvent and to remove organic residuals. This coating/drying procedure was repeated for ten times before the film was inserted into a tube furnace and annealed at 450 oC in air for 1 h. The crystal structure and orientation of the films have been investigated by X-ray diffraction method. The films have the polycrystalline structure and (002) as the preferred orientation. The information on strain and crystallite size was obtained from the fullwidths-at-half-maximum (FWHM) of the diffraction peaks. The texture coefficient and lattice parameters of the films were also calculated. The deformation in crystalline structure of the ZnO film was observed due to Sn incorporation.

Keywords: metal oxides; sol-gel method; X-ray diffraction and structure

FA2-MS06-P10

XRD Study of Indium Oxide Film Deposited by Sol-Gel Spin Coating. Mujdat Caglar[a], Saliha Ilican[a], Yasemin Caglar[a], Fahrettin Yakuphanoglu[b]. [a]*Anadolu University, Department of Physics, Eskisehir, Turkey.* [b]*Firat University, Department of Physics, Elazig, Turkey.*
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Transparent-conducting oxide (TCO) film coatings are important in a number of optoelectronics devices including photovoltaic cells. In this study, Indium oxide film has been prepared by sol-gel process using spin coating method. Indium III chloride, 2-methoxyethanol and monoethanolamine were used as a starting materials, solvent and stabilizer, respectively. A liquid film on glass substrate was formed in a spinning-coater at a spinning speed 2000 rpm for 30s. After the spin coating, the film was dried at 120 ^{o}C for 10 min in a furnace to evaporate the solvent and to remove organic residuals. This coating/drying procedure was repeated for ten times before the film was inserted into a tube furnace and annealed at 300 ^{o}C in air for 45 min. The heat treatment temperature was selected 400 ^{o}C and 500 ^{o}C (in air for 1 h). The crystal structure and orientation of the films have been investigated by X-ray diffraction method. Indium oxide film has polycrystalline structure. Some structural parameters such as texture coefficient, lattice parameters, grain size of the film were calculated. Surface morphology of the film has been also analyzed by a scanning electron microscope (SEM). The enhanced in crystalline structure of the Indium oxide film was observed due to heat treatment.

Keywords: metal oxides; sol-gel method; X-ray diffraction and structure

FA2-MS06-P11

Effects of Plastic Deformation and Inhomogeneous Thermal Fields During Grinding and Milling on the Real Structure of Steels. Zdenek Pala[a], Nikolaj Ganev[a], Jan Drahokoupil[a,b]. [a]*Department of Solid State Engineering, Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University in Prague, Prague, Czech Republic.* [b]*Department of Metals, Institute of Physics,Academy of Sciences of the Czech Republic, Prague, Czech Republic.*
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Mechanical surface treatments like grinding and milling are often used as the last machining operations and have, therefore, pronounced impact on the resulting real structure of surface layers. Since the surface itself forms an interface between the bulk and its neighborhood, knowledge of its real structure represents information which is paramount for understanding various surface-related processes as well as for surface quality assessment. An effective source offering diverse array of real structure parameters can be found in analysis of data from suitably designed diffraction experiments. Both milling and grinding are accompanied by plastic deformation and thermal fields which are inherently inhomogeneous due to the anisotropy of directional movements of the used tool. In general, two dominant physical processes are under way. Firstly, energy of plastic deformation and friction between the tool and the machined object generate heat whose presence causes creation of inhomogeneous thermal fields. These fields dynamically evolve as the whole system strives to get into thermal equilibrium and as the tool goes back and forth. Secondly, the surface layers of machined object are being removed and plastic deformation is, thus, inherently inhomogeneous. Moreover, external forces and moments are present and as soon as they cease to be in action, the object proceeds to the state of mechanical equilibrium [1] while the unloading can be

elastic or plastic. Both milling and grinding can be carried out in either up-cut or down-cut modes which differ significantly in the incidence of machining forces and, hence, in the mechanism of material removal. If different cooling environments are in usage, effect of temperature fields can be studied as well [2]. The goal of the performed X-ray diffraction analysis was to obtain detailed information about the state of macroscopic and microscopic residual stress, and mean coherent scattering domain sizes in surface layers of metals which were subjected to either up-cut or down-cut mode of either grinding or milling with various cutting and cooling conditions.

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Keywords: real structure; mechanical treatment; surface quality

FA2-MS06-P12

Defects Study of Polymorph B Enriched Zeolite Beta. Daliang Zhang[a,b], Junliang Sun[a,b], Sven Hovmöller[a], Xiaodong Zou[a,b]. [a]*Structural Chemistry, Stockholm University, Stockholm, Sweden.* [b]*Berzelii Centre EXSELENT on Porous Materials, Stockholm University, Stockholm, Sweden.*
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High silica zeolite Beta is one of the industrially important zeolites due to the catalytic properties in fluid catalytic cracking, and organic synthesis and separation. Zeolite Beta always exists as an intergrowth of two end-member structures of polymorph A (*BEA, $P4_122$ or $P4_322$) and polymorph B ($C2/c$). Stacking faults dominate all over the Beta crystals and even some large pore defects were observed[1-2]. It is important to study the defects of zeolite Beta in order to improve the synthesis and investigate new properties and applications of the materials.

A sample of typical polymorph B enriched zeolite Beta was provided by Corma and co-workers, and the synthesis procedure was described in Reference [3]. The polymorph B enriched zeolite Beta crystals show a wedge-shaped rod-like morphology. The surfaces of the crystals are not smooth but ridge-like. Generally speaking, the surfaces of most perfect crystals should be smooth; however they are not in this case. The property of crystal surfaces very often plays a major role for the properties of a material, especially when the surface structure is different from that of the balk crystals. So the study of the ridges on the surfaces of the polymorph B enriched zeolite Beta sample is very important.

HRTEM images were taken along the [1-10] direction. A TEM image in figure 1 shows that the stacking of 12-ring channels follows the *ABC* or *CBA* type stacking mode of polymorph B. These two types of stacking can be considered as two different twin components. It is very obvious that the ridge at centre shows a different stacking mode compared with the other areas. The *CBA* type stacking in the center ridge and the *ABC* type stacking for the other areas belong to different polymorph B twin components, all of them grow from the same crystal *ab* plane. Since their frameworks do not fit each other, so they have to produce large pore defects in between. This significantly increases the lattice energy and may speeds up the dissolving. Due to the symmetry of the polymorph B structure, there should be also stacking faults in the orthogonal [110] direction. The stacking behavior at the crystal surface should be also the same. The ridges can be observed along both two directions.

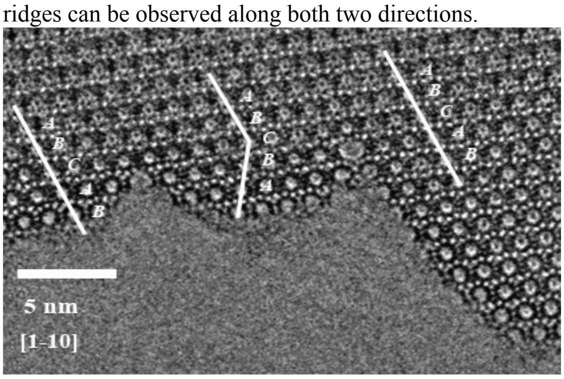

Figure 1. A HRTEM image showing ridges with different stacking modes. Large pore defecta are observed between the ridges

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Keywords: zeolite beta; HRTEM; defects

FA2-MS06-P13

Nano Properties and X-ray Crystallographic Analysis of Hard Coatings Synthesized by PVD and IBAD. Branko Škorić[a], Damir Kakaš[a], Gregory Favaro[b], Aleksandar Miletić[a]. [a]*University of Novi Sad, Serbia.* [b]*CSM Instruments SA, Peseux, Switzerland.*
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In the paper are presented characteristics of hard coatings, type TiN, produced by classic technology PVD (physical vapour deposition) and IBAD (ion beam assisted deposition). The synthesis of the TiN film by IBAD has been performed by irradiation of Ar ions at 1000 eV. Such coatings exhibit improved mechanical properties in comparison with TiN deposited by PVD. The three basic points that are considered fundamental to studies of friction are the surface area and nature of the intimate asperity contacts, the surface adhesion and shear strength, and the nature of deformation and energy dissipation occurring at the asperity junctions. The optimization procedure for coated parts could be more effective, knowing more about the fundamental physical and mechanical properties of a coating, their interdependence and their influence on the wear behaviour.The morphology and characteristics of surface layer structure as well as important properties were