

angle was 0.7 or 0.9 times the critical angle for total reflection. Thus, a depth of 2 and 3 nm, respectively, of the top-layers was probed.

For the bulk microstructure, no long-range order has been experimentally established in Pt-Rh owing to small interactions and sluggish kinetics. Only recently, weak diffuse maxima were found at $1\frac{1}{2}0$ positions. For the near-surface microstructure, typically 600 positions were measured, with about 500 counts in 200 s. After calibration and subtraction of the inelastic scattering contributions, the remaining elastic scattering was decomposed into short-range order scattering, size-effect scattering, and Huang scattering. Local order was revealed for both surfaces, but there were differences, too. For the (110) surface, the diffuse maxima were located at $1\frac{1}{2}0$ positions as for the bulk microstructure, for the (111) surface they were at $\frac{1}{2}\frac{1}{2}\frac{1}{2}$ positions. In the evaluation, surface segregation was considered negligible, an assumption that seemed justified in view of the measured and calculated segregation profiles.

Keywords: grazing incidence diffraction, alloys, short-range order

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Shape, Polydispersity and Aggregation Number of Alkyl Sulphate Micelles

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Based on the thermodynamic consideration that the micellar cores are compact and consist entirely of portions of the hydrocarbon chains, the length of the latter should limit at least one micellar dimension. Due to the fluctuations in the local electrostatic field, the hydrocarbon chains in ionic micelles with realistic aggregation numbers can fit the above spatial constraints only if the micellar shape is a prolate or oblate ellipsoid.

The recent methods of interpreting experimental data are ambiguous in this respect in that the results they provide may be compatible with each of the above given types of micellar shape. One of the reasons for this is that the scattering pattern from monodisperse spheroids can be fitted e.g. by a set of polydisperse spheres. The present work is devoted to demonstrate that the scattering patterns from alkyl sulphate micelles can be well fitted by assuming either monodisperse prolate- or polydisperse oblate ellipsoidal micelles. Because the two types of micelle have significantly different mean aggregation numbers, the decision on the shape and polydispersity may be based on independent information of the mean aggregation number stemming e.g. from thermodynamic theories.

Keywords: micelles, interfaces, scattering

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Evolution of Nanocrystallinity in Periodic Mesoporous Anatase Thin Films

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Within the last few years, many periodic mesostructured forms of titania denoted meso-TiO₂ have been produced based upon the self-assembly method. Besides the usual benefits of the self-assembly method including high surface area and uniform pore size and shape, the crystallinity and crystallite size of the anatase composing the channel walls of meso-TiO₂ are an equally important factor since potential applications rely upon the intrinsic properties of titania governed by the extent and nature of its crystalline phase. Although crystallite growth, during the film calcination step, within the mesostructured titania framework should be considered the critical step in the formation of meso-TiO₂ thin films, the issue of crystallite

growth has yet to be identified as a major determining factor with respect to the properties of meso-TiO₂ thin films and their applicability to electroactive and photoactive devices.

Herein we report the first kinetic study of the intrachannel wall phase-transition of amorphous titania to nanocrystalline anatase for periodic mesoporous titania thin films, monitored by time-resolved *in-situ* high temperature X-ray diffraction (HTXRD).^[1] Structural transformations associated with the phase transition are further probed by high-resolution scanning electron microscopy (HRSEM) and transmission electron microscopy (HRTEM). The model found to be most consistent with the kinetic data involves 1-D diffusion controlled growth of nanocrystalline anatase within the spatial confines of the channel walls of the mesostructure. The observation of anisotropic, rod-shaped anatase nanocrystals preferentially aligned along the channel axis implies that the framework of the liquid crystal templated mesostructure guides the crystal growth.

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Keywords: crystal growth, *in situ* temperature diffraction, thin-film material

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Sol-gel Synthesis and Study of LaPO₄ Doped with Cerium(III) and Ytterbium(III) Thin Films

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In this research nanocrystalline thin films of Lanthanum phosphate doped with cerium(III) and ytterbium(III) were prepared.

Lanthanum oxide reacted with hexa hydrated cerium nitrate or ytterbium oxide dissolved in nitric acid and mixed with chelating agent for the metal ions (i.e. water-ethanol solution containing citric acid). The required amount of Poly ethylene glycole (PEG) as cross-linking agent and diamonium hydrogen phosphate were also added using a sol-gel method. The product was then dried on silica glass substrate. Heating on dried films for 5 hours in the temperature range of 800-1000°C results in formation of Lanthanum phosphate doped with cerium(III) and ytterbium(III). X-ray diffraction (XRD) and FT-IR spectroscopy, SEM and Fluorimetric of doped lanthanum phosphates were presented.

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Keywords: sol-gel, lanthanum phosphate, cerium and ytterbium

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Pulsed Laser Deposition Growth of thin Hydroxyapatite Layers on Titanium Substrates

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Hydroxyapatite-based ceramics are largely applied as coatings on metallic components of prostheses for inducing osteoblasts apposition and subsequent regrowth. However the ceramics-metal interfaces are often the seat of residual stresses with amplitude primarily depending on the deposition technique and the coating conditions. The amplitude of this stress can be very high causing a failure mechanism at the interface. Our aim is to validate new methods of laser ablation deposition (PLD), making it possible to control the residual stresses in ceramic layers and adherence to titanium substrates. We present a