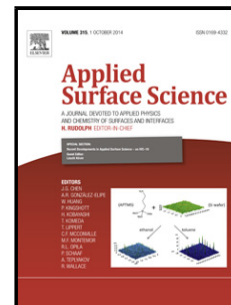


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Sol-gel synthesis of nanostructured indium tin oxide with controlled morphology and porosity

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Abstract

Nanostructured indium tin oxide (ITO) powders and thin films differing in morphology and porosity were prepared by a sol-gel method. In³⁺ and Sn⁴⁺ were hydrolyzed in aqueous medium through the use of ethanolamine (EA) or sodium acetate (AC). X-ray diffraction measurements demonstrated that both EA and AC furnished indium tin hydroxide, which became nanocrystalline after aging for one day. The indium tin hydroxide samples calcined at 550 °C afforded ITO with a cubic crystal structure, but the morphology differed significantly, depending on the agent used for hydrolysis. Electron microscopy revealed the formation of round monodisperse nanoparticles when AC was used, whereas the application of EA led to rod-like ITO nanoparticles. Both types of nanoparticles were suitable for the preparation of transparent and conductive ITO thin films. The influence of the morphology and porosity on the optical properties is discussed.

Keywords: ITO nanoparticles; sol-gel method; spin-coating; morphology; spectroscopic ellipsometry.

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