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Studies on electrochemically deposited ZnO thin films

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Abstract:

Zinc oxide (ZnO) is a technologically important II-VI compound semiconducting material with large band gap energy between 3.2 and 3.4 eV at room temperature. It is widely used in a variety of industrial and technological applications [1] in material for ultraviolet (UV) lasers, transparent conducting films, chemical sensors, solar cell windows, photonic devices in the UV range and light emitting diodes.

In this study, ZnO thin films were cathodically deposited on indium tin oxide (ITO)-coated conducting glass substrate by a potentiostatic method. The deposition potential-dependent nucleation and growth mechanism of electrodeposited zinc oxide was studied by using the chronoamperometry technique. The current transients were analyzed by fitting chronoamperometric data into the Scharifker–Hills nucleation model, which reveals an instantaneous and diffusion-limited growth of three-dimensional hemispherical islands over a wide range of applied potentials. It has been confirmed that the electrodeposition potential has a great influence on the morphology of the obtained ZnO films. X-ray diffraction measurements indicated that the as-grown films were of hexagonal wurtzite structure. It was convinced that the ZnO films showed best microstructures and morphology when the depositions were carried out at −1.3 V vs. SCE.

References

[1] Z. L. Wang, *J. Phys.: Condens. Matter* 16 (2004) R829.