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Electrodeposited boron doped ZnO films: Preparation and characterization

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As a wide-direct-band gap semiconductor with large exciton binding energy (about 60 meV), ZnO is one of the most promising semiconductor materials for the next generation of optoelectronic devices applications in nanodevices. Many useful methods have been used to prepare high quality ZnO thin films, such as, magnetron sputtering, metal-organic chemical vapor deposition, pulsed-laser deposition, molecular beam epitaxy and electrodeposition. Among these methods, the electrodeposition method has some advantages to prepare large area ZnO thin films at low cost and easy technology. Electrodeposition is well known for depositing metals and metallic alloys at the industrial level, with a wide range of applications from large area surface treatments (i.e. zinc electroplating) to most advanced electronic industries. In this study, undoped and boron (B) doped ZnO films were grown by electrochemical deposition onto p-Si substrates from an aqueous route. Aqueous solution of $Zn(NO_3)_2 6H_2O$ and hexamethylenetetramine (HMT) was prepared using triple distilled water. The different atomic ratios of H_3BO_3 were used as a dopant element. Electrodepositions were carried out in a conventional three electrode cell for the working electrode (p-Si), reference electrode (Ag/AgCl, sat.) and counter electrode (platin wire). The effects of B doping level on the structural, morphological and optical properties of B doped ZnO films were investigated by means of XRD, FESEM and UV spectrophotemeter, respectively. The optical band gap of the B doped ZnO film deposited on silicon substrate was determined using the reflectance spectra by means of Kubelka-Munk formula.

Biography

Saliha Ilican received her PhD degree from Anadolu University and is currently working in the same university. Her current research includes in the preparation and characteriaztion of nano-semiconductors and fabrication of their devices. She has published more than 73 papers in reputed journals.

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