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Investigation of structural and optical properties of nickel doped ZnO deposited by MW-CBD method

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Transparent conducting oxides having a wide band- gap (>3.0eV) are being used extensively for photovoltaic and optoelectronic devices. The physical characteristics of ZnO can be successfully optimized by doping as well as optimizing the various processing conditions. Among them, doping of ZnO with Ni is interesting as these tend to improve its optical, electrical, morphological and structural properties. In this work, we present the study on the variation on the Nickel content on the crystalline quality and optical properties of ZnO obtained by microwave chemical bath deposition (MW-CBD) on to n-Si substrate. The p-Si substrates were cleaned using the suitable procedure. 0.1 M zinc nitrate hexahydrate ($Zn(NO_3)_2.6H_2O$;ZnNt), nickel nitrate hexahydrate ($Ni(NO_3)_2.6H_2O$;NiNt) and an equal molar concentration of hexamethylenetetramine ($C_6H_{12}N_4$;HMTA) were dissolved in DI water. Doping precursor various amount of NiNt added separetly into the aqueous ZnNt+HMTA solutions. The solution was stirred 2 h at 90°C. After, solution was irradiated using a temperature-controlled microwave synthesis system at 600 and irradiation times 10 min. The films were washed with DI water to remove the remaining salt. Finally, the films were dried at 60oC for 1 h. Structural characterization of the layers was carried out using X-ray diffraction (XRD). Field emission scanning electron microscope (FESEM) was used to analyze the surface morphology of the ZnO films. The diffuse reflectance spectra of the Ni doped ZnO films were measured and the optical band gap values were determined using Kubelka–Munk theory.

Biography

Yasemin Caglar has completed his PhD from Anadolu University and is a Full Professor of Solid State Physics at Anadolu University. She is currently interested in the areas of semiconductors devices, nanoelectronics, organic electronics, metal oxide materials. She has published more than 76 papers in reputed journals, has presented 142 presentations in national/international conference and has been serving as the Editorial Board Member of repute.

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