Fabrication and characterization of pure ZnO thin films deposited by Sol – gel method

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Abstract
ZnO thin films were prepared via Sol-gel method and were deposited on ordinary glass substrate using dip coating technique. These latters undergo optical annealing using UV irradiation, during 2 hours. The starting materials used were zinc acetate dihydrate 2-methoxyethanol which was used as solvent as well as mono-ethanolamine (MEA) as stabilizer.
Structural characterization by XRD showed the formation of ZnO wurtzite structure ,the films showed a preferred orientation along the (002) plane at 2θ=34,72° after 2h irradiation with UV. Moreover, the PL measurement exhibited the of optical absorption in the UV – visible domain.
The optical direct band gap values of ZnO nanoparticles were calculated to be about 3.37 eV by optical absorption measurements, these values belong to the blue shift absorbance. The photoluminescence measurement reveals that the samples prepared exhibit intense emission band in the visible and near UV. This observation led us to practical applications in area of optoelectronic.

Keywords: ZnO thin films; Sol-gel method; UV absorption; Photoluminescence.

Structural and optical study of co doped zno thin films

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Abstract
ZnO is a n-type II-VI semiconductor with a wurtzite structure, a wide direct band gap of 3.37eV, and a large exciton binding energy of 60meV. It occupies a particular place among wide bandgap semiconductors (GaN, ZnS…), which have been actively studied because of their exceptional electrical and optical properties. There are different (physical and chemical) ways to synthesize ZnO nanostructures which improve these properties. The present study deals with to the fabrication and characterizations of ZnO thin films and Co doped ZnO with different concentrations. The samples

preparation was carried out by sol-gel method and films were deposited onto cleaned glass substrates by dip-coating technique. Zinc acetate dehydrate, cobalt acetate, methanol and ethanolamine were used as starting materials with controlled ratios. The obtained films were characterized by different techniques such as X-ray diffraction and Scanning Electron Microscopy (SEM) from which we deduce the good crystallinity of ZnO and the orientation along [002] axis of ZnO crystals. The average size of ZnO crystallites (R = 48 nm) was calculated using the Debye-scherrer formula. The UV-Visible absorption of Co doped ZnO

thin films shows a shoulder at 366 nm which indicates a size dispersion of ZnO crystallites. The observed blue shift of the absorption edge and the widening of the bandgap ΔE_g= 1,01 eV confirm the quantum confinement induced by the nanometric size of ZnO crystallites.

Keywords: Nanocrystals; thin films; Sol-gel method; XRD; SEM; UV-Visible absorption; quantum confinement.