

Effects of stabilizer ratio on photoluminescence properties of sol-gel ZnO nano-structured thin films

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Abstract: Nanostructured ZnO thin films with different molar ratios of MEA to zinc acetate (0.5, 1.0, 1.5 and 2.0) have been deposited on glass substrates by a sol-gel dip coating technique. X-ray diffraction, Scanning Electron Microscopy, UV-visible spectrophotometry and photoluminescence spectroscopy have been employed to investigate the effect of MEA stabilizer ratio on structural, morphological, absorbance and emission properties of the ZnO thin films. Diffraction patterns have shown that all the films are polycrystalline and exhibit a wurtzite hexagonal structure. The c axis orientation has been enhanced with increasing stabilizer ratio. SEM micrographs have revealed that the morphology of the ZnO films depend on stabilizer ratio. The UV-visible absorption spectra have demonstrated that the optical absorption is affected by stabilizer ratio. The photoluminescence spectra have indicated one ultraviolet and two visible emission bands (green and red), while band intensities are found to be dependent on stabilizer ratio. ZnO thin films deposited at MEA ratio of 1.0 show the highest UV emission while the minimum UV emission intensity is observed in thin films deposited at ratio of 0.5 and the maximum green has been recorded for films deposited at MEA ratio of 2.0.

Keywords : ZnO thin film, Sol-gel, Stabilizer ratio, Photoluminescence