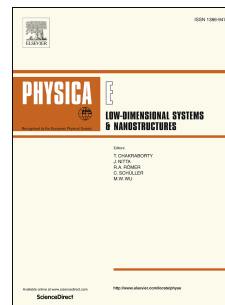


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Compositional dependence of optical and electrical properties of indium doped zinc oxide (IZO) thin films deposited by chemical spray pyrolysis

Lawrence K. Dintle ^a, Pearson V.C. Luhanga ^a, Charles Moditswe ^{b,*} Cosmas M. Muiva ^b

^aDepartment of Physics, University of Botswana, Private Bag UB0704, Gaborone, Botswana

^bDepartment of Physics and Astronomy, Botswana International University of Science and Technology, Private Bag 16, Palapye, Botswana

*Corresponding author E-mail address: moditswec@biust.ac.bw (C. Moditswe); Tel: +267 4900117;

Fax: +2674900102

Abstract

The structural and optoelectronic properties of undoped and indium doped zinc oxide (IZO) thin films grown on glass substrates through a simple reproducible custom-made pneumatic chemical spray pyrolysis technique are presented. X-ray diffraction (XRD) results showed a polycrystalline structure of hexagonal wurtzite phase growing preferentially along the (002) plane for the undoped sample. Increase in dopant content modified the orientation leading to more pronounced (100) and (101) reflections. Optical transmission spectra showed high transmittance of 80-90% in the visible range for all thin films. The optical band gap energy (E_g) was evaluated on the basis of the derivative of transmittance ($dT/d\lambda$) and wavelength (λ) model and Tauc's extrapolation method in the region where the absorption coefficient, $\alpha \geq 10^4 \text{ cm}^{-1}$. The observed values of E_g were found to decrease generally with increasing In additive. From the figure of merit calculations a sample with 4 at.% indium concentration showed better optoelectronic properties.

Keywords: In doped ZnO, Chemical spray pyrolysis, Optoelectronic properties, Structural properties

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