

# Abstract

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## **Synthesis, Characterization and Fabrication of Gas Sensor Devices Using ZnO and ZnO:In Nanomaterials**

Undoped and In-doped ZnO including nanoparticles and nanorods were successfully synthesized via sol gel method. Effect of different doping ratios (1, 5 and 10%) of indium as a dopant element was optimized for the highest gas sensitivity. The morphological structures of prepared Undoped and doped ZnO were revealed using scanning electron microscope (SEM) and the aspect ratios of nanorods were calculated. X-ray diffraction (XRD) patterns reveal a highly crystallized wurtzite structure and used for identifying phase structure and chemical state of both ZnO and ZnO doped with In under different doping ratios. Energy dispersive X-ray (EDS) analysis was performed to be confirming the chemical composition of the In-doped ZnO nanopowders. The gas sensitivity for O<sub>2</sub>, CO<sub>2</sub> and H<sub>2</sub> gases were measured for the fabricated gas sensor devices as a function of temperature for In-doped ZnO nanopowders and compared with un-doped ZnO films. Copyright 2014, Beni-Suef University. Production and hosting by Elsevier B.V. All rights reserved.