PAPER ID:157

POST ANNEALING ANALYSIS OF Mg DOPED ZnO THIN FILMS DEVELOPED BY ELECTRODEPOSITION TECHNIQUE

Shashikant Rajpal[1*], Suresh Kumar[2], S.R. Kumar[1]

[1] Department of Applied Sciences and Humanities, National Institute of Foundry and Forge Technology, Ranchi, 834003, India

[2] Department of Physics, Chaibasa Engineering College, Chaibasa, Jharkhand-833215, India

* Corresponding author

ABSTRACT

In past two decades, group II-VI semiconductor have more attention by research community because of their unique properties and potential applications in device fabrication. Among these materials, zinc oxide (ZnO) is the member of group II-VI compound and it is best photo-conducting materials, owing to its optical, electrical, optoelectronic properties as well as applications. For the tuning of structural and optical properties ZnO can be simply modified by alloying Mg. Here we investigated the effects of annealing on the structural and optical properties of Mg doped ZnO thin films. A nanocrystalline ZnMgO thin film was successfully developed by electrodeposition technique. The structural, compositional and optical properties of as deposited and annealed ZnMgO thin films were studied by XRD, SEM, EDS, AFM, UV- VIS spectroscopy and PL spectroscopy. The diffraction peak of ZnMgO films observed at $2\theta \simeq 36°$ with preferred plane indicate the crystalline nature of ZnMgO film. Crystalline size has been calculated by using Scherrer formula. A SEM photograph shows that after annealing films at 400°C distribution of grains on the film surface was more compact. Compositional analysis reveals the presence of Zn, Mg. Average roughness of the film is decreased after annealing. With increase in annealing temperature the optical energy band gap of ZnMgO films varies and photoluminescence emission of film is weakly emissive in UV region at ~310 nm. Annealing temperature results into sharp increase in emission intensity along with appearance of a new peak in visible region. It is observed that ZnMgO thin film annealed at 400°C provides a smooth and flat texture suited for device applications.

Keywords: Annealing, Characterization, Optical, Structural, Thin films, ZnMgO

 ISBN: 978-81-947843-2-6; DOI: 10.21467/abstracts.108