

Effect of Annealing on the Dark and Illuminated $I(V)$ Characterization of a ZnO:Ga|Cu₂O Hetero-junction Prepared by Ultrasonic Spray System

© H. Trir¹, L. Radjhi², N. Sengouga^{1,¶}, T. Tibermacine¹, L. Arab¹, W. Filali³, D. Abdelkader², N. Attaf⁴

¹Laboratoire des Matériaux Semiconducteurs et Métalliques, Université Mohammed Khider, 07000 Biskra, Algeria

²Laboratoire des Structures, Propriétés et Interactions Inter Atomiques (LASPI2A), Khenchela University, Algeria

³Centre de Développement des Technologies Avancées (CDTA), Algiers, Algeria

⁴Laboratoire couches minces et interfaces, Département de Physique, Faculté de Sciences exactes, Université de Frères Mentouri,

Constantine1, Algeria

¶ E-mail: n.sengouga@univ-biskra.dz

Received December 2, 2019

Revised December 30, 2019

Accepted January 5, 2020

This paper presents the Ultrasonic Spray Pyrolysis system fabrication of gallium-doped Zinc Oxide (ZnO:Ga)|Cuprous Oxide (Cu₂O) thin film hetero-junction. The deposition parameters were constant for ZnO:Ga and Cu₂O. Structural and optical properties of ZnO:Ga, Cu₂O and ZnO:Ga|Cu₂O hetero-junction were characterized by X-Ray Diffraction method and UV-Vis Spectrometry, respectively. SEM and FTIR were used to reveal the morphology and the nature of the chemical bonds. The electrical properties were measured by an Agilent $I-V$ source meter. The ZnO:Ga|Cu₂O hetero-junction was annealed at 350, 400, and 450°C and the current-voltage characteristics were measured. The band gaps of ZnO, Cu₂O, and ZnO:Ga|Cu₂O are ~ 3.27 eV, ~ 2.65 eV, and ~ 3.29 eV, respectively. The annealing temperature improves the hetero-junction quality.

Keywords: ZnO:Ga|Cu₂O hetero-junction, ultrasonic spray pyrolysis, electrical properties, annealing.

Full text of the paper will appear in journal SEMICONDUCTORS.