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Mehdi Torabi Goodarzi, Hosein Eshghi

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Fabrication and characterization of CuO/ZnO:Al photo-diode prepared by spray pyrolysis method**Mehdi Torabi Goodarzi; Hosein Eshghi***

Department of Physics, Shahrood University of Technology, Shahrood, Iran.

* h_eshghi@shahroodut.ac.ir**Abstract**

CuO/ZnO:Al photo-diode has been fabricated by spray pyrolysis technique. The prepared sample characterized by FESEM images, XRD and UV-Visible spectra, also I-V measurements in dark and under illumination. We found that, the investigated layers have a polycrystalline structure with optical band gaps of 3.25 eV and 1.63 eV for ZnO and CuO layers, respectively. Electrical characterization of the sample showed a rectifying behavior in dark, with an ideality factor of 5.8 ± 0.1 , and under illumination in reverse bias at 1.5 V, the photo-generated current was more than twice of its dark current.

Key words: CuO/ZnO, heterojunction, Spray pyrolysis, Photo-diode.**1 Introduction**

In many electronic and optoelectronic devices, p-n junctions play an important role in this field of technology. Cupric oxide (CuO) is a p-type semiconducting metal oxide with a narrow bandgap of 1.2–1.9 eV. Due to high absorption coefficient in the visible range, non-toxicity and inexpensive production, CuO is one of attractive mineral oxide materials [1]. CuO thin films are favorable for solar cells [2], gas sensors [3-5] and as electrodes in lithium cells [6]. Zinc oxide (ZnO) thin film, a II–VI intrinsically n-type metal oxide semiconductor with a wide band gap (~3.37 eV) and hexagonal wurtzite crystal structure, is widely investigated for optoelectronics devices and gas sensors [7, 8]. By joint fabrication of these p and n-type semiconductor layers, i.e. CuO/ZnO structure, a p-n heterojunction can be formed. According to the literature reports, thin layer heterojunctions of these metal oxide semiconductors are fabricated by various methods including: mechanical pressing of two sintered metal layers [9], RF Magnetron sputtering [10], sol-gel [11] and electro-deposition [12]

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