

ABSTRACT

Schottky diodes fabricated from FTO substrate and ZnO semiconductor potentially to be used as conventional radiological x-ray detectors. The addition of magnesium as a semiconductor dopant material has been proven to improve performance for detecting conventional radiographic x-rays. The performance improvement is supported by the results of thin film material characteristics, where the crystallite size becomes larger from 26,4166 nm to 26,4171 nm and is accompanied by improvements in the parameters of crystal defect, such as lattice strain, lattice constants, and dislocation density which is smaller. Evaluation of the morphological appearance of thin films shows that porosity decreases from 57,5% to 52,2% with a larger particle size of 215 nm compared to 175 nm. Characterization of optical properties shows that thin films experience a red shift in UV-Vis spectroscopy, and decreasing energy band gap from 3,38 eV to 3,26 eV and Urbach energy from 0,12 eV to 0,10 eV. Improvement of thin film characteristics has an affect on the diode performance, where the diode only needs 0,16 V to schottky transition in dark conditions compared to 0,19 V without dopant and increases the peak of the schottky transition from the order of 10^{-10} A, to the order of 10^{-9} A. The addition of Mg dopant has a better transient current peak response at the same tube energy, from $0,36 \times 10^{-10}$ A to $0,56 \times 10^{-10}$ A. When the tube energy is increased linearly, the response of the diode with dopant responds more linearly.

Keywords: *shcottky diode, ZnO, MZO, FTO, x-ray, conventional radiography*