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EFFECTS OF POST-DEPOSITION ANNEALING IN OXYGEN AMBIENT OF RF MAGNETRON SPUTTERED Ga_2O_3 THIN FILM

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ABSTRACT- In this work, the gallium oxide (Ga_2O_3) thin films were deposited on silicon substrate using radio frequency (RF) magnetron sputtering and these Ga_2O_3 thin films were subjected to post-deposition annealing in oxygen ambient at different temperatures of 400, 600, 800, and 1000°C for 60 minutes. The structural properties of post-deposition annealed Ga_2O_3 thin films were characterized using grazing incidence X-ray diffraction (GIXRD). Atomic force microscopy (AFM) and field emission scanning electron microscopy (FESEM) were employed to attain the three-dimensional surface topographies and morphologies, respectively, for the investigated Ga_2O_3 thin films. In additional, elemental composition of these thin films were characterized using energy-dispersive X-ray spectroscopy and thickness of the investigated Ga_2O_3 thin films were estimated based on the cross-sectional FESEM images. Current-voltage characteristics of the Ga_2O_3 thin films subjected to different post-depositional annealing temperatures were also presented in this work.

Keywords: Gallium oxide, Silicon, Sputtering, Grazing incidence X-ray diffraction, Annealing.