

EFFECTS OF ANNEALING GROWTH CONDITIONS OF β -Ga₂O₃ THIN FILMS FOR SOLAR BLIND UV PHOTODETECTORS BY USING SOL-GEL DIP COATING METHOD

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ABSTRACT- In this paper, the effects of different annealing growth conditions on the structural, surface morphology and optical properties of the grown β -Ga₂O₃ thin films on *p*-Si(100) substrates via sol-gel dip coating were reported. Field-emission scanning electron microscopy observations shows uniform and densely packed grains as well as decreasing pinholes are formed at annealing temperatures of 900°C. As the annealing temperatures increase from 700°C to 1200°C, the crystallinity of the β -Ga₂O₃ (400) peak at 900°C shows improved quality as well as increases crystallite size, *D* and decreasing FWHM value. The root-mean-square (rms) surface roughness of the deposited β -Ga₂O₃ thin films increases from 0.479 nm to 91.0 nm when annealing temperature increased from 700°C to 1200°C and exhibits nanocrystalline structure at 900°C. FTIR measurements demonstrated that the reflectivity spectra of β -Ga₂O₃ thin films increases from 700°C and diminishes above 1000°C. Finally, all the results revealed that 900°C in air ambient was the best annealing growth conditions to deposit β -Ga₂O₃ thin film and have high potential for deep UV photodetector applications.

Keywords: Gallium oxide, Sol-gel, Dip coating, Annealing, Thin film.