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X-RAY DIFFRACTION ANALYSIS OF GALLIUM OXIDE THIN FILMS SYNTHESIZED BY A SIMPLE AND COST-EFFECTIVE METHOD

Tiankun Wang¹, Sha Shiong Ng^{1,*}

¹*Institute of Nano Optoelectronics Research and Technology (INOR),
Universiti Sains Malaysia, 11800 Penang, MALAYSIA.*

**Corresponding Author: shashiong@yahoo.com*

ABSTRACT- Wide energy gap beta type gallium oxide (Ga_2O_3) semiconductor material has attracted many researchers' interests due its thermal and chemical stability. For synthesising Ga_2O_3 thin films, sol-gel spin coating is a simple and cost-efficient method, especially for spin coating on cheap substrate such as silicon (Si) substrate. However, little is known about the spin coating growth of the Ga_2O_3 thin films on Si substrate. In this paper, special attention was paid to the pre-treatment of the Si substrate and the coated layer prior and post spin coating because the uniformity and the quality of the synthesized films are strongly affected by the surface conditions of the substrate/layer. To access the structural and crystallite quality of the deposited Ga_2O_3 , X-ray diffraction measurements were carried out and in-depth analyses using Williamson-Hall and size-strain plots methods were performed. The results show that the crystallite size of the spin coated Ga_2O_3 on Si is not influenced by the micro strain.

Keywords: Gallium oxide, Spin coating, X-ray diffraction, Williamson-Hall, Size-strain plots.