

EFFECT OF NUCLEATION TIME ON GaN LAYER GROWN ON DIFFERENT SHAPE OF PATTERNED SAPPHIRE SUBSTRATE

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ABSTRACT- This work describes the effect of nucleation time on GaN layer; which was grown separately on three different shape of patterned sapphire substrate (PSS); cone PSS and dome PSS. Prior to the GaN layer growth, a low temperature of GaN nucleation layer was initially grown at 40, 80 and 160 second. The nucleation islands became larger as the nucleation time was longer. Bigger islands promote better coalescence, while smaller islands showed otherwise. Besides, the GaN layer grown on bigger islands exhibit smoother surface. From XRD measurement, FWHM of the GaN peak decreased for longer nucleation time, indicating the benefit of bigger islands to reduce the dislocations in the layer through better coalescence. It was found that the GaN layer grown on dome-patterned substrate exhibits better quality than the one on cone-patterned substrate. The growth of GaN layer on flat sapphire was also performed for comparison.

Keywords: GaN layer, Nucleation islands, Nucleation time, Sapphire substrate.