

Growth of Non-Polar a-Plane AlGaN Epilayer with High Crystalline Quality and Smooth Surface Morphology

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Abstract : Non-polar a-plane AlGaN epilayers of high structural quality have been grown on *r*-sapphire substrate by using metalorganic chemical vapor deposition (MOCVD). A graded non-polar AlGaN buffer layer with variable aluminium concentration was used to improve the structural quality of the non-polar *a*-plane AlGaN epilayer. The characterisations were carried out by high-resolution X-ray diffraction (HR-XRD), atomic force microscopy (AFM) and Hall effect measurement. The XRD and AFM results demonstrate that the Al-composition-graded non-polar AlGaN buffer layer significantly improved the crystalline quality and the surface morphology of the top layer. A low root mean square roughness 1.52 nm is obtained from AFM, and relatively low background carrier concentration down to 3.9×10^{-3} cm⁻³ is obtained from Hall effect measurement.

Keywords : non-polar AlGaN epilayer, Al composition-graded AlGaN layer, root mean square, background carrier concentration

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