



P19

Optimization of Post-Annealing Treatment Conditions on GaN Layer Grown on m-Plane Sapphire Substrate by Electron Beam Evaporator

A. Ariff, N. Zainal, Z. Hassan, K. Ibrahim

*Institute of Nano Optoelectronic Research and Technology (INOR), School of Physics,
Universiti Sains Malaysia, 11800 USM, P. Pinang, Malaysia.*

This paper describes the effect of using different conditions of post-annealing treatment on properties of GaN layer grown on m-plane sapphire by electron beam (e-beam) evaporator. Prior to the annealing, the surface of the grown GaN was found to be smooth with some agglomerations of its grains in a specific direction on the surface. A weak signature of GaN (100) together with Ga₂O₃ crystals were also detected. When the annealing was demonstrated at 650°C in N₂ ambient, the evidence of Ga₂O₃ disappears, especially at 30 minutes of annealing. Annealing in NH₃ ambient at the same temperature eliminated the GaN (100) crystals but the existence of Ga₂O₃ was expected. Further annealing at 950°C in ammonia (NH₃) ambient has successfully produced a better non-polar GaN in (100) direction. However, inclusions of GaN (002) and (101) crystals were also detected. Increase in annealing temperature at 980°C and 1100°C caused deteriorations of the structural and optical properties of the GaN layer. From this work, we proposed that the properties of GaN crystalline structure can be controlled by varying the conditions of the post-annealing treatment.