Comprehensive comparison of epitaxially grown GaN layer grown on conventional sapphire and patterned sapphire substrates

Ismail ALTUNTAS¹, Ilkay DEMIR¹, A. Alev KIZILBULUT¹, Baris BULUT¹ and Sezai ELAGOZ¹
¹Cumhuriyet University, Turkey
²ERMAKSAN OPTOELECTRONIC AR-GE, Turkey

GaN based materials including light emitting diodes, blue laser diodes and high-power microwave transistors have received much attention over the past few years. An important problem of these structures is the high levels of structural defects, mostly dislocations, due to the lack of a suitable lattice-matched substrate. So far, the substrate of choice has been mainly sapphire (Al₂O₃) substrates, which has a large lattice mismatch with GaN or AlN. As a result, (0001) GaN layers epitaxially grown on sapphire substrates include high concentrations of misfit and threading dislocations. In this study, epitaxial GaN layers have been grown on both conventional sapphire and patterned sapphire substrates by using an MOCVD system and high resolution XRD scans and photoluminescence measurements are performed to compare the effect of patterned sapphire substrates on the dislocation density.

Recent Publications:

3. P Başer, I Altuntas, S Elagoz (2016) The hydrostatic pressure and temperature effects on hydrogenic impurity binding energies in GaAs/In x Ga 1-x As/GaAs square quantum well. Superlattices and Microstructures 92, 210-216.

Biography

Ismail ALTUNTAS has continued PhD in Solid State Physics in Cumhuriyet University, Turkey. During his PhD studies he worked at Microelectronic Materials and Device Laboratory-Virginia Commonwealth University USA under the supervision of Prof. Dr. Hadis Morkoç. Currently, he is a research assistant at Nanophotonics Research and Application Center at Cumhuriyet University. His research interest covers high quality III-V semiconductor thin films (InGaAs, InAlAs, InP, AlInN, AlGaN, GaN etc) growth by MOCVD and detailed characterization to produce electronic and optoelectronic devices.

ialtuntas@cumhuriyet.edu.tr