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Compherensive comparison of epitaxially grown gan layer grown on conventional sapphire and patterned sapphire substrates

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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 subtrates 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:

1. V Sheremet, M Genç, M Elçi, N Sheremet, A Aydınlı, I Altuntaş, K Ding, V Avrutin, Ü Özgür, H Morkoç (2017) The role of ITO resistivity on current spreading and leakage in InGaN/GaN light emitting diodes. Superlattices and Microstructures (in press)
2. M. B. Ullah, V. Avrutin, T. Nakagawara, S. Hafiz, I. Altuntaş, Ü. Özgür, H. Morkoç (2017) Growth kinetics of O-polar BexMgyZn1-x-yO alloy: Role of Zn to Be and Mg flux ratio as a guide to growth at high temperature. Journal of Applied Physics 121 (18), 185704.
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.
4. ES Tuzemen, K Kara, S Elagoz, DK Takci, I Altuntas, R Esen (2014) Structural and electrical properties of nitrogen-doped ZnO thin films. Applied Surface Science 318, 157-163.
5. P Baser, I Altuntas, S Elagoz (2011) In concentration dependence of shallow impurity binding energy under the hydrostatic pressure. Marmara Fen Bilimleri Dergisi 23 (4), 171-180.

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, AlN, AlGaN, GaN etc) growth by MOCVD and detailed characterization to produce electronic and optoelectronic devices.

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