

Abstract Submitted
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Investigation of Threading Dislocations in Undoped and Doped AlN Epilayers by TEM¹ B. CAI, M.L. NAKARMI, Department of Physics, Brooklyn College of the CUNY, Brooklyn, NY 11210 and the Graduate Center of the CUNY, New York, NY 10031 — Aluminum nitride (AlN) has emerged as a promising deep ultraviolet material for the development of deep ultraviolet optoelectronic devices such as light emitting diodes and photodetectors in the spectral range down to 200 nm. The characterization of threading dislocations and techniques to reduce the threading dislocations are crucial to improve the material quality and the performance of the devices. We report on the investigation of threading dislocations of AlN epilayers grown on sapphire substrates using transmission electron microscopy (TEM). Bright and dark field images of cross section and plan view images were taken to investigate the propagation and annihilation of threading dislocations. We found that the edge type threading dislocations dominate the total dislocation density. The threading dislocations are greatly reduced by inserting an intermediate layer. Microanalysis of doped AlN epilayers grown on AlN/sapphire templates is also performed. Comparative TEM analysis of the microstructures in connection to the generation and annihilation of threading dislocations due to the different dopants will also be presented.

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