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Investigation of Mg- and Si- doped AlN epilayers by Transmission Electron Microscopy BO CAI, Department of Physics, Brooklyn College of CUNY, NY 11210, M.L. NAKARMI — Aluminum nitride (AlN) has emerged as a promising deep ultraviolet (UV) material for the development of optoelectronic devices operating in deep UV region. Low dislocation density AlN on sapphire substrate has been achieved by metal organic chemical vapor deposition technique. Doping in AlN is very crucial in order to use it in active devices. Silicon and magnesium are usually used for n- and p- type doping in III-nitride materials. We report on microstructure analysis of Mg- and Si- doped AlN epilayers by transmission electron microscopy (TEM). The samples were grown on low dislocation density AlN/sapphire templates. Cross section and plan view TEM images were taken to characterize the threading dislocations in these samples during the growth process. High resolution TEM images are also taken to study the detailed nature of the dislocations, and their generation and propagation. The TEM images will be compared with the undoped AlN epilayers to investigate the effect of doping in the generation/annihilation of threading dislocations. Implications of our finding for the applications in deep UV optoelectronic devices will be discussed.

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