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Structural and optical properties of GaN films grown on GaAs substrates by molecular beam epitaxy O. MAKSIMOV, V. HEYDEMANN, Electro-Optics Center, Pennsylvania State University, P. FISHER, H. DU, M. SKOWRONSKI, Dept. of Mat. Sci. and Eng., Carnegie Mellon University, Y. GONG, I. KUSKOVSKY, Dept. of Physics, Queens College of NY, ELECTRO-OPTICS CENTER TEAM, CARNEGIE MELLON UNIVERSITY TEAM, QUEENS COLLEGE OF NY TEAM — GaN emerged during the past decade as a wide band gap semiconductor with promising material properties for the development of short-wavelength optoelectronic, high frequency and high power electronic devices. Most GaN research has been focused on the growth of high quality GaN epitaxial layer on A12O3 and SiC substrates. The MBE growth of GaN on GaAs substrates is much less studied, although it provides several advantages, such as a closer thermal expansion coefficient matching and a possibility to stabilize cubic β-GaN. In this work we report on MBE growth of GaN films on the (100) GaAs substrates. Contrary to previous literature accounts, we do not employ an As beam, neither during oxide desorption nor during GaN nucleation and growth. We determine that direct growth on thermally desorbed GaAs results in a polycrystalline film that contains inclusions of both α and β GaN. Low-temperature nitridation followed by annealing improves structural properties resulting in the growth of α-GaN with 0002 orientation.

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