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Morphological Study of MBE Grown Iron Nitride Films on Zinc-Blende GaN(001) JEONGIHM PAK, WENZHI LIN, YINGHAO LIU, KANGKANG WANG, ABHIJIT CHINCHORE, ARTHUR SMITH, Nanoscale and Quantum Phenomena Institute, Department of Physics and Astronomy, Ohio University, Athens, OH 45701, KAI SUN, Department of Materials Science and Engineering, University of Michigan, Ann Arbor, Michigan 48109 — Iron nitrides are attractive materials for their high magnetic moments, corrosion, and oxidation resistance. We present the successful epitaxial growth of iron nitride (FeN) film on zinc-blende gallium nitride (*c*-GaN) using molecular beam epitaxy with Fe *e*-beam evaporation and rf N-plasma source at substrate temperature of 210 °C. The film growth is monitored *in-situ* using reflection high energy electron diffraction (RHEED) and the samples are analyzed *ex-situ* using x-ray diffraction (XRD), cross-sectional TEM and atomic force microscopy (AFM). By monitoring the structure, morphology, and lattice constant evolution of the FeN films, the crystal phase and orientation with respect to the *c*-GaN substrate are deduced to be zinc-blende phase with the epitaxial relationship $[001]_{FeN} \parallel [001]_{GaN}$ and $[100]_{FeN} \parallel [100]_{GaN}$. Surface morphological studies by AFM show cubic structures ranging from 250-400 nm in size and having smooth plateaus with roughness of 6 Å. This work has been supported by DOE (Grant #DE-FG02-06ER46317).

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