Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Iron and Iron Nitride Layers on Wurtzite Gallium Nitride Studied Using MBE/STM WENZHI LIN, JEONGIHM PAK, YINGHAO LIU, KANGKANG WANG, ABHIJIT CHINCHORE, DAVID INGRAM, 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
— It is of interest to study epitaxial growth of iron and iron nitride (FeN) layers on wurtzite gallium nitride (w-GaN) as a possible magnetic/wide-gap semiconductor system for spintronics. X-ray diffraction (XRD) and reflection high energy electron diffraction (RHEED) of Fe deposited on GaN(0001) suggest the existence of the epitaxial relationship $[110]_{Fe}||\ [0001]_{GaN}$. Furthermore, multi-streak RHEED patterns indicate the formation of a multi-domain but smooth film. Also, we have investigated the growth of $\sim$ 1:1 iron nitride on w-GaN(0001) using nitrogen plasma-assisted molecular beam epitaxy (MBE). Both reciprocal and real space techniques were used to study the growth of FeN, including RHEED and scanning tunneling microscopy/spectroscopy (STM/STS). Bulk characterization was also applied, including XRD and transmission electron microscopy (TEM). The results indicate that zinc-blende FeN grows on GaN(0001) with the epitaxial relationship $[111]_{FeN}||$ $[0001]_{GaN}$, and initial atomically-smooth FeN layers are formed. This work has been supported by DOE (Grant #DE-FG02-06ER46317).

Jeongihm Pak
Nanoscale and Quantum Phenomena Institute, Department of Physics
and Astronomy, Ohio University Athens, OH 45701

Date submitted: 10 Dec 2008 Electronic form version 1.4