Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Polarity effects on the electronic states of N- and Al-polar aluminum nitride surfaces JI-SOO PARK, YINGJIE TANG, ROBERT DAVIS, ROBERT NEMANICH, North Carolina State University — N- and Al-polar (0001) wurtzite AlN films were grown on C- and Si-polar 6H-SiC substrates, respectively. The polarity was confirmed by KOH chemical etching and atomic force microscopy (AFM) imaging. The surfaces were cleaned in situ by annealing to $\sim$1100^{o}C in a flux of ammonia, and X–ray photoemission spectroscopy (XPS) and UV photoemission spectroscopy (UPS) were employed to measure the electronic states at the surfaces. The results indicated a similar electron affinity for both surfaces which appears to approach a value of zero. Furthermore, it was determined that the Fermi energy (Ec-Ef) was 2.4 eV below the conduction band for N-face AlN and 3.0 eV for Al-face AlN. The 0.6eV difference in the Fermi energy indicates a difference in band bending near the surface which is discussed in terms of the built-in field induced by the polarization bound surface charges.

Yingjie Tang

Date submitted: 28 Nov 2005 Electronic form version 1.4