Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Characterization of GaN grown on Si substrate with sputtering AlN buffer layer by molecular beam epitaxy[1] WEN-YUAN PANG, IKAI LO, Y.C. HSU, C.H. SHIH, C.H. HU, Y.C. WANG, Department of Physics, National Sun Yat-sen University, Kaohsiung, Taiwan, SEAN WU, Department of Electrical Engineering, Far East College, Tainan, Taiwan — This study reports the characterization of GaN grown on Si substrate with sputtering AlN buffer layer by plasma-assisted molecular beam epitaxy. Structural properties were measured by X-ray diffraction measurement and transmission electron microscopy. XRD spectrum showed the sputtering buffer layer which was mainly $(100)_{AlN}$ and followed by the GaN epilayer which contained poly $\boldsymbol{M}$-plane GaN and other structural planes such as $(002)_{GaN}$ ($\boldsymbol{c}$-plane), and $(101)_{GaN}$. In TEM analysis, we demonstrated GaN of $\boldsymbol{c}$- and $\boldsymbol{A}$-plane grains. The pure $\boldsymbol{M}$-plane GaN was also found in the form of grain and the high-resolution images showed clear atomic arrangement. Besides, the diffraction pattern with multi $\boldsymbol{M}$-plane GaN was attributed to several $\boldsymbol{M}$-plane GaN crystals which were grown in different orientations on in-plane surface. In addition, optical properties measured by photoluminescence and cathodoluminescence measurement both showed two main peaks at 3.2 eV and 3.4 eV, indicated that zinc-blende and wurtzite structure exist in the GaN layer at the same time.

[1]The project is supported by National Research Council of Taiwan (grant No. NRC 98-2112-M-110-003-MY3).

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Date submitted: 17 Nov 2011 Electronic form version 1.4