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GaN Grown on Sputtering AlN Buffer Layer with Sapphire Substrate by Plasma-Assisted Molecular-Beam Epitaxy¹ YU-CHIAO LIN, IKAI LO, WEN-YUAN PANG, CHENG-HUNG SHIH, CHEN-CHI YANG, CHENG-DA TSAI, SHUO-TING YOU, Department of Physics, National Sun Yat-Sen University, Kaohsiung, Taiwan, SEAN WU, Department of Electronics Engineering and Computer Sciences, Tung-Fang Institute of Technology, Kaohsiung, Taiwan — The non-polar gallium nitride (GaN) film is a potential candidate for high-efficient optoelectronic devices. This study reports the characterization of GaN grown on aluminum nitride (AlN) buffer layer by plasma-assisted molecular-beam epitaxy (PA-MBE). The AlN buffer layer containing both *c*-plane and *M*-plane AlN was grown by RF magnetron sputter on a sapphire substrate before growing GaN. The growth direction of GaN is $[1\bar{1}00]$ oriented (*M*-plane) instead of $[0001]$ oriented (*c*-plane). It was found that the *c*-plane GaN disappeared for higher growth temperature and the zinc-blende GaN appeared. The band gap was changed when we tuned III/V ratio. The crystal characteristics of GaN films for different growth parameters were studied by scanning electron microscopy (SEM), transmission electron microscopy (TEM), photoluminescence (PL), X-ray diffraction (XRD), and reflection high-energy electron diffraction (RHEED).

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