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AlGa_N/Ga_N high electron mobility transistor grown on Ga_N template substrate by molecule beam epitaxy system¹ JENN-KAI TSAI, Center for General Education, National Formosa University, Hu-Wei, Yun-Lin, Taiwan 63208, R.O.C., Y.L. CHEN, M.H. GAU, W.Y. PANG, Y.C. HSU, IKAI LO, Department of Physics, Center for Nanoscience and Nanotechnology, National Sun Yat-Sen University, Kaohsiung, Taiwan, Republic of China, C.H. HSIEH, Institute of Material Science and Engineering, National Sun Yat-Sen University, Kaohsiung, Taiwan, Republic of China — In this study, AlGa_N/Ga_N high electron mobility transistor (HEMT) structure was grown on Ga_N template substrate radio frequency plasma assisted molecular beam epitaxy (MBE) equipped with an EPI UNI-Bulb nitrogen plasma source. The undoped Ga_N template substrate was grown on c-sapphire substrate by metal organic vapor phase epitaxy system (MOVPE). After growth of MOVPE and MBE, the samples are characterized by double crystal X-ray diffraction (XRD), transmission electron microscopy (TEM), field emission scanning electron microscopy (SEM), atomic force microscopy (AFM), and Hall effect measurements. We found that the RMS roughness of template substrate plays the major role in getting the high value of mobility on AlGa_N/Ga_N HEMT. When the roughness was lower than 0.77 nm in a 25 μm x 25 μm area, the mobility of HEMT at the temperature of 77 K was over 10000 cm²/Vs.

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