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Characterization of *c*-plane GaN epi-flim Grown on $LiGaO_2$ substrate by Plasma-assisted Molecular Beam Epitaxy[1] SHUO-TING YOU, CHEN-HUNG SHIH, IKAI LO, YING-CHIEH WANG, CHEN-CHI YANG, Department of Physics, National Sun Yat-Sen University, Kaohsiung 80424, Taiwan, R. O. C, MITCH CHOU, Department of Materials and Optoelectronic Science, National Sun Yat-Sen University, Kaohsiung 80424, Taiwan, R. O. C — $LiGaO_2$ (001) is a nearly lattice-matched substrate for growth of ***c***-plane GaN film. However, $LiGaO_2$ single crystal has multi-domains defect on $LiGaO_2$ (001), ie. metal domain and oxygen domain. In this work, we have studied the growth mechanism of ***c***-plane GaN on two domain areas by plasma-assisted molecular beam epitaxy. We found that the growth mechanism of ***c***-plane GaN on $LiGaO_2$ (001) was in the form from 3D to 2D evaluated by the observation of in-situ reflection high energy electron diffraction (RHEED). According to RHEED and TEM analyses, we found that zinc-blend GaN islands were formed at early growth stage. The surface morphology of GaN grown on two domains was observed by AFM image which showed that the GaN grown on the metal domain was flat. The luminescence properties of the GaN grown on two-domain $LiGaO_2$ were also analyzed by phtonluminescence and cathodoluminecence, which also showed that the ***c***-plane GaN grown on metal domain has better luminescence property than that grown on oxygen domain. Our study indicates that metal domain $LiGaO_2$ (001) is suitable to grow high quality ***c***-plane GaN.

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