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The epitaxial relationship between M-Plane and c-plane GaN grown on gamma-LiAlO₂¹ YING-CHIEH WANG, IKAI LO, CHENG-HONG SHIH, CHIA-HSUENG HU, CHENG-DA TSAI, SHOU-TING YOU, Department of Physics, National Sun Yat-Sen University, Kaohsiung, Taiwan, ROC. — The M-plane and c-plane oriented GaN have been found co-existed in the γ -LiAlO₂ substrate grown by molecular beam epitaxy (MBE). Two-step growth with different N/Ga ratios has been used in the experiment at growth temperature 670°C. By the SEM images, the smooth M-plane surface was observed and the c-plane GaN 3-D structures homogenously spread on it. From the scanning of ω -2 θ X-ray diffraction pattern, the peaks at 32.295° and 34.505° were attributed to the M-plane and c-plane GaN. The microstructure of the samples was investigated by transmission electron microscopic (TEM) study. It was found that the c-plane and M-plane GaN both were oriented from the substrate with the same growth direction and arranged vertically to the substrate with a periodical pattern. The interfaces between the c-plane and M-plane GaN can be confirmed clearly by one or two monolayer in high resolution TEM images. The stacking faults were found at the edge of c-plane side at the interface that released the dislocation between the M- and c-plane GaN. In summary, we found that the M-plane and c-plane GaN can be assembled on γ -LiAlO₂ substrate with a clear phase-transition interface.

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