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Local electronic and optical behavior of ELO a-plane GaN[1] A.A. BASKI, J.C. MOORE, U. OZGUR, V. KASLIWAL, X. NI, H. MORKOC, Virginia Commonwealth University — Conductive atomic force microscopy (CAFM) and near-field optical microscopy (NSOM) were used to study a-plane GaN films grown via epitaxial lateral overgrowth (ELO). The ELO films were prepared by metal organic chemical vapor deposition on a patterned SiO_2 layer with 4-μm wide windows, which was deposited on a GaN template grown on r-plane sapphire. The window regions of the coalesced ELO films appear as depressions with a high density of surface pits. At reverse bias below 12 V, very low uniform conduction (2 pA) is seen in the window regions. Above 20 V, a lower-quality sample shows localized sites inside the window regions with significant leakage, indicating a correlation between the presence of surface pits and leakage sites. Room temperature NSOM studies also suggest a greater density of surface terminated dislocations in the window regions, while wing regions explicitly show enhanced optical quality of the overgrown GaN. The combination of CAFM and NSOM data therefore indicates a correlation between the presence of surface pits, localized reverse-bias current leakage, and low PL intensity in the window regions.

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