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Photoluminescence Investigation of Oxidation on GaN GULTEN KARAOGLAN, VLADIMIR KURYATKOV, SERGEY NIKISHIN, MARK HOLTZ, TTU, MARY M. COAN, DEREK W. JOHNSON, JUNG HWAN WOO, IMAN REZANEZHAD, H. RUSTY HARRIS, TAMU, MARK HOLTZ'S GROUP AT TTU TEAM, RUSTY HARRIS'S GROUP AT TAMU TEAM — We investigated the effect of oxide layers grown on GaN/sapphire using thermal oxidation and atomic layer deposition (ALD) for MOS-HEMT applications by means of photoluminescence (PL) measurements. Any influence from the oxide is expected to be at the topmost GaN layer (< 100 nm) so optical measurements are performed to probe the effect of oxide. For the thermal oxide, PL spectra were measured (10 K) prior to oxidation, with oxide, and following removal. The primary PL peak blue shifts 7 meV after the oxidation, but returns to the original position upon the removal of oxide. This shift is attributed to stress from the oxide. Below-bandgap emission is observed upon oxidation; these features remain after removing of the oxide. PL for ALD HfO_2/GaN and Al_2O_3/GaN samples exhibit only minor shift for the primary PL peak. Weak sub-bandgap PL peaks may be attributed to native defects and donor-acceptor recombination. A band near 3.27 eV for samples with oxide may suggest that oxygen impurities are involved in the recombination process.

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