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**GaN Overgrowth on GaN Nanocolumns by Molecular Beam Epitaxy**[1] K. L. AVERETT, J. E. VAN NOSTRAND, J. BOECKL, Materials and Manufacturing Directorate, R. CORTEZ, J. D. ALBRECHT, Sensors Directorate, Air Force Research Laboratory, Wright-Patterson Air Force Base, OH —
GaN nanocolumns grown by plasma-assisted molecular beam epitaxy are explored as host structures for overgrowth of bulk-like GaN films. We investigate the layers of vertical GaN nanocolumns $90 \pm 10$nm in width which were grown on sapphire and alternate substrates. We present photoluminescence, x-ray diffraction, and microscopy data that indicates that the columns are unstrained, low-defect wurtzite GaN nanostructures. The nanocolumns form discontinuous layers with areal densities controlled by grown conditions. The nanocolumn layers are subsequently overgrown with thick GaN films and compared with commercial GaN template materials used for device fabrication. The overgrowth of GaN is studied as a function Ga flux and growth temperature. We present photoluminescence and Hall effect characterization of the overgrown layers. The microstructure and morphology are probed by atomic force, scanning and transmission electron microscopy, as well as x-ray diffraction.

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