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Effect of various surface treatments on optical and morphological characteristics of homoepitaxially overgrown GaN layers and device structures FATEMEH SHAHEDIPOUR-SANDVIK, VIBHU JINDAL, JAMES GRANDUSKY, MUHAMMAD JAMIL, College of NanoScale Science and Engineering, University at Albany-State University of New York, COLLEGE OF NANOSCALE SCIENCE AND ENGINEERING TEAM — Effect of ex-situ treatment on morphological and optical quality of homoepitaxially grown GaN layers as function of layer thickness is reported. Treatments include use of organic solvents, Hydrochloric and Hydrofluoric acids. The properties of the grown GaN on template layers were observed to vary significantly due to different surface treatments. For un-treated (surface blown dry with UHP N₂) samples morphology of the surface becomes smooth with RMS roughness of 0.6 nm shortly after nucleation and becomes as smooth as the initial surface (RMS=0.3nm) after 1 μm of overgrowth. The surface treated with HCl, on the other hand, shows increase in roughness initially and then recovers after the growth of 1 μm while the HF treated surface does not recover up to 1 μm of growth. In addition to the morphological changes, photoluminescence measurements are also presented which characterize the difference in optical properties of the layers as a function of layer thickness for different surface treatments. We will also present the effect of various treatments on performance of violet light emitting diodes.

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