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Characteristics of Coalesced Planar GaN Layers on GaN/Si (111) Nanowires Grown By Plasma-AssistedMolecular Beam Epitaxy[1] WEI GUO, MENG ZHANG, PALLAB BHATTACHARYA, University of Michigan — GaN-based quantum well and quantum dot light emitting diodes are being investigated and developed for solid state lighting. This development has, in general, been impeded due to the lack of suitable substrates with low defect density. It has been demonstrated that dislocation free GaN nanowires can be grown on silicon substrates due to the large surface-to-volume ratio of the nanowire structure. The growth of catalyst-free GaN nanowires on (111) silicon substrates by plasma-assisted MBE has been investigated in the present study. It is seen that the average nanowire diameter is determined by the growth temperature, T_g. The diameter can be increased by lowering T_g and the nanowires can coalesce into a planar film by continued growth. Utilizing the coalesced GaN film as a substrate, InGaN/GaN quantum wells with emission wavelength of 530 nm were grown and the photoluminescence spectra of these exhibit significantly narrower linewidth ($\sim$26 nm at 300 K) than those reported for wells grown on commercially available GaN templates ($\sim$40-60 meV). Detailed structural and optical characteristics of the nanowires and planar GaN films on top of them will be presented.

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