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Optical Characteristics of Dislocation Free InGaN/GaN Multiple Quantum Wells Embedded in GaN Nanorod Arrays YONG-HOON CHO, S.M. YOON, A. GOKARNA, Y.P. SUN, Chungbuk National University (KOREA), H.M. KIM, T.W. KANG, Dongguk University (KOREA), K.L. WANG, University California, Los Angeles — We investigated the optical properties of dislocation-free InGaN/GaN multiple quantum well (MQW) nanorod arrays (NRAs) by photoluminescence (PL), PL excitation, and time-resolved PL spectroscopy. The InGaN MQW NRAs were grown on sapphire substrates by metal-organic hydride vapor phase epitaxy in the absence of a catalyst, resulting in the growth of vertically well-aligned NRAs with homogeneous length and diameter. The temperature and excitation power dependent PL spectra were performed, and a remarkable enhancement in PL efficiency was observed in these dislocation-free InGaN/GaN MQW NRA structures. The origin of the InGaN-related emission was investigated by PL excitation and time-resolved PL experiments. The results suggest that the InGaN-related emission is not much degraded by non-radiative recombination centers and that the emission wavelength is strongly affected by the built-in internal field present in the NRA growth direction.

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