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Growth and Optical Properties of Al rich AlN/AlGaN Quantum Wells T.M. AL TAHTAMOUNI, N. NEPAL, M.L. NAKARMI, J.Y. LIN, AND H.X. JIANG, Department of Physics, Kansas State University, Manhattan, Kansas 66506-2601 — Al rich AlGaN alloys are promising materials for the applications in the optoelectronic devices such as deep ultraviolet (UV) emitters and detectors in the spectral range down to 200 nm. AlGaN based UV emitters (λ <340nm) has applications in bio-chemical agent detection and medical research/ health care. To realize deep UV emission (λ < 280 nm) Al rich AlGaN based quantum wells (QWs) are required. We report here the growth of AlN/Al_xGa_{1-x}NQWs (x>0.65) on AlN/sapphire templates by metalorganic chemical vapor deposition (MOCVD). Deep UV photoluminescence (PL) was employed to study the optical properties of the QWs. Well width (Al composition) dependence was studied by varying the QW thickness (Al composition) with fixed x $\sim$ 0.65 (well width at 3 nm). Optical properties of these QWs such as the effects of alloy fluctuation, temperature, strain and piezoelectric field, carrier and exciton localizations on the quantum efficiency have been studied. Carrier and exciton dynamics were probed. Implications of our findings on the applications of Al rich AlN/AlGaN QWs for UV emitters and detectors will also be discussed.

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