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Growth of InN and In rich InGaN by "High Pressure Chemical Vapor Deposition" (HPCVD) MAX BUEGLER, MUSTAFA ALEVLI, RAMAZAN ATALAY, GOKSEL DURKAYA, JIELEI WANG, INDIKA SENEVIRATHNA, Physics & Astronomy Department, Georgia State University, Atlanta, GA, 30303, MUHAMMAD JAMIL, IAN FERGUSON, School of ECE, Georgia Institute of Technology, Atlanta GA, NIKOLAUS DIETZ, Physics & Astronomy Department, Georgia State University, Atlanta, GA, 30303 — We present the growth of III-nitrides under elevated nitrogen pressure to stabilize the growth surface at elevated temperatures. The achievable growth temperatures are significantly higher than in conventional low pressure MOCVD systems. With this the integration of In-rich materials into GaN and GaAlN becomes possible. In addition we present structural and optical properties of thin films grown by HPCVD at a reactor pressure of 15bar and temperatures of 870^{o}C. The Samples have been analyzed by Raman, optical absorption, IR reflectance and photoluminescence spectroscopy and by XRD. The growth of single phase layers of high crystalline quality has been proven by XRD with InN (0002) Bragg reflex FWHM's of 200arcsec ($2\Theta - \Omega$-scan) and 1600arcsec (rocking curves). These is backed up by Raman spectra with InN E_2(high) peak FWHM's of below 10cm^{-1}. Free carrier concentrations in the mid 10^{18} cm^{-3} to low 10^{19}cm^{-3} have been calculated from IR reflection spectra. Photoluminescence spectroscopy showed luminescence at 0.77eV.

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