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Optical properties of Er doped III-nitride epilayers and quantum wells synthesized by MOCVD C. UGOLINI, M.L. NAKARMI, N. NEPAL, J.Y. LIN, AND H.X. JIANG, Department of Physics, Kansas State University, Manhattan, KS 66506 — The wide bandgap semiconductor, GaN, is an excellent host for Er since the thermal quenching of radiative intra-4f Er^{3+} transitions is very low in Er implanted or Er doped GaN, and the solubility of Er in GaN is high. Due to these properties and the characteristic transition of 1.54 μm of Er^{3+}, Er doped GaN structures are promising for Er related emitters operating in the infrared region. In recent studies, Er doped III-Nitride epilayers were obtained by ion implantation or molecular beam epitaxy (MBE). But, in-situ Er doping of III-Nitride epilayers has not been achieved by metalorganic chemical vapor deposition (MOCVD), mostly due to the low vapor pressure and lack of suitable, metalorganic Er sources. However, due to the large output and high-crystalline quality of MOCVD grown III-nitride epilayers, use of this process to grow Er doped III-nitride epilayers would be very useful for commercial applications. We report on the synthesis of Er doped III-nitride epilayers and quantum wells (QW) grown by MOCVD, and their optical properties. Optical properties in the visible and infrared region for epilayers and QW's of different Er concentrations and growth conditions are discussed. The mechanisms of optical transitions involving different intra-4f Er^{3+} energy levels are also discussed. Lastly, potential applications of Er doped III-nitride structures in the communication wavelength will be presented.

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