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High Mobility InN epilayers grown on AlN templates by MOCVD

NEELAM KHAN, ASHOK SEDHAIN, JING LI, JINGYU LIN, HONGXING JIANG, Department of Physics, Kansas State University, Manhattan, KS 66506-2601 — Among III-nitrides, InN has the smallest electron effective mass, the largest mobility and smallest direct band gap. These distinguished properties make InN an interesting material for the applications in high speed electronic devices and full color displays. However, obtaining InN and In-rich InGaN epilayers with controllable conductivity is still a challenging task. We report here on the growth and transport property studies of InN epilayers on AlN templates, as compared to GaN templates. Significant improvements in the electrical and optical properties of InN epilayers were observed on AlN templates. A hall mobility of 1390 cm^2/Vs with a carrier concentration of $1x10^{19} cm^{-3}$ at room temperature was observed, which is highest value reported for MOCVD grown InN epilayers. The photoluminescence emission spectra revealed band to band emission peak at $\sim$0.75 eV. The effects of post growth annealing on transport, structural and optical properties of undoped and Mg-doped InN epilayers will also be presented.

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