Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Single phase $In_xGa_{1-x}N$ ($0.25 \leq x \leq 0.63$) alloys synthesized by MOCVD. BED PANTHA, LI JING, JINGYU LIN, HONGXING JIANG, Kansas State University , KANSAS STATE UNIVERSITY TEAM — $In_xGa_{1-x}N$ alloys have received much attention due to their applications in optoelectronic devices operating in the near infrared region to the near UV region as the band gap of $In_xGa_{1-x}N$ alloys can be continuously tuned from $\sim$ 0.7 eV (InN) to 3.4 eV (GaN). Recently, it has been suggested that high quality In-rich InGaN alloys offer great potential applications in many important areas as follows; (1) high efficiency multijunction solar cell, (2) high efficiency photoelectronchemical (PEC) cell, and (3) thermoelectric (TE) devices. Our recent experimental results show that In-rich InGaN alloys could be as good as SiGe alloys in terms of figure of merit (ZT) for TE applications. However many experimental techniques have proven that growth of In-rich InGaN alloys is extremely challenging due to the solid phase miscibility gap between InN and GaN. Here we present the growth of single phase InGaN alloys with high In-contents by metal organic chemical vapor deposition on AlN/Al_2O_3 and/or GaN/Al_2O_3 templates. X-ray diffraction was employed to determine indium content. Single peak of wide range theta-2theta scan of (002) plane confirmed that there is no evidence of phase separation. Optical and electrical properties and surface morphology were also studied by photoluminescence, Hall-effect and atomic force microscopy measurements, respectively.

Bed Pantha
Kansas State University

Date submitted: 20 Dec 2007 Electronic form version 1.4