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**Single phase  $\text{In}_x\text{Ga}_{1-x}\text{N}$  ( $0.25 \leq x \leq 0.63$ ) alloys synthesized by MOCVD.** BED PANTHA, LI JING, JINGYU LIN, HONGXING JIANG, Kansas State University, KANSAS STATE UNIVERSITY TEAM —  $\text{In}_x\text{Ga}_{1-x}\text{N}$  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  $\text{In}_x\text{Ga}_{1-x}\text{N}$  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/ $\text{Al}_2\text{O}_3$  and/or GaN/ $\text{Al}_2\text{O}_3$  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.

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