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Thermoelectrical properties of InGaN BED PANTHA, RAJENDRA DAHAL, JING LI, ZHAOYANG FAN, JINGYU LIN, HONGXING JIANG, G. POMRENKE, KANSAS STATE UNIVERSITY TEAM, AIR FORCE OFFICE OF SCIENTIFIC RESEARCH TEAM — III-nitride semiconductors offer tremendous scope for the enhancement of the thermoelectric figure of merit (ZT) through the use of the bandgap engneering, alloying and nanostructure manipulation. Although III-nitride materials have been extensively studied for visible and ultraviolet light emitters and detectors and high power transistors during the past decade, very little work has been done with respect to their applications for thermopower technology. The ZT value of a thermoelectrical material can be enhanced by decreasing the thermal conductivity. In this study, we have employed the 3-Omega method to characterize the thermal conductivities of III-nitride nano-structures. It was found that the incorporation of indium in GaN significantly reduced the thermal conductivity. A systematic study has been carried out on the dependence of the thermal conductivity of InGaN on the In-content. Various growth schemes for introducing scattering centers and InGaN/GaN supperlattices for phonon-blocking were carried out with the aim of further reducing the thermal conductivity and enhancing the ZT value. The results of these studies will be reported in this talk.

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