Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Engineering Efficiency Droop in InGaN/GaN Multiple Quantum Well LEDs YASHVANTH PUTTASWAMY, SASI SUNDARESAN, KRISHNA YALAVARTHI, SHAIKH AHMED, Southern Illinois University — In this work, we address the technologically important issue of efficiency droop pronounced in InGaN/GaN multiple quantum well (QW) LEDs. A two-fold modeling approach is employed where: 1) the NEMO 3-D tool is used to compute the atomistic strain fields and associated polarization potentials in the active region, and 2) the outputs from NEMO 3-D are then coupled to the Synopsys TCAD tool to determine the terminal electrical and optical properties of the device. Next, a series of numerical experiments are performed that mainly aims to improve the efficiency droop without compromising the internal quantum efficiency (IQE) of the device. These include:1) varying the QW thickness, 2) employing different configurations of tri-material barriers, 3) varying the molar concentration of the barrier materials, and 4) varying the doping density in the barrier region.

Krishna Yalavarthi
Southern Illinois University

Date submitted: 10 Nov 2011 Electronic form version 1.4