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Effects of Internal Fields on the Optical Emission in Nanostructured III-N LEDs KRISHNA YALAVARTHI, SASI SUNDARESAN, KY MERRILL, SHAIKH AHMED, Southern Illinois University — Nanostructured optical emitters can accommodate a broader range of lattice mismatch, be used in full-solar-spectrum light emitting diodes, and provide higher temperature stability of the threshold current and the luminescence. However, strong quantum confinement and certain symmetry-lowering mechanisms (caused by various internal fields) lead to pronounced optical polarization anisotropy and strong suppression of interband transitions in these structures. The objective of this work is to study the competing effects of various internal fields on the electronic structure and optical properties of nanostructured III-N LEDs. A multiscale approach has been employed where: 1) the NEMO 3-D tool is used to calculate the atomistic strain distribution and one-particle electronic states within a sp3s*d5 tight-binding framework, 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.

Krishna Yalavarthi
Southern Illinois University

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