SCIENCE SEMINAR

Thursday, October 4 - Carson Taylor Hall room 322

Rajkumar Vinnakota

Doctoral Candidate - Louisiana Tech University

Presenting

"Electromagnetic Wave-Matter Interactions in Complex Optoelectronic Materials and Devices"

Understanding the intricate physics of light-matter interactions is of high importance for the development of contemporary optoelectronic technologies. We have developed a multi-physics model which couples electromagnetism, semiconductor physics and thermal effects for applications in the fields of plasmotronics and Selective Laser Melting (SLM). A device architecture based on an InGaAs degenerate PN+-junction is shown to operate at signal modulation surpassing -100dB and switching rates up to 50GHz, thus providing a new pathway toward bridging the gap between electronic and photonic devices. Furthermore, the developed self-consistent model is adapted for studies of the complex electrodynamic and thermodynamic processes involved in SLM. The results provide new insights into the dynamic interplay between laser facilitated joule heating, radiation and thermal conduction; this under the full-wave formalism. Description is provided for important SLM process parameters such as critical laser power density, saturation temperature, and time to melt. Specific guidelines are presented for improved energy efficiency and optimization of the SLM process deposition rates.

Come at 3:30pm for refreshments, speaker at 4:00pm