Friday, October 16, 2 PM, Yates 102

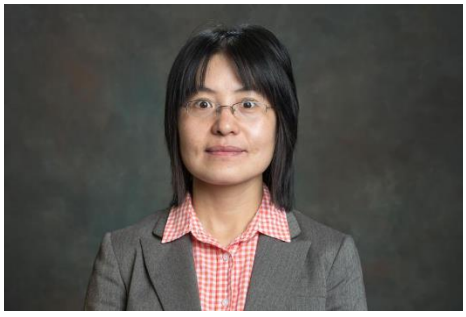
(note time/room change)

PHYSICS COLLOQUIUM

Light Extraction Efficiency of LED with Self-assembled Periodic Nanostructures

Peifen Zhu

The importance of having low-cost and practical technology to improve the efficiency of solid-state lighting is the key to implementation of this technology in general illumination market. In this talk, the utilization of self-assembled colloidal sphere/lens arrays deposited by rapid convective deposition (RCD) method to enhance the light extraction efficiency will be demonstrated in both GaN and organic LEDs. The use of rapid convective deposition method enables roll-to-roll printing process of microsphere and nanosphere arrays on large wafer area. Comprehensive studies were carried out to analyze the light extraction efficiency of LEDs with microsphere arrays deposited via rapid convective deposition process. The device structure was engineered to achieve optimum light extraction. Light extraction efficiency of 86% has been achieved by employing microlens arrays on LED, which is 1.3 times higher than that of state-of-the-art TFFC LED with surface roughness approach. The key advantage of the self-assembled colloidal process is the ability for implementation of roll-to-roll printing method for large wafer scale manufacturing process.



Dr. Zhu is an assistant professor of physics at the department of physics and engineering physics at the University of Tulsa. Her research areas are related to III-Nitride semiconductor nanostructures for solid-state lighting technologies. Her research work covers the theoretical and experimental aspects of the physics of nano-scale semiconductors, MOCVD and device fabrications of III-Nitride semiconductor devices on GaN substrates, nanomaterial synthesis and characterization. Her research interests include phosphor-converted white LED, light extraction efficiency of GaN-based LED and organic LED, solar hydrogen generation based on III-V semiconductors.

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