The Electrical and Computer Engineering Program presents

ECEN Seminar Series

Growth of nanomaterials for photodetectors, LEDs, and biosensors

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Tuesday, 17th November, 12 – 1 PM

Lecture Hall 144

Light lunch will be served

The growth and characterization of nanomaterials and nanostructures will be presented. The nanomaterials were characterized prior to the device fabrication by using optical, electrical, and structural methods. The devices were fabricated by using a standard photolithography method while different methods were used to couple metallic nanoparticles and optical nanoantennas to devices. The devices performances were obtained by using the I-V characteristic, spectral response, and quantum efficiency. Uncooled photodetectors with detectivity on the order of 10^{10} Jones and a spectral response in the mid-infrared spectral regions were attained by coupling nanocrystals to interdigital metallic structures. These photoconductive devices were also found to be polarization sensitive due to the plasmonic effect. The quantum dots light emitting diodes (QLEDs) were characterized by using micro-photoluminescence and micro-Raman spectroscopy while the emission spectrum was found to be in the visible spectral region peaking around 600 nm depending on the nanocrystal size. For the ZnO based biosensor, a two-electrode system is employed to measure the electric current for sensing the glucose concentration inside an electrochemical cell. Nafion/GOx/ZnO nanorods/ITO is used as the working electrode, and platinum plate as the reference electrode. Amperometric response for clinical range of blood glucose concentration (0.25 - 20 mM) is measured to be on the order of 0.8 V. The response time for the proposed biosensor is identified to be less than 3 seconds. For a linear range of glucose concentration (0.25 - 7.5 mM), the analyzed sensitivity is found to be on the order 51.3 $\mu A/(cm^2\,mM)$.

Omar Manasreh: Received the B.Sc. degree from The University of Jordan, Amman, Jordan, in 1976, the M.Sc. degree from the University of Puerto Rico, Rio Piedras, Puerto Rico, in 1980, and the Ph.D. degree from the University of Arkansas, Fayetteville, in 1984. Between 1987 and 1999, he was an Electronic Engineer with the U.S. Air Force, where he worked on several projects related to electronic and optoelectronic applications of III–V semiconductor materials. In late 1999, he joined the Department of Electrical and Computer Engineering, The University of New Mexico, Albuquerque, as a Research Professor, where he established two research laboratories that are fully funded externally with several graduate and undergraduate students being involved. In June 2003, he joined the Department of Electrical Engineering, University of Arkansas, where he established a state-of-the-art Optoelectronic Research Laboratory funded by the Department of Defense, NASA, and the NSF. He published over 210 technical papers in many preeminent journals. He was the Editor-in-Chief for the following book series: 1) Optoelectronic Properties of Semiconductors and Superlattices (Taylor and Francis) with 21 volumes; 2) Semiconductor Materials and Devices (Artech House) with seven volumes; and 3) Nanoscience and Technology (McGraw-Hill) with six volumes. He authored the following textbooks: 1) Semiconductor Quantum Wells and Superlattices forLong Wavelength Infrared Detectors (Artech House, 1993); 2) Semiconductor Heterojunctions and Nanostructures (McGraw-Hill, 2005); and 3) Introduction to Nanomaterials and Devices (Wiley, 2012). His current research is focused on the experimental and theoretical optoelectronic properties of III–V semiconductors, nanomaterials, and related devices. Dr. Manasreh was a recipient of several awards, including the Science and Technology Achievement Awards presented by the Air Force Materiel Command at Wright-Patterson Air Force Base and the Aubrey E. Harvey Award (Sigma Xi) presented by the University of Arkansas. He was a National Research Council Fellow during 1988–1989.

FOR MORE INFORMATION:

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