COLLEGE OF ENGINEERING AND COMPUTER SCIENCE

FACULTY RESEARCH TALKS

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Zoom talk | Friday, Mar. 24, 2023 | Noon to 1 p.m.

PRESENTER 1:
KEVIN R. COFFEY
Professor,
Materials Science
and Engineering

Semiconductor Interconnects

While there is much interest in novel semiconductor devices, the transistors themselves are not the problem for modern CMOS. It is the interconnecting network of wires between transistors that have become the performance limiters (power dissipation, speed) for recent generations. This talk will touch upon older work on the resistivity size effect for Cu and describe more recent work with single crystal metallic nanowires for interconnect applications.

Dr. Coffey received an M.S. in physics from Northeastern University in 1985 and a Ph.D. in materials science and engineering from Massachusetts Institute of Technology in 1989. He then worked in industry before joining UCF in 2002. His research interests are focused on thin film electronic materials, primarily metals. Dr. Coffey's current interest is the electrical conductance of metallic nanowires for semiconductor interconnect applications, which grew from his work in spin-dependent scattering at interfaces in magnetic materials. His research record includes 34 issued U.S. patents and more than 100 referred journal articles.

PRESENTER 2:
WOO HYOUNG LEE
Associate Professor
Civil, Environmental
and Construction
Engineering

Detection and Degradation of Emerging Environmental Contaminants and Bioenergy Production from Wastes

As the human population increases and environmental requirements become more stringent, the need for sustainable water management treatment systems that meet regulatory standards and reduce energy consumption, or produce renewable energy from wastes, has become a top priority in the water industry. In this talk, novel sensing technologies for emerging contaminants will be introduced. These include harmful algal toxins biosensors, heavy metal detection sensors, microbial-fuel cell water toxicity sensors and manganese detection sensors. Needle-type microelectrodes will also be introduced as an optimal tool for in-situ microscopic study for biofilm, metal corrosion and membrane research. Novel technology to degrade emerging environmental contaminants will include advanced photodegradation of harmful algal toxins and an electrochemical per- and polyfluoroalkyl substances destruction technology. Renewable energy production technology such as photo-algal hydrogen production and biohydrogen production from urine will be also introduced.

Dr. Lee received his Ph.D. in environmental engineering from the University of Cincinnati in 2009. He was an Office of Naval Research summer faculty member for the last five years. Dr. Lee specializes in the development and use of electrochemical sensors for water quality monitoring and advanced water and wastewater treatment using nanotechnology and biotechnology. His research has been funded by competitive grants from sponsors including the EPA, NASA, USDA, DOE and DOD. Dr. Lee is a registered professional engineer and serves as a member of the EPA's Board of Scientific Counselors Social and Community Science Subcommittee.

PRESENTER 3:
WEN SHEN
Assistant Professor,
Mechanical
and Aerospace
Engineering;
Nanoscience
Technology Center

Biomimetic Sensors and Applications

Implantable and wearable devices must be both biologically and mechanically compatible with host environments to overcome foreign body reactions. To achieve this goal, Dr. Shen will introduce natural materials based devices for neural interfacing and transcutaneous sensing. Moreover, wireless interrogation is desirable to minimize sensor footprints for many healthcare and environmental applications. Towards this goal, Dr. Shen will introduce microsensors featuring magnetoelastic sensing modality to support in-situ and wireless sensing.

Prior to joining UCF, Dr. Shen was an assistant professor at the University of Texas at Arlington. Her research interests are in the development of functional materials-based microelectronics for biomedical interfacing, agricultural sensing and structural health monitoring. Dr. Shen's current research is funded by the USDA.

ZOOM LINK: https://bit.ly/3lLqC1l | PREVIOUS TALKS: www.cecs.ucf.edu/faculty-research-talks