FIU Biomedical Engineering
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Biomedical Engineering
Wallace H. Coulter Foundation
Lecture Series

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Develop novel optical biosensors for sensitive in vitro and in vivo bioassays

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Lecture: 9:00 AM-10:00 AM
ENGINEERING CENTER
ROOM EC 1105

Abstract: There is a high demand for highly sensitive biosensors for quantifying biomolecule concentrations or binding affinities for a wide range of biomedical and pharmaceutical applications. In this talk I will present two unique biosensors for both *in vitro* and *in vivo* applications. First, I will describe a photonic crystal based biosensor for label-free bioassays. As opposed to a conventional optical microcavity sensor that has a closed structure with its cavity layer sandwiched between two highly reflective surfaces, the photonic crystal sensor we developed possesses a novel open optical microcavity. The open configuration allows the sensing layer to be easily functionalized and directly exposed to analyte molecules for label-free bioassays through monitoring the change in resonant conditions of the open microcavity. A wide range of applications can be facilitated by the unique open-cavity biosensor. In particular, two different applications will be covered in this talk. One is for label-free measurements of cardiac biomarkers-Troponin I (cTnI). The sensor is functionalized with antibodies against cTnI for sensitive detection of cTnI with a concentration as low as 0.1 ng mL^{-1}. The other application is to use the sensor for the study of interactions between different peptides and FvTox1- a toxin produced by a soil borne pathogen that causes sudden death syndrome in soybean plants. Furthermore, I will discuss the development of a novel two-photon optical fiber fluorescence (TPOFF) probe and its applications for *in vivo* biosensing, such as real-time monitoring nanoparitcle-based drug delivery in a live mouse model

Biography :Dr. Jing Yong Ye is currently an associate professor in the Department of Biomedical Engineering at the University of Texas, San Antonio. The primary focus of his research is to develop cutting-edge ultrasensitive and ultrafast laser-based technologies to address critical issues at the frontiers of biomedical research and applications. He has led multiple exciting research programs including development of a novel optoacoustic sensor for high-frequency photoacoustic imaging, photonic crystal based biomolecular assays, *in vivo* fiber-optic biosensing and imaging of a multifunctional nano-device for targeted cancer drug delivery, ultrafast laser interaction with nanoparticle-targeted cancer cells, *in vivo* two-photon flow cytometry, adaptive optical aberration correction in multiphoton scanning microscopy, and single-molecule fluorescence imaging and spectroscopy. He has published 86 refereed articles, 150 conference papers, and two book chapters, and holds 12 patents. He serves as a grant reviewer for federal funding agencies (NIH and NSF), state programs and private foundations. He is also a co-founder of a biotech company and serves on a company's advisory board and as a professional consultant for five companies.