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School of Microelectronics, SUSTech

Academic Frontier Lecture

No. 018

Title: Nanostructured transducers and receptors for ultrasensitive and versatile biosensing

TIME: 14:00pm-15:00pm, Jun. 6, 2019
VENUE: Room 114, Taizhou Hall (台州楼114)
SPEAKER: Faheng Zang , Postdoctoral Research Associate at Princeton University in the Electrical Engineering Department

INTRODUCTION

Faheng Zang is a Postdoctoral Research Associate at Princeton University in the Electrical Engineering Department. His research interests include nanophotonics, nanodevices, micro-/nano-fabrication, biosensors, microfluidics, and microsystems for applications in ultrasensitive sensing, functional nanomaterial system-integration, and nanostructured energy devices. At Princeton University, he is the leading researcher in a collaborative research project between Princeton University and U.S. government labs to dramatically improve the test for the Ebola virus through nanophotonics and nanofabrication. Prior to joining Princeton University, he conducted his Ph.D. research at University of Maryland, College Park, where he initiated and led the research on integrating one-dimensional virus nanostructures in microdevices for sensing and energy storage.

ABSTRACT

Nanostructured transducers and receptors are two essential elements for ultrasensitive and selective biological sensors. Scalable nanofabrication combining nanoimprint lithography and thin-film processes has been used for creating three-dimensional nanoantenna sensors for ultrasensitive biosensing. The nanoantenna sensor utilizes optical resonance to maximize the absorbance of excitation laser energy, tremendously improving the fluorescence-based Ebola antigen immunoassay sensitivity over 200,000-fold compared to existing method. On the receptor side, functional bio-nano-materials can be integrated in biosensors to significantly improve biosensing selectivity and versatility. Genetically modified Tobacco mosaic virus-like particles (TMV) are emerging one-dimensional bio-nano-materials that have been integrated in biological and chemical microsensors. Controlled assembly of TMV in biosensors using microsystem approaches has also enabled rapid functionalization of biosensors for on-demand antibody sensing. The nanostructured transducers and receptors combined have highlighted the great potential of nanofabrication and nanotechnology in developing next-generation biosensors.