

# 学术报告

题目: Engineering and  
Functionalizing Quasi-3D  
Plasmonic Nanostructures  
for SERS Biosensing

报告人: Assoc. Prof. Qiuming Yu  
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时间: 12月22日(周一) 上午10:00

地点: 卢嘉锡楼报告厅(202)

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固体表面物理化学国家重点实验室  
化学化工学院  
12月16日

# Engineering and Functionalizing Quasi-3D Plasmonic Nanostructures for SERS Biosensing

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时间: 2014年12月22日上午10点

地点: 卢嘉锡楼报告厅(202)

## Abstract:

Surface-enhanced Raman spectroscopy (SERS) has emerged as a powerful analytical and sensing tool for use in many important fields such as biomedical diagnostics, environmental monitoring, and food safety. Unlike using colloid metal nanoparticles as SERS substrates, we developed quasi-3D plasmonic nanostructures arrays (Q3D-PNAs) with tunable localized surface plasmon resonance (LSPR) as well as strength and location of the strongest local electric fields (i.e., hot spots). The unique properties of Q3D-PNAs allow sensitive and selective detections of small (molecules, proteins, and virus) and large (microorganisms) analytes simultaneously or separately. We demonstrated that bacteria such as marine pathogen *Vibrio parahaemolyticus* can be rapidly detected using a SERS barcode method. By making x-shaped nanoholes, we can vary the locations of hot spots by changing polarization of the excitation laser, which enables the characterization of heterogeneous domains of cell membranes. Finally, we functionalized the Q3D-PNAs surfaces with probe and non-fouling molecules to enable sensitive and specific detection of small molecules with weak Raman signals. We show analytes such as fructose can be sensitively detected in complex media via monitoring the SERS signal changes of the immobilized probe molecules.

Qiuming Yu received her BS and MS degrees from the Department of Chemistry at Nanjing University in China. She earned her Ph.D. degree from the Department of Chemical Engineering at Cornell University in 1995. She was a postdoctoral fellow at the Microdevices Laboratory at the NASA Jet Propulsion Laboratory / California Institute of Technology. After spent three years as research assistant professor in the Department of Chemical Engineering at Kansas State University, she moved to the University of Washington (UW) in 2000, where she served as research associate in the Departments of Physics and Chemical Engineering, and lab manager of the Nanotech User Facility at the UW Center for Nanotechnology. Currently, she is a research associate professor at UW Chemical Engineering. Her research interest focuses on semiconductor nanomaterials and plasmonic nanostructures for photovoltaics and optoelectronics devices and chemical and biological sensors.