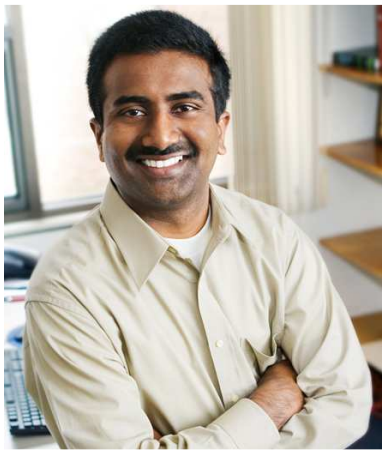
Mechanical Engineering Department Seminar

3:35pm March 9, 2016
1130 Mechanical Engineering
111 Church Street SE, Minneapolis, MN 55455

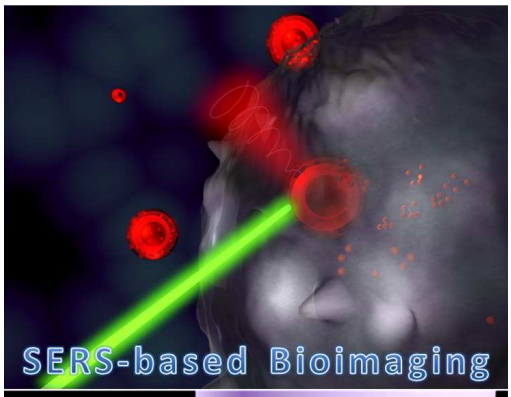


Plasmonic Engineering in Nanomedicine

Srikanth Singamaneni

Associate Professor; Washington University

Plasmonics involves the confinement and manipulation of light at the nanoscale using surface plasmons. Plasmonics is making a tremendous impact in the field of life sciences, with applications in bioimaging, biosensing, and targeted delivery and externally-triggered locoregional therapy. In the first part of this talk, we present a novel class of ultrabright surface enhanced Raman scattering (SERS) probes based on core-satellite and core-shell plasmonic nanostructures. Apart from serving as ultrabright contrast agents, we demonstrate that the core-satellite superstructures can serve as nanoscale sensors. The unique design of the superstructures with accessible electromagnetic hotspots enables facile sampling of the surrounding biological milieu. In the second part of this talk, we demonstrate that a filter paper adsorbed with biofunctionalized metal nanoparticles enables the detection of target biomarkers in complex physiological fluids. To deploy such plasmonic bio-sensors in resource-limited and point-of-care settings, we replace natural antibodies with peptide recognition elements or artificial antibodies by molecular imprinting on the plasmonic nanotransducers. We demonstrate that plasmonic biosensors based on peptide recognition elements or artificial antibodies exhibit enhanced thermal and chemical stability. Taken together, our research effort takes plasmonics closer to making an impact on the detection and intervention of life-threatening diseases.



Bio: Dr. Singamaneni is an Associate Professor in the Department of Mechanical Engineering and Materials Science at Washington University in St. Louis. He obtained his PhD in Polymer Materials Science and Engineering from Georgia Institute of Technology in 2009. His research group is involved in the design, synthesis and self-assembly of plasmonic nanostructures for various biomedical applications. He has co-authored more than 100 refereed articles (including 8 invited reviews) in archival journals, 6 book chapters, and a book (Scanning Probe Microscopy of Soft Matter: Fundamentals and Practices). He is a recipient of the NSF CAREER award (2013), Dean's Faculty Award for Innovation in Research (2013), Translational New Investigator Award, DOD-Army (2011) and Materials Research Society Graduate Student GOLD Award (Fall 2008).