

Molecular Plasmonics: Nanoscale Sensing and Spectroscopy”

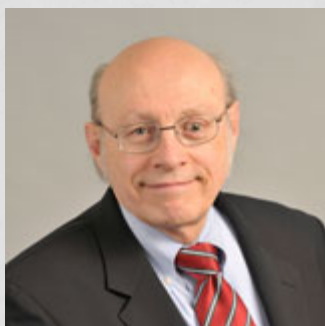
Surface enhanced Raman spectroscopy (SERS) was discovered in 1977. The primary observable in SERS is that the intensity of Raman scattering from non-resonant molecules adsorbed on certain metals is amplified (enhanced) by a factor of $10^8 - 10^9$. The origin of this large enhancement factor (EF) has been revealed as the nanoscale interaction between light, adsorbed molecules, and the collective electronic excitations in materials (e.g. Ag, Au, Cu) that support localized surface plasmon resonances (LSPRs). Approximately 20,000 papers have been published on SERS and that number is still exponentially increasing.

In the first part of this lecture, I will provide some background material on the basic physical concepts underlying SERS and localized surface plasmon resonance (LSPR) spectroscopy. Next, I will turn to the area of single particle surface enhanced Raman spectroscopy (SPSERS). In this section I will provide specific answers for several, long-standing fundamental questions such as: (1) what is the largest possible value for the EF and (2) what nanostructure produces the largest EF. Our approach to answering these questions involved the development of new tools using single nanoparticle SERS and single nanoparticle LSPR spectroscopy spatially correlated with high resolution transmission electron microscopy (HRTEM).

In the second part of this lecture, I will discuss two biosensing applications of molecular plasmonics. The first is in vivo glucose sensing with SERS and the second is the first demonstration of single molecule sensitivity in LSPR biosensing.

MATERIALS & ANALYTICAL MELOCHE SEMINAR

Thursday, October 11
12:15 p.m., 1315 Chemistry



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