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Department of Chemistry

Student Seminar Series

9:45 a.m. Tuesday, October 28, 2014 • 331 Smith Hall

Associate Professor

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University of Texas, Austin

Super-Resolution Imaging of Plasmonic Nanostructures

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Abstract

Noble metal nanoparticles can support localized surface plasmons, which lead to strong nanoparticle coloration and enhanced electromagnetic fields at the nanoparticle surface which are the basis of surface-enhanced spectroscopies such as surface-enhanced Raman scattering (SERS). While extensive theoretical calculations have been performed that predict how these plasmon-enhanced electromagnetic fields are distributed on the nanoparticle surface, confirming these results using optical techniques is extremely challenging due to the diffraction limit of light, which prevents objects smaller than roughly half the wavelength of light from being resolved. Because the metal nanoparticles are smaller than the wavelength of light, they appear as diffraction-limited spots in optical images, obscuring the local electromagnetic field enhancements as well as the position of molecules residing in these regions of strong plasmonic enhancement. This talk will describe plasmon-coupled super-resolution single molecule imaging techniques as a new tool to beat the diffraction limit by over an order of magnitude, providing the necessary resolution to optically image local electromagnetic field enhancements and probe plasmon-coupled molecular emission.

Katherine "Kallie" Willets is an associate professor at the University of Texas at Austin. She received her applied bachelorette degree at Dartmouth College in 1999. Her research, under E.G. Lipson, included studying the miscibility of polymer blends. She then went on to Stanford University for her doctorate, and studied novel fluorophores systems to image single molecules, under the tutelage of W.E. Moerner. After receiving her doctorate in 2005, she moved to Northwestern to post-doctorate in Rick Van Duyne's lab for two years. In 2007, Willets became an assistant professor at the University of Texas at Austin, and she was promoted to associate professor in 2014. She recently accepted a position at Temple University where she will be moving her lab this winter. During her time at UT Austin, she received multiple awards, including the Department of Energy Early Career Award, Preferred Professor, Mortar Board of the National College Senior Honor Society, UT Regents Outstanding Teaching Award, and Air Force office of Scientific Research Young Investigator Award.

Host: Sarah Gruba