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COLLEGE OF ARTS & SCIENCES

Department of Chemistry

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Plasmons in Chemistry and Imaging

ABSTRACT:

Advances in nanotechnology enable the synthesis of structures that have unique interactions with light. For particles that exhibit plasmon resonances, the interaction with light can enable detection of trace molecules but also cause chemical reactions with unique reaction pathways. Research in the Schultz lab has examined the underlying physical processes that occur in plasmonic nanostructures and applications that derive from them. Interesting properties have been observed associated with electrons transferring between particles and molecules. We have further developed technology to enable super-resolution imaging of plasmonic nanoparticles, where the fluctuations in the surface enhanced Raman scattering (SERS) signal can be analyzed with localization microscopy techniques to provide nanometer spatial resolution of the emitting molecules location. We have been able to use this approach to increase the spatial resolution of SERS imaging in diverse applications. In this presentation we will discuss the instrumentation, nanoparticles, and data illustrating the wealth of information obtainable from the Raman signals of molecules interacting with nanoparticle probes.

BIO:

Zachary D. Schultz, Ph.D., is a professor at The Ohio State University. Prof. Schultz earned his B.S. degree from the Ohio State University in 2000 and Ph.D. from the University of Illinois at Urbana-Champaign in 2005. As a graduate student, he was recognized with an ACS Division of Analytical Chemistry Graduate Fellowship (2004). Upon completing his Ph.D., he was awarded a National Research Council Postdoctoral Fellowship to conduct research at the National Institute of Standards and Technology (USA). Following his postdoctoral training at NIST, Dr. Schultz continued as a research fellow at. While at the NIH, Dr. Schultz was awarded an NIH Pathway to Independence Award. Dr. Schultz began his independent career as an assistant professor of chemistry and biochemistry at the University of Notre Dame in 2009 and was promoted with tenure to associate professor in 2015. In January of 2018, Prof. Schultz moved his research program to Ohio State, where he was promoted to professor in 2022. Prof. Schultz was recognized as a Cottrell Scholar in 2013, elected a Fellow of the American Association for the Advancement of Science (AAAS) in 2019, and was awarded the Craver Award for applied vibrational spectroscopy from the Coblentz Society in 2021. Prof. Schultz's research focuses on developing innovative approaches utilizing the unique interactions between light and nanostructured materials for spectroscopic imaging and ultrasensitive label-free spectroscopic detection.