

ANALYTICAL SEMINAR

EXAFS: A Tentative Tool for Probing Single Atom Catalysts

John Fredrick Koons

Graduate Student
Purdue University



Single atom catalysts present a new and exciting frontier in the field of heterogeneous catalysis. They also bring forward the question of how to probe the structure and catalytic activity of single atoms on a substrate. X-ray absorption spectroscopy and more specifically Extended X-ray Absorption Fine Structure (EXAFS) offers the unique ability to analyze local coordination environments on a sub-Angstrom scale. This technique has been widely used to verify the existence of single metal atom catalysts as opposed to nanoparticle clusters by analyzing the nature of bonds surrounding the metal atoms. However, recent research has highlighted some previously unaddressed limitations in using EXAFS for this application. This seminar will introduce EXAFS and how it is used for analysis of single atom catalysts as well as address the limitations of the technique.



Tuesday, January 28, 2025



3:30 pm



WTHR 320

ANALYTICAL SEMINAR

A Ratiometric pH-dependent SERRS Probe for *in vivo* Tissue Imaging

Samuel Nortz

Graduate Student
Purdue University



Surface-enhanced resonance Raman scattering (SERRS) is a powerful spectroscopy technique which relies on surface modified metallic nanoprobe to significantly enhance the Raman scattering effect of light. Its main advantage is its high sensitivity which arises from the 10⁸-10¹² signal enhancement from the SERRS effect. High sensitivity, along with the ability to probe unique vibrational footprints from Raman scattering, have paved the way for the use of SERRS as an intriguing analytical tool in biomedical, environmental, food, and security applications. Recent developments have focused on improving the nanoparticle and surface substrates, especially for quantitative analysis in the complex environment of living systems. Gold nanoparticles functionalized with unique reporter molecules have recently been demonstrated as robust sensing modalities for precisely identifying malignant tissue based on local pH in live animal models. These studies have demonstrated remarkable potential for delineating tumor boundaries in an accurate and non-invasive manner and pave the way for practical biomedical applications of SERRS.



Tuesday, January 28, 2025



3:30 pm



WTHR 320