

Analytical Chemistry Seminar

Tuesday, March 26, 2024
3:30 p.m. ~ WTHR 320

"Functional Bond-Selective Microscopy for Subcellular Bioanalysis"

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Bio:

Lu obtained her Ph.D. from Columbia University in 2015 and joined the faculty at Caltech as an Assistant Professor of Chemistry in 2018. Her group works on developing and applying next-generation vibrational imaging techniques to quantitatively investigate the intracellular biophysical and biochemical processes with an emphasis on neuronal metabolism; multiplex live-cell imaging; functional vibrational imaging and sensing with down to single molecule sensitivity. Lu has been recently recognized by the 2020 NIH Director's New Innovator Award, the 2022 Sloan Research Fellowship, the 2022 Vallee Scholar Award, the 2023 NSF CAREER award, and the 2024 BPS Margaret Oakley Dayhoff Award. Lu is also a Heritage Medical Research Institute (HMRI) Investigator at Caltech.

Abstract :

Advances in optical spectroscopy and microscopy have revolutionized our understanding in live biological functions at the sub-cellular levels. In this seminar, I will present our recent efforts in developing and applying next-generation bond-selective spectro-microscopy for retrieving functional chemical information in live cells and neurons. I will first discuss the coupling of the stimulated Raman scattering (SRS) imaging, a nonlinear Raman imaging modality, with newly developed biorthogonal chemical strategies for quantitative subcellular analysis of protein aggregates in neurodegenerative diseases and for intracellular local environmental sensing through alkyne- hydrogen–deuterium exchange (Alkyne-HDX). I will then present a new mid-infrared near-infrared double-resonance imaging technique, BonFIRE, for bond-selective fluorescence imaging with single-molecule sensitivity. This microscopy platform will allow new capabilities for wide-field super-multiplex imaging and vibrational life-time imaging for sensing heterogeneous cellular interactions and environment.