Analytical Chemistry Seminar

Tuesday, January 16, 2024
3:30 p.m. ~ WTHR 320

"Liquid Phase Transmission Electron Microscopy: Overcoming Solution Limitations and Proving Nano Dynamics"

Brady Layman
Graduate Student, Purdue University

Abstract:

Material innovation is quickly accelerating across science and engineering. These materials often have exciting properties to serve purposes such as energy transport and storage; thus, measurement scientists must be creative and redefine possibilities in their characterization to probe and understand these properties. For much of the history of electron microscopy, liquids (such as water) have been problematic for analysis. However, innovations in transmission electron microscopy have allowed the use of liquid sample cells. Liquid phase transmission electron microscopy (LP-TEM), developed since the turn of the millennia, has opened doors into previously unreachable dynamics at the nanoscale such as its unique capacity to offer analysis in real time. An overview of the technique will be shown, along with a comparison of the two different cell types: silicon nitride and graphene. The 'elephant in the room', using liquid in the path of an electron beam and its implications, will also be discussed, along with methods used to mitigate resolution limitations caused by the phase boundaries present in the cell. The power of LP-TEM can be realized by probing mechanisms of material formation in real time. This is exemplified by how monocrystalline gold nanocrystal's mechanism of formation was discovered with LP-TEM.

Bio:

Brady Layman is a second-year graduate student in the Jeffrey Dick Research Group working on the development of in situ electrochemiluminescence corelated optical microscopy in multiphase environments. Originally from Oregon, he discovered his passion for chemistry while developing an electrochemical biosensor for Bacterial Kidney Disease in salmonids at Eastern Oregon University under the advisement of Dr. Anna Cavinato. After graduating with his B.S. in Biology and B.S. in Chemistry-Biochemistry in the Spring of 2022, he moved to Purdue University to begin his graduate studies in Fall of 2022.

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