

PHYSICAL CHEMISTRY SEMINAR



Dr. Peter Dahlberg

*Department of Chemistry
Stanford University*

Monday, Mar. 8, 2021
4:00 PM
via Zoom

“Combining cryogenic single-molecule fluorescence measurements and CryoEM: New methods with applications from biology to physical chemistry”



Both Super-resolution fluorescence microscopy and cryogenic electron microscopy have undergone major advances in the past decade. These advances have enabled higher resolution imaging and resulted in a deeper understanding of a broad range of biological and synthetic systems. Despite the strength of both of these imaging modalities, each suffers from unique limitations. Many of these limitations can be circumvented when the two are integrated into a single method: super-resolved cryogenic correlative light and electron microscopy. However, the development of this powerful combination requires overcoming several experimental challenges. These challenges span technical issues like instrumentation and hardware limitations to more fundamental problems such as achieving photophysical control over fluorescent labels at cryogenic temperatures. I will discuss some of these challenges and our solutions that have led to two areas of recent advancement. The first advancement demonstrates our ability use single-molecule fluorescence localizations to precisely and accurately annotate the positions of specifically labelled biomolecules in cryogenic electron tomography reconstructions. The second advancement pushes these correlative microscopies to the limit by correlating cryogenic tomography of single particles with single-molecule fluorescence spectroscopy data. I will conclude with a brief perspective on the future of these correlative methods and anticipated developments which will have the most profound impact on diverse fields of study.