Department of Chemistry and Biochemistry
Physical Chemistry Seminar Series

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Hosted by Jim Prell

Uncovering Membrane Protein and Peptide Interactions in Lipid Nanodiscs with Native Mass Spectrometry

Abstract:

Due to their important biochemical roles, membrane proteins are important drug targets. Although lipids can clearly influence membrane protein function, the chemistry of lipid binding remains difficult to study because protein-lipid interactions are polydisperse, competitive, and transient. Native mass spectrometry (MS) has emerged as a powerful technique for studying membrane protein oligomeric state and interactions. However, conventional native MS of membrane proteins has relied on detergent micelles, which may distort membrane protein-lipid interactions and are unsuitable for assembly of smaller membrane-embedded peptide complexes. We are developing nanodiscs as an alternative membrane mimetic for native MS that provide a native-like lipid bilayer environment with a defined lipid composition. Here, we will discuss using native MS of nanodiscs to study membrane protein-lipid interactions and to understand how membrane proteins remodel their surrounding lipid bilayer environment. We are also employing nanodisc native MS to characterize interactions of antimicrobial peptides, which target bacterial membranes and may prove useful in combatting antibiotic resistance. Finally, we will look at new research studying oligomerization of the SARS-CoV-2 envelope protein. Ultimately, we expect this unique combination of nanodiscs and native MS will provide new insights into interactions of biomolecules with and within lipid membranes.