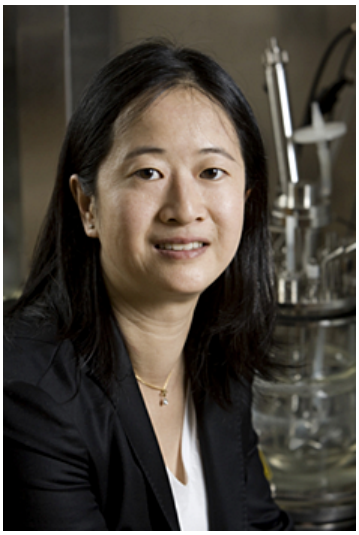
UCLA Department of Chemistry & Biochemistry

Physical Chemistry Seminar



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Characterization of Protein Secondary Structures at Interfaces Using Chiral Sum Frequency Generation Spectroscopy

Characterization of protein secondary structures using vibrational spectroscopy is challenging because of strong vibrational background from water and spectral overlapping of proteins' amide I bands of various secondary structures. Our recent studies have shown that chiral sum frequency generation spectroscopy (cSFG) can be used to address the challenge. We obtained cSFG spectra of amide I and N-H stretch of protein backbones in various secondary structures at interfaces. These spectra are highly characteristic to parallel beta-sheets, anti-parallel beta-sheets, alpha-helices, 3-10 helices, and random-coils. Because cSFG spectra are muted to achiral solvent, cSFG can be used to characterize secondary structures at interfaces with zero water background. Using cSFG, we studied the aggregation of human islet amyloid polypeptide (hIAPP), which is associated with type II diabetes. We observed in situ and in real time the misfolding of hIAPP from disordered structures to alpha-helices and then beta-sheets on membrane surfaces. The results have provided insight into the pathogenic mechanism of hIAPP aggregation in type II diabetes. The studies have also demonstrated the capacity of cSFG in solving fundamental and engineering problems in biological and biomedical sciences.

Monday, March 4, 2013
4:00 P.M.
2033 Young Hall

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