Physics Colloquium, University of South Florida
3:00 pm, Friday, Sep. 20th, 2019, ISA 2023
☞☞*Refreshment available* ☜☜

Membrane Interactions and Amyloid Formation of α-Synuclein

Dr. Jennifer C. Lee

**Laboratory of Protein Conformation and Dynamics,
Biochemistry and Biophysics Center,
National Heart, Lung, and Blood Institute,
National Institutes of Health, Bethesda, Maryland 20892**

α-Synuclein is most well-known for its involvement in the etiology of Parkinson's disease where α-synuclein amyloid fibrils are found in Lewy bodies, a histopathological hallmark. Membrane association of α-synuclein is associated with its biological function and implicated in pathogenesis. Upon membrane association, α-synuclein adopts an α-helical structure, whereas in solution, the protein is disordered. In a disease state, β-sheet rich, amyloid fibrils of aggregated α-synuclein accumulate in the cytosol. In this work, we aim to understand how amyloid formation is influenced by lipids and in turn, how the protein aggregation process may lead to deleterious α-synuclein interactions with membranes. We are especially interested in the ability of α-synuclein to sense and generate membrane curvature, which could have both functional and dysfunctional consequences. Building upon the fundamental understanding of α-synuclein–lipid interactions, we are developing Raman microspectroscopy to study protein conformational dynamics and aggregation in cells. This powerful approach reports on protein secondary structural changes, allowing us to identify whether the protein has adopted a β-sheet rich form, indicative of amyloid structure, as a function of its spatial location. In this talk, I will present our latest results on (1) membrane fluidity and curvature sensing by α-synuclein, (2) Raman spectroscopic characterization of α-synuclein amyloid formation, and (3) cellular studies of α-synuclein. Through our work, we are developing a chemical understanding in how specific biomolecular interactions and cellular environments modulate α-synuclein structure and aggregation propensity.

Dr. Jennifer C. Lee is a Senior Investigator at the National Heart, Lung, and Blood Institute, National Institutes of Health. Her research efforts are dedicated towards the elucidation of mechanisms of amyloid formation through biophysical and biochemical approaches. She is interested in understanding the chemical nature of intermolecular interactions that drive amyloid formation in a cellular environment. Prior to joining the NIH, she was a Beckman Senior Research Fellow at the Beckman Institute Laser Resource Center at the California Institute of Technology. Jennifer obtained a Ph.D. in Chemistry from Caltech in 2002 working in the laboratory of Harry Gray and has undergraduate degrees in Chemistry and Economics from the University of California at Berkeley.