School of Molecular Sciences
Arizona State University

SMS Fall 2021 Seminar Series

Friday Oct 15 | 2:30pm | Virtual*

In-Cell Protein Footprinting Coupled with
Mass Spectrometry for Structural Biology Across the Proteome

In recent years, protein footprinting coupled with mass spectrometry has been used to identify protein-protein interaction sites and regions of conformational change through modification of solvent accessible sites in proteins. The footprinting method, fast photochemical oxidation of proteins (FPOP), utilizes hydroxyl radicals to modify these solvent accessible sites. To date, FPOP has been used in vitro on relatively pure protein systems. We have further extended the FPOP method for in vivo analysis of proteins. This will allow for study of proteins in their native cellular environment and be especially useful for the study of membrane proteins which can be difficult to purify for in vitro studies. A major application of the in vivo method is for proteome-wide structural biology. In one such application, we used in-cell FPOP (IC-FPOP) to identify on and off targets of the anti-cancer drug Gleevec in triple negative breast cancer cells. By obtaining structural information on proteins across the proteome, we were able to distinguish the differences in the mechanism of action of Gleevec in different racial populations. We have further extended the FPOP method for analysis in C. elegans, a member of the nematode family. This allows us to study protein structure directly in animal model for human disease. These methods have the potential to become a powerful tool in the structural biology toolbox.

Lisa Jones, PhD

Associate Professor of Pharmaceutical Sciences
University of Maryland

Lisa M. Jones is an Associate Professor in the Department of Pharmaceutical Sciences at the University of Maryland. She received her BS from the Department of Chemistry at Syracuse University and her PhD in Chemistry from Georgia State University. She received postdoctoral training in structural virology at the University of Alabama-Birmingham and in MS-based protein footprinting at Washington University in St. Louis. Dr. Jones's research interests include the use of the protein footprinting method fast photochemical oxidation of proteins (FPOP) coupled with mass spectrometry for the characterization of the higher order structure of proteins. In particular, her lab has further developed the FPOP method for in-cell (IC-FPOP) studies for proteome-wide structural biology. Biological applications of IC-FPOP include characterizing protein folding intermediates directly in the cell and drug target (both on and off targets) determination. The Jones lab has also extended the method for in vivo analysis (IV-FPOP) in C. elegans. This provides the ability to study protein structure in an animal model for human disease.

**ZOOM: https://asu.zoom.us/j/85970513480*