

# *Advanced Analytical Instrument Methods for Structure Determination*

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Analytical  
Chemistry  
Faculty  
Candidate  
Seminar

**4:00 p.m.**  
**Thursday**  
**April 14, 2022**  
**In 126 Schrenk**  
**also live via**  
**Zoom**

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**Abstract:** The advances of modern analytical instruments have greatly extended our detection limit and improved resolution for structure determination, not only for small molecules but also for big complexes of proteins. Mass spectrometry and cryo-electron spectroscopy are among the most powerful analytical tools for life science studies. In this talk, I will discuss three associated projects. 1. Development of a novel ionization method named Continuous Flow Desorption Ionization (CF\_EDESI) for mass spectrometry. This ionization method improves on traditional electrospray ionization (ESI) by conserving protein tertiary structure, reducing signal from undesired lipid adducts, and affording direct coupling with normal phase chiral separation. 2. Development of covalent and non-covalent “shift reagents” for improved separation of mono- and disaccharides in ion mobility mass spectrometry. 3. Application of cryo-electron microscopy and other structure biology methods to determine the 3D structures of fibrils formed from acetylated protein-Tau peptides. I will also briefly discuss mass spectrometry tools for identifying microorganisms (Shimadzu MALDI\_iD plus or Bruker MALDI Biotyper), imaging tissues (Bruker Tissue typer), and identifying protein-protein interactions (crosslinking mass spectrometry).

**About the speaker:** Dr. Li Li is an interdisciplinary scientist broadly trained at the forefront of analytical chemistry and structure biology. Li earned a B.S. and M.S. in medical chemistry from Shenyang Pharmaceutical University and the Shanghai Institute of Organic Chemistry. She completed a Ph.D at the University of Texas at Arlington, developing fundamental methodologies for mass spectrometry. After work at the UTA Shimadzu Center for Advanced Analytical Chemistry, she completed postdoctoral research at Georgia Tech, where she applied synthetic and ion mobility mass spectrometry methods to understanding the role of sugars in the origin of life. She is currently a postdoctoral researcher at the Center for Alzheimer's and Neurodegenerative Diseases, University of Texas Southwestern Medical Center, applying mass spectrometry and cryo-electron microscopy to study protein Tau posttranslational modifications, and their impact on Tau aggregation in neurodegeneration disease.