CHEMISTRY SEMINAR

3:45 PM Thursday
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RNS 310

VARUN GADKARI, PH.D.

Varun Gadkari obtained his B.S. and Ph.D. in biochemistry from The Ohio State University in 2012 and 2017 respectively. His Ph.D. thesis focused on the biochemical and biophysical characterization of DNA replication proteins and enzymes. After his Ph.D., Varun joined the laboratory of Prof. Brandon Ruotolo at the University of Michigan as postdoctoral research fellow. His Postdoctoral work focused on the development native mass spectrometry methods, and new instrumentation for gas phase biomolecular measurements. Varun joined the University of Minnesota Department of Chemistry as an Assistant Professor in 2022. The Gadkari Research Group develops and applies native mass spectrometry, ion mobility-mass spectrometry, and charge detection mass spectrometry to study a broad range of relevant biological systems. Current projects relevant to human health are focused on proteins and nucleic acids involved in neurological disorders, and cancer. Method development projects are focused on biotherapeutic structural analysis, and high mass biomolecular analysis of analytes above 1,000,000 Da.

APPLICATIONS OF MASS SPECTROMETRY BEYOND MASS MEASUREMENT: CHARACTERIZING BIOMOLECULAR STRUCTURE IN THE GAS PHASE

Rapid advances in structural biology have enabled the visualization of three- dimensional biomolecular structures yielding valuable insights into biological structure-function relationships. However, due to the stringent sample quantity/quality requirements of current structure elucidation techniques, some essential biomolecular classes have been excluded from characterization. New structural biology techniques are necessary which are capable of analyzing these intractable samples and elucidating their structural properties. In this seminar, I will present my work aimed at developing mass spectrometry-based methods for the characterization of challenging biological targets which elude conventional structural biology. This includes development of specialized instrumentation and methods for gas phase biomolecular measurements, and the application of these approaches to characterize various biologically challenging systems such as neurodegenerative disease-linked amyloidogenic proteins, near-megadalton protein complexes, and nucleic acids. In total, my work highlights the benefits of combining bioanalytical chemistry, chemical biology, and structural biology to characterize otherwise inaccessible biomolecules, and provides a path forward for the investigation of other biological questions in the absence of conventional structural data.