



CHICAGO

MASS

SPEC

DAY

2020

August 14th via Zoom

Co-Chairs: Audra Lemley and Mi Nguyen

**Faculty Advisors: Stephanie Cologna, PhD
and Laura Sanchez, PhD**

Organized by trainees for trainees

Chicago Mass Spec Day 2020 Agenda

Friday, August 14, 2020

All times are in Central Daylight Time (CDT)

10:00 - 10:10 AM Welcome and Introductions

Oral Presentations

Early career scientists deliver 15 minute talks about their research.

Hosts: Mi Nguyen and Audra Lemley (University of Illinois at Chicago)

10:10 - 10:27 AM **Pei Su** (Purdue University)
"Preparative Mass Spectrometry Using a Rotating Wall Mass Analyzer"

10:28 - 10:45 AM **Yilin Han** (University of Michigan)
"Ion Mobility-Mass Spectrometry Probes the Link between Human Microbiome and Parkinson's Disease"

10:46 - 11:03 AM **Nick Riley, PhD** (Stanford University)
"O-glycoproteomics: Perspectives on Protease Selection, Data Acquisition, and Spectral Identification"

11:04 - 11:21 AM **Diana Abbasi** (Rush University Medical Center)
"Characterization of the Cerebrospinal Fluid Proteome in Patients with Fragile-X Associated Tremor/Ataxia Syndrome"

11:22 - 11:40 AM **Kevin Parker** (Northern Illinois University)
"Gas-Phase Models for the Nickel- and Palladium-Catalyzed Deoxygenation of Fatty Acids"

11:40 - 12:00 PM Coffee Break

Flash Talk Presentations

Scientists deliver three minute talks about their research.

Audience will be automatically directed into five breakout rooms, all of which will be viewable to attendees only after the meeting.

Host (available to all breakout rooms): Mi Nguyen (University of Illinois at Chicago)

12:00 - 1:00 PM Breakout Flash Talk Sessions (details on pages 2 to 4)

Keynote Presentation

A notable assistant professor in the field of mass spectrometry presents research.

Audience will be automatically directed from the five breakout rooms to the main meeting room.

Hosts: Mi Nguyen and Audra Lemley (University of Illinois at Chicago)

1:00 - 2:00 PM Keynote Talk
Michael T. Marty, PhD (University of Arizona)
"Combining mass spectrometry and nanodiscs to investigate membrane protein-lipid interactions and antimicrobial peptides"

2:00 - 2:10 PM Acknowledgements and Awards

CMSD 2020 Flash Talk Breakout Rooms

Flash Talk Presentations

Scientists deliver three minute talks about their research.

Audience will be automatically directed into five breakout rooms, all of which will be viewable to attendees only after the meeting.

Breakout Room 1 Moderator: Denise Tran, PhD (Northwestern University)

Lee Cantrell (Vanderbilt University)

“Enhanced Profiling of the Ocular Lens Proteome with Data Independent Acquisition Mass Spectrometry”

Lydia Davis (University of Illinois at Chicago)

“Investigation of Environmental Regulators of Metabolite Expression from Freshwater Cyanobacteria using Targeted and Untargeted Metabolomic Platforms”

Nicholas Lesner (University of Texas Southwestern Medical Center)

“ α -Ketobutyrate Links Amino Acid Metabolism and Respiratory Activity in Mitochondrial Dysfunction”

Ashley Phetsanthad (University of Wisconsin-Madison)

“Enrichment Assisted Identification of Glycosylated Neuropeptides in Crustaceans”

Iliana Hampton (University of Michigan)

“Investigation of Membrane Proteins in different Membrane Mimetics by Ion-Mobility Mass Spectrometry”

Christopher Solis, PhD (University of Illinois at Chicago)

“Sarcomere Disassembly after Unloading is Regulated by Ubiquitination and Acetylation of CapZ and α -Actinin”

CMSD 2020 Flash Talk Breakout Rooms

Breakout Room 2 Moderator: Fernando (Ralph) Tobias, PhD (The Ohio State University)

Laura Muehlbauer (University of Wisconsin-Madison)
“Global Phosphoproteome Analysis Using FAIMS on a Hybrid Orbitrap Mass Spectrometer”

Wenyun Lu, PhD (Princeton University)
“Improving Adduct Annotation for Untargeted Metabolomics”

Gordon Luu (University of Illinois at Chicago)
“BLANKA: a Tool for Blank Subtraction in Complex Biological Samples”

Fernando (Ralph) Tobias, PhD (The Ohio State University)
“Untargeted Spatial Lipidomics of Colon Carcinoma Spheroids”

Xiaojing Sui, PhD (Northwestern University)
“Widespread Remodelling of Proteome Solubility in Response to Different Protein Homeostasis Stresses”

Breakout Room 3 Moderator: Teodora Zagorac (University of Illinois at Chicago)

Kristine Parson (University of Michigan)
“The Structures and Stabilities of Cytochrome P450 – Drug Complexes Depend upon Their Local Lipid Environments”

Austin Carr (University of Wisconsin-Madison)
“MetaNetwork: A Weighted Gene Co-expression Network Analysis Platform for Interpreting Proteomics Data”

Melissa Pergande (University of Illinois at Chicago)
“Mass Spectrometry Analysis Reveals Altered Fatty Acid Levels in the Brain of the Symptomatic Niemann-Pick, Type C1 Mouse Model”

Nicole Beller (The Ohio State University)
“Selective Pulse Chase-SILAC Labeling of Three-Dimensional Multicellular Spheroids for Global Proteome Analysis”

Raveendra Wickramasinghe (University of Illinois at Chicago)
“Femtosecond Laser Desorption Postionization MS vs. SIMS Imaging for Uncovering Biomarkers Buried in Geological Samples”

CMSD 2020 Flash Talk Breakout Rooms

Breakout Room 4 Moderator: Audra Lemley (University of Illinois at Chicago)

Chandimal Pathmasiri (University of Illinois at Chicago)

“Investigation of the altered brain myelin lipidome in the neurodegenerative disorder, Niemann-Pick Type C1”

Ettore Gilardoni (University of Milan)

“Identification of the Mechanism of Action of 5,6-dimethyl-1H,3H-2,1,3-benzothiadiazole-2,2-dioxide as STAT3 Inhibitor”

Carolina Rojas Ramirez (University of Michigan)

“Annotating Collision Induced Unfolding Pathways using Electron Capture Dissociation”

Meng Xu (University of Wisconsin-Madison)

“Mapping Spatial Distributions of Drug Candidates for Inflammatory Bowel Disease with MALDI Mass Spectrometry Imaging”

Ashley Frankenfield (George Washington University)

“A Proximity-labeling Proteomics Approach for Studying Protein-Protein Interactions of the Lysosome Membrane”

Yijia Wang (The Ohio State University)

“MALDI-MSI Evaluation of Penetration of Different Pyrazole-based Compounds into Multicellular Tumor Spheroids”

Breakout Room 5 Moderator: Dylan Tabang (University of Wisconsin-Madison)

G. Asher Newsome, PhD (Smithsonian Institution Museum Conservation Institute)

“Non-proximate Ambient Sampling for Solvent-free Analysis of Intact Objects”

Aruni C. Pulukkody (University of Illinois at Chicago)

“Distinguishing Aerobic from Anaerobic Proteins of *Pseudomonas aeruginosa* Biofilms by Laser Ablation Sample Transfer”

Hongwu Jing, PhD (University of Illinois at Chicago College of Medicine)

“Connecting the Dots on the Potential Impact of COVID-19 to Pregnant Women and Fetuses Using Multi-Omics Network Analysis”

Fidel Serna-Perez (University of Illinois at Chicago)

“Investigation of Proteome Changes in a Neuronal and Pharmacological Cell Culture Model of Niemann-Pick Disease, Type C”

Dylan Tabang (University of Wisconsin-Madison)

“Profiling Tumor Microenvironment-Induced Changes in the Post-Translationally Modified Proteome in KPC Mouse-Derived Pancreatic Cancer Spheroids”

CMSD 2020 Keynote Presentation

Combining mass spectrometry and nanodiscs to investigate membrane protein-lipid interactions and antimicrobial peptides



Michael T. Marty, PhD

Assistant Professor, Department of Chemistry and Biochemistry, University of Arizona

Research in the Marty Lab is centered on characterization of membrane proteins and antimicrobial peptides by mass spectrometry. Our lab works at the interface of chemistry and biochemistry, combining cutting-edge analytical methodologies with biotechnology.

Abstract for the Keynote Talk

Due to their important biochemical roles, membrane proteins are important drug targets. Although lipids can clearly influence membrane protein function, the chemistry of lipid binding remains difficult to study because protein-lipid interactions are polydisperse, competitive, and transient. Native mass spectrometry (MS) has emerged as a powerful technique for studying membrane protein oligomeric state and interactions. However, conventional native MS of membrane proteins has relied on detergent micelles, which may distort membrane protein-lipid interactions and are unsuitable for assembly of smaller membrane-embedded peptide complexes. We are developing nanodiscs as an alternative membrane mimetic for native MS that provide a native-like lipid bilayer environment with a defined lipid composition. Here, we will discuss using native MS of nanodiscs in combination with a novel lipid-exchange mass spectrometry (LX-MS) approach to study membrane protein-lipid interactions and to understand how membrane proteins remodel their surrounding lipid bilayer environment. We are also employing nanodisc native MS to characterize interactions of antimicrobial peptides, which target bacterial membranes and may prove useful in combating antibiotic resistance. Ultimately, we expect this unique combination of nanodiscs and native MS will provide new insights into interactions of biomolecules with and within lipid membranes.

