Ion traps as reaction vessels

Ion Trap Interest Group
71st ASMS Conference on Mass Spectrometry and Allied Topics
Monday, June 5th, 2023

Presiders: Dalton Snyder (Teledyne FLIR), Lucas Szalwinski (Thermo Fisher Scientific)

Presentations:
Ion traps for high-throughput infrared (IR) spectroscopic fingerprinting
Stephan Warnke (Rizzo Lab) - École Polytechnique Fédérale de Lausanne

Gas-Phase Ion/Ion Reactions Enabled for Biomolecule Identification on a FT-ICR MS
Jonathan Specker (Prentice Lab) – University of Florida

Benefits of Post-UVPD fractionation and proton transfer charge reduction reactions for the characterization of intact proteins
Sean Dunham (Brodbelt Lab) - The University of Texas at Austin

Gas-phase ion transformations via I/I rxns
Scott McLuckey - Purdue University

Ion Trap Modifications for Ion-Molecule Reactions for Gas Phase Catalysis
Anthony Fanizza (Ryzhov Lab) - Northern Illinois University

Ion/Photon Reactions for Mass Analysis
Mark Bier and Liam Dugan (Bier Lab) – Carnegie Mellon University

Attendance: ~100

Format: ~5-7 min flash talks followed by ~25 min Audience Q&A

The previous year's meeting (2022) highlighted the commercial successes of miniature/portable ion trap mass spectrometers and reviewed the technologies which made those successes possible. This year's meeting aimed to exhibit the latest research where ion traps are used as reaction vessels. The mixture of presenters represented the three major reaction types being done in ion traps: ion/ion, ion/molecule, and ion/photon. The specific research topics that were discussed included: showing infrared fingerprinting of isomeric glycans in the gas phase, imaging isobaric lipids using ion/ion reactions, improving protein identification through a combination of UVPD and PTCR, reactions of two ions of the same polarity including a myriad of other ion/ion reactions, monitoring gas phase reactions of metals to better understand the kinetics of catalysis, and a new method of mass analysis using interactions with photons.

After the presentations, the Q&A had some presentation-specific questions followed by a short discussion on how researchers tailor the reagents for their specific reactions. An attendee proposed that more unstable ions may be potentially interesting ion/ion reagents. Another common theme in subsequent discussion was related to the kinetics in these various reaction types. One discussion point addressed the difficulty in finding reagents to accomplish particular transformations in the gas phase, and how the speakers balance selectivity with general applicability.