ASMS 2024 Workshop Report

Interest Group “Photoionization“

Title “Quo Vadis Photoionization MS – Between Industry and Academia”

Presiding: Christopher P. Rüger (University of Rostock) & Sven Ehlert (Photonion GmbH)

Date: 3rd of June, 5:45-7:00 PM

Participants: ~20 people

Christopher Rüger gave a short introduction of the speakers and program. He actively motivated everyone to check their interest group memberships. Three speakers were invited to provide a brief 5-10 min overview on photoionization solutions covering this technological field's academic, spin-off-company, and large-vendor spectrum.

Prof. Ralf Zimmermann from the University of Rostock presented the theoretical concepts of photoionization as well as the utilization in online monitoring of complex gaseous organic mixtures, such as those emitted from a Fisher-Tropsch reactor. Here, resonance-enhanced multiphoton ionization (REMPI) has emerged as a highly robust solution with superior selectivity and sensitivity towards aromatic constituents.

Secondly, Dr. Andreas Walte from the Photonion GmbH elucidated on custom individual photoionization mass spectrometer solutions for versatile field and laboratory usage, tracing the molecular signature of a wide variety of emissions, such as from coffee roasting, e-cigarettes, or combustion engines.

Spontaneously, a presentation from Alexander Laskin (Purdue University) has been integrated with a lively discussion on utilizing atmospheric pressure photoionization (APPI) high-resolution Orbitrap mass spectrometry for the molecular-level description of carbonaceous aerosols. More specifically, he discussed on accessing the volatility basis set distribution and viscosity of those complex matrices via temperature-programmed desorption direct analysis in real-time (DART).

The workshop was concluded with a presentation by Dr. Arnd Ingendoh from Bruker Daltonics on photoionization in the framework of ion mobility high-resolution time-of-flight mass spectrometry. The presentation focused on the capabilities of matrix-assisted laser desorption ionization (MALDI) for complex biological sample materials. MALDI TIMS HR-ToF is a fully commercialized solution with a high unit number and can be seen as the industry part of larger vendors of the photoionization instrumentation spectrum. Dr. Ingendoh compared traditional MALDI with post-ionization MALDI (MALDI-2). Particularly, examples of MALDI imaging of biological tissues have been given to support the advantages of MALDI-2.

The workshop ended with an active discussion initiated by Dr. Gunnar Dittmar (Luxembourg Institute of Health) with Dr. Ingendoh on MALDI-2. The discussion exceeded the workshop's time frame; thus, the workshop was closed by Dr. Rüger, and conversations continued in smaller groups, fostering further exchange.