

Workshop summary

“Photoionization Mass Spectrometry”

61st ASMS Conference on Mass Spectrometry and Allied Topics, Minneapolis, MN

Monday, 5:45 – 7:00 pm

Chaired by: Jack Syage and Ralf Zimmermann

The workshop followed the oral session “Photoionization” that occurred Monday afternoon to a large audience. The workshop demonstrated continued strong interest in the subject matter as it attracted a very large audience with people lining the walls and the door way. On the whole there was a very high quality of audience participation as evidenced by strong and rigorous discussion on the varied topics. Many of the top luminaries in the field were also present to provide stimulating viewpoints and discussion.

The workshop began with the workshop chairs (Jack Syage and Ralf Zimmermann) presenting some introductory slides on the development of the field (e.g., publication statistics) and introduced important topics/variables (e.g., sample phases, light sources for PI, selectivity and softness of PI, ionization source pressure, matrix effects, etc.). Five experts were chosen to lead discussions on a diversity of topics in PI MS:

- Thorsten Benter from University of Wuppertal addressed the challenges in APPI-MS to detect the neutral composition in the ion sources. As chemistry gets involved time, concentrations and kinetic energies are becoming important. Depending on the matrix properties one might encounter: i) VUV-absorbing and ionizable matrix, ii) VUV-absorbing and photodissociable matrix or iii) not VUV-absorbing matrix each giving different observable regimes. The VUV-absorbing ionizable matrix case applies for the dopant assisted APPI and represent a chemical ionization process with molecular adduct ions being formed. On the other hand, the not VUV-absorbing matrix emphasizes physical photoionization with predominately molecular radical cations. Photodissociable matrices form radicals which may undergo side reactions with the analytes and thus are discouraged.
- Robert Voyksner from LCMS Ltd presented results showing the reduced ion suppression observed by APPI for LC/MS of pesticides and mycotoxins. This improvement was more pronounced for fast chromatography where co-elution is more severe. The audience challenged some of the results as perhaps over-enhancing the benefits, but Dr. Voyksner provided statistically backed data.
- Brian Musselman of Ionsense, Inc., discussed a combination of DART and APPI for the detection of complex mixtures. Although APPI enhanced overall signal by a small factor for this configuration, it did reveal significantly more peaks, which is key to conducting comprehensive component analysis for complex mixtures such as fuels, the subject of his discussion presentation.
- Andreas Walte from Photonion GmbH focussed on the light sources for PI and discussed the advantages and disadvantages of different lamps-types and lasers.
- Luke Hanley from University of Illinois, Chicago addressed advances in laser desorption combined with post-photoionization. With this technique mapping of metabolites in biofilms is possible. He also emphasized new possibilities opened up by actual developments in the laser technique (fs-lasers) and third harmonic generation (THG) for VUV-laser pulse generation.

The feedback we got from the audience and presenters is that this was clearly one of the better workshops that they have attended or participated in. In the words of one presenter, “thanks for organizing this really great workshop. I have attended some in the past - this one was outstanding.” The good attendance and the intensive discussions induced by the short topical lectures underline the dynamic character of the field and encourage workshops and sessions on future meetings as well as maybe the formation of an interest group.