



Introducing the Novel timsTOF fleX MALDI-2 a powerful tool to enhance sensitivity and dimensionality for SpatialOMx

Klaus Dreisewerd and Jens Soltwisch

Biomedical Mass Spectrometry, University of Muenster, Germany

Matrix-assisted laser desorption/ionization combined with laser-induced post-ionization (MALDI-2) is a recently introduced method for enhanced mass spectrometry imaging of numerous classes of biomolecules including phospho- and glycolipids, sterols, glycans, and pharmaceuticals in tissue sections at high lateral resolution (Soltwisch et al., *Science* 2015,348, 211). Here we describe the adaptation of the technology to a Bruker timsTOF fleX mass spectrometer. Upon use of a 1 kHz post-ionization laser, MALDI-2 produces a sizable increase in the number of detected features as well as in ion signal intensities. This enhancement is similar to that described previously for low repetition rate MALDI-2 systems, but now enables state of the art acquisition speeds.

Following a brief historical overview and introduction to the MALDI-2 principle, in our talk we will describe the technical realization on the timsTOF fleX and then demonstrate with selected examples how the combination of MALDI-2 with the trapped ion mobility spectrometry (TIMS) functionality of the instrument can crucially support unravelling complex molecular compositions. The application examples range from the analysis of small molecules and various classes of lipids in rat brain and testis over sampling potential antibiotics in cultures of competing bacteria and sterols in marine flatworms to the analysis of N-glycans in human cerebellum. Numerous isomeric/isobaric ion species were successfully separated upon using the collisional cross section (CCS) as additional specific physical property. With the possibilities of high data acquisition speed or high separation powers in combination with the increased sensitivity of MALDI-2 available in one instrument, the described methodology could be a valuable tool in many areas of biological and medical research.