

Allgemeines Physikalisches Kolloquium

Donnerstag, 03.11.2022 um 16 Uhr c.t.

PD Dr. Jens Soltwisch

WWU Münster



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Antrittsvorlesung

Mass spectrometry imaging - developing new tools for the life sciences

Mass spectrometry imaging (MSI) combines the strength of mass spectrometry, to decipher the molecular composition of a sample, with spatial information. For this, the sample is analyzed in a pre-defined raster using a finely focused probe such as laser light or a beam of primary ions, recording a mass spectrum at every pixel. Post processing results in signal intensity distributions that can be reconstructed for every recorded ion species. In the life sciences, typical samples, such as tissue sections, are notoriously complex in their molecular make-up and the concentration of molecules of interest may vary over orders of magnitude. To investigate the full depth of this complexity, instrumentation has to provide high yields of ionization on the one hand and sensitive and highly resolving mass spectrometers on the other. In addition, many of the analyzed molecules are prone to thermal degradation, hampering their intact ionization and transfer to the gas phase.

Altogether, these prerequisites make the development of MSI equipment multifaceted and challenging. A successful advancement of the technique, therefore, relies on a thorough knowledge of the underlying physical and chemical processes and mechanisms. In his regard, fundamental research helps to identify and understand limitations and shortcomings of the employed techniques and may reveal new approaches to yet unsolved problems. The lecture will include a short introduction to the diverse approaches to MSI in the life sciences and present examples where a deeper understanding of fundamental mechanisms has helped to improve the analytical capabilities of different techniques in MSI.

