DBMR Research Conference

Langhans Auditorium, Pathology Building
Murtenstrasse 31, 3008 Bern

Date: Monday, October 31, 2022, 17:00 – 18:00
Title: Translational molecular imaging: Using a mass spectrometer as a microscope.
Speaker: Prof. Dr. Ron M.A. Heeren
The Maastricht MultiModal, Molecular Imaging Institute, Maastricht University, The Netherlands

Bio: Prof. Dr. Ron M.A. Heeren obtained a PhD degree in technical physics in 1992 at the University of Amsterdam on plasma-surface interactions. He was the research group leader at FOM-AMOLF for macromolecular ion physics and biomolecular imaging mass spectrometry in the period 1995-2015. In 2001 he was appointed professor at the chemistry faculty of Utrecht University lecturing on the physical aspects of biomolecular mass spectrometry. In 2014 he was appointed as distinguished professor and Limburg Chair at the University of Maastricht. He is scientific director of M4I, the Maastricht MultiModal Molecular Imaging institute and heads the division of imaging MS. He is the vice-president of the international mass spectrometry foundation and has been active in many professional societies to advance mass spectrometric research, education and professionalization. His academic research interests are mass spectrometry based personalized medicine, translational molecular imaging research, high-throughput bioinformatics and the development and validation of new mass spectrometry based “omics” imaging techniques for the life sciences.

Abstract: Modern molecular analytical technologies in the “omics” arena plays a crucial role in many scientific disciplines ranging from material sciences to clinical diagnostics. Molecular pathology is no different. Technological advances have increased methodological sensitivity allowing researchers to acquire molecular information of smaller and smaller samples. The biggest challenge is to put that concerted information in the context of the problem the samples originate from. This lecture describes how innovative molecular imaging technologies, based on mass spectrometry and “omics” innovations have impacted translational clinical research. Or: how a mass spectrometer can be used as a sensitive and selective molecular microscope. Innovative imaging technologies now offer new insights in life’s complexity that can be employed for precision medicine, the understanding of new (bio)materials and the processes that happen on the interface of living and ‘dead’ matter. Innovations in mass spectrometry based chemical microscopes have now firmly established themselves in translational molecular research. One key aspect of translational success is the ability to obtain this molecular information on thousands of molecules on a process relevant timescale. Modern mass microscopes can now rapidly acquire images of metabolites, lipids, polymers, peptides and proteins, depending on the spatial resolution chosen. Single cells can be metabolically analyzed in the context of their native tissue. Combined this offers a truly precision multi-omics approach that reveals contextual molecular complexity in biological and material environments.

High resolution MALDI-FTMS image using MALDI-2 of a kidney cryosection demonstrating morphological and molecular detail that can easily be achieved with innovative high performance MSI.

Prof. Dr. Ron M.A. Heeren has been invited by Prof. Dr. phil. nat. Manfred Heller, Head of Core Facility Proteomics & Mass Spectrometry, Department for BioMedical Research, University of Bern

Next DBMR Research Conference

Monday, December 5, 2022, 17:00 – 18:00
Speaker and Title: tba

The DBMR Research Conference will be followed by an apéro.