



### **Single cell based diagnostics: translation imaging mass spectrometry**

Prof. Ron Heeren

Ph.D., Director and Division Head Imaging Mass Spectrometry, Maastricht MultiModal Molecular Imaging Institute, M4i, Maastricht University, Maastricht, Netherlands

Mass spectrometry plays an important role in many aspects of our life. It is assisting in many ways to reach the world's sustainable development goals. Research into achieving the good health and wellbeing is heavily impacted by the increased sensitivity of modern MS systems. This is rapidly accelerating research into innovative clinical diagnostics which improves our understanding of the molecular basis of health and disease. Context is critical in these type of studies and crucial for clinical translation. In imaging mass spectrometry this translates into a drive towards sensitive, high throughput tissue analysis to visualize a single cell in the context of a complex, changing environment. The improved sensitivity of MALDI-2, instrumental improvements now allow researchers to routinely visualize details at 5 micrometer or smaller. Recent developments in the combination of untargeted (unlabelled) and targeted (using labelled antibodies) imaging is revolutionizing proteome imaging. These new capabilities will assist in accelerating the pickup of these new approaches in digital pathology. MS image guided tissue selection, with laser capture microdissection, followed by in-depth proteomics (or metabolomics) analysis is added to this workflow to provide detailed insight in local molecular signalling pathways. In this lecture recent advances and applications in the field of translational molecular imaging and "omics" will be discussed.

#### **Biography:**

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 and later became part of the Netherlands Proteomics Center. In 2014 he was appointed as distinguished professor and Limburg Chair at Maastricht University.

He is scientific director of M4I, the Maastricht MultiModal Molecular Imaging institute on the Brightlands Maastricht Health campus. There, he heads the division of imaging MS. He was awarded the prestigious 2019 Physics Valorization prize by the Dutch organization for scientific Research, NWO and the 2020 Thomson medal of the international mass spectrometry foundation. In 2021 he was elected as a member of the Royal Dutch Academy of Sciences, KNAW. His academic research interests are mass spectrometry based personalized medicine, translational molecular imaging and “omics” research, high-throughput bioinformatics and the development and validation of new mass spectrometry based molecular imaging techniques for the life sciences. He is actively involved in the development of molecular imaging education, instrumentation engineering and the improvement of the Dutch national large scale research infrastructure.