

# PhD Position in Mass Spectrometry Imaging

## About the position

A fully funded PhD studentship in the field of mass spectrometry imaging is available in the research group of Dr. Sebastiaan Van Nuffel at the Maastricht University. The position is will be based at the Maastricht MultiModal Molecular Imaging (M4i) Institute, embedded in the Faculty of Health, Medicine and Life Sciences (FHML) at Maastricht University.

Over the past couple of years, mass spectrometry imaging (MSI) has arisen as a powerful tool to answer research questions in the biomedical field. MSI is an imaging technique that allows the visualization of molecules. In biological tissue, it can locate biochemical compounds such as proteins, lipids and metabolites, which provides mechanistic insight into biological processes and helps us understand diseases such as cancer. The MSI technique best positioned for tissue analysis is time-of-flight secondary ion mass spectrometry (ToF-SIMS) because it has the highest spatial resolution of all the molecular MSI techniques and can detect many biochemical species with high sensitivity. Thus far, ToF-SIMS has been extensively used in research involving relatively low-mass molecules such as lipidomics and metabolomics [1]. Unfortunately, it is still difficult to detect large molecules such as intact proteins with a typical ToF-SIMS instrument so label-free SIMS imaging of proteins in biological materials is not currently feasible. However, it is possible to conduct MSI-based immunohistochemistry (IHC) using metal-labeled antibodies and then detect the metals instead [2]. Combining labeled protein imaging with the label-free detection of lipids and metabolites in the same tissue section would be extremely powerful as it will finally be possible to link the expression of a protein to other spatial omics.

This PhD project aims to develop a methodology for MSI-based immunohistochemistry (IHC) using our state-of-the-art ToF-SIMS instrument (PHI nanoTOF II) in order to obtain correlative multi-omic image data of biological samples. In particular, you will develop new sample preparation protocols, experimental procedures and data analysis methods. You will then apply this methodology to answer biomedical research questions in cooperation with internal and external collaborators. You are expected to present your work in scientific journals and at scientific conferences. In addition, you will be able to gain experience teaching and mentoring bachelor and master students.

The PhD position will be supervised by Dr. Sebastiaan Van Nuffel and Prof. Ron Heeren. The position is a 4-year long (full-time) paid position. The terms of employment are set out in the Collective Labour Agreement of Dutch Universities (caoNU) and supplemented by local Maastricht University provisions. The anticipated start date is the fall of 2022, but reasonable accommodations can be made for the right candidate.

[1] Van Nuffel, S. *et al.*, *Anal.Chem.* **2020**, 92, 12079.

[2] Bodenmiller, B. *Cell Systems* **2016**, 2, 225.

## Skills and qualifications

Required:

- A Master's degree (GPA > 3.0) in Chemistry, Physics, Biochemistry, Materials Science, Chemical Engineering or a related subject;
- Proficiency in English (C1 or higher);
- Lab experience with mass spectrometry and/or immunohistochemistry;
- Capacity to quickly acquire new knowledge and master new skills;
- Interest in both hands-on research activities and data analysis;
- Ability to work independently and as a member of a research team;
- Problem solving skills and creativity.

Preferred (if you have a couple of these, you are more likely to succeed):

- Lab experience with (or in-depth knowledge of) mass spectrometry imaging;
- Lab experience with (or in-depth knowledge of) histological techniques;
- Lab experience with (or in-depth knowledge of) optical microscopy;
- Good knowledge of basic statistics and image data processing.

Desired (not vital, but highly appreciated):

- Lab experience with (or in-depth knowledge of) analytical instrumentation other than mass spectrometry (e.g. EM, NMR, XPS, FTIR, etc.);
- Programming skills.

## How to Apply

Interested candidates are invited to submit a cover letter, an up-to-date CV, translated copies of their Bachelor and Master degrees (including transcript of records) and the contact details of at least two references. Candidates can submit their application directly to Dr. Sebastiaan Van Nuffel ([s.vannuffel@maastrichtuniversity.nl](mailto:s.vannuffel@maastrichtuniversity.nl)).