# A unique expertise in Mass Spectrometry and Optical Spectroscopy

Founded in the early 1990s and taken over in October 2018 by Prof. Gauthier Eppe, the MSLab, with its forty or so members, is Belgium's largest mass spectrometry platform for fundamental research, development and analytical technologies.

The group is made of mainly chemists, bio-chemists, pharmacists, computer scientists, engineers and about 20 PhD students to cover the required expertise in instrumental developments, in sophisticated hyphenation in separation techniques with MS, in physical-chemistry of ions in gas phase, in development of new concept in analytical chemistry and omics methods.

© MSLab - ULiège - Prof. Gauthier Eppe, MSLab head

The MSLab structures its activities on five main areas:

- **MSLab-Analytics:** Analytical strategies to monitor emerging contaminants.
- **MSLab-Biology:** Understand the properties of animal venom toxins.
- **MSLab-Fundamentals:** Understand physico-chemical properties of ions in liquid and gas phases.
- **MSLab-Vib:** Vibrational spectroscopy, infrared and Raman.
- **MSLab-Omics:** Single cell proteomics, spatial omics and metabolomics.

On a cross-disciplinary basis, the laboratory is developing molecular mass spectrometry imaging to obtain spatial information for characterization techniques (brain slices, biological tissues, bacterial chemical communication, etc.). To do this, it uses an exceptional array of the latest technologies and prototypes to develop innovative analytical chemistry workflows. This is a major asset in meeting current and future analytical challenges in the fields of the environment, food safety, biotechnology, materials science and physical chemistry.

More specifically, G. Eppe developed skills in accurate trace analysis by MS, in ion mobility-mass spectrometry hyphenated with GC and LC, with a particular emphasis on non-targeted analysis in the field of ultra-trace analysis of environmental contaminants entering the food chain (food safety). New topics such as collision induced unfolding (CIU) for high order structural characterization of biomolecules and in developing new supports (SALDI and LDI) for mass spectrometry imaging have led to several significant publications in this field.

He is also director of the Centre for Analytical Research and Technology (CART), an ISO 17025-accredited analytical platform recognised as Belgium's national reference laboratory for halogenated persistent organic pollutants (POPs) and food process contaminants.

## Regional and international collaborations

The MSLab applies its expertise to numerous projects at regional, federal, European and international level. At regional level, it is contributing to the FoodWal project by coordinating the PeptiBoost project, a project which is developing breakthrough methodological, technological, scientific and digital innovations in response to the issues and challenges facing Walloon companies involved in the production of functional foods and, more specifically, bioactive peptides, prebiotics and probiotics.

G. Eppe is also coordinating the PHENIX project (Plateformes tecHnologiques et aNalytIques d'eXcellence wallonne en agro-alimentaire), a structuring, multidisciplinary project to group together analytical platforms and technology platforms in the Walloon region in the field of agri-food and innovative biotechnologies.

These two pillar projects are part of the FoodBooster IIS where the objective is to make Wallonia a hub for prebiotics, probiotics and bioactive peptides. The aim is two-fold: to bring high added value to biomass, thereby reinforcing circularity through the use of co-products as raw materials, and to develop a critical mass of players in Wallonia covering the entire value chain. This strategic innovation initiative is managed in close collaboration with the accredited research center CER groupe in Marloie, Dr N. Gillard.

## Global reach and academic collaborations

Beyond Belgium's borders, MSLab participated in the European FT-ICR-MS network, dedicated to large mass spectrometry instruments (Horizon 2020 program). It is also taking part in Horizon Europe and Interreg projects. And that's not all: it works closely with the University of North Carolina in the United States on the timely issue of PFAS.

Other collaborations, this time in the field of teaching, include a doctoral student exchange

program with Vietnam and involvement in an international master's degree at the University of Ho Chi Minh City in environmental science and management — a course set up in 2011 and which has proved to be a long-lasting success.

## A bright future for mass spectrometry

Fundamental research, support for business innovation, mentoring for future researchers: mass spectrometry has a bright future ahead of it!

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