

PRÉSENTATION DU PROJET DE STAGE M2

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TITRE DU PROJET :

Probing Perfluoro-compounds in aquatic organisms by MALDI Mass Spectrometry Imaging

DESCRIPTION DU PROJET :

Context

Perfluorinated compounds (PFs) represent a class of chemical substances widely used in a variety of industrial and commercial applications, thanks to their unique properties and stabilities, which make them highly resistant to degradation. As a result, they represent a significant environmental and health problem. With high chemical diversity, PFs can be found accumulated in various environmental media causing bioaccumulation and interactions within living systems such as plants and aquatic organisms.

In the context of environmental and health protection, there is the growing need to find sensitive and reliable methods for the detection and quantification of PFs in living organisms and the environment. A specific campaign of experiments has been conducted by the IFREMER to study the bioaccumulative effect of different PFs on fish. After 49 days of exposition to a mixture of PFs at low concentration in water, one species of sea bass was sacrificed and solvent extracted for further analyses. LC-MS/MS analyses showed that all the PFs were found in the basses. To understand the mechanism of this bioaccumulation behavior, other analytical approaches able to localized each PFs in basses need to be conducted. This is the main analytical development that will be challenging by mass spectrometry imaging during this internship period.

Objectives

The main objective of this project is to set up an imaging experiments of young sea bass using MALDI high resolution mass spectrometry to localize and quantify various PFs present at amounts (~ng). As a result, their spatial distribution in the scale of the fish organs will provide valuable information on the mode of contamination of organisms exposed to these pollutants

Material and methodology

The response of different MALDI (matrix-assisted laser desorption/ionization) matrices for the selected PFs has even be performed by mass spectrometry. First step of the internship will be dedicated to:

- Performing bibliography work to define the MSI workflow
- Training on the use of HRMS analyses and matrix deposition
- Enlarging the diversity of PFCs analyzed by MALDI-HRMS
- Testing their response by MSI.

In a second step, the applicant will work on real sample of bass:

- Application of the workflow defined by the first task (including sample preparation)
- Interpretation of the results, in particular by using statistical tools
- Integration of quantitative MSI