



Ph. D. in Chemistry at Centre de Biophysique Moléculaire, Orléans (France)

Development of redox sensitive MRI agents for combined ^{19}F and ^1H detection

Project : Inflammation is associated to various pathologies, and imaging tools that allow *in vivo* visualization of inflammation can help better understand the pathogenesis of these diseases as well as contribute to their efficient and earlier diagnosis. Among the different imaging modalities, Magnetic Resonance Imaging (MRI) stands out with its high spatial and temporal resolution, and allows whole body imaging due to unlimited depth penetration.

Inflamed tissue is characterized by a highly oxidizing microenvironment. In this project, we propose to design, synthesize and characterize paramagnetic complexes based on Mn or Fe as MRI contrast agents that are responsive to the oxidizing environment in inflammatory tissues. Such probes will be able to visualize the presence of increased ROS, in particular peroxyde concentrations in tissues, which is a recognized biomarker of inflammation. They will allow detection in both ^1H and ^{19}F MRI : the combination of two detection modalities will be important to provide unambiguous results. Following the synthesis of a first selection of ligands, detailed physical-chemical characterization of their Mn and Fe complexes will be performed. The best optimized complexes will be evaluated in *in vivo* ^1H and ^{19}F MRI experiments in mice.

The PhD student will be in charge of:

- (1) the **synthesis of novel ligands and their metal complexes**,
- (2) the **detailed physical-chemical characterization** of the complexes (potentiometry, UV-Vis and NMR spectroscopies, relaxometry, cyclic voltammetry, etc).

Additionally, the student might participate to the *in vivo* imaging evaluation of the most promising probes.

The candidate will work in the **“Metal complexes and MRI” group of the Centre de Biophysique Moléculaire in Orléans**. The group has international recognition in MRI probe development and CBM possess all state-of-the-art equipment necessary for the synthesis, *in vitro* characterization and *in vivo* validation of such imaging agents. The candidate will benefit from the large national and international collaborative network of the host group. The thesis is funded by the Univ. of Orléans.

Student profile : The candidate should have a strong background in organic chemistry (synthesis and characterization). Experience in coordination chemistry and physical chemistry (NMR and optical spectroscopies) will be a plus.

Contact : please send your resume, academic records and two references to eva.jakabtoth@cnrs.fr and celia.bonnet@cnrs.fr.

Deadline 15th of April 2025