

Intitulé du sujet de thèse: **Synthesis of polarizing agents for Dissolution DNP imaging**

Laboratoire: Institut de Chimie Radicalaire (ICR)

Team: SREP

Supervisor: Dr. Olivier OUARI, olivier.ouari@univ-amu.fr

Context of the PhD project:

During the last century, diagnostics transformed the practice of medicine as blood tests, imaging and biopsies opened the possibility to get a physiological view of symptoms. Today, a further revolution is happening with the development of molecular imaging. This field enables the *in vivo* visualization and characterization of biochemical processes at the cellular levels. Molecular chemistry is a key player in this effort to make progress in molecular imaging.

Dissolution dynamic nuclear polarization (d-DNP) is a Magnetic Resonance (MR) based technique, endowed with all its benefits, but overcoming the intrinsic sensitivity limitation of MR by transferring the high polarization of unpaired electrons to the nuclear spins of interest. In the recent years, d-DNP has encountered a tremendous interest due to its rapid translation from the laboratory to the clinic. The method has evolved from the idea (2003) to human clinical studies (2013) with a record pace. Hyperpolarization by d-DNP can enhance magnetic resonance signals of molecules in solution by a factor 10000, opening new possibilities and perspectives for *in vivo* real time metabolic magnetic resonance imaging (MRI). Despite tremendous progress, the scope of improvement is substantial for the polarizing sources. We propose to overcome these limitations by the design and synthesis of new photochemical probes and nitroxides.

The student will be hosted at the Institut de Chimie Radicalaire in Marseille for a 3-year PhD contract from Aix-Marseille to begin in October 2019. Our team has a strong expertise in the design and synthesis of DNP probes.

PhD project:

We are looking for highly motivated candidates to take up a PhD position for the synthesis of new agents for medical imaging (dissolution DNP). This work will be part of a consortium gathering experts in organic chemistry, magnetic resonance and clinical imaging. In particular, the candidate will be working on the rational design and synthesis of new photo-induced probes and nitroxides with improved performances.

The thesis work will be focused at 80% on organic synthesis of new and innovative molecules and will involve collaborations with groups at EPFL, ENS Lyon and DTU for applications. Short missions in these groups will be possible.

Candidate profile:

We are looking for highly motivated candidates with skills in **organic synthesis** and strong scientific background, independence, and who enjoy teamwork. You should hold a relevant qualification in organic chemistry.

Motivated candidates should contact Olivier Ouari with a CV by email at olivier.ouari@univ-amu.fr. Applications should be made *asap* and will be reviewed until April 20. Please send applications including i) a detailed CV, ii) transcripts of Master and undergraduate studies, iii) the contact of at least one reference.

References from our team:

J. Am. Chem. Soc. **2018**, 140, 13340; *J. Am. Chem. Soc.* **2018** 140, 14455 ; *Angew. Chem. Int. Ed. Engl.* **2019**, 28, 1334-. *Chem. Sci.* **2020**, 11, 2810; *L'Actualité Chimique* **2019**, 443.