



Period: 24 months – Financial support: RIN Emergence, Normandy Regional council

Start date: **January 6th, 2025**

Laboratory: CERMN, Centre d'Etudes et de Recherche sur le Médicament de Normandie, UR 4258

### **Post-doctoral position in Organic and Supramolecular Chemistry at CERMN, University of CAEN (France).**

#### Background and objectives of the project:

Alphatherapy is an innovative medical technique in oncology that uses alpha particles emitted by a radioactive elements, combined with molecular vectors, to target and destroy cancer cells, minimizing damage to healthy tissue. It offers significant benefits by reducing side effects and improving patients' quality of life. In this purpose, astatine-211 has been the object of growing attention these last twenty years.<sup>1</sup> However, large-scale production of this radioelements remains a major challenge, limiting its use, and its half-life drastically limits its radius of distribution.

A promising alternative production method, developed by GANIL in Caen, involves the intermediate formation of radon-211. This production route would extend the distribution radius of astatine-211, but requires the development of an astatine generator, a device capable of trapping and storing radon and releasing astatine during its formation.

Our project will explore the use of cryptophanes,<sup>2</sup> ball-shaped molecules capable of encapsulating noble gases, to encapsulate radon-211 in solution, paving the way for a liquid-phase astatine generator. This project aims to define the structural requirements to optimize cryptophanes affinity for radon-211 in order to prepare a molecule offering optimal encapsulation.

The recruited research engineer will be involved in the design and the set-up of the experiment using a home-made radon-211 generator available at IMOGERE (<https://imogere.unicaen.fr/>). He/she will also synthesize several known cryptophanes, in order to realize radon encapsulation measurements of these molecular hosts, assessed using this experiment coupled to liquid scintigraphy counting device, and according to the described methodology.<sup>3</sup>

- (1) *Acc. Chem. Res.* **2021**, 3264–3275. doi 10.1021/acs.accounts.1c00327.
- (2) *Chem. Rev.* **2009**, 88–130. doi 10.1021/cr0680437.
- (3) *Appl. Radiat. Isot.* **2012**, 1997–2001. doi 10.1016/j.apradiso.2012.02.099.

#### Missions:

- Design and development of radon in solution generator
- Synthesis of known cryptophanes and their intermediates
- Establish radon encapsulation measurements
- Writing of protocols, reagents ordering
- Preparation/ writing of publications, posters, oral communication
- Participation to shared lab tasks
- Mentoring and supervising students

#### Qualification requirements:

- Good knowledge and experience in organic chemistry
- Experience in classical analytic experiments, (NMR  $^1\text{H}$ ,  $^{13}\text{C}$ , 1D and 2D ; MS)
- Good knowledge in Excel, Word and PowerPoint softwares
- Publication writing skills, good communication skills (oral and written) English/French

Required degree and experience:

- a PhD in organic chemistry or related area
- a postdoc experience in organic chemistry would be a plus
- any experience in supramolecular chemistry or work with any radioelement would be a plus

Deadline for application **December 1st, 2024**

Please send a CV and the name of two references to [emmanuelle.dubost@unicaen.fr](mailto:emmanuelle.dubost@unicaen.fr)