Laboratoire de Chimie et Biochimie, CNRS UMR 8601
45 rue des Saints Pères, 75006 PARIS
France.

Group of Supramolecular Bioinorganic Chemistry
https://lcbpt.biomedicale.parisdescartes.fr/supramolecular-bioinorganic-chemistry/

POSTDOC OFFER DESCRIPTION

- **ORGANISATION/COMPANY: Université de Paris – CNRS UMR 8601 – LCBPT**
- **TEAM: Supramolecular Bio-Inorganic Chemistry – Prs. O. Reinaud & B. Colasson**
- **RESEARCH FIELD: Bio-inspired Chemistry – redox processes**
- **Organic synthesis + coordination chemistry + supramolecular chemistry + electrochemistry**
- **OFFER STARTING DATE: March-April 2022**
- **DURATION: 18 months**
- **FRAMEWORK PROGRAM: Collaborative ANR Project «MoleculAR Cavities for ELectrocatalysis» (MARCEL)**

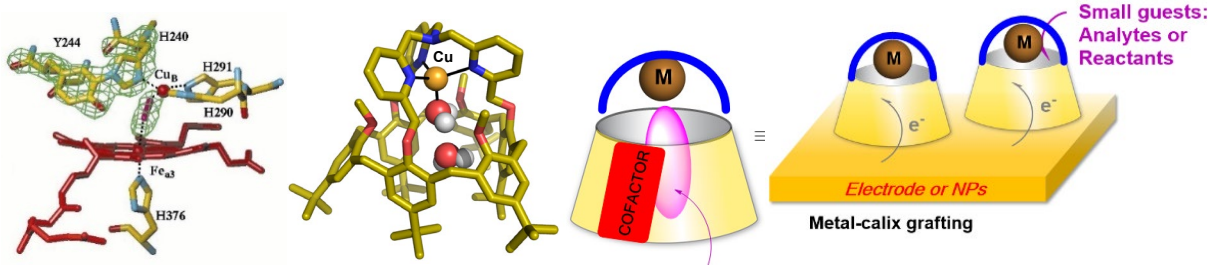
Contact

Requests for information as well as applications accompanied by a complete CV, a letter of motivation and the contact information of 2 references should be sent to Olivia Reinaud: **olivia.reinaud@u-paris.fr**

We are looking for a highly motivated **chemist** to work on the synthesis and development of bio-inspired supramolecular catalysts for O_2 and CO_2 multi-electron reduction. This **18-month postdoctoral fellowship** is offered in the context of a project funded by the National Research Agency (ANR) aimed at the development of Nano-supramolecular catalysts for redox processes (O_2 and CO_2).
This research takes place in the chemistry laboratory of UMR 8601 at the Université de Paris, in close collaboration with the 4 other teams of the project (*vide infra*), where some visits and short stays can be organized.

Objective of the work

This project aims at constructing a biomimetic system that associates 3 key elements: a **biologically relevant metal** ion **to a redox active organic co-factor** prone to electron transfer and exchange, under the **supramolecular control of a macrocycle** (a calixarene) that will mimic the proteic cavity found in natural systems.[1] Grafting these complexes on surfaces (electrodes and nano-particles) in order to obtain devices.



From left to right: crystal structure of Cytochrome c Oxidase, source of bio-inspiration; Cavity-complex mimicking the embedment of a metal ion in a nano-sized organic cavity (a calix[6]arene) occupied by two water guest molecules; Design of redox-active receptors; Supramolecular catalysts for O_2 and CO_2 reduction.

---

[1] (a) *Supramolecular Modeling of Mono-Copper Enzyme Active Sites with Funnel-Complexes,* N. Le Poul, Y. Le Mest, I. Jabin, O. Reinaud*, Acc. Chem. Res.,* **2015***, 48,* 2097–2106. DOI: 10.1021/acs.accounts.5b00152. (b) *Biomimetic Cavity-Based Metal Complexes,* J.-N. Rebilly, B. Colasson, O. Bistri, D. Over, O. Reinaud, *Chem. Soc. Rev.* **2015**, *44*, 467-489. DOI: 10.1039/c4cs00211c.

The goal is multiple:

- Obtain fundamental insights into the intrinsic properties and reactivity of such interlocked systems in relationship with biological systems.
- Evaluate the properties and potentialities of such highly controlled associations
- Open new routes for the construction and development of innovative devices for electron transfer, detection of small molecules and catalysis (surface grafting).

Job description

The successful applicant will join the team of Pr. Olivia Reinaud and Pr. Benoit Colasson to work on the **synthesis of supramolecular redox-active catalysts based on calixarene-metal complexes. This will involve multistep organic synthesis of the calix-ligands, coordination chemistry (complexation of metal ions), various spectroscopies for the characterization of the metal complexes, and electrochemical studies of their property and reactivity as host-guest systems and catalysts.**
This requires close collaboration with the other teams of the project.
English and French are the main languages spoken in the laboratory, but all results will be disseminated in English (presentations, written reports, and articles). Participation in international conferences will be encouraged.

Skills/Qualifications

- ✓ Excellent past achievements
- ✓ Experience in Synthetic Organic Chemistry
- ✓ Experienced in the structural characterization, especially by NMR spectroscopy
- ✓ Familiar with the concepts of Redox Chemistry
- ✓ Experience in Electro-Chemistry (an expertise in electrocatalysis with small gaseous molecules would be appreciated)
- ✓ Team worker
- ✓ Creativity and problem-solving skills
- ✓ Strongly developed logic and critical thinking skills
- ✓ Excellent communication skills in English

Description of the ANR consortium "MARCEL"

The consortium associates **5 teams** with well-recognized and complementary expertise, necessary for the success of **MARCEL,** namely calix[n]arene synthesis, transition complexes/ligand synthesis, coordination and host/guest chemistries, nanoparticles synthesis, surface grafting and characterization, nanoplasmonics, spectro-electrochemical characterizations, electrochemical reactivity studies and theoretical modeling. The partners are: **1-MaCSE, Rennes** including experts in electrochemistry and mechanistic simulations, nanoparticles preparation, surface immobilization and characterizations (C. Lagrost, P. Hapiot, Y. Leroux) and plasmonics (Y. Leroux); **2-CTI, Rennes** is well-recognized expert in theoretical modeling and computational analyses (M. Kepenekian, A. Fihey); **3-LCBPT, Paris** (O. Reinaud, B. Colasson) brings extensive expertise in the fields of cavity-based ligand design and synthesis, host-guest chemistry and reactivity; **4-CEMCA, Brest** (N. Le Poul, B. Douziech) is expert in inorganic electrochemistry, spectro-electrochemistry and surface grafting of inorganic complexes; **5-ULB, Brussels** (I. Jabin, A. Mattiuzzi, G. Bruylaants) is expert in organic chemistry and synthesis of functionalized calix[n]arene derivatives and in nanomaterials and nanoplasmonics.