

JOB DESCRIPTION

Job Title: **Homogeneous catalysis with redox-active ligands: Electronic engineering of redox catalytic structures**

Job Summary:

We seek a motivated and dedicated PhD researcher for a research project that spans the fields of redox systems, homogeneous and redox catalysis, and ligand design.

The aim of this project is to develop redox-active molecular systems with catalytic activity that can be controlled and operated through external stimuli. The design of such systems will involve the introduction of stimuli-responsive motifs in redox architectures. The interaction with an external stimuli will trigger and /or allow control over redox changes occurring in the system, thus exerting direct influence on its reactivity. This project is expected to provide advanced redox catalytic systems that can operate under selective conditions.

Requirements:

This funding is from an international doctoral program. Successful applicants must hold a masters degree from a university outside of France OR must have studied abroad previously and hold a master degree from a French university.

Job Description:

About the project:

Drawing inspiration from the redox cofactors found in metalloenzymes, the use of redox ligands, able to delocalize spin density, is lately emerging as a catalytic tool of its own. These privileged molecular scaffolds bearing extended conjugation (e.g. aminophenols, iminopyridines) have been shown to **actively participate in catalytic events through reversible delocalization of spin density**. This redox interplay between ligand and metal provides attractive venues for catalyst development such as unconventional behaviour or alternative mechanisms in established reactivities. **However, in order to establish this approach as a true game changer, knowledge and control must be gained over the mode of action of these ligands.**

This project deals with the development of *tools and systems* that will empower the field and propel it towards large-scale implementation of redox processes. This work has a strong focus on metals with weak ecological footprints and aims at broadening and controlling chemical reactivity. Our approach delves into the combination of these systems with enabling tools such as stimuli-responsive catalysis and molecular nanoobjects. This work can deliver **smart and advanced redox catalytic systems needed to shape future applications that range from catalysis to energy storage.**

Project objectives:

- Develop selective and stimuli-responsive behavior in catalytic redox systems
- Evaluate catalytic reactivity
- Study the reversibility of the processes and achieve temporal control

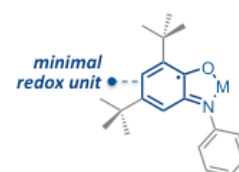
Qualifications and personal qualities:

- Experience in organometallic and organic synthesis, organometallic catalysis, spectroscopy (NMR, UV-vis, IR).
- Interest for interdisciplinary work/ability to work in collaborative environments.

Recent related publications:

- *Copper-catalysed aziridination with redox-active ligands: molecular spin catalysis*, Ren, Y.; Cheaib, K.; Jacquet, J.; Vezin, H.; Fensterbank, L.; Orio, M.; Blanchard, S.; Desage-El Murr, M., *Chem. Eur. J.* **2018**, doi:

Prototypical redox ligand



this
project



Advanced
functionalities

10.1002/chem.201705649.

- *Circumventing metallic intrinsic reactivity: radical generation with redox-active ligands*, Jacquet, J.; Cheaib, K.; Ren, Y.; Vezin, H.; Orio, M.; Blanchard, S.; Fensterbank, L.; Desage-El Murr, M., *Chem. Eur. J.* **2017**, *23*, 15030–15034.

- *C–N bond formation from a masked high-valent copper complex stabilized by redox non-innocent ligands*, Jacquet, J.; Chaumont, P.; Gontard, G.; Orio, M.; Vezin, H.; Blanchard, S.; Desage-El Murr, M.; Fensterbank, L., *Angew. Chem. Int. Ed.* **2016**, *55*, 10712–10716.

- *Redox-ligand sustains controlled generation of CF₃ radicals by well-defined copper complex*, Jacquet, J.; Blanchard, S.; Derat, E.; Desage-El Murr, M.; Fensterbank, L., *Chem. Sci.* **2016**, *7*, 2030–2036.

Main research field :

Chemistry

JOB DETAIL

Type of contract : Temporary

Status : Full-time

Company / Institute : Université de Strasbourg

Country : France

City : Strasbourg

Postal Code : 67000

Street : 4 rue Blaise Pascal

APPLICATION DETAILS

Provisional start date : 01/09/2018 or later

Application deadline : 22/06/2018

Application e-mail : please send pdf files of a cover letter and your CV including names and details of 2 referees to Prof. Marine DESAGE-EL MURR : desageelmurr@unistra.fr

<http://institut-chimie.unistra.fr/equipes-de-recherche/omeca-objets-metaux-et-catalyse/>