Post-doctoral position

Investigation of physical-chemical properties of supramolecular tandems constructed from the association of polyoxometalates and metal cluster complexes

Research Fields: Inorganic chemistry, Physical chemistry, Supramolecular chemistry

Work Place: Université Paris-Saclay (Université de Versailles/Université de Paris-Sud)

Research Laboratory(ies): Institut Lavoisier de Versailles (ILV) UMR-8180 / Institut des Sciences Moléculaires d'Orsay (ISMO) UMR-8214

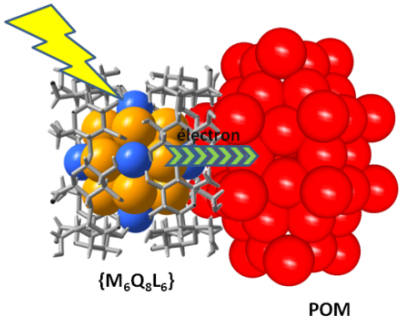
Head(s) of the Scientific Project: Prof. Cadot (ILV) / Dr. C. Falaise (ILV) / Prof. R. Méallet-Renault (ISMO)

Funding: Labex CHARMMMMAT (http://www.charmmmat.fr/en/);

Short term contract (12 months); net salary: from 2605,99€ per month

Starting Date: Between 1st October 2018 - 1st January 2019

Scientific context: The supramolecular approach to the design modular systems with complementary properties is a particularly attractive way. Recently, we have demonstrated that it is possible to produce donor-acceptor tandems from molecular entities previously known to be chemically incompatible (Cadot *et al.* J. Am. Chem. Soc., 139, 12793). Thus, the association of electron-rich entities such as octahedral clusters $\{M_6Q_8L_6\}$ (where M = Re, Mo or W and Q = chalcogen or halogen, and L = halo, cyano etc.) with polyoxometalates (POMs) which are electron-poor species, constitutes a novel and promising tuneable chemical system considering the potential offered by the building units in terms of structural richness, **modular physico-chemical and photophysical properties (redox, luminescence…)** and functional complementarities.



In this project, we propose to study further the steady-state and time-resolved photo-physical properties of modular systems built from a purely inorganic photosensitizer (metal cluster complexes) combined with a polyoxometallate acting as catalytic platform. In a second step photo-catalytic properties will be investigated. These two inorganic building units can be associated by a native cyclodextrin which provides the role of supramolecular ditopic connector. Another strategy consists to assemble cationic metal clusters with anionic POMs into ionic arrangements. The project aims at characterizing the full photophysical and electrochemical properties of supramolecular systems, with a special attention devoted on electron transfer processes. Additionally we will explore the potential applications of our hybrid supramolecular tandems focusing on the societal challenges related to clean energy (H_2 production).

Our recent publications about this research project:

- Cadot *et al.* **J. Am. Chem. Soc.**, 2017, 139, 12793
- Cadot *et al.* **J. Am. Chem. Soc.**, 2017, 139, 14376
- Cadot *et al.* **Chem. Eur. J.** ASAP DOI: 10.1002/chem.201802102

Required skills: The candidate should have performed his/her PhD in physical chemistry or eventually in inorganic chemistry, and already have skills in photo-physical measurements (luminescence, time-resolved emission, transient absorption…) and in electrochemistry. The project will be performed in interaction with two research groups thereby the candidate is expected to have good communication skills and team-working capabilities.

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