# One year Post-doctoral position – Sorbonne Université, Faculté des Sciences

Towards single POM photoswitch for data storage

Description:

The E-POM team of the IPCM (Institut Parisien de Chimie Moléculaire) has been interested for several years in the study of the transport properties of polyoxometalates (POMs) assemblies grafted onto various substrates (carbon, silicon, gold…) for their integration into information storage devices. POMs are anionic nanometric oxo-clusters formed by the early transition metals in their highest oxidation state ($[X_xM_pO_y]^{n-}$, X=P, Si…, M=W^{VI}, Mo^{VI}, V^V,…). They display remarkable redox properties and they can especially be reduced by light irradiation.

In the present project, the aim is to regularly isolate the POMs from each other on a carbon substrate thanks to the presence of a porous bidimensional organic template and to study their transport properties by Scanning Tunnelling Spectroscopy (STS). The POMs will be deposited by a host/guest strategy in the pores of a honeycomb supramolecular network formed by the self-assembly of stilbene units on HOPG. Such functionalized substrates will be provided by D. Kreher, IPCM. The substrates will be characterized by XPS and STM at the liquid-solid interface (room temperature and pressure) before being introduced in a UHV STM to measure the I-V curves by STS on a single POM. The POMs will be chemically reduced prior to their deposition to get the typical I-V curve of a reduced POM versus an oxidized POM. Finally, the photoreduction of the adsorbed POMs will be performed *in situ* to study the modulation of the current as a function of the photoinduced redox state of the POM. This work should pave the way towards single molecule information storage devices for which writing is induced by light and reading is induced by an electric field.
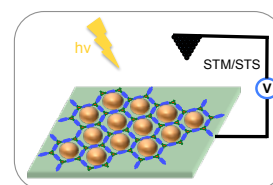
The main part of this post-doc position will deal with STM/STS experiments, performed in the MONARIS laboratory in collaboration with I. Arfaoui.

References:

G. Izzet, F. Volatron, A. Proust, *Chem. Rec.* **2017**, *17*, 250 and references herein
T. Yamase, *Chem. Rev.* **1998**, *98*, 307
G. Schull, L. Douillard, C. Fiorini-Debuisschert, F. Charra, *Nano Lett.* **2006**, *6*, 1360
H. Li, S. Pang, S. Wu, X. Feng, K. Müllen, C. Bubeck, *J. Am. Chem. Soc.* **2011**, *133*, 9423

Profile:

The candidate must possess strong background in surface characterization by Scanning Tunnelling Microscopy and eventually in Scanning Tunnelling Spectroscopy. Extra skills in surface chemical science and molecular chemistry would be greatly appreciated.

Starting date:

As soon as possible, **imperatively before the 1st of June 2018**

Contact:

Interested candidates should send a single pdf file containing a cover letter, curriculum vitae, and the names of two references to florence.volatron@sorbonne-universite.fr