Postdoctoral position (12 months, renewable)

« Porphyrin Zr-based MOFs with high photocatalytic CO_2 reduction activity »

Keywords: Porphyrins, Metal-Organic Frameworks, organic and coordination chemistry, CO_2 photocatalytic reduction

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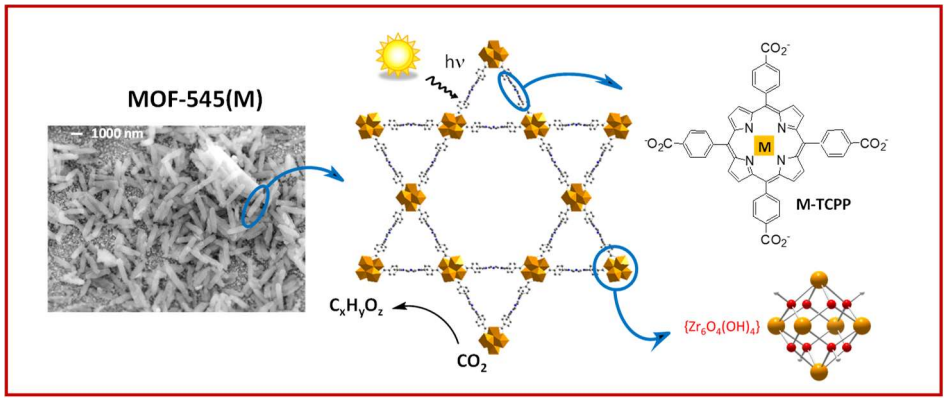
In the context of the CO_2 valorization, the project aims at synthesizing metal-organic frameworks (MOFs) exhibiting high photocatalytic activities for CO_2 reduction under visible light illumination. We will consider the Zr(IV) porphyrinic MOF-545 as a versatile platform to elaborate new functionalized photocatalysts. We recently proposed a mechanism for the photocatalytic reduction of CO_2 into formate (Y. Benseghir et al. *J. Mater. Chem. A*, 2022, in press, DOI:10.1039/d2ta04164b). We have shown that TEOA radicals are generated photochemically at the porphyrinic linkers and then transfer a formal hydride to a CO_2 molecule activated on a Zr(IV) center, the latter acting as a Lewis acid. The present project will further explore different strategies to enhance the CO_2 reduction photocatalytic activity playing both with the porphyrinic linkers and the photocatalytic conditions. Photophysical studies in solutions will complement the photocatalytic experiments allowing us to scrutinize the mechanism at play. The synthesis of the porphyrin linkers and the photocatalytic experiments will be performed at ICMMO (Orsay); the synthesis and the characterization of the MOF materials will be effectuated at ILV (Versailles), both laboratories belonging to University Paris-Saclay. When required, DFT calculations will be performed at the Collège de France (Paris) in collaboration with C. Mellot-Draznieks.



Candidates must have experience in organic synthesis, in the synthesis of hybrid organic inorganic materials and in the usual characterization methods of organic molecules (NMR, mass spectroscopy …) and of materials (IR, powder X-ray diffraction …). An experience in photocatalytic experiments and photophysical measurements will also be appreciated. They should submit their application in English or in French. It must include a CV, a minimum of two letters of references and a cover letter. The complete file must be sent to Anne Dolbecq (ILV, anne.dolbecq@uvsq.fr) and Zakaria Halime (ICMMO, zakaria.halime@universite-paris-saclay.fr).