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Keywords: Solar energy, Organic Synthesis, Coordination Chemistry, Catalysis, Photochemistry, Flow chemistry

Preparation and evaluation of supported catalysts for MOST systems

The project SOLPHOTOCAT intends to investigate the development of new chemical devices for the storage and the release on demand of solar energy. The targeted **MOST (molecular solar thermal energy storage)** system is a chemical system capable of (i) converting solar energy into a storable chemical energy via a **photochemical** transformation of A into B and (ii) releasing on demand the stored energy via the **catalytic** reverse transformation of B into A (Fig. 1). Among the main molecular systems investigated for MOST applications[1], the norbornadiene/quadricyclane[2] couple (NBD/QC, Fig. 2) appears the most promising as it offers high energy density and robustness. However, several drawbacks prevent their development on large scale such as poor overlap of the solar emission spectrum, costly chemical precursors and catalysts as well as toxic solvents. The project SOLPHOTOCAT is thus targeting the development of **new cheap, environmental-friendly and efficient MOST systems** along with the development of **a microfluidic device capable of rapidly evaluating their performances** in the whole system of storage and conversion of solar energy.

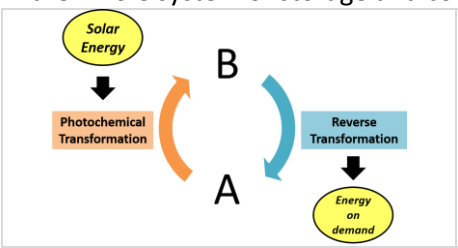

Figure 1

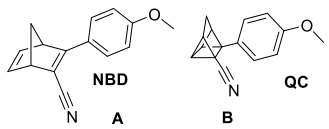

Figure 2

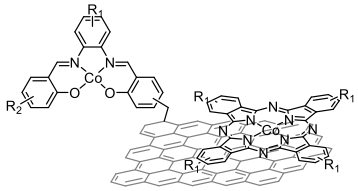

Figure 3

In this context, this thesis will therefore focus on the **preparation and the evaluation of supported catalysts for the on demand release of the stored energy** for both NBD/QC reference systems and the new molecular systems developed in the project. The targeted catalysts are **Cobalt-based complexes** featuring phthalocyanin- or salen-type ligands and grafted onto **carbon materials** (Fig. 3). The main objectives are to acquire knowledge (i) on the mechanism involved in the catalytic back reaction and (ii) on the role of the support in the performances of the catalyst, both in batch or flow conditions in the microfluidic device developed. The project will thus involve organic synthesis and coordination chemistry, structural characterization and catalysis along with photochemistry and flow chemistry.

Required skills: Applicants for this position should hold a Master Degree in Chemistry or Chemical Engineering or equivalent, a strong interest in multidisciplinary research and good team working abilities. Strong knowledge/experience in organic synthesis and coordination chemistry is required. Experience in supported catalysis, photochemistry and/or in flow chemistry will be appreciated.

Application requirements: a CV including the names of two referees and a short letter outlining the motivation and experience for the position should be sent to Odile Dechy-Cabaret Odile.DechyCabaret@ensiacet.fr and Jérôme Durand Jerome.Durand@ensiacet.fr

Deadline: Applications will be evaluated on an ongoing basis until the position is filled, therefore applicants should apply as soon as possible and before **June 6th**.

[1] Sun *et al.*, *ChemPhotoChem* **2019**, 3, 268.

[2] Wang *et al.*, *Energy Environ. Sci.* **2019**, 12, 187. Orrego-Hernández *et al.*, *Acc. Chem. Res.* **2020**, 53, 1478.