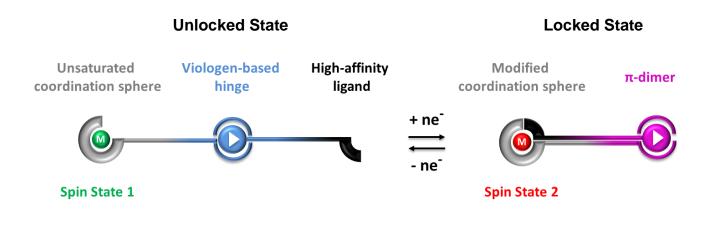
Coordination-induced Spin State Switching in Redox-responsive Viologen-based Metalloporphyrins

Shaymaa AL SHEHIMY, Elise DUMONT, Denis FRATH, Floris CHEVALLIER and Christophe BUCHER

Univ Lyon, ENS de Lyon, CNRS UMR 5182, Univ Claude Bernard Lyon 1, Laboratoire de Chimie, F-69342 Lyon, France

shaymaa.al-shehimy@ens-lyon.fr

The control of magnetic properties by external stimuli has attracted much interest over the past few decades and tremendous work has been achieved thereafter.¹ Our contribution to this field is based on the **C**oordination-induced **S**pin **S**tate **S**witching approach (*CiSSS*)² which, as its name implies, aims at changing the spin state of a porphyrin-complexed metal center by modifying its coordination sphere. Therefore, based on our expertise in supramolecular chemistry and with the help of theoretical calculations, a well-suited model system was designed and eventually synthesized. In this presentation, the targeted tweezer-like molecule features a redox-responsive viologen-based hinge tethering a high affinity ligand to a magnetically active metal center. In agreement with the concept depicted below, the electrical stimulation of the hinge is expected to trigger a large amplitude molecular motion driven by the reversible, intramolecular π -dimerization of the electrochemically-generated viologen cation radicals.^{3,4} This fully reversible back and forth self-locking process will enable to control the coordination/dissociation of the ligand to/from the metalloporphyrin and, consequently, the metal's spin state. The switching process will be discussed on the grounds of spectroscopic, electrochemical data supported by quantum calculations.



References:

- ¹O. Sato, J. Tao, Y.-Z. Zhang Angew. Chem. Int. Ed. 2007, 46, 2152-2187.
- ² B. Doistau, L. Benda, B. Hasenknopf, V. Marvaud, G. Vives *Magnetochemistry*, **2018**, *4*, 5-20.
- ³ C. Kahlfuss, S. Denis-Quanquin, N. Calin, E. Dumont, M. Garavelli, G. Royal, S. Cobo, E.Saint-Aman, C. Bucher J. Am. Chem. Soc. **2016**, *138*, 15234-15242.
- ⁴ C. Kahlfuss, T. Gibaud, S. Denis-Quanquin, S. Chowdhury, G. Royal, F. Chevallier, E. Saint-Aman, C. Bucher *Chem. Eur. J.* **2018**, *24*, 13009-13019.