

Towards Electron-triggered Coordination-induced Spin State Switching in Viologen-based Metal Complexes

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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 coordination-induced spin state switching approach (CiSSS)² which, as its name implies, aims at changing the spin state of a 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 metal center and, consequently, its spin state. The spin-state switching process will be discussed on the grounds of spectroscopic, electrochemical and spectro-electrochemical data supported by quantum calculations.

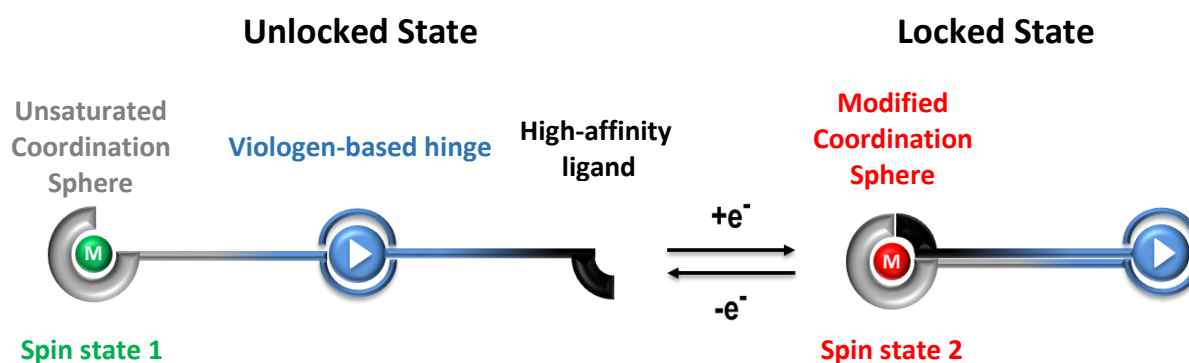


Figure 1 Electron-triggered self-locking behaviour for reversible CiSSS.

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