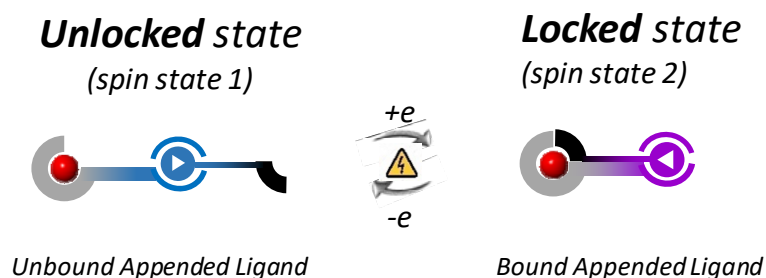


Electron-Triggered Metamorphism in Metal-Organic Architectures : From Responsive Self-Assembled Materials to Spin-State Switching

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The ability to control the structure and properties of molecular materials has emerged in the past decade as a major scientific objective that is mainly motivated by exciting foreseeable applications in nanoscience. Enormous technologic interests are for instance at stake in being able to devise molecular objects that could respond to external stimuli by changes in structure and function. To achieve these objectives, our group has been focusing over the past few years on the development of tailor-made electron-responsive molecular or supramolecular systems involving metal ions and electrogenerated organic π -radicals as key responsive and/or assembling elements. Our contribution in this area ranges from the development of discrete rotor-or tweezer-like molecules to supramolecular assemblies whose mechanical movements or whose macroscopic properties can be controlled by electrical stimuli. In recent years, controlling molecular motions has also emerged as a promising approach for the development of molecules exhibiting switchable magnetic states, the underlying idea being that modifying the structure of a molecular system could induce drastic modifications of its magnetic properties. From a practical standpoint, these ambitious objectives have so far mainly been addressed with coordination complexes using light as an input signal [1, 2] In contrast, far less progress has been made in these directions with electron-responsive systems even though electrochemistry stands as a particularly attractive trigger in the perspective of applications in solid-state devices or to avoid risks of bleaching associated to high energy light irradiations. In this context, we have recently focused on the development of molecular systems for which large amplitude movements actuated by electron transfer can be used to control the magnetic state of magnetically active metalloporphyrin centers. Following our previous works on redox-responsive mechanoreactive (supra)molecular architectures [3-6], we will detail in this presentation some of our most recent achievements along these lines including a recent strategy wherein the local environment and the electronic configuration (High Spin versus Low Spin states) of a nickel porphyrin can be determined with an electric trigger enabling to control the nature and number of coordinated ligands [7].



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