

CONTROL OF 4f COMPLEXES LUMINESCENCE AND MAGNETISM WITH ORGANIC PHOTOSWITCHES

Lucie NOREL,¹

¹ Univ Rennes, Institut des Sciences Chimiques de Rennes - UMR 6226, F-35000 Rennes, France

lucie.norel@univ-rennes1.fr

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Résumé:

At the heart of various high technology applications, rare earth optical and magnetic properties both find their origin in the fascinating electronic structures of lanthanide(III) ions. Our research deals with the control of lanthanide molecular complexes with light and target either luminescence photomodulation or photomagnetism. In this tutorial presentation, I will introduce several families of organic photoswitches. Understanding which property of the organic switch is affected upon light induced reaction is key to understand ligand design. Indeed, one can target the optical control of luminescent materials with potential applications such as super resolution imaging^[1] or authentication solutions.^[2] The specificities of lanthanide-based emission combined with such light control could lead to innovative solution in the field of bioimaging and smart materials.^[3] I will describe important examples from the literature and then focus on our recent work with photochromic β -diketonate ligands having a dithienylethene ligand, that we could coordinate to a variety of lanthanide ions including NIR or visible emitters in order to understand the photophysical mechanisms at play.^[4] On the other hand, these photoswitchable ligands can also be designed to implement efficient control of Single Molecule Magnets via a contactless and fast external stimulation. Over the years, we have developed several strategies based either on spiropyran ligands,^[5] or the association of highly anisotropic dysprosium complexes and dithienylethene photoswitches (Fig. 1).^[6,7] I hope to show that these strategies are complementary to approach the challenging goal of photoswitchable SMM as well as to describe the current advances in this field of research.

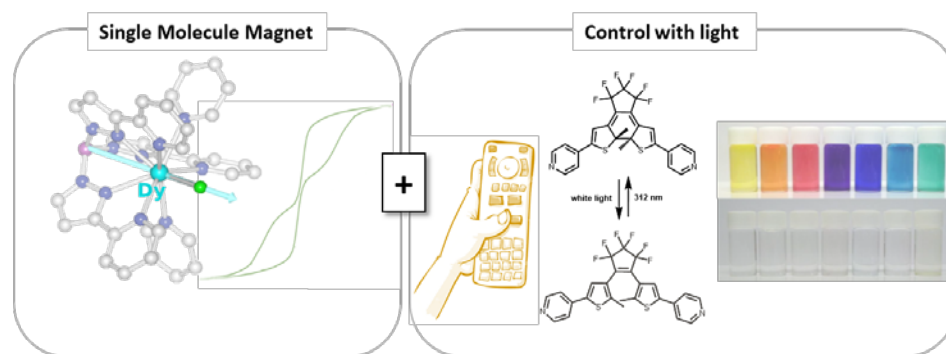


Fig. 1 Schematic view of the strategy used to reach photomagnetic effects with organic photoswitches.

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