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Photoswitching of Single Molecule Magnets

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For potential applications in information storage devices, Single Molecule Magnets (SMM) are remarkable candidates because they are able to retain magnetic information at the level of one molecule. The switching of such SMM through an external stimulus is extremely promising for the preparation of tristable or even multistables systems then providing a new paradigm for information storage with enhanced density. For this switching, light offer several advantages such as its contactless and non-invasive nature.

Photoswitching of SMM can rely on Spin Cross Over complexes or on Photoinduced Electron Transfer. Our strategy is rather based on the incorporation of precisely designed photochromic ligands into lanthanide based complexes, nowadays recognized as the best SMM systems, with record magnetic blocking temperatures close to liquid nitrogen temperature. To illustrate our recent progress in this field, I will first describe new air stable complexes having a terminal dysprosium fluoride bond that behave as single molecule magnets with large barrier to magnetic relaxation [1] and can serve as highly anisotropic building blocks. Following this strategy, a supramolecular assembly with organic photoswitches showing Single Crystal to Single Crystal transformation and hysteresis photomodulation will be described [2].

[1] L. Norel, L. E. Darago, B. Le Guennic, K. Chakarawet, M. I. Gonzalez, J. H. Olshansky, S. Rigaut, J. R. Long, *Angew. Chem. Int. Ed.* **57**, 1933 (2018).
[2] M. Hojorat, H. Al Sabea, L. Norel, K. Bernot, T. Roisnel, F. Gendron, B. Le Guennic, E. Trzop, E. Collet, J. R. Long, S. Rigaut , *J. Am. Chem. Soc.* **142**, 931 (2020)

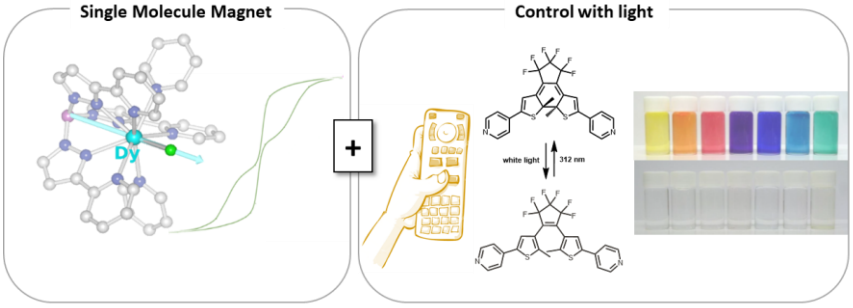

Figure 1 : Cartoon illustrating the supramolecular strategy towards SMM photoswitching (photograph taken from Irie, Chem. Rev. 2014).