Spin Crossover Molecular Materials:
From molecule to nanoelectronic and nanophotonic applications

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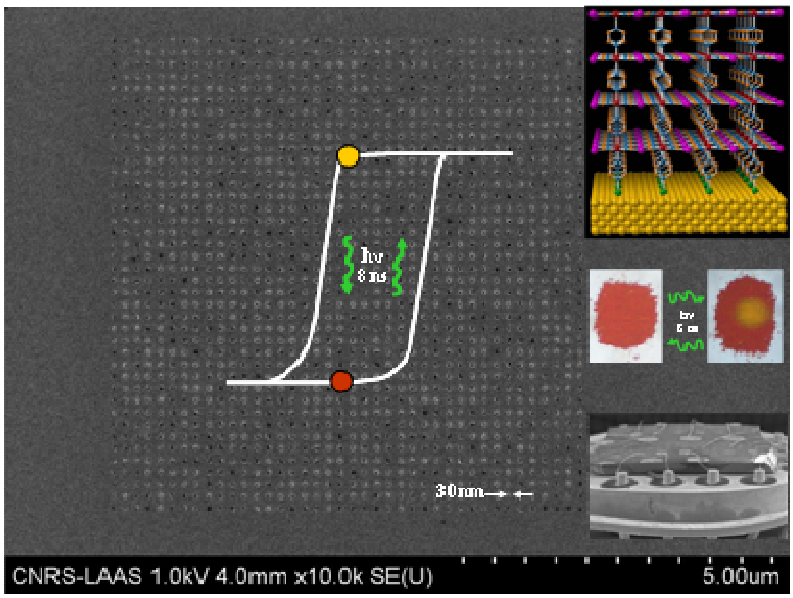
The spin crossover phenomenon in inorganic materials is one of the most spectacular examples of molecular bistability, which means that these molecules may exist in two different electronic states within a certain range of external perturbations. Most notably, the existence of a thermal hysteresis in certain complexes (in the solid state) confers a memory effect on these systems.[1-3] In our group we are particularly interested in the synthetic elaboration of nanometric thin films[4] and nano-sized patterns[5] that we obtain by electron beam lithography and in the application of an external perturbation in the hysteresis loop of spin crossover materials leading to an irreversible switching of their physical properties.[2] Experiments under different pulsed external stimuli such as temperature, high pressure, intense magnetic field and light irradiation, dielectric properties leading to molecular memories, nanothermometry devices for medical applications after elaboration of bistable thin films and their nano-structuration will be presented and discussed.[1-8]



Combined Top - Down and Bottom -Up Apporoach for the nanoscale pattering of {Fe(Pyrazine)[Pt(CN)$_4$]}. Inserts : Schematic structure on Gold surface of {Fe(Pyrazine)[Pt(CN)$_4$]} ; reversible nanosecond photo-switicing in the hystersis loop at room temperature and memory device prototype using the dielectric properties of spin crossover compounds.

[1] *A. Bousseksou, et al CHEM. SOC. REV (2011)*
[2] *N. Ould Moussa et al, PHYS.REV. LETT. 94 (2005) 107205.*
[3] *S. Bonhommeau et al, ANGEW. CHEM. INT. ED. 44 (2005) 4069-4073.*
[4] *S. Cobo et al, ANGEW. CHEM. INT. ED. 45 (2006) 5786-5789.*
[5] *G. Molnár et al, ADV.MAT. 19 (2007) 2163-2167.*
[6] *S. Cobo,et al, J. AMER. CHEM. SOC. 130 (2008) 9019–9024.*
[7] *T. Mahfoud et al, J. AMER. CHEM. SOC. 131 (2009) 15049–15054.*
[8] S. Cobo et al, *J. NANOSCI. NANOTECH.* 10 (2010) 5042-5050.