

HYBRIDS NANOMATERIALS FOR A CONTROLLED PHOTOSWITCHING AT ROOM TEMPERATURE

Three years PhD grant 2017-2020

Institut de Chimie de la Matière Condensée de Bordeaux (ICMCB)

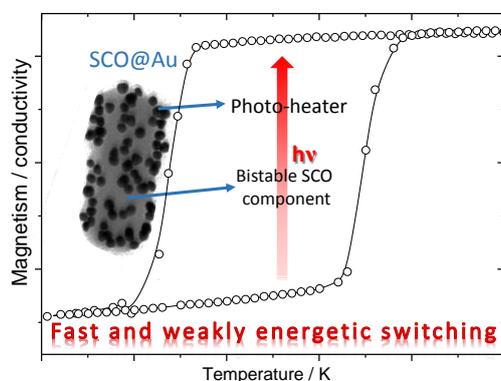
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The project targets a highly **tunable photoswitching, at room temperature**, of spin-crossover nanoparticles (SCO-NPs). SCO-NPs can be switched by temperature and light between different spin-states, associated with a memory effect of interest for applications in molecular electronics. The photoswitching at room temperature is associated to a light-induced local warming to induce the spin-crossover. This photo-thermal effect requires ultra-short and energetic laser pulses. The combination with a controlled number of nano-sized metallic particles (gold for instance) that bring hyperthermic ability, will allow to reach low energy process. The project aims at creating novel and versatile hybrid architectures with a strong interplay between plasmonic resonance of gold nanoparticles and optical switching of spin state to obtain **low-power and fast molecular switches**, of high potential for **molecular electronics**. This highly collaborative project involves the synthesis of SCO-NPs combined/grafted with metallic nanoparticles will be performed in collaboration with the “Chemistry of nanomaterials” group of the ICMCB (with Stéphane Mornet) and the optical switching properties will be studied in the “photonic and ultrafast laser spectroscopy” group of the LOMA (Laboratoire Ondes-Matière Aquitain, Eric Freysz). Implementation in electronic devices could be planned in our partner’s laboratory (Institut de Physique et Chimie des Matériaux de Strasbourg, Bernard Doudin).



A PhD grant is available for this project and will be funded by the University of Bordeaux after selection. We look for strongly motivated candidate with master degree in material sciences or nanochemistry. The PhD candidate should have a background in the elaboration and characterization of nanoparticles. An experience in electronic microscopy would be appreciated (a dedicated training could be done at the ICMCB). The PhD work will be dedicated to the synthesis and first optical and magnetic characterizations of the hybrid architectures, from the understanding of the metallic/SCO interface chemistry to the elaboration of various and complex hybrid architectures. Specific scientific training and participation to conferences will be part of the PhD work.