Photo-magnetic transitions

BELLEC A.

Laboratoire Matériaux et Phénomènes Quantiques, Université Paris Diderot / CNRS, France,
amandine.bellec@univ-paris-diderot.fr

Spin crossover molecules are composed of a central metallic ion (Cr, Mn, Co or Fe) surrounded by organic ligands. The metallic ion being in an octahedral geometry, a splitting of the 3d-orbitals is observed. Thus depending on the balance between the ligand field splitting and the paring energy two spin states of the molecules can be stabilized either a low spin state (S=0 for Fe^{II}) or a high spin state (S=2 for Fe^{II}). Spin crossover molecules thus have the peculiar property to possess two spin states and to transit from one to the other thanks to external stimuli such as temperature, light or pressure [1,2]. Especially, at low temperature, the low spin state is stable but it is possible to stabilize the high spin state by light-induced excited spin state trapping (LIESST) [3]. If such mechanisms are well documented for molecules in the form of polycrystalline powders or in solutions, it is today a great challenge to keep the spin crossover property of molecules, especially under light, in the form of nanoparticles, thin films or single molecules and in contact with a surface.

References:

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