Photo-induced Molecular Switching : Neutron Diffraction Studies

Béatrice Gillon, *Laboratoire Léon Brillouin (CEA-CNRS), Saclay, France.* E-mail: gillon@llb.saclay.cea.fr

The design of molecules that could be utilized for information storage is one of the main challenge in molecular material science and optical switching is one of the most intense areas of interest in memory molecules. Polarized neutron diffraction (PND) was used for the first time to investigate the photo-magnetic properties of photo-switchable inorganic molecular solids. Spin crossover compounds containing an octahedrally coordinated Fe^{2+} ion present a low spin diamagnetic (S = 0) ground state which can be switched, under light illumination with a suitable light wavelength, to a high spin paramagnetic (S = 2) metastable state having an extremely long lifetime at low temperatures.

A new experimental setup, allowing for both in-situ light illumination and PND measurements, has been developed on the 5C1 diffractometer at the LLB and tested on the $[Fe(ptz)_6](BF_4)_2$ (ptz = 1-propyltetrazole) spin crossover compound [1]. The photo-excitation kinetics was followed by PND, which evidenced a complete photo-excitation process. The first magnetization density map in a photo-induced magnetic state has been obtained at 2K using a laser beam with 473 nm.

[1] Goujon A., Gillon B., Gukasov A., Jeftic J., Nau Q., Codjovi E., Varret F., *Phys. Rev. B*, 2003, **67**, 220401(R).

Keywords: polarized neutron scattering, molecular magnetism, molecular switches