Photomagnetic Mixed-Valence Compounds: Molecules and Nanoparticules

Corine Mathonière,1 Laure Catala,2 Talal Mallah,3 S. M. Holmes,4 Rodolphe Clérac5

1 Université de Bordeaux 1; CNRS, Institut de Chimie de la Matière Condensée de Bordeaux, UPR 9048, 87 Av. du Dr Schweitzer, 33608 PESSAC, Cedex, France.
2 Laboratoire de Chimie Inorganique, Université Paris XI, Bât 420, 91405 Orsay Cedex, France.
3 Department of Chemistry and Biochemistry, University of Missouri
Saint-Louis, MO 6321-4400, USA
4 Université de Bordeaux 1; CNRS, Centre de Recherche Paul Pascal, 115, Avenue du Dr Schweitzer, 33600 Pessac, France
Email: mathon@icmcb-bordeaux.cnrs.fr

The photomagnetism in molecular compounds is today a very active field of research, since the photocontrol of magnetic properties at the molecular scale opens new perspectives in information storage. The photomagnetic properties in molecular bimetallic compounds have been discovered in Japan in 1996 by the group of Professor Hashimoto [1]. The first studies have concerned mixed-valence FeCo prussian blue analogs where the photomagnetic effect is based on Charge Transfer Induced Spin State Transition in extended networks [2]. Later, other mixed-valence extended networks and molecules built from octacyanometallalates have been revealed as other efficient photomagnetic systems [3,4]. Recently, we have started a systematic study of photo-induced magnetization in cyanometalllates compounds due to an electron transfer mechanism. In this presentation, we will focus on recent results we have obtained, and two different types of materials will be presented: (i) molecular clusters [5], and (ii) nanoparticles [6]. A particular attention will be devoted to the comparison with the photomagnetic behaviors of nano-sized systems with those obtained for same materials at the microscopic scale.