

of  $[\text{Ni}(\text{tmdt})_2]$  and  $[\text{Au}(\text{tmdt})_2]$ . It was quite surprising that in spite of the compressed crystalline powder sample, the room temperature conductivity of  $[\text{Pt}(\text{tmdt})_2]$  was as high as  $350 \text{ S cm}^{-1}$  and temperature dependence of the resistivity was metallic down to 4 K. Here, our recent studies on crystal structures and their physical properties of single-component molecular conductors with different central metal atoms (Cu, Zn, Co) will also be presented.

Keywords: single-component molecular metal, molecular metals and superconductors, phase transition

### MS.31.3

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#### Photoswitchable high spin molecules

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This presentation intends to point out some recent achievements in the field of photoswitchable high spin molecules. These compounds might be viewed as Photo-Magnetic Molecular Devices (PMMDs) devoted to molecular spintronics. Results have been firstly obtained on a polynuclear complex,  $\text{Mo}(\text{IV})\text{Cu}(\text{II})_6$ . Before light irradiation, this complex behaves as a paramagnetic species, as expected for six isolated paramagnetic Cu(II) ions surrounding a Mo(IV) diamagnetic core. After light irradiation, the magnetic properties are found to be consistent with those of a high spin molecule,  $\text{Mo}(\text{V})\text{Cu}(\text{I})\text{Cu}(\text{II})_5$  ( $S = 3$ ). The long-lived photo-produced metastable state is persistent up to an unusually high temperature (300K). Furthermore, the photo-magnetic effect is thermally reversible. The EPR studies, as well as the X-ray absorption spectroscopy and XMCD performed under synchrotron radiation, allowed us to demonstrate the photo-induced electron transfer. A large family of new  $\text{MoCu}_x$  ( $x = 1, 2, 4, 6$ ) and hetero-tri-metallic complexes,  $\text{MoCuM}$  ( $M = \text{Ni}, \text{Mn}, \dots$ ), have been recently obtained and fully characterized by X-Ray crystallography opening the way of photo-switchable single molecule and single chain magnets. Promising results have been done on photoactive molecules grafted on surface that would be of great interest for the information storage at the molecular scale.

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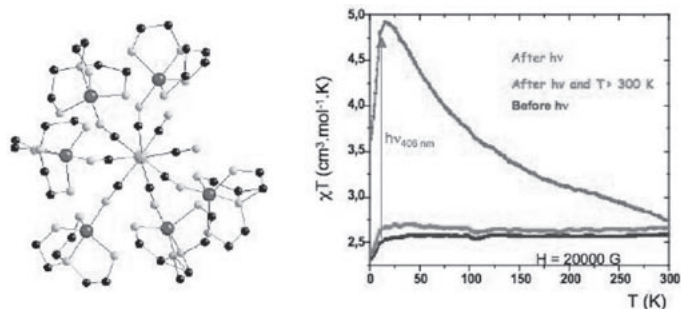


figure 1 :  $\text{MoCu}_6$  complex and photoswitchable magnetic properties

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#### Structural aspects of magnetic transitions and high conductivity in ionic complexes of fullerenes

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Structural details governing magnetic and conductivity properties of multicomponent ionic complexes of fullerenes,  $(\text{D}_1^+)(\text{D}_2)(\text{C}_{60}^-)$ , are discussed. In these complexes  $(\text{D}_1^+)$  is a cation or strong donor capable to ionize  $\text{C}_{60}$  molecules, and  $\text{D}_2$  is a neutral structure-forming molecule. The following examples are highlighted:

1. Complexes  $(\text{D}^+)\text{Co}^{\text{II}}\text{OEP}(\text{C}_{60}^-)$  (OEP = octaethyl-porphyrine) with coordinating cation of N-methyldiazabicyclooctane (MDABCO<sup>+</sup>) shows reversible dissociation of the Co-C( $\text{C}_{60}^-$ )  $\sigma$ -bond in the 50-250K region with the transition of the complex from diamagnetic to paramagnetic state[1].

2. In the complex  $\{(\text{MDABCO}^+)\cdot\text{Co}^{\text{II}}\text{TMPP}\}_2\cdot(\text{C}_{60}^-)_2$  (TMPP = tetramethoxyphenyl-porphyrine) there are  $\pi$ - $(\text{C}_{60}^-)_2$  dimers bound by two C-C bonds. The dimers contain about two unpaired spins, whose behaviour is described well by a model presuming a singlet ground state ( $S=0$ ) and a close lying excited triplet ( $S=1$ ) state with the energy gap of 70 cm<sup>-1</sup>. Additionally, strong AF exchange interaction of spins in the  $\text{Co}^{\text{II}}\text{TMPP}-(\text{C}_{60}^-)_2-\text{Co}^{\text{II}}\text{TMPP}$  chains with large negative Weiss constant of -34K is observed[2].

3. Complex  $(\text{MDABCO}^+)(\text{TPC})(\text{C}_{60}^-)$  (TPC = triptycene) contains closely packed hexagonal layers of monomeric  $(\text{C}_{60}^-)$  radical anions and manifests metal-like behaviour. Magnetic and conductivity behaviours are affected much by the interplay of electronic states in two crystallographically independent fullerene layers with ordered and orientationally disordered fullerene molecules, resulting from transformations of interfullerene interactions.

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Keywords: complex compound crystal structure, fullerenes, magnetic and transport behaviours

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#### The spin-crossover triangle in the iron(III) porphyrinoids

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Some iron(III) complexes exhibit a spin-crossover phenomenon. The three possible pathways of spin-crossover processes are; the