

Azine and polyazine N-oxide ligands for novel magnetic molecular materials

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Ligands decide about crystal structure of the coordination materials and in many cases could be a key factor in achieving, tuning and controlling the target properties. Several important features of their molecular structure and electronic structure can be preprogrammed at the very first stage of synthetic procedure. This can be done by the selection of (i) type, number, and spatial distribution of coordinated atoms, (ii) distribution of charge density (iii) and overall flexibility (or rigidity). Further, the number of properties could be introduced or supported in the final products, such as chirality, magnetic interactions, photomagnetism, luminescence, porosity, conductivity, catalysis and others [1-5].

During the last decade an old group of azine and polyazine N-oxides emerged in the field of coordination chemistry for novel functional materials, particularly in CN^- , SCN^- or N_3^- bridged systems with long range magnetic ordering or very recently in hybrid complex salts [6,7]. They offer a good alternative for selective and directional binding and connecting of d and f metal ions, compared to formerly exploited purely N-donor amines, imines, Schiff bases and others. Along this line we present novel $\text{Co}^{\text{II}}\text{-L-}[\text{W}^{\text{V}}(\text{CN})_8]^{3-}$ (L = selected-N-oxides) supramolecular porous networks composed of low dimensional $\text{Co}^{\text{II}}\text{-CN-W}^{\text{V}}$ linear or zig-zag skeletons and mononuclear Co^{II} complexes, contributing to the overall magnetic properties with local magnetic exchange coupling and slow magnetic relaxation processes (Figure 1). The channel systems hosting hydrogen bonded coordination and/or crystallization H_2O is discussed in terms of potential molecular exchange/sorption properties and their impact on magnetic properties and conductivity.

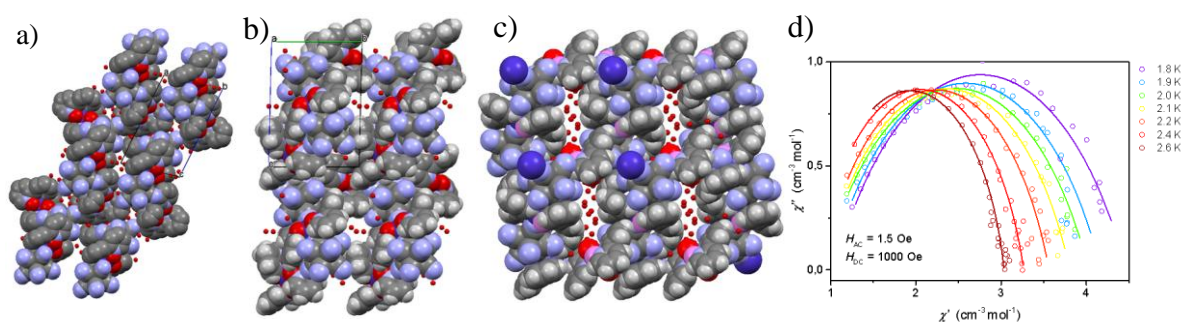


Figure 1. View along porous structure of $\text{Co}^{\text{II}}\text{-2,2'-bpdo-}[\text{W}^{\text{V}}(\text{CN})_8]^{3+}$ (a), $\text{Co}^{\text{II}}\text{-2,2'-bpdo-}[\text{W}^{\text{V}}(\text{CN})_8]^{3-}$ (b), $\text{Co}^{\text{II}}\text{-2,2'-bpmo-}[\text{W}^{\text{V}}(\text{CN})_8]^{3-}$ (c). Magnetic relaxation of $\text{Co}^{\text{II}}\text{-2,2'-bpmo-}[\text{W}^{\text{V}}(\text{CN})_8]^{3-}$ (d).

Literature

- [1] S. Batten, *Coordination Polymers*, RSC Publishing (2009).
- [2] B. Nowicka et al. *Coord. Chem. Rev.* **256** (2012) 1946.
- [3] H. Tokoro and S. Ohkoshi, *Dalton Trans.* **40** (2011) 6825.
- [4] S. Chorąży, K. Nakabayashi, S. Ohkoshi, B. Sieklucka, *Chem. Mater.* **26** (2014) 4072.

- [5] D. Pinkowicz, Z. Li, P. Pietrzyk, M. Rams, *Cryst Growth Des.* **14** (2014) 4878.
- [6] Ma, B.-Q.; Sun, H.-L.; Gao, S.; Su, G. *Chem. Mater.* **13** (2001) 1946.
- [7] R. Podgajny et al. *Cryst. Growth Des.* **14** (2014) 4030.