HEPTACOORDINATED COMPLEXES : UNIQUE PLAYGROUND FOR MOLECULAR MAGNETISM

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Mots-clés: heptacoordinated complexes; coordination chemistry; single-molecule magnets; single-chain magnets

Résumé: Several chemical strategies have been developed to prepare molecule-based magnets with specific properties (blocking temperatures, coercive fields) and multifunctionalities (photo-, piezo-sensitivity, luminescence, chirality, …).[1] All these works highlighted the crucial role of magnetic anisotropy. In 1D, 2D and 3D networks, magnets require an additional control over its strength, its spatial orientation and on the intra- and inter-molecular exchange interactions. Heptacoordinated complexes are adequate platforms to play on these parameters. They are built from pentadentate ligands defining a planar surrounding to metal or lanthanide ions.[2]

In this tutorial, I will discuss the impact of i) the metallic center (electronic configuration and orbital filling), ii) symmetry and iii) ligand fields on magnetic anisotropy. Their use as building blocks will be illustrated through selected results showing how they give access to heterometallic materials with diverse dimensionalities[3] and magnetic properties ranging from simple paramagnets, SMMs[4]/SCMs[5] to ordered networks[6] (Figure 1). The influence of chirality in these systems will also be presented.[6]

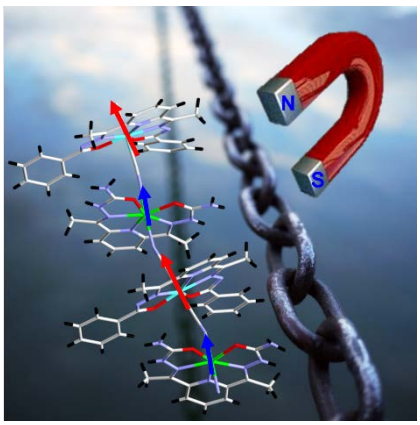

Fig. 1 Illustration of a Single-Chain Magnet built from heptacoordinated complexes.

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