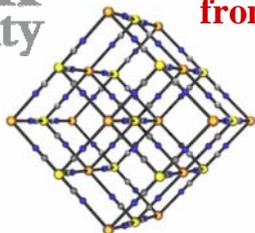




Brock
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Chemistry

Magnetic and Conducting Hybrid Materials from Molecular Building Blocks



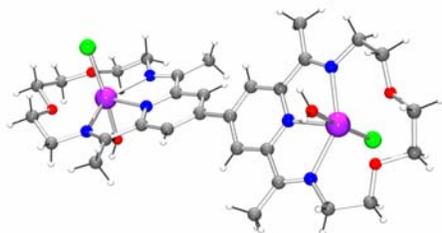
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Research in the Pilkington group spans topics in synthetic and structural inorganic chemistry with a focus on problems in molecular materials chemistry. The combined use of X-ray crystallography, EPR, magnetometry, and electrochemistry reflect the interdisciplinary nature of our research. Our aim is to define important synthetic challenges and tackle their solution with an arsenal of physical, chemical and spectroscopic data.

1. Ligand Synthesis - Self-assembly is a powerful approach which involves the encoding of coordination information into a ligand, and then using a metal ion to interpret and use this information, according to its own coordination preferences, in order to organize the growth of large polynuclear metal ion arrays. These are of interest because they provide routes to novel magnetic materials, and in the context of a 'bottom up' approach to 'devices' based on molecules, an entry into the electronic, and perhaps magnetic, high technology arena of the future.

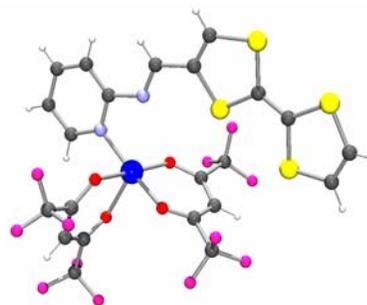


Our Strategy - Strategies to produce coordination complexes with large numbers of transition metal centers include direct synthesis from an ambidentate ligand, and methods which use the organizing ability of a metal ion and a ligand or a ligand precursor (e.g. template syntheses). The success of creating polynuclear complexes relies heavily on the use of synthetic organic techniques to produce new ligands and ligand precursors.^[1]

Structural and Magnetic Studies - Our interest in the creation of polynuclear complexes is driven in part by our interest in the solid state structures and magnetic properties of such systems. The design, synthesis and study of spin crossover compounds for possible applications in data storage and optical display devices is a major focus.

2. Dual Property Electronic and Magnetic Materials - The search for molecular materials with interesting conducting, optical and/or magnetic properties presents a major challenge for synthetic chemists. Of particular interest are "hybrid" solids that combine two or more physical properties e.g. conductivity and magnetism not traditionally found in the same material.

Our Strategy - Our strategy involves the covalent attachment of metal ion binding groups to tetrathiafulvalene (TTF) derivatives.^[2] We then apply the principles of coordination chemistry for the design of new 1-D and higher dimensionality materials.



References

- [1] M. Pilkington, M. Gross, P. Franz, M. Biner, S. Decurtins, H. Stoeckli-Evans and A. Neels, *J. Solid State Chem.*, **2001**, 159, 262.
[2] M. Chahma, X-S. Wang, A. van der Est and M. Pilkington, *J. Org. Chem.*, **2006**, 71, 2750.

