

DEVELOPING CONDUCTIVE AND REDOX-ACTIVE RUTHENIUM METALLOLIGANDS FOR THE SYNTHESIS OF 2- AND 3-DIMENSIONAL POROUS MATERIALS

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The Creutz-Taube ion, synthesised in 1969 by Carol Creutz and Henry Taube,¹ initiated decades of research into intramolecular electron transfer between dinuclear metal centres. In particular, significant efforts have been devoted to ruthenium and osmium dinuclear complexes with pyridyl and polypyridyl bridges.² Such systems are significant by virtue of their easily accessible redox couples and high electron density, resulting in strong charge transfer behaviour, including Intervalence Charge Transfer (IVCT) in the mixed-valence state. While these systems have been used to develop 1-dimensional polymers,³ 2- and 3-dimensional materials are relatively rare.

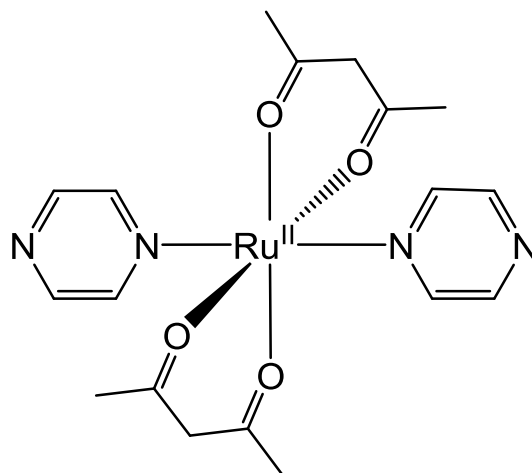


Figure 1: *trans*-dipyrazine-bis(acetylacetonate)ruthenium (II) (RuML1)

We have designed a family of metalloligands structurally similar to the Creutz-Taube Ion and its derivatives. The discrete system RuML1 (figure 1) forms the template for this family of ligands, complexes capable of coordinating to metal nodes as a linear linker. The synthesis of this metalloligand is also highly adaptable,³ by functionalising the diketone group, or using a different N-heterocyclic ligand. In this way, framework materials based on this class of metalloligand will conceivably have highly tuneable properties, including structure, pore size and conductivity.

This presentation will discuss the structural, conductive, electrochemical and spectroelectrochemical properties of framework materials that incorporate ruthenium metalloligands in comparison to those of related discrete systems. The results provide a unique platform to elucidate the nature of bonding and long-range electron transfer behaviour in multidimensional coordination space.

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2. Creutz, C., *Prog. Inorg. Chem.* **2007**, *30*, 1-73.
3. Hasegawa, T.; Lau, T. C.; Taube, H.; Schaefer, W. P., *Inorg. Chem.* **1991**, *30* (14), 2921-2928.