Exploring The Scope of Transition Metal Complexes Bearing Imidazol(in)ium-2-dithiocarboxylate Ligands

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Despite the widespread use of N-heterocyclic carbenes (NHCs) as neutral, two-electron donors in organic synthesis and in organometallic chemistry, only a modest number of reports have looked at their potential to generate other ligand systems. Yet, the facile reaction of NHCs with heteroallenes X=C=Y such as COS, CS_2, or RNCS to afford the corresponding betaines in high yields and purities provides a convenient starting point to generate new heteroatom-based ligands with tailored binding modes.[1]

In particular, the reaction of preformed or *in situ* generated NHCs with carbon disulfide affords stable, crystalline adducts that can act as κ^2-*S,S′* chelating or bridging ligands toward various transition metals. Thus, in 2009 our group reported the formation of cationic ruthenium - arene complexes bearing imidazol(in)ium-2-dithiocarboxylate ligands.[2] In collaboration with James Wilton-Ely at Imperial College, the coordination chemistry of NHC•CS_2 zwitterions was further extended to various other complexes of ruthenium,[3,4] osmium,[4] palladium,[5] and gold.[6] We also demonstrated that NHC·CS_2 betaines were suitable ligands for the stabilization of gold nanoparticles.[6]

The potential of NHC•CS_2 zwitterions to generate new molecular architectures prompted us to further investigate the preparation of a large family of mono- and polynuclear complexes based on transition metals from groups 6 to 8 bearing these ligands. In this presentation, we shall discuss the coordination mode of NHC•CS_2 zwitterions in a series of new transition metal carbonyl complexes, on the basis of X-ray diffraction analysis and spectroscopic characterization techniques. We will also discuss their potential applications in catalysis.

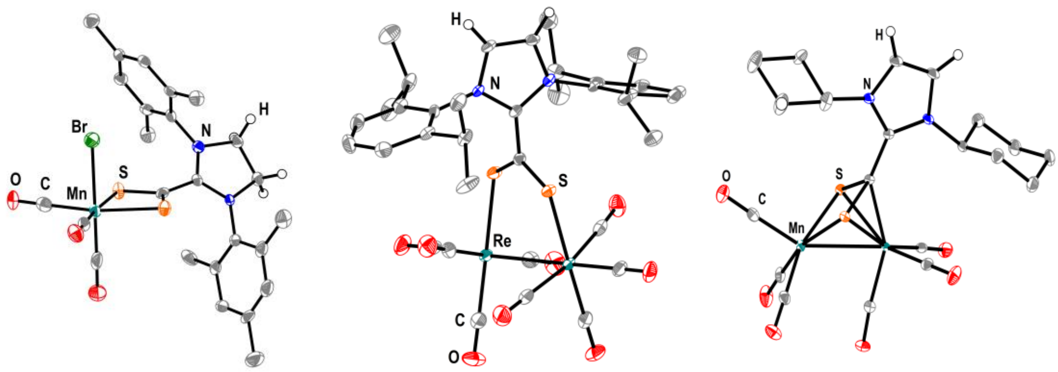

Figure 1. ORTEP representations of $[MnBr(CO)_3(S_2C\cdot SIMes)]$ (left), $[Re_2(CO)_8(S_2C\cdot IDip)]$ (center) and $[Mn_2(CO)_6(S_2C\cdot ICy)]$ (right).

References

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