

Imidazole based ambiphilic ligands for anion sensing, metalation and photophysical properties

S. Parveen, I. Avinash, G. Anantharaman

Department of Chemistry, Indian Institute of Technology, Kanpur, Uttar Pradesh 208016,

garaman@iitk.ac.in, sabeeha@iitk.ac.in

Ambiphilic molecules such as phosphine-borane and amine-borane have drawn huge interest recently. Amine borane in particular, has been widely known to be efficient in sensing of hazardous anions such as fluoride and cyanide which can be monitored using the fluorimetry. In addition, the coordination properties of P-/N- donor containing borane compounds with various coinage metals had a significant impact in their luminescence properties which can be utilized for various biological or electronic applications.^{1,2}

Erstwhile, we have reported a series of backbone heteroatom-substituted imidazoles (SPh, PPh₂, SiMe₃, O₂BPh, I, Br) as a precursors for the synthesis of functionalized NHC-metal complexes.³ In this work, synthesis of ambiphilic ligand on metal halogen exchange with a Lewis acidic BMes₂ (Mes = mesityl) at the backbone of the imidazole was achieved.⁴ Among them, two isomeric boron-phosphine functionalized imidazoles, monoboron-functionalized imidazoles, and its corresponding imidazolium salts were prepared and thoroughly characterized. Their solid-state structures reveal a dimeric B-N adduct that six-membered [C-B-N]₂ ring, and a tetrameric B-N adduct that forms an interesting 16-membered macrocycle, among various other monomeric BMes₂-substituted imidazoles. The fluoride sensing properties of the synthesised BMes₂-containing imidazoles were studied using UV-vis and fluorescence spectroscopy.

The ideal separation provided by P[^]N-type ligand gives room for metal-metal interaction upon the coordination with coinage metals which in turn lead to bright luminescent. Here, the P[^]N type ligand synthesised was treated with CuX (X=Br, I) to give L₂Cu₄I₄-type luminescent metal complexes. In addition, metalation of the P[^]N ligand with other coinage metal salts such as AgX (X=OTf, NO₃), AuCl.SMe₂ was also tried. Upon crystallisation, their solid-state structures reveal the cleavage of C-5 BMes₂

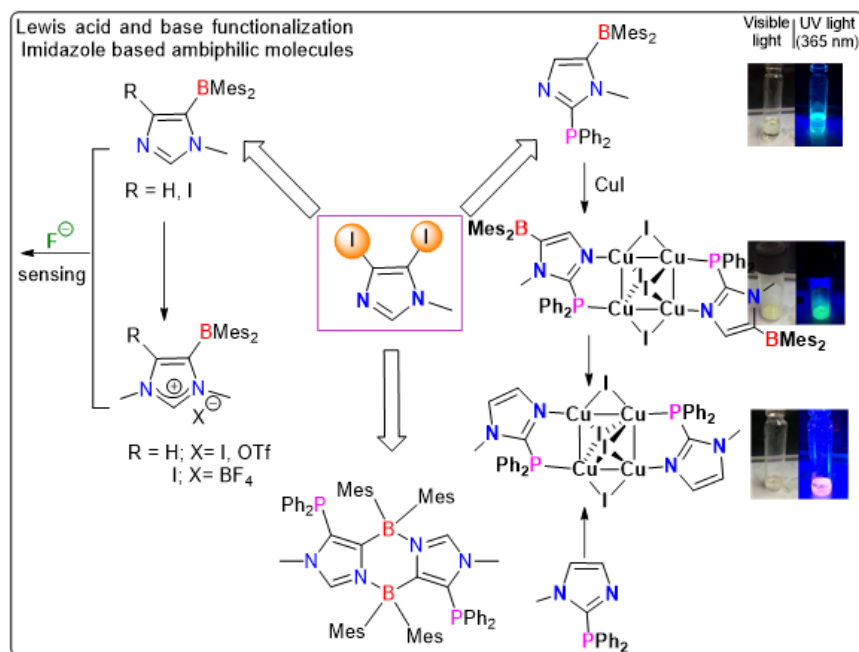


Figure 1. The chemical structure of various compounds synthesised, fluoride sensing and the metalation study of the P[^]N Ligand.

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