Photoactive Complexes with Earth-Abundant d^6-Metals

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Precious and rare elements such Ru and Ir are used in some of the most popular photoactive complexes, but interest in alternatives made from earth-abundant metals is growing. Fe and Cu have long received significant attention and recent breakthroughs are very encouraging. Nevertheless, it seems worthwhile to explore other abundant first- and second-row transition metals for usage in photoactive complexes. Our group discovered that chelating isocyanide ligands provide access to luminescent Cr and Mo complexes that are isoelectronic to $Fe(bpy)_3^{2+}$ and $Ru(bpy)_3^{2+}$, and we demonstrated that they can be used for triplet fusion and photoredox catalysis.

This talk will begin with an introduction to the basic challenges faced when aiming at emissive $3d^6$ complexes. New results from our research on complexes with Cr, Mo and other earth-abundant metals will be presented. Particular focus will be on ligand design, excited-state relaxation pathways, luminescence color tuning, the interplay between singlet and triplet emission, and photoredox properties.

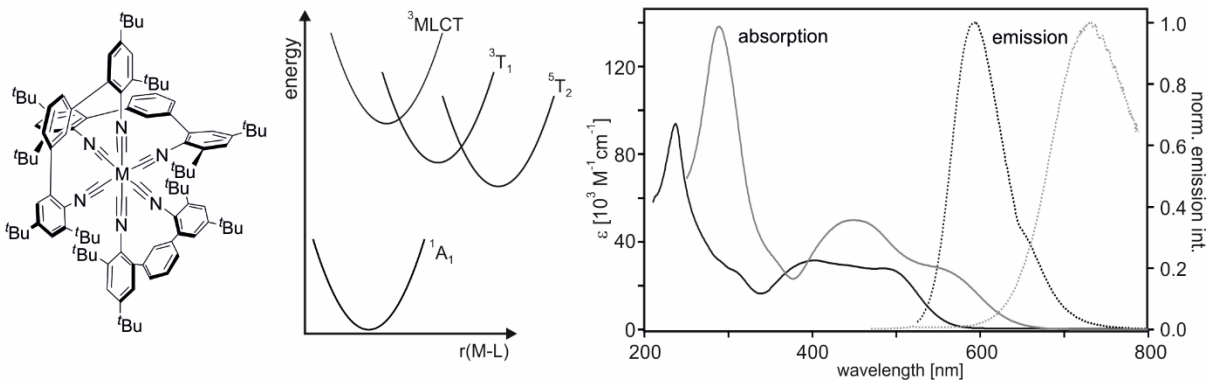

Fig 1. Cr and Mo complexes with chelating isocyanide ligands.