Homoleptic Low-Valent Diisocyanide Complexes: Photophysics and Photoredox Catalysis

Christopher B. Larsen[1], Patrick Herr[1], Laura A. Büldt[1], Xingwei Guo[1] and Oliver S. Wenger*[1]

[1]Department of Chemistry, University of Basel, St Johanns-Ring 19, CH-4056, Basel, Switzerland

E-mail: christopherbryan.larsen@unibas.ch

Precious metal complexes with d^6 and d^{10} electronic configurations exhibit bountiful excited state chemistry and are well-established as luminophores and photosensitizers for a range of applications.[1] There is a long-standing interest in replacing these precious metals with more earth-abundant elements.[2] Our approach has been to design structural and electronic analogues of d^6 and d^{10} metal complexes based on low-valent earth-abundant elements, using chelating diisocyanide ligands as structural analogues of the 2,2′-bipyridine (bpy) ligand.[3,4,5]

Herein are presented several homoleptic low-valent diisocyanide complexes of Mo^0, Re^I, Cr^0 and Ni^0, all of which exhibit MLCT photoluminescence. The Mo^0 and Re^I complexes are powerful photoreductants and have been exploited in several test reactions,[3] the Cr^0 complex is an efficient photosensitizer for anthracene triplet-triplet annihilation,[4] and the Ni^0 complexes exhibit the first reported MLCT photoluminescence from a homoleptic Ni^0 isocyanide complex.[5]

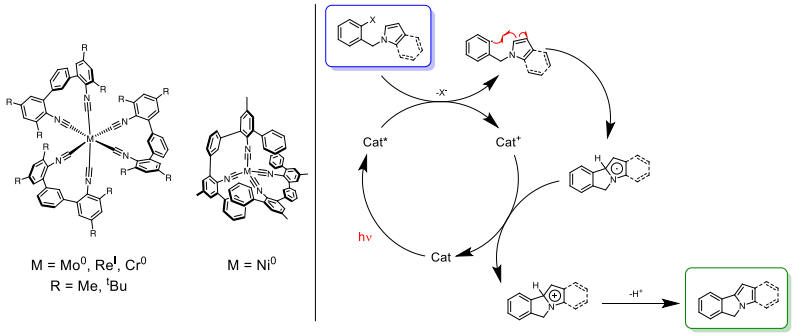

Figure 1. (left) Structures of investigated complexes. (right) Photocatalytic BHAS reaction performed by a Mo^0 complex.

References:

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