INORGANIC SEMINAR

Cu(I) MLCT Chromophores: Exploration of Steric and Electronic Influence of Excited-State Decay Through Recent Years

Dilki Shanaz Hassan

Graduate Student
Purdue University

The use of precious metals such as Ru and Ir as chromophores has gained significant attention due to their thermal and photochemical stability. This stability is attributed to their $4d^6$ and $5d^6$ electron configurations, which lead to long-lived metal-to-ligand charge transfer (MLCT) states. Recently, however, the focus has shifted toward earth-abundant first-row transition elements to achieve long-lived MLCT states that can be applied in photoredox catalysis, photochemical upconversion, and solar energy conversion schemes. In addition to six-coordinated inorganic photosensitizers, four-coordinated diimine-chelated Cu(I) complexes with pseudo-tetrahedral geometry have attracted considerable attention due to their ability to fine-tune the steric environment of the complex, thereby enhancing the stability of long-lived MLCT states. Recent discoveries involving Cu(I) MLCT chromophores, coordinated by chelating 1,10-phenanthroline (phen) with alkyl-bearing 2,9-substituents, have yielded molecules exhibiting observable photoluminescence at room temperature. This overview examines Cu(I) complexes chelated with modified phen ligands to better understand the steric and electronic effects on excited-state decay, as well as the utilization of these complexes in photochemical upconversion and photoredox catalysis.

Seminar time will be shared with Kyle McGuire

Tuesday, March 11, 2025 *12:30 pm* *BRWN 4102*

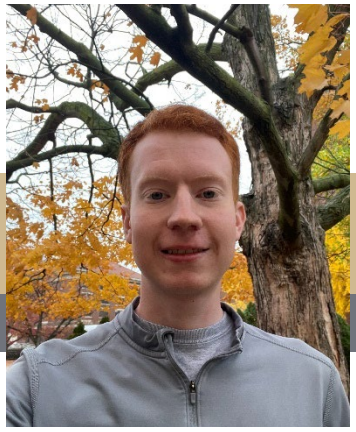
PURDUE UNIVERSITY | James Tarpo Jr. and Margaret Tarpo Department of Chemistry

INORGANIC SEMINAR

Small Molecule Activation at Pincer-Supported Nickel Sites

Kyle McGuire

Graduate Student
Purdue University



Nickel catalysis has garnered much attention recently due to its activity in numerous organometallic reactions and small molecule activation. In biological systems, metalloenzymes such as carbon monoxide dehydrogenase (CODH), acetyl-coenzyme A synthase (ACS), and methyl-coenzyme M reductase (MCR) utilize nickel sites to perform CO_2 activation, C-S bond activation, and C-C bond formation. Additionally, the lactate racemase enzyme displays an organometallic nickel pincer scaffold, which has inspired research into several nickel pincer systems to mimic enzymatic active sites. Herein is described the recent advances utilizing acridane-based PNP nickel pincer scaffolds to perform small molecule activation of CO and CO_2 for C_1 conversion into value-added products. Additionally, conversion of anionic NO_x moieties into NO utilizing the same nickel pincer scaffold will be discussed.

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