C-C and C-Heteroatom Bond Forming Reactions on Diiron Bis-Cyclopentadienyl Complexes

Fabio Marchetti

Department of Chemistry and Industrial Chemistry, University of Pisa, Via Moruzzi 13, 56122 Pisa, Italy

fabio.marchetti@unipi.it

Dinuclear metal complexes may offer unique reactivity patterns, not attainable with related monometallic species, by leveraging cooperative effects between adjacent metal centers.[1]

Diiron complexes featuring a bridging vinyliminium ligand can be prepared on a multi-gram scale through a broad-scope synthesis, starting from the commercially available and inexpensive $[Fe_2Cp_2(CO)_4]$ (Cp = η^5-C_5H_5).[2] This class of dinuclear metal complexes is susceptible to a wide variety of functionalization reactions, exploiting the acidity of the vinyliminium moiety and enabling multicomponent assembly strategies under mild conditions (Figure 1). As a result, a diverse array of uncommon yet stable organometallic architectures can be generated.[3] This reactivity will be reviewed, with a focus on the convenient access to a family of multi-substituted selenophenes[4] and the first reproducible synthesis of ferrabenzenes.

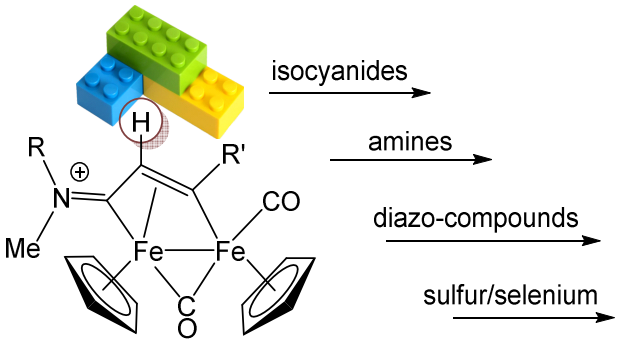

Figure 1. General structure of diiron vinyliminium complexes, which serve as benchmark compounds for the synthesis of a wide variety of organometallic frameworks, including highly functionalized organic molecules. R = alky, aryl; R' = alkyl, aryl, H, carboxylate, $SiMe_3$, thiophenyl, pyridyl, ferrocenyl.

References

[1] (a) Campos, J. *Nat. Chem. Rev.* **2020**, *4*, 696-702. (b) Ritleng, V.; Chetcuti, M. J. *Chem. Rev.* **2007**, *107*, 797-858.

[2] Review articles: (a) Biancalana, L.; Marchetti, F. Coord. Chem. Rev. 2021, 449, 214203. (b) Marchetti, F. *Eur. J. Inorg. Chem.* **2018**, 3987-4003.

[3] See for instance: Zappelli, C.; Taglieri, F.; Schoch, S.; Bresciani, G.; Funaioli, T.; Marchetti, F.; Zacchini, S.; Di Giuseppe, A.; Crucianelli, M. *ChemCatChem* **2024**, *16*, e202400811.

[4] Provinciali, G.; Bortoluzzi, M.; Funaioli, T.; Zacchini, S.; Campanella, B.; Pampaloni, G.; Marchetti, F. *Inorg. Chem.* **2020**, *59*, 17497-17508.