

Manganese Alkyl Carbonyl Complexes: From Iconic Stoichiometric Textbook Reactions to Catalytic Applications

Karl Kirchner

Institute of Applied Synthetic Chemistry, Vienna University of Technology, Getreidemarkt 9/163-AC, A-1060 Wien, Austria

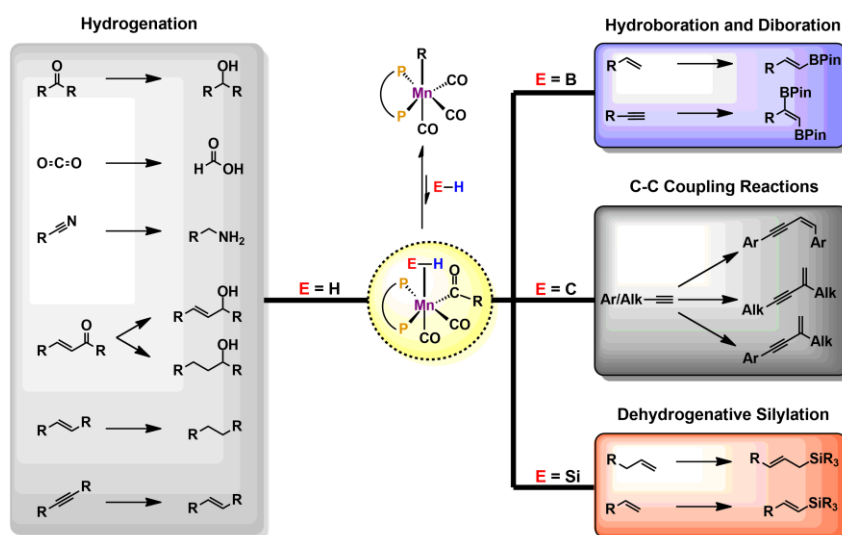
E-mail: karl.kirchner@tuwien.ac.at

Website: www.ias.tuwien.ac.at

The utilization of base-metal catalysts represents an emerging field in homogeneous catalysis. Among others, manganese-based complexes were proven to be highly competitive catalysts for several (de)hydrogenation reactions.

This lecture outlines the potential of alkylated Mn(I)-carbonyl complexes for the activation of non-polar and moderately polar E-H (E = H,

C, Si, B) bonds and disclose our successful approach for the utilization of complexes in the field of homogeneous catalysis.¹⁻⁵ This will involve the rational design of manganese-complexes for hydrogenation reactions, including alkenes, which was not possible with defined manganese complexes before. Furthermore, the potential of our Mn-based catalysts in the field of hydrofunctionalization reactions for carbon-carbon multiple bonds will be discussed. Our investigations unveiled novel insights in reaction pathways of dehydrogenative silylation of alkenes and allowed *trans*-1,2-diboration of terminal alkynes, which was not reported for transition metals before.



References

1. “E-Selective Manganese-Catalyzed Semihydrogenation of Alkynes with H₂ - Directly Employed or *in situ* Generated”, Farrar-Tobar, R. A., Weber, S.; Csendes, Z.; Ammaturo, A.; Fleissner, S.; Hoffmann, H.; Veiros, L. F.; Kirchner, K. *ACS Catal.* **2022**, *12*, 2253-2260.
2. “Efficient hydroboration of alkenes and *trans*-diboration of alkynes catalyzed by Mn(I) alkyl complexes”, Weber, S.; Zobernig, D. P.; Stöger, B.; Veiros, L. F.; Kirchner, K. *Angew. Chem., Int. Ed.* **2021**, *60*, 24488-24492.
3. “Manganese-Catalyzed Dehydrogenative Silylation of Alkenes Following two Parallel Inner-Sphere Pathways”, Weber, S.; Glavic, M.; Stöger, B.; Pittenauer, E.; Podewitz, M.; Veiros, L. F.; Kirchner, K. *J. Am. Chem. Soc.* **2021**, *143*, 17825-17832.
4. “Selective Manganese-Catalyzed Dimerization and Cross Coupling of Terminal Alkynes”, Weber, S.; Veiros, L. F.; Kirchner, K. *ACS Catal.* **2021**, *11*, 6474-6483.
5. “Rethinking Old Concepts - Hydrogenation of Alkenes Catalyzed by Bench-Stable Alkyl Mn(I) Complexes”, Weber, S.; Stöger, B.; Veiros, L. F.; Kirchner, K. *ACS Catal.* **2019**, *9*, 9715-9720.