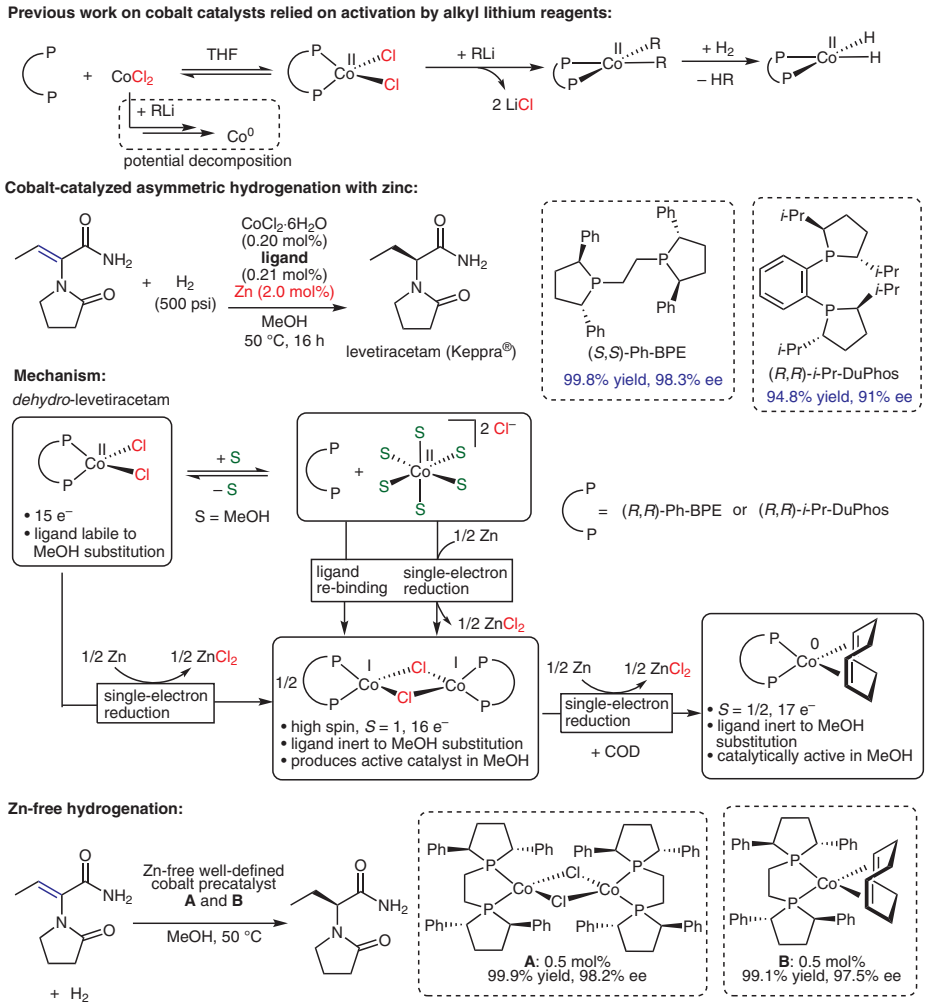
M. R. FRIEDFELD, H. ZHONG, R. T. RUCK, M. SHEVLIN*, P. J. CHIRIK* (PRINCETON UNIVERSITY AND MERCK RESEARCH LABORATORIES, RAHWAY, USA)

Cobalt-Catalyzed Asymmetric Hydrogenation of Enamides Enabled by Single-Electron Reduction
Science **2018**, *360*, 888–893.

Cobalt-Catalyzed Enantioselective Hydrogenation of Enamides



Significance: On the basis of a discovery from high-throughput reaction studies, the authors have developed a low-catalyst-loading enantioselective hydrogenation of functionalized alkenes through activation by zinc instead of the more-usual alkyl reagents. The optimized catalytic system $CoCl_2 \cdot 6H_2O$/(*R*,*R*)-Ph-BPE or $CoCl_2 \cdot 6H_2O$/(*R*,*R*)-*i*-Pr-DuPhos realized a high reactivity and enantioselective hydrogenation in MeOH.

Comment: A series of mechanistic studies revealed that Co(II) metal dissociates from the Co(II)/phosphine complex in MeOH, and that Zn reduces Co(II) to Co(I) through one-electron reduction to form a more stable Co–phosphine bond, which is key to the efficient enantioselective reduction of alkenes. The hydrogenation can be applied to a large-scale reaction requiring only 0.08 mol% of the cobalt catalyst.

SYNFACTS Contributors: Hisashi Yamamoto, Takahiro Sawano
Synfacts 2018, 14(08), 0819 Published online: 18.07.2018
DOI: 10.1055/s-0037-1610460; **Reg-No.:** H07818SF

Category

Metal-Catalyzed Asymmetric Synthesis and Stereoselective Reactions

Key words

cobalt catalysis

asymmetric hydrogenation

enamides

single-electron reduction