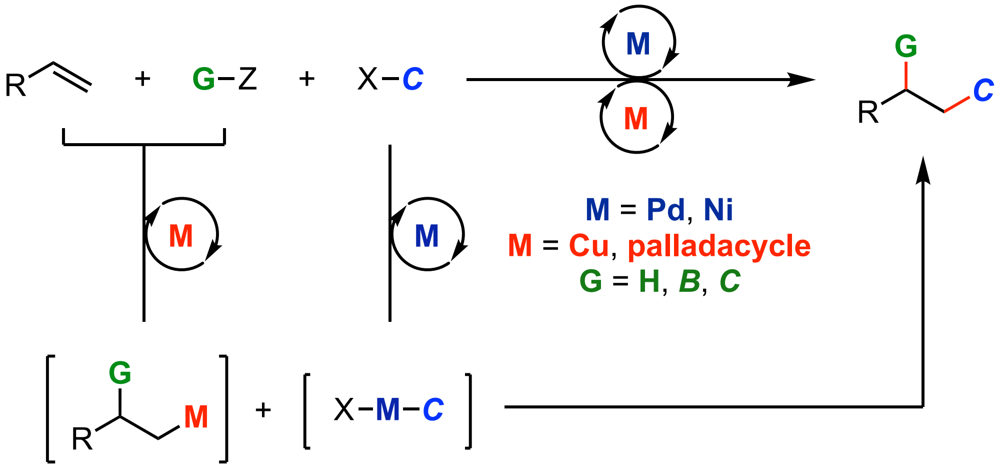
Organic Synthesis by Cooperative Metal Catalysis

(*Graduate School of Engineering, Kyoto University*) ○Kazuhiko Semba

Keywords: *Cooperative Catalysis*, *Transition-Metal Catalyst, Synthetic Organic Chemistry*

Csp^3-enriched molecules are increasing their importance in drug discovery due to their target specificity.[1] Cross-coupling reactions with alkylmetal reagents enable rapid access to Csp^3-enriched molecules in a modular fashion.[2] Typically, these reactions require pre-synthesized alkylmetal reagents. However, common alkylmetals such as alkylmagnesium, alkylzinc, and trialkylboron reagents are sensitive toward moisture and O_2, leading to laborious operations in handling them. In contrast to the typical method, a method based on catalytically generated alkylmetals from alkenes offers several advantages: 1) Laborious operation for the reactive alkylmetals is not required. 2) Stable and abundant alkenes serve as alkylmetal surrogates. 3) Decorated alkylmetals, which are rarely used under the typical cross-coupling conditions, can be utilized.

Our group has contributed to developing the cross-coupling with alkenes by taking advantage of cooperative transition-metal catalysis (Scheme 1).[3] In this line, we have successfully developed hydroarylation, carboboration, dicarbofunctionalization of alkenes that are unattainable by single metal catalysis. In this presentation, we will share recent progress on the cross-coupling with alkenes as alkylmetal surrogates by cooperative transition-metal catalysis.



1) F. Lovering, *Med. Chem. Commun.* **2013**, *4*, 515.
2) R. Jana, T. P. Pathak, M. S. Sigman, *Chem. Rev.* **2011**, *111*, 1417.
3) K. Semba, Y. Nakao, *J. Synth. Org. Chem., Jpn.* **2017**, *75*, 1133.