

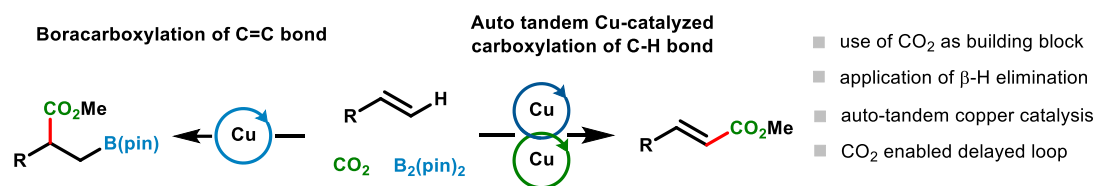
Auto-tandem copper-catalysed carboxylation of undirected alkenyl C–H bonds with CO₂

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Development of new catalytic reactions enabling control of the selectivities of chemical processes for the divergent synthesis of value-added compounds lies at the heart of modern organometallic chemistry and catalysis. β -Hydride elimination is one of the most fundamental reactions in organometallic chemistry. However, the incorporation of a β -hydride elimination process into productive *auto-tandem catalysis* is highly challenging because of the instability of the in-situ generated metal hydride species, which often results in catalyst deactivation. The development of a straightforward approach to overcome this problem is of utmost importance because it will greatly extend the potential of β -hydride elimination in organometallic catalysis and synthetic applications. Carbon dioxide (CO₂) is an attractive one-carbon (C1) building block for the assembly of important chemicals because it is abundant, readily available, cheap, and renewable. Our group has been working on CO₂ fixation with a wide range of organic substrates using copper catalysts.¹ In this presentation, we would like to present an auto-tandem copper-catalyzed carboxylation of undirected alkenyl C–H bonds with CO₂. This unprecedented transformation has been achieved through the β -hydride elimination of an alkyl copper species to give a copper hydride, which then undergoes a delayed loop with insertion of CO₂ to form an active catalyst to promote two mechanistically distinct catalytic cycles. On the other hand, by suppressing the β -hydride elimination process, the boracarboxylation of the alkene C=C unit has been exclusively achieved.



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