

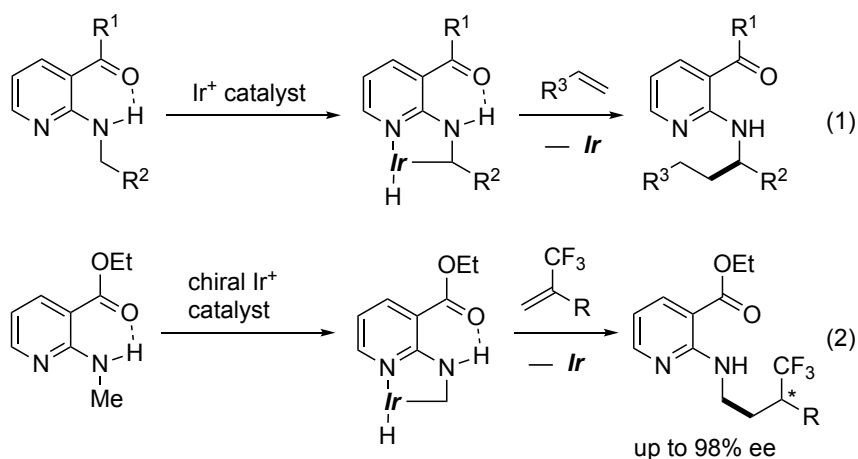
## Iridium-Catalyzed Enantioselective $sp^3$ C-H alkylation of a N-Methyl group with $\alpha$ -Trifluoromethyl Styrenes

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**Keywords:** Iridium; Enantioselective;  $sp^3$  C-H activation

Transition-metal-catalyzed  $sp^3$  C-H functionalization has been developed as one of the most useful molecular transformations realizing atom economical processes. The  $sp^3$  C-H bond adjacent to nitrogen atom is reactive toward transition metal catalysts, and direct alkylation reactions have been achieved by using a variety of early and late transition metal catalysts. In this respect, we have recently developed cationic iridium-catalyzed  $sp^3$  C-H alkylation of a methyl group adjacent to nitrogen of 2-(methylamino)pyridines with terminal alkenes (eq 1).<sup>1</sup> In this reaction, the generation of a conformationally rigid intermediate, which is formed by use of a hydrogen bond between the proton of the amino group at the 2-position and a carbonyl group at the 3-position, was required for the effective C-H activation.

Here we reported that a cationic iridium/chiral bisphosphine complex catalyzed the asymmetric hydroalkylation reaction of 1,1-substituted alkenes *via*  $sp^3$  N-methyl C-H bond activation (eq 2).



1) M. Nagai, M. Nagamoto, T. Nishimura, H. Yorimitsu, *Chem. Lett.* **2017**, 46, 1176.