

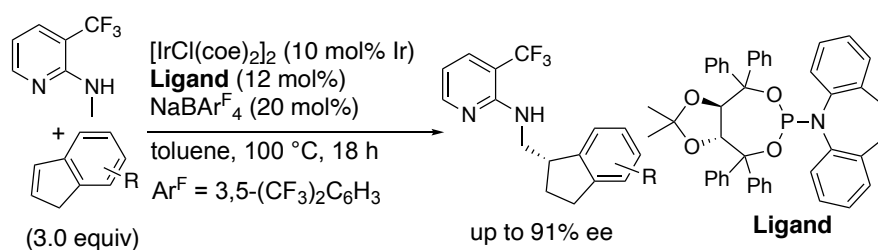
## Iridium-Catalyzed Asymmetric Addition of an *N*-Methyl C–H Bond to Cyclic Alkenes

(Graduate School of Science, Osaka City University) ○ Kana Sakamoto, Takahiro Nishimura

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Transition-metal-catalyzed direct C–H alkylation with alkenes gives a facile and efficient route for organic synthesis. A number of successful C(sp<sup>2</sup>)–H alkylation reactions have been reported over the past decades. Much effort has also been devoted to the development of C(sp<sup>3</sup>)–H alkylation, which is more challenging because of its low reactivity and difficulty to control the regioselectivity of the C–H activation. We recently reported iridium-catalyzed C(sp<sup>3</sup>)–H dialkylation of 2-(*N*-methylamino)pyridines with terminal alkenes such as allylarenes, simple alkenes, and vinylsilanes to give  $\alpha$ -dialkylated amines.<sup>1</sup> The reaction provides achiral  $\alpha$ -dialkylated amines by the reaction with two equivalents of the alkenes, or alternatively, chiral ones were given by use of two different alkenes.

Here we report direct asymmetric alkylation of 2-(*N*-methylamino)pyridines with cyclic alkenes such as indene derivatives and bicycloalkenes. The asymmetric reaction proceeded in the presence of an iridium complex with a chiral phosphine-olefin ligand, which has been rarely used in enantioselective C–H addition reaction to unsaturated bonds.



1) H. Hattori, T. Nishimura, *Adv. Synth. Catal.* **2018**, 360, 4827.