Cobalt-Catalyzed Asymmetric Hydroboration of Alkenes

**Significance:** A cobalt-catalyzed asymmetric hydroboration of 1,1-disubstituted aryl alkenes is presented. A series of chiral \( \alpha \)-alkyl-\( \beta \)-pinacolato-boranes were prepared with exclusive regioselectivities in high yields (up to 98%) with excellent enantioselectivities (up to 99.5% ee).

**Comment:** Novel iminopyridine–oxazoline (IPO) ligands are found to be highly efficient in the enantioselective hydroboration of alkenes under cobalt catalysis. The synthetic utility of this method is demonstrated by the synthesis of naproxen.

**Synthesis of naproxen:**

\[
\text{HBpin (1 equiv)} \rightarrow \text{LiMe (1 mol%)} \rightarrow 3 \text{ M NaOH} \rightarrow 30\% \text{ H}_2\text{O}_2 \rightarrow \text{NaClO}_2 \rightarrow \text{NaH}_2\text{PO}_4 \rightarrow 2\text{-methylbut-2-ene} \rightarrow \text{naproxen}
\]

95% yield 98% ee

90% yield 97% ee

93% yield 99% ee

74% yield 99% ee

73% yield 98% ee

94% yield 76% ee

91% yield 99.5% ee

56% yield 94% ee

95% yield 98% ee

90% yield

85% yield

91% yield 98% ee

97% ee

99.5% ee

99% ee