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Cobalt-Catalysed Enantioselective C(sp³)-C(sp³) Coupling

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Enantioselective Cobalt-Catalyzed Alkene Hydroalkylation

Selected examples:

^a from 1:5.3 (Z/E) monofluoroalkene, ^b from 19:1 (Z/E) monofluoroalkene, Ar = 2-naphthyl

Proposed mechanism:

Mechanistic studies:

Significance: A stereoselective Co-catalyzed C(sp³)-C(sp³) coupling reaction to access chiral fluoroalkanes has been developed. The reaction exhibits catalyst-controlled enantioselectivity, thereby removing the requirement for substrate auxiliaries. A series of mechanistic and computational studies were conducted to elucidate the mechanism for the transformation.

Comment: The reaction demonstrated high functional group compatibility with regards to both coupling partners. Radical clock experiments support a radical pathway from the alkyl halide. Kinetic studies suggest the reaction proceeds through an irreversible rate-limiting *syn*-hydrometalation of the Co-H intermediate across the π -system.

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