Category
Metals in Synthesis

Key words
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Co-Catalyzed Hydrofluorination of Alkenes: Photocatalytic Method Development and Electroanalytical Mechanistic Investigation
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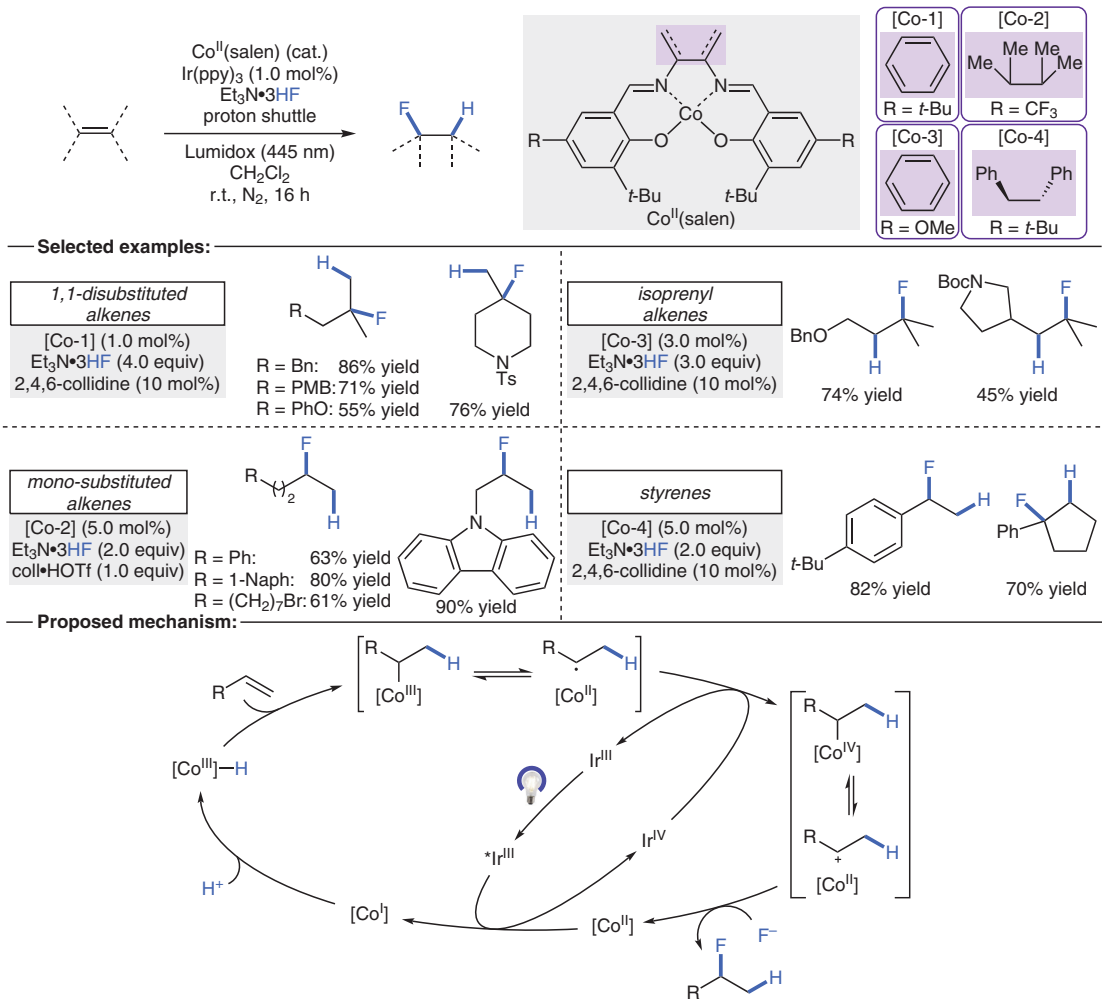
Hydrofluorination of Alkenes Using $Et_3N{\cdot}HF$ under Dual Cobalt and Photoredox Catalysis



Significance: A dual cobalt- and photoredox-catalyzed method for the regioselective hydrofluorination of alkenes using $Et_3N{\cdot}HF$ as HF surrogate is reported. This protocol features a broad substrate scope, tolerating both unactivated aliphatic alkenes and styrenes. Exploiting the structure–activity relationships between the structurally modular cobalt(II) salen complexes and different alkene classes through high-throughput experimentation provided access to a range of hydrofluorinated compounds with varying substitution patterns.

Comment: This methodology was also applicable to the ^{18}F-labeling of diverse biologically active compounds. Mechanistic experimental investigations including Stern–Volmer and voltammetry studies along with DFT calculations support the shown catalytic cycles. However, distinctive pathways could be identified in the nucleophilic step of this polar-radical-polar crossover mechanism depending on the alkene structure. Ongoing studies aim to deepen the understanding of this process.

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