

Photoelectrocatalyzed Synthesis of Chiral Cyclobutanes

Category

Metals in Synthesis

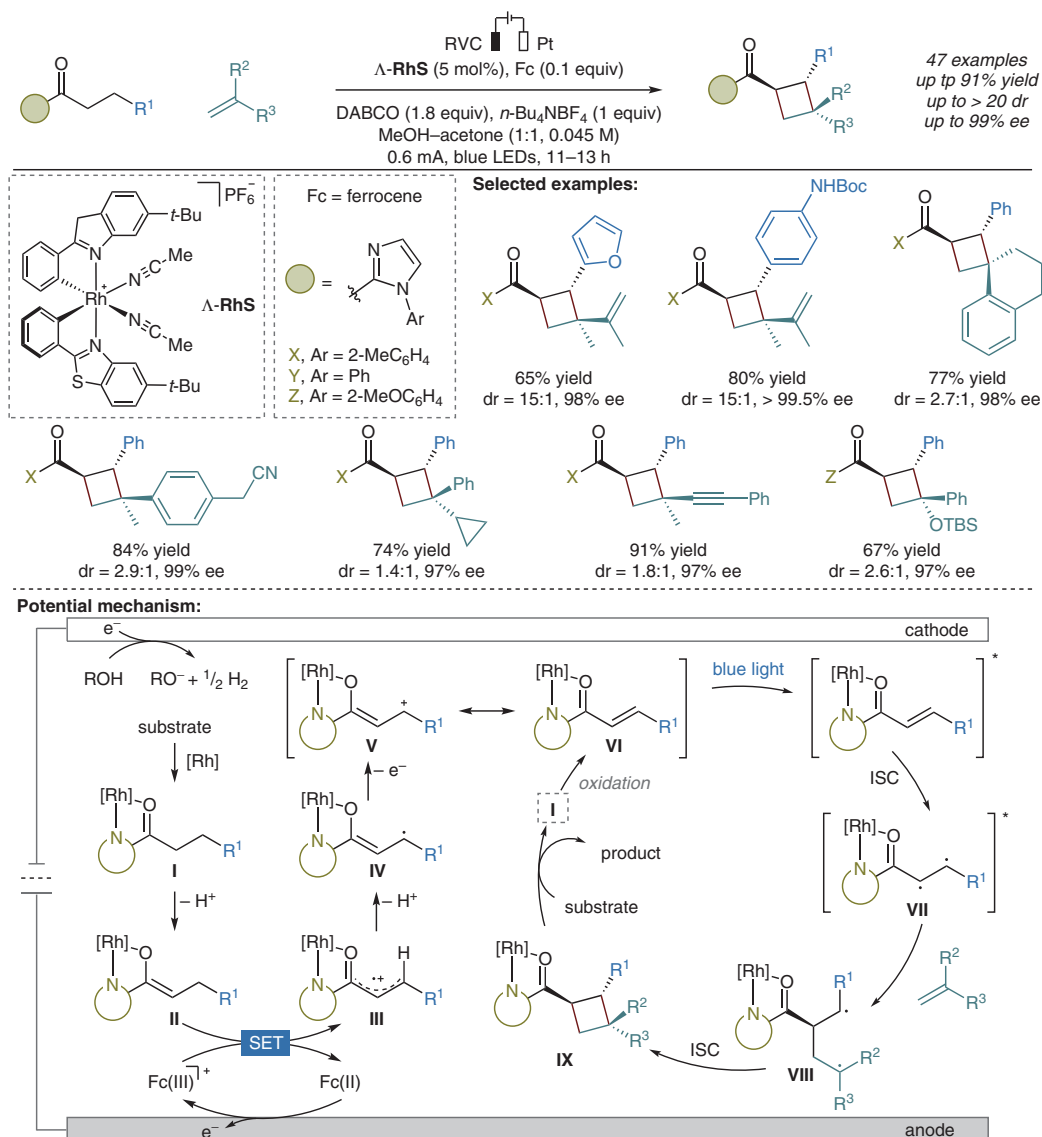
Key words

rhodium catalysis

photoelectrocatalysis

C–H bond activation

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Significance: Meggers and co-workers describe an enantioselective [2+2] photocycloaddition between alkyl ketones and alkenes to synthesize cyclobutanes. The method utilizes electrocatalysis to activate two C(sp³)–H bonds, and, under blue light irradiation, promotes coupling with two C(sp²) carbons. The procedure highlights a sustainable approach to asymmetric small ring synthesis.

Comment: Alkyl tethered (hetero)aryl ketones and various aryl- and alkyl-substituted alkenes can react in a highly enantioselective fashion. The transformation can be performed on gram-scale. It is proposed that the role of ferrocene serves as a redox mediator to turn over the electrocatalytic system, while a chiral rhodium Lewis acid mediates the dehydrogenation of the ketone (I to VI) and the subsequent cycloaddition (VII to IX).

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 Synfacts 2024, 20(02), 0147 Published online: 16.01.2024
 DOI: 10.1055/s-0043-1772987; Reg-No.: L01624SF