Gd-Catalyzed Photocycloaddition of Aryl Cyclopropyl Ketones to Alkenes

Significance: The authors report a gadolinium-catalyzed asymmetric [3+2] photocycloaddition of aryl cyclopropyl ketones with alkenes. A variety of chiral cyclopentanes were obtained in high yields (≥95%) and stereoselectivities (up to >99% ee and dr up to >20:1).

Comment: This result demonstrates that a combination of a chiral Lewis acid and photoredox catalysis offers a robust and potentially general approach to photochemical stereocontrol that is broadly applicable to the increasing number of powerful transformations achievable by using photoredox catalysis.

Selected examples:

Proposed mechanism: