Asymmetric Vinylogous Mukaiyama–Michael Reaction via Iminium Catalysis

Significance: The authors report a highly enantio- and diastereoselective vinylogous Mukaiyama–Michael reaction of acyclic dienol silyl ethers 2 to various enals 1 by employing a Jørgensen–Hayashi catalyst. 1,7-Dicarbonyl compounds 3 are obtained under mild reaction conditions with good to excellent yield and remarkable regioselectivity. Z/E-Configured γ-methyl-substituted dienol silyl ethers are selectively converted into the anti and syn products with excellent enantioselectivity.

Comment: Vinylogous Michael reactions of dienol derivatives can form a C–C bond with high regio- and stereoselectivity in the presence of a chiral catalyst. However, a catalytic enantioselective process of this reaction with acyclic nucleophiles and enals was elusive since the reaction can produce a number of regio- and stereoisomers. Herein, the catalyst nicely operates presumably by forming an iminimum species with enal 1 to induce 1,4-addition of nucleophile 2 with high γ-selectivity.