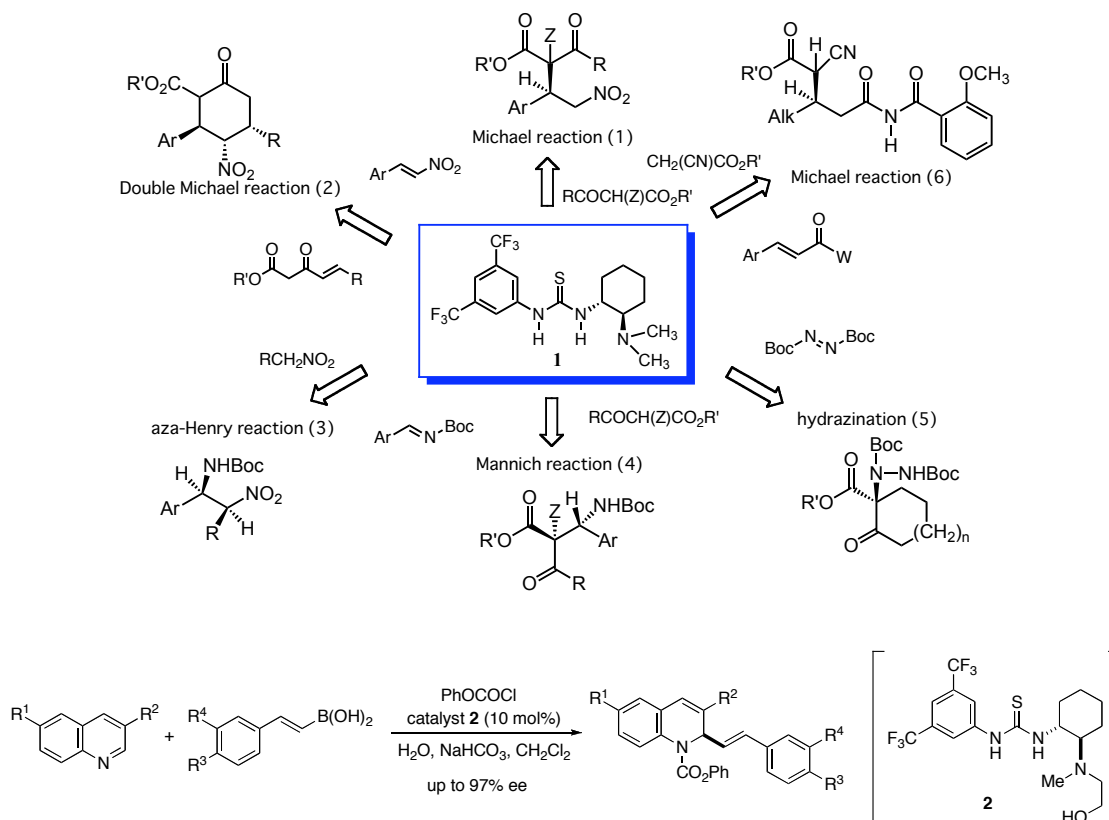


DEVELOPMENT OF CHIRAL THIOUREA CATALYST AND ITS APPLICATION TO ASYMMETRIC CATALYTIC REACTIONS

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We have developed several multi-functional thiourea catalysts bearing a tertiary amine or an 1,2-amino alcohol with expecting the synchronous activation of a nucleophile and an electrophile through both acid-base and hydrogen-bonding interactions. From the study, it was revealed that their weak acidity compared with metallic Lewis acids could be overcome by this modification. The bifunctional aminothiurea **1** could be used efficiently for a wide range of diastereo- and enantioselective nucleophilic reactions such as Michael addition of 1,3-diketones to nitroolefines, aza-Henry reaction of nitroalkanes to *N*-Boc imines, and hydrazination of cyclic β -keto esters. Furthermore, we also discovered that multi-functional thiourea catalyst **2**, bearing an 1,2-amino alcohol moiety, significantly accelerated the Petasis-type reaction of alkenylboronic acids to *N*-phenoxy carbonyl quinolinium salts, prepared from quinolines **2**, to afford 1,2-addition products with high enantioselectivity (up to 97% ee). Some of these reactions were applied to enantioselective total synthesis of natural products and drug candidates.



Reviews: Takemoto, Y. *Org. Biomol. Chem.* **2005**, *3*, 4299; Takemoto, Y. *J. Synth. Org. Chem. Jpn.* **2006**, *64*, 1139; Takemoto, Y.; Miyabe, H. *Chimia* **2007**, *61*, 269; Miyabe, H.; Takemoto, Y. *Bull. Chem. Soc. Jpn.* **2008**, *81*, 785.