

S27-5 Design and Synthesis of New Hydrogen Bond Donor Catalysts

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Recently, organocatalysts have attracted considerable attention as the 'third' catalysts in addition to bio- and metalcatalysts. The development of organocatalyzed reactions without any metallic reagents is an important subject of research from the perspective of both environmental and economic advantages. Specific goals are to 1) use raw materials and feedstock that are renewable rather than depleting, and 2) design chemicals and products that degrade after use. Since all of the problems of synthetic chemistry can not be addressed by a single type of catalyst, we should develop new concepts for designing innovative catalysts and combining different catalysts in a complementary manner. In this symposium, I will present two topics: (1) the development of a nonmetal-catalyzed asymmetric addition reaction of organoboronic acids to α,β -unsaturated ketones and imines through the use of multi-functional thioureas, and (2) the creation of a new hydrogen-bond donor catalyst bearing a new 'privileged structure'.

We found that thiourea catalysts bearing a hydroxy group such as an alcohol or phenol dramatically promoted the Michael or 1,2-addition of organoboronic acids to γ -hydroxyenones or 2-iminoacetamides by forming an *in-situ* binary catalyst with organoboronic acids or organoboronic esters. Furthermore, we discovered that bicyclic heterocycles such as benzimidazole and quinazolin-4-one bearing a tertiary amino group could be used as acid-base organocatalysts due to their strong hydrogen-bond donor.