

Enantioselective Bifunctional Organocatalysis: New Powerful Methods and Synthetic Applications

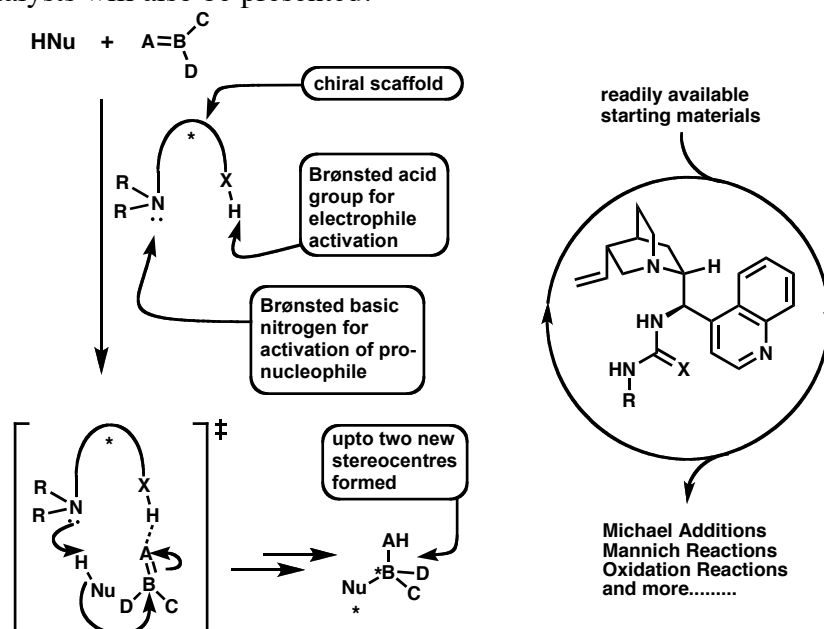
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Enantiomerically pure organic compounds with the capacity to activate simultaneously electrophilic substrates and pro-nucleophilic reagents towards one another, offer numerous opportunities for the discovery of powerful new asymmetric carbon-carbon and carbon-heteroatom bond forming reactions. When the catalyst has a well-defined chiral pocket combined with a fairly rigid skeleton and appropriate distances between the two activating groups, the templating of the two reagents via a ternary complex can lead to excellent levels of enantio- and diastereocontrol in efficient reactions at relatively low loadings and at reasonable reaction rates.

In pursuit of chemical efficiency, stereochemical control and synthetic utility, our group has been actively developing and applying new single-enantiomer bifunctional Bronsted base / Bronsted acid catalysts to the discovery of new and powerful addition reactions. In this presentation a new family of bifunctional organocatalysts derived from cinchona alkaloids and their use in highly enantioselective Michael addition reactions, Mannich reactions, oxidation reactions and total synthesis will be described.¹ Furthermore, the effective modification of the catalyst system into synthetically powerful bifunctional Bronsted base / Lewis acid catalysts will also be presented.



1 a) J. Ye, D. J. Dixon, P. S. Hynes, *Chem. Comm.* **2005**, 4481. b) A. L. Tillman, J. Ye, D. J. Dixon, *Chem. Comm.* **2006**, 1191. c) P. S. Hynes, D. Stranges, P. A. Stuppel, A. Guarna, D. J. Dixon, *Org. Lett.* **2007**, **9**, 2107. P. Jakubec, D. Cockfield and D. J. Dixon *J. Am. Chem. Soc.* **2009**, **131**, 16632.