

Research on Navel Catalyst and Catalysis for the Synthesis of Chiral Compounds

Masahisa Nakada

Waseda University, Department of Chemistry

Synthesis of some asymmetric diamines and diphosphines and examination of their utility as ligands are described. The complex prepared in situ by the asymmetric ethylenediamine derivative and $\text{Cu}(\text{OTf})_2$ was found to catalyze Diels-Alder reaction of cyclopentadiene with an acrylic acid derivative to afford the adducts in 99% yield (endo/exo=3.5/1, 82% ee (endo)). The absolute configuration of the major product was determined by the comparison of its specific rotation with the reported value. The determined structure of the adduct suggests that the complex formed by the asymmetric ethylenediamine derivative, $\text{Cu}(\text{OTf})_2$ and an acrylic acid derivative exists as a tetrahedral complex. Diels-Alder reaction of cyclopentadiene with an crotonic acid derivative was also catalyzed by the asymmetric catalyst to afford the adducts in 47% yield (endo/exo=8.1/1, 72% ee (endo)). Aldol reaction of asilylenoether with hydrocinnamaldehyde was catalyzed by the asymmetric catalyst, but the product showed no optical activity. Glyoxylic acid derivative is now tested to react with silylenoether, because the derivative will act as a bidentate ligand. Asymmetric catalyst based on a diamine ligand effective on Diels-Alder reaction has not been reported, therefore spectroscopic study on the asymmetric catalyst is now under investigation.