Asymmetric *bis*-Boron Compounds as Enantioselective Catalysts

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Therapeutic compounds for the treatment of disease are becoming increasingly complex as targeted processes (e.g. neural, metabolic) and structures (e.g. receptors) become more selective. Many carbon-based therapeutic compounds, such as Indinivar and Taxol, present especially challenging synthesis requirements because of their multiple chiral centers. We have provided a more efficient method for synthesizing non-racemic compounds through the utilization of chiral Lewis acids. Previous research has indicated that *mono*-Lewis acids are effective in the synthesis of enantiopure compounds through the binding to two electron donors. More recently, achiral *bis*-Lewis acids have shown enhanced activity with carbonyl substrates due to simultaneous binding to both lone pairs. We went further by synthesizing a chiral *bis*-boron Lewis acid capable of bidentate binding to a carbonyl substrate. Furthermore, we determined the asymmetric synthetic utility of this class of catalyst in Diels-Alder reactions. We showed that the *bis*-Lewis acid catalyst produced superior yield over the corresponding *mono*-acid as well as improved enantioselectivity. Our success in this project would provide a new powerful tool for asymmetric organic synthesis with the ability to outperform current *mono*-Lewis acids.