Planar chiral ferrocene ligands have been widely used in asymmetric catalysis. However, most of the planar chiral ferrocene derivatives reported to date relate to the Lewis basic phosphine and amine ligands. The use of planar chiral Lewis acids in asymmetric synthesis is limited to only a few selected examples. We are currently interested in developing useful synthetic routes to ferrocene based chiral Lewis acids. Recently, we have demonstrated the efficacy of heteronuclear bidendate Lewis acid in the stereoselective allylation of ketones. These results encouraged us to further probe the efficiency of organoborane-functionalized ferrocene in asymmetric synthesis and chiral recognition schemes. In this presentation, we will discuss the properties of several new ferrocene-based planar chiral Lewis acids, including the unusual supramolecular structure of a chiral ferrocenyl boroxine.