INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

The present thesis, entitled as "**Organocatalytic Asymmetric Synthesis of Imidazolidines, Pyrrolidines, Oxazolidines and Dihydroquinolones**" have been divided into six chapters based on the results achieved from the experimental works performed during the entire course of the PhD research programme. **Chapter 1** narrates a brief introduction and the literature review about asymmetric organocatalysis and reactive nature of different H-bonding catalysts including bifunctional thiourea and squaramide catalysts has been discussed. Also a detailed discussion about the hetero Michael cascade reactions, organocatalytic asymmetric Michael and Mannich reactions has been elaborated here. **Chapter 2** demonstrates first highly diastereo- and enantioselective synthesis of 2,4-disubstituted imidazolidinines *via* a domino addition-*aza*-Michael reaction. Bifunctional squarmide catalysts were successfully employed in this reactions. **Chapter 3** describes bifunctional squaramide mediated organocatalytic asymmetric cascade reaction for the construction of highly substituted pyrrolidines having stereogenic quaternary centre at 3-position. **Chapter 4** reveals an unprecedented organocatalytic asymmetric synthesis of 2,5-disubstituted oxazolidines. Bifunctional squaramide catalyst derived from quinine amine furnished the oxazolidine derivatives with excellent enantio- and diastereoselectivities. **Chapter 5** illustrates first organocatalytic asymmetric Michael reaction for the synthesis of biologically important 3,3-disubstituted-3,4-dihydro-2-quinolones. Cinchona alkaloid derived bifunctional amino-thiourea catalysts were found to be the best catalysts and the products were isolated in high enantio- and good diastereoselectivities. **Chapter 6** delineates the first organocatalytic asymmetric Mannich reaction for the synthesis of optically active 3,3-disubstituted-3,4-dihydro-2-quinolones. This method is potent for the synthesis of biologically important 3,3-disubstituted-dihydro-2-quinolones. Cyclohexyldiamine derived bifunctional amino-thiourea catalyst was quite efficient to provide the products in high enantio- and good diastereoselectivities.