



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI  
SHORT ABSTRACT OF THESIS

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Programme of Study : Ph.D.

Thesis Title: ***Catalytic Asymmetric Synthesis of Benzofuran Derivatives and Desymmetrization Reactions to Generate Chiral Pyrrole Compounds***

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SHORT ABSTRACT

The thesis entitled "***Catalytic Asymmetric Synthesis of Benzofuran Derivatives and Desymmetrization Reactions to Generate Chiral Pyrrole Compounds***" has divided into five chapters based on the results achieved from the experimental works performed during the entire course of the Ph.D. research programme.

**Chapter 1:** It is the introduction part. The chapter contains a brief discussion of asymmetric catalysis. Particularly, asymmetric organocatalysis and silver/organocatalyst combined catalysis. This part also described a desymmetrization reactions.

**Chapter 2: Structurally divergent enantioselective synthesis of benzofuran fused azocine derivatives and spiro-cyclopentanone benzofurans enabled by sequential catalysis**

A protocol for the structurally divergent synthesis of benzofuran fused azocine derivatives and spiro-cyclopentanone benzofurans has been developed via chiral bifunctional urea catalyzed reaction between aurone-derived  $\alpha,\beta$ -unsaturated imine and ynone followed by switchable divergent annulation reactions by Lewis base catalysts (DBU and PPh<sub>3</sub>). Furthermore, the mechanism study revealed, a concomitant epimerization is responsible for high dr and ees.

**Chapter 3: Organocatalytic Regio- and Enantioselective Friedel-Crafts Alkylation of N-Aryl Anilines with Aurone-Derived Azadienes: Access to Benzofuran Embedded Triarylmethanes**

Herein, we have disclosed a catalytic asymmetric Friedel-Crafts alkylation of N-aryl anilines with azadienes for the synthesis of benzofuran containing triarylmethanes. In this method, (R)-TRIP, was found to be effective for this reaction.

The triarylmethanes with benzofuran motif were obtained in moderate yields with high regio- and good to high enantioselectivities (upto 95% ee).

**Chapter 4: Catalytic Asymmetric de novo Synthesis of Chiral Pyrroles through Desymmetrizing Oxidative [3+2]-Cycloaddition and the Van Leusen Reaction**

Herein, we reported the first catalytic enantioselective de novo construction of centrally chiral pyrroles through desymmetrizing oxidative [3+2]-cycloaddition of meso cyclohexedione with isocyanoacetate by employing silver catalysis. Furthermore, to introduce a more diverse set of substituents, we developed the first catalytic asymmetric the Van Leusen reaction with  $\alpha$ -substituted TosMIC for the synthesis of centrally chiral pyrroles. In both cases, high to excellent yield and excellent ee were observed.

