INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Programme of Study	:	**Ph.D.**

Thesis Title: **Selective Catalytic Cross-Coupling Reactions Using Carbonyl Compounds and Alcohols: Sustainable Synthesis of *β*-Branched Unsaturated Ketones and *N*-Heterocyclic Aromatic Compounds**

Name of Thesis Supervisor(s)	:	Dr. ANIMESH DAS
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Key words for description of Thesis Work	:	Aldol condensation, Alkene isomerization, Acceptorless dehydrogenative coupling, Metal-ligand cooperation, transfer hydrogenation strategies, *β*-Branched Unsaturated Ketones, *N*-Heterocyclic Compounds.

SHORT ABSTRACT

The present thesis, entitled ***"Selective Catalytic Cross-Coupling Reactions Using Carbonyl Compounds and Alcohols: Sustainable Synthesis of β-Branched Unsaturated Ketones and N-Heterocyclic Aromatic Compounds***" is divided into six chapters based on the results obtained from the experimental works during the course of PhD research period.

Chapter 1 includes a brief introduction about the basic concepts of aldol reaction, alkene isomerization, acceptorless dehydrogenation *via* metal-ligand cooperation, and a general background of transfer hydrogenation reactions.

Chapter 2 describe a ruthenium-catalyzed chemoselective and regioselective cross-coupling reaction of ketones for the synthesis of *β*- branched *β*, *γ*-unsaturated ketones. Interestingly, single crossed aldol condensation products are formed even in reactions where a mixture of products is possible.

Chapter 3 reports the synthesis and characterization of new bench-stable triazine-based NNN-pincer ligands and their corresponding cost-effective chromium complexes. The utility of these NNN-pincer complexes has been explored in the cross-coupling of methyl ketones with cyclic ketones to *β*-branched *β*, *γ*-unsaturated ketones.

Chapter 4 describe an efficient method for the synthesis of C2 substituted quinoline, C3 substituted quinoline and quinazoline derivatives *via* ADC reaction catalyzed by well defined, bench-stable Cr(III) complex as precatalyst.

Chapter 5 illustrates chromium-catalyzed annulation of 2-aminoaryl alcohol with phenoxy acetophenone to 3-oxo-quinoline derivatives is reported. Phenoxy acetophenones are employed as *β*-O-4′ lignin models for this conversion.

Chapter 6 demonstrates a boronic acid catalyzed one-pot tandem reduction of quinolines to tetrahydroquinolines followed by reductive alkylation by the aldehyde has been demonstrated.