The thesis entitled, "**High-Valent Cp*Co(III)-Catalyzed C–C and C–N Bond Formation via Directed C–H Bond Functionalization**" has been divided into five chapters.

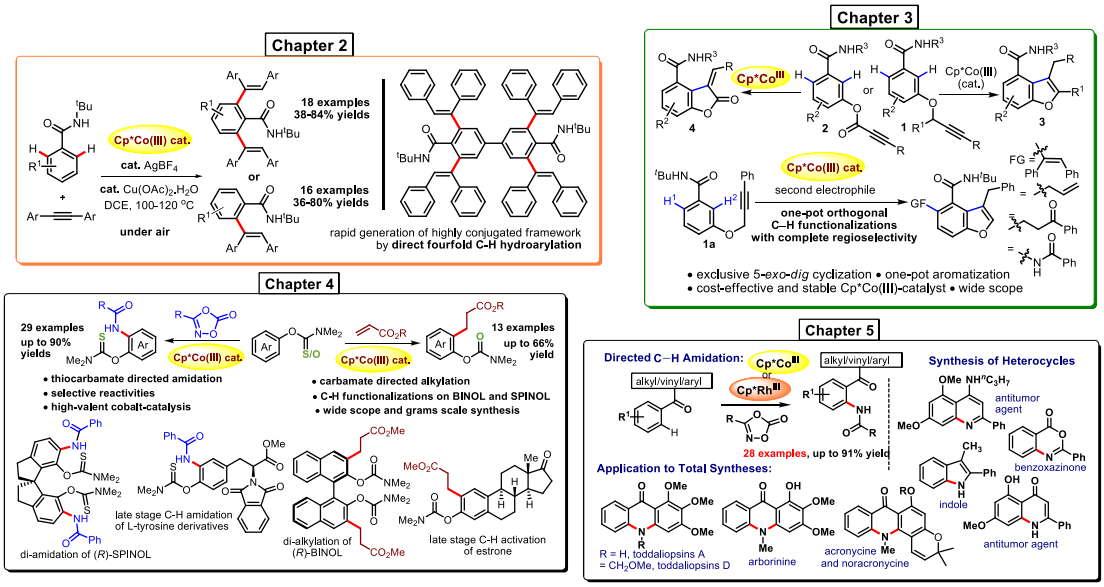
***Chapter 1*** describes the evolution of cost-effective, stable, high valent Cp*Co-catalyst and its specific and selective nature in comparison to its rhodium (Rh) and iridium (Ir) congeners. Previous reports on Cp*Co(III)-Catalyzed C–H alkylation, alkenylation and amidation have also been demonstrated.

***Chapter 2*** presents the Cp*$Co^{III}$-catalyzed *syn*-selective manifold C−H hydroarylation of alkynes using benzamides as directing groups. Four-fold C–H hydroarylation was also achieved using the method. Mechanistic studies have also been performed to elucidate the mechanism of the reaction.

***Chapter 3*** discloses about the construction of benzofurans and benzofuranones through cobalt(III)-catalysis. One-pot orthogonal unsymmetrical double C−H functionalizations were devised using this method to access polysubstituted benzofurans.

***Chapter 4*** describes the selective nature of the carbamates directing groups under cobalt catalysis. Where thiocarbamate is responsible for C–H amidation and carbamates were used for alkylation reactions. BINOL, SPINOL derivatives took part in the reaction conditions providing the hope for the modification of these chiral ligands.

***Chapter 5*** deals with the weakly coordinating ketone-directed Cp*Co(III)- and Cp*Rh(III)-catalyzed C–H amidation of arenes. This method paved the way to the synthesis of several bioactive acridone alkaloids like Toddaliopsin A, Toddaliopsin D and Arborinine etc.




**Keywords:** *C–H Functionalization, Catalysis, Cobalt, Hydroarylation, Alkylation, Amidation, Benzofuran, BINOL, Acridone.*