ABSTRACT

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Thesis Title: Design and Synthesis of Indole Containing Hybrid Molecules Via Tandem Reactions

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The main proposal of the research work is to develop the synthetic method aimed at being straightforward, adaptable, cost-effective, and environmentally sustainable. These efforts resulted in the development of new methods for the synthesizing derivatives of indole-fluorene, indole-xanthydrol, indole-indazole hybrid molecule. The thesis has been divided into four chapters.

Chapter 1 introduces the readers to the recent developments in the synthesis of indole containing hybrid molecule. After giving the detailed review, the objectives of the works presented briefly in this thesis.

Chapter 2 describes a common method for the syntheses of indole tethered fluorene hybrid molecules. Initially, propargylated 2-haloanilnes were subjected to Pd-catalysed reductive Heck reaction. Then this reductive Heck product underwent DDQ/$FeCl_3$-mediated tandem oxidative carbon–carbon bond formation to form the derivatives of indole-fluorene hybrid molecule in good to excellent yield.

Chapter 3 presents a common strategy for the synthesis of indole-xanthydrol hybrid molecules via two-step process. At first substituted 2-bromo-*N*-(3-(2-phenoxyphenyl)prop-2-ynyl)-*N*-tosylbenzenamine underwent Pd-catalyzed domino reductive Heck reaction. The reductive Heck products then underwent iron-catalysed oxidative cycloisomerization/hydroxylation reaction to furnish indole-xanthydrol hybrids in high yields. The synthetic utility of this protocol was further explored by the one-pot synthesis of the highly substituted xanthene containing bis-indolylmethane derivative.

Chapter 4 presents a *tert*-butyl nitrite (TBN) mediated straightforward metal free approach for the synthesis of a diverse range of C-3-substituted indazole-indole hybrids using readily accessible 2-(indolin-3-ylidenemethyl)aniline derivatives in good to excellent yields. By employing this strategy, 7-azaindole-indazole and 3*H*-indazole-indole hybrids were also synthesized.

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