

## SUMMARY

Eco-friendly synthetic methodologies are becoming increasingly popular in response to pressing environmental hazards and financial constraints faced by chemists. As a result, transition metal-free protocols with significant potential for selective transformations are being embraced. Among these, solvent-free mechanochemistry, photo-redox catalysis, and reactions using mild reagents at room temperature are the most notable. In this context, the primary focus of this thesis is to present transition metal-free and operationally simple protocols for constructing various heterocyclic scaffolds through C-N and C-O bond formation. To demonstrate mechanochemistry as an effective alternative to traditional methods, a wide range of 1,2-disubstituted benzimidazoles and quinazolin-4(3H)-one derivatives were synthesized using solvent-free ball milling process. Further a mild reagent *N*-Iodosuccinimide was employed for intramolecular C-N coupling to deliver benzimidazole-fused phenanthridines scaffolds at room temperature stirring for 22 h. Mechanistic study revealed a radical pathway for this transformation. Subsequently, we proposed a room temperature activation of EDA complex to facilitate brominative cyclization of *o*-styrylbenzamide. Here, in presence of CH<sub>3</sub>CN, 4-bromo-isochromanone O-methyl oxime, whereas in CH<sub>3</sub>OH solvent exclusively 4-bromo-isochromanone, were yielded. Next, we demonstrated visible light promoted regioselective synthesis of quinazolinone-fused phenanthridines employing a metal free photocatalyst e.g., Mes-Acr-MeClO<sub>4</sub>. Detailed control experiments were performed to validate the proposed mechanism.