One and Two-Photon Responsive Carbazole based Photoremovable Protecting Groups for Single and Dual Release of Bioactive Molecules

Our main focus is to develop one and two-photon responsive photoremovable protecting groups (PRPGs) for the single and dual release of bioactive molecules. With this intention, we developed carbazole-based PRPGs, which can release single and dual (similar or different) active molecules upon photoirradiation. Further, we anchored this carbazole moiety with *o*-hydroxycinnamate PRPG to make two-photon responsive PRPG. Finally, we designed a single component photoresponsive theranostic drug delivery system based on carbazole chromophore for efficient anticancer treatment.

The thesis entitled as "*One and Two-Photon Responsive Carbazole based Photoremovable Protecting Groups for Single and Dual Release of Bioactive Molecules*" consists of five chapters. **Chapter 1** describes overview of one and two-photon responsive photoremovable protecting groups for single and dual release: application in drug delivery. **Chapter 2** deals with photocaging of single and dual (similar or different) carboxylic and amino acids by acetyl carbazole and its application as dual drug delivery in cancer therapy. **Chapter 3** illustrates bis-acetyl carbazole as a photoremovable protecting group for the sequential release of two different functional groups and exploring its application in the therapeutic release. **Chapter 4** describes one- and two-photon uncaging by carbazole fused *o*-hydroxycinnamate platform for the dual release of alcohols (same or different) with real-time monitoring and **Chapter 5** describes three-arm, biotin-tagged carbazole-dicyanovinyl-chlorambucil conjugate for simultaneous tumor targeting, sensing, and photoresponsive anticancer drug delivery.