Visible Light Activated Photoremovable Protecting Groups: Design, Development and Biomedical Applications

Our main focus was to develop visible light activated environment sensitive photoremovable protecting groups for controlled delivery of bio-active molecules. With this intention, we synthesized fluorescent organic phototriggers based on *p*-hydroxyphenacyl and coumarin which can regulate the release of active molecules upon photoexcitation. We modified these phototriggers in such a way that they became sensitive toward tumor microenvironments like reactive oxygenetive species (H_2O_2), hypoxia, nitric oxide (NO) and zinc (for prostate cancer). Finally, we used the newly developed environment sensitive drug delivery systems for cell imaging and release of active drug *in vitro*.

The thesis entitled as "*Visible Light Activated Photoremovable Protecting Groups: Design, Development and Biomedical Applications*" consists of five chapters. **Chapter 1** describes the Overview of Photoremovable Protecting Groups and Drug Delivery Systems. **Chapter 2** deals with Environment Activatable Nanoprodrug: Two-Step Surveillance in the Anticancer Drug Release. **Chapter 3** illustrates an *In-situ* Generation of Triazolocoumarin: A Strategy for Hypoxia Activated Nitric Oxide Detection followed by Photoresponsive Delivery of Antitumor Agent**.** **Chapter 4** describes Single Component Image Guided 'On-demand' Drug Delivery System for Early Stage Prostate Cancer and **Chapter 5** describes 'AIE + ESIPT' Assisted Photorelease: Fluorescent Organic Nanoparticles for Dual Anticancer Drug Delivery with Real-Time Monitoring Ability.