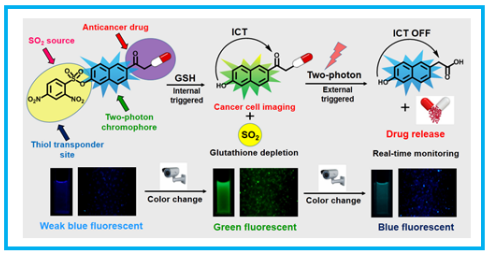
One- and Two-Photon Responsive Photoremovable Protecting Groups for Uncaging Bioactive Molecules within the Phototherapeutic Window

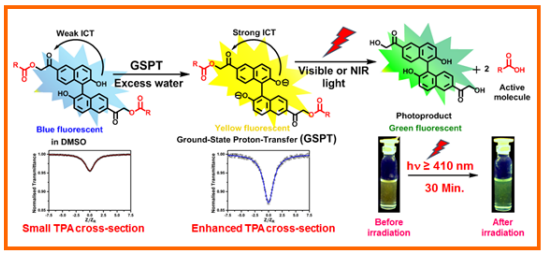
Our main focus is to develop one-and two-photon responsive photoremovable protecting groups (PRPGs) for spatio-temporal uncaging of biological entities upon irradiation of light within the 'phototherapeutic window' (600 – 950 nm), and use these PRPGs to develop drug delivery systems (DDSs) for cancer therapy.

The thesis entitled "*One- and Two-Photon Responsive Photoremovable Protecting Groups for Uncaging Bioactive Molecules within the Phototherapeutic Window*" consists of five chapters. **Chapter 1** describes the overview of one and two-photon responsive photoremovable protecting groups (PRPGs) and their applications as drug delivery systems for cancer treatment. **Chapter 2** explains the strategy to reverse multidrug resistance for alkylating agents in cancer cells by stepwise dual stimuli triggered dual drug release using single naphthalene-based two-photon chromophore with dual surveillance in uncaging steps. **Chapter 3** demonstrates Ground-State Proton-Transfer (GSPT) assisted enhanced two-photon uncaging from a binol based AIE-fluorogenic phototrigger. **Chapter 4** deals with NIR-responsive lysosomotropic phototrigger, which acts as a 'AIE + ESIPT' active single naphthalene probe with two-photon uncaging and real-time monitoring ability. **Chapter 5** describes a dicyanomethylene-4*H*-pyran based PRPG that uncages active molecules upon irradiation with red light (600-650 nm) *via* single-photon excitation.

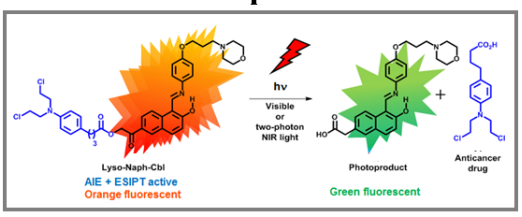
Chapter 1



Chapter 2



Chapter 3



Chapter 4