Target Specific Photodynamic Therapy (PDT) for Mono and Bimodal Anticancer Treatment

Prime focus of the present study is to develop theranostic agents that can show target specific monomodal and bimodal cancer treatment. To this end, we have designed anthracene-N-phenylethylenediamine and fluorene-morpholine-based organic nanoparticles having strong inherent fluorescence for target-specific image-guided PDT. Thereafter, the well-known coumarin phototrigger was devised to show synergic PDT and chemotherapy by decorating onto TiO_2 semiconducting nanoparticles and a star-shaped 4-arm polyethylene glycol to accomplish better image-guided biological application. Moreover, a xanthene-coumarin-based FRET-induced theranostic system was developed to attain "activatable" bimodal treatment of PDT and chemotherapy with real-time monitoring.

The thesis entitled "*Target Specific Photodynamic Therapy (PDT) for Mono and Bimodal Anticancer Treatment*" consists of six chapters. **Chapter 1** describes the overview of lightinduced cancer treatment. **Chapter 2** describes an organic nanoparticle-based fluorescent chemosensor for selective switching ON and OFF of Photodynamic Therapy (PDT). **Chapter 3** illustrates fluorene–morpholine-based organic nanoparticles for lysosome-targeted pHtriggered two-photon photodynamic therapy with fluorescence switch On-Off. **Chapter 4** elaborates the use of targeted photoresponsive TiO_2–coumarin nanoconjugate for efficient combination therapy in MDA-MB-231 breast cancer cells involving synergic effect of photodynamic therapy (PDT) and the anticancer drug chlorambucil. **Chapter 5** deals with coumarin-containing-star-shaped 4-arm polyethylene glycol-based targeted fluorescent organic nanoparticles for dual treatment involving PDT and chemotherapy. **Chapter 6** elaborates a fluorescence resonance energy transfer (FRET)-based xanthene-coumarin theranostics for "activatable" bimodal treatment of PDT and chemotherapy with real-time monitoring of drug action.