Title:	Design, synthesis, and studies of luminescent organic non-planar push–pull chromophores
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Abstract:	In today's modern life, the dependence and need for electronic devices to satisfy various growing demands like energy, lighting, and computing, etc. are increasing exponentially. Along with other inorganic materials, organic semiconducting materials are actively contributing to advanced electronic devices. In general, the semiconducting or push–pull (donor-acceptor, D–A) system based materials are indispensable and play a key role in all these devices by light-absorbing, charge separation (electron-hole), etc. Though the concept of donor-acceptor compounds has been known for more than a century, in 1974, Aviram and Ratner have introduced the organic electronics concept which possesses promising features like tunability of HOMO–LUMO gap, flexibility, and easy processability over the inorganic based semiconductors. Since then, the research interest in these compounds has received great attention. However, among the D–A compounds reported so far donor-substituted poly- cyano based non-planar push–pull chromophores (TCBDs) obtained via thermal [2+2] cycloaddition (CA) followed by spontaneous retro-electrocyclization (RE) reaction represents a more prominent class due to the exceptional intramolecular charge-transfer bands (often absorb up to NIR region), reversible redox behavior, super-accepting character, etc. Although this class of compounds shows promising features they also do have certain limitations for instance, such as lack of fluorescence property which greatly limit their use in several applications, in particular, sensing, lighting, and bio- imaging applications. Hence, the main focus of this research was to design, synthesize new organic TCBDs-based non-planar push–pull chromophores which possess luminescence property including the new method for the alternative route to obtain the TCBDs with easy functionalization and study their supramolecular self-assembly behavior which can be exploited to tune the photophysical properties in particular luminescence. Further, nanotechnology was used to achieve solid-phase luminescence and water-soluble bio-compatible chromophores via electrospun nanofibers and by encapsulating them into nano-micelles, respectively for bioimaging and photodynamic therapeutic applications. The fundamental aim of this thesis is the development of the new method and design of luminescent organic non-planar push–pull chromophores as advanced functional materials for applications in white-light emission, bioimaging, and photodynamic therapy.
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