PHOTOPHYSICAL CHARACTERIZATION OF SELF-ASSEMBLED PERYLENE TETRACARBOXYLIC DIIMIDE WITH APPENDED DIAMINE - NAPHTHALENE-1,5 OR 2,6-DIYLBIS(OXY)) BIS (ETHANE-2,1-DIYL)) DIPHOSPHONIC ACID

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Ultrafast interfacial charge transfer (CT), charge separation (CS), and charge recombination (CR), are among the key factors in determining the overall efficiency of the organic photovoltaic devices. Perylene tetracarboxylic diimide (PDI) and its derivatives exhibit excellent thermal, chemical and optical stability, and highly absorbed in visible region. The combination of these features makes PDIs ideal molecular frameworks for development of a photovoltaic devices. Perylene tetracaroxylic diimides with appended diamine (PDI-EA), and two isomers of phosphonic acid-appended diakoxynapthalene derivatives (DAN) have been synthesized and their photophysical properties and self-assembly studied by using absorption and emission spectroscopic techniques. These complexes were designed for use as mimics of the photosynthetic reaction center. Self-assembly of these molecules in aqueous environment resulted in the formation of charge transfer (CT) complex. In polar solvent, the absorption and emission spectra were blue-shifted as the incremental addition of NAD. Further increasing DAN1 to PDI-EA ratio resulted in significant fluorescence quenching of the emission band, which can be assigned to fast electron transfer from DAN1 to singlet-excited state of PDI-EA.