Photoinduced Electron Transfer in Porphyrin-Fullerene Dyads as a Function of Molecular Topology

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We have synthesized a large number of porphyrin-C60 dyads in which the topology of the system, i.e., the relative spatial orientation of the fullerene and porphyrin moieties, has been extensively varied. These include dyads with flexible (polyether) and rigid (steroid) linkers, as well as "parachute" compounds in which the fullerene is attached to a strap connected to phenyl groups located at opposite meso positions on the porphyrin. The results from photophysical studies on all of these systems, including both free base and Zn-porphyrins, in polar as well as nonpolar solvents, will be presented. The rate constants for electron transfer, energy transfer and charge recombination will be discussed in terms of the varying topology of these systems, as determined from spectroscopic and computational studies.