ELECTRONIC COMMUNICATION AND PHOTODYNAMICS IN MULTIPORPHYRIN ARRAYS FOR MOLECULAR ELECTRONICS APPLICATIONS

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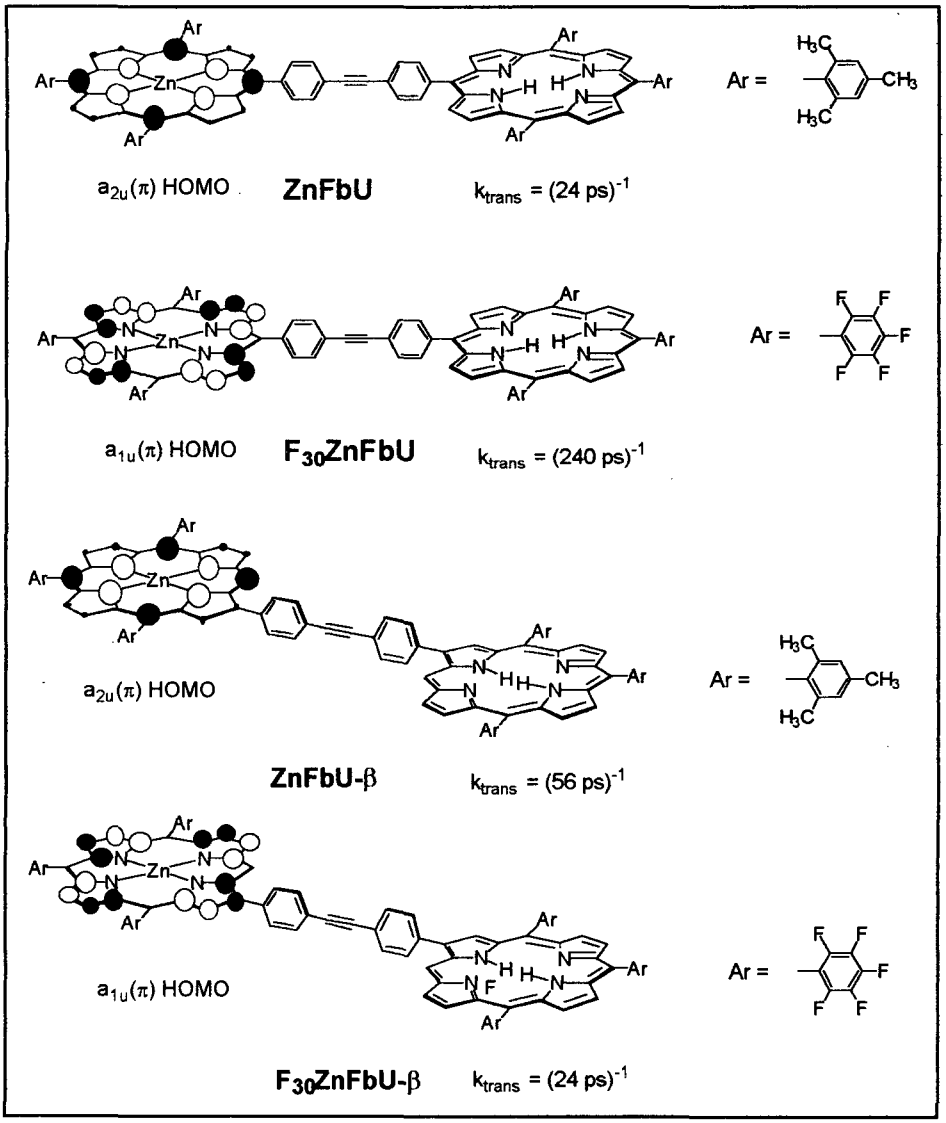
We have been investigating covalently-linked multiporphyrin arrays that function as energy funnels, molecular wires, and optoelectronic gates. We also have studied a family of dimers in order to probe the pairwise electronic interactions among the porphyrins. The electronic communication (excited-state singlet energy transfer in neutral complexes; ground-state hole hopping in oxidized complexes) between the porphyrins is dominated by a through-bond process mediated by the diarylethyne linker. A major finding concerns the interplay of the site of linker connection and the nature of the frontier molecular orbitals in the porphyrins, as revealed by the up to 10-fold variation in photoinduced energy-transfer rates in the dimers shown at the right.[5] We are now using insights gained from these and other arrays to design and study more advanced multiporphyrin assemblies for use in molecular photonics.



[5]"Effects of Orbital Ordering on Electronic Communication in Multiporphyrin Arrays", Strachan et al. *J. Am. Chem. Soc.* **1997**, *119*, 11191-11201; "Interplay of Orbital Tuning and Linker Location in Controlling Electronic Communication in Porphyrin-Based Arrays," Yang et al. *J. Am. Chem. Soc.* in press.