Arrays of chlorophyll molecules harvest energy from sunlight and transfer it efficiently to the reaction center via ultrafast energy migration during photosynthesis. This lecture will present the synthesis and photophysical investigation of light-harvesting nanorings that mimic these natural systems. Recent advances in template-directed synthesis make it possible to prepare large porphyrin nanorings, in the size regime of proteins, in a few steps from simple starting materials. Results on the delocalization of singlet excited states, triplet excited states and charge in these nanorings will also be presented. A recurring question in these experiments is whether delocalization occurs by quantum coherent tunneling or incoherent multi-step hopping. The study of aromaticity and antiaromaticity in cyclic delocalized states will be discussed as a test for coherence.

Host: Phil Castellano