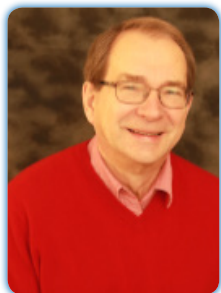


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**Ryszard Jankowiak**

Kansas State University, USA

Excitonic structure and dynamics in various photosynthetic antenna protein complexes: Hole-burning and modeling studies

Low temperature (high-resolution) Hole-Burning (HB) spectroscopy and modeling studies of various optical spectra (using a non-Markovian reduced density matrix theory with a Nelder-Mead Simplex algorithm for parameter optimization) provide new insight into the excited state electronic structure and dynamics of several photosynthetic complexes. The following complexes will be discussed: (1) The reconstituted CP29 antenna complex and its A2 and B3 mutants of Photosystem II from spinach, (2) The B800-850 LH2 antenna complex from *Allochrochromatium vinosum* and (3) The FMO antenna from *Chlorobaculum tepidum* (*C. tepidum*) and its Y16F mutant. The information gained provides new insight into disorder, excitonic structure, excitation energy transfer (EET) dynamics and mutation induced changes via site directed mutagenesis. The following issues will be addressed in more detail: (1) Mutation-induced shifts of pigment site energies, (2) altered excitonic structure and inhomogeneity of mutants, (3) spectral density and electron-phonon couplings and (4) protein energy landscape. Better understanding of mutation-induced effects (at the molecular level) on the excitonic structure and EET processes in various photosynthetic proteins may help to design better artificial systems for future photovoltaic devices. Finally, challenges facing an understanding of the nature of low-energy excited states in CP29 and FMO mutants will be briefly addressed.

Biography

Ryszard Jankowiak is a Distinguished Professor of Chemistry and Ancillary Distinguished Professor of Physics at Kansas State University, Manhattan in USA. He is also affiliated with the Photosynthetic Antenna Research Center, Washington University, Saint Louis, MO. He has published over 230 papers in various areas of physical chemistry, toxicology, carcinogenesis, physics and biophysics. Currently he is studying photosynthetic reaction centers and photosynthetic antenna pigment complexes (and their mutants) of green plants/algae and photosynthetic bacteria using solid-state low temperature (laser-based) spectroscopies and modeling.

ryszard@ksu.edu