

Energy Transfer Processes in Solar Energy Conversion
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During the past year, we have made substantial progress in both theoretical and experimental aspects of the program. The program involves the investigation of excitation transport and electron transfer in complex systems. In the area of electron transfer, we have been studying electron back transfer following donor-acceptor photoinduced electron transfer. We are addressing this problem both theoretically and experimentally. In the area of excitation transport, we have been examining transport in solid solutions, liquid solutions, and in clustered excitation transport systems. Again, we are pursuing both experimental and theoretical approaches.

The problem of electron back transfer between photogenerated ions is of central importance in both artificial and biological solar energy conversion. Once an electron has been transferred from an optically excited donor to an acceptor, back transfer competes with the ability of the radical ions to go on to do useful chemistry. We are studying the back transfer process using picosecond transient grating experiments in conjunction with time resolved and steady state fluorescence quenching measurements. The transient grating experiment makes the back transfer process a direct experimental observable, while the fluorescence experiments allow the forward transfer to be examined. By combining the experiments, a complete picture emerges.

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