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Energy Transfer Processes in Solar Energy Conversion

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During the past year, we have been working in three general areas: electronic excitation transport in clustered chromophore systems and other complex systems, photo-induced electron transfer and back transfer in liquid solutions in which diffusion and charge interactions are important, and the construction of a new two color dye laser system to enhance our experimental capability. In each area we have made considerable progress.

Recently we have been conducting experimental and theoretical studies of electronic excitation transport in clustered chromophore systems in which the clusters are at such high concentration that excitation transport occurs between clusters as well as on a single cluster. This is a very complex problem that is scientifically interesting and also interesting from a practical stand point. We are focusing on micelle systems and polymer systems. We have completed a detailed study of the micelle problem. The system is one that readily self-assembles. The chromophore is octadecyl rhodamine B (ODRB). This is a dye molecule with a long hydrocarbon tail. The micelles are Triton X-100. When mixed, the chromophore, which is ionic, resides on the surface of the micelle. At low micelle concentration, excitation transport occurs only on single micelles. This is a problem of excitation transport among chromophores distributed on the surface of a sphere. At high micelle concentrations, the micelles are close enough