Ultrafast and Coherent Transport of Excitons in Sequential Molecular Arrangements

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Photophysical processes such as excitation transfer are expected to occur very fast in organized molecular systems in which molecules are arranged with close proximity and optimal orientation, and therefore they can be coupled to an adjacent molecule with relatively strong molecular interaction. If the reaction rate exceeds the rate of vibrational relaxation and if the reaction system consists of several molecules which are arranged lineraly along the reaction pathway, a sequential reaction can occur among non-equilibrium excited states of reactant molecules. Exciton propagates as a quantum wave packet through a molecular channel. We have investigated exciton transport in several types of organized molecular systems with a *fs* fluorescence up-conversion method and a *ps* time-correlated photon-counting method.