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Transient picosecond studies of singlet fission in PDTP-DFBT low band gap polymer[1] UYEN HUYNH, VALY VARDENY, Department of Physics and Astronomy, University of Utah, GANG LI, YANG YANG, Department of Materials Science and Engineering, University of California, Los Angeles —
We measured picoseconds transient mid-IR photoinduced absorption (PA) spectra in PDTP-DFBT low band-gap polymer. With 800 nm pumping the PA spectrum at t=0 in pristine film and isolated polymer chain in polystyrene shows two prominent PA bands: PA1 at 0.4eV and Pa2 at 0.8eV. PA1 is assigned to absorption from singlet excitons (transition from $1B_u$ to mA_g), whereas PA2 is due to a state of triplet-pair, which is formed via singlet fission in the sub-ps time domain. We found that PA2 lifetime strongly depends on the excitation intensity, showing non linear recombination process in both pristine film and in polystyrene. We also found that the triplet-pair recombines with no trace of fusion back to the singlet exciton; we thus conclude that singlet fission is an exothermic process in this polymer. We therefore do not find any magnetic field effect on the transient dynamics of the triplet-pair within our experimental sensitivity (0.2%).

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