Transient picosecond studies of singlet fission in PDTP-DFBT low band gap polymer\textsuperscript{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: $\text{PA1}$ at 0.4eV and $\text{Pa2}$ at 0.8eV. $\text{PA1}$ is assigned to absorption from singlet excitons (transition from $1B_u$ to $mA_g$), whereas $\text{PA2}$ is due to a state of triplet-pair, which is formed via singlet fission in the sub-ps time domain. We found that $\text{PA2}$ 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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