**Ultrafast Field-Induced Decay of Singlet Excited-State in Conjugated Polymers**

Ji-Ping Yang

*Department of Applied Physic, Hefei University of Technology, China*

*Email: yangjp@hfut.edu.cn*

A picosecond pump-probe technique has been used to study the field-induced effect of the ultrafast transient photo-induced absorption (PIA) in poly(phenylene-vinylene)(PPV). In order to apply an electric field across PPV, the film (110 nm thickness) was sandwiched between electrode of aluminium (anode) and indium tin oxide(ITO, cathode) (see Fig. 1 inset). A mode-locked Nd:YAG laser produced pulses at a repetition rate of 10 Hz with 35 picosecond pulse duration. The excitation pulse was the third harmonic pulse (355 nm) of the YAG laser. A probe and reference beam were derived from the white-light continuum be means of a 50% beam splitter. All of measuments were performed at vacuum ($10^{-4}$ mbar).

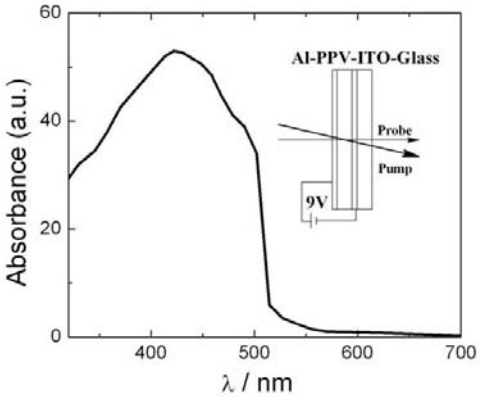


Fig.1: Absorption spectrum of PPV. The inset shows the experimental configuration for the excited sample.

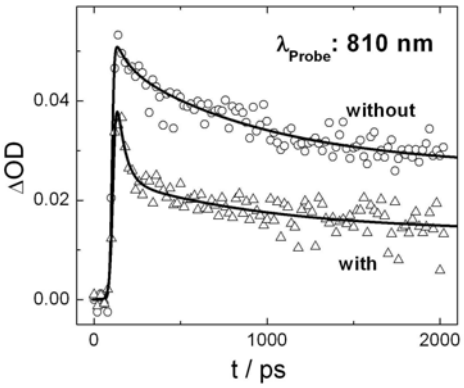


Fig.2: Transient PIA decay curves of PPV at 810 nm, for 0 bias (circles) and 9 V (triangles). The solid lines are fitted curves.

The PIA spectra show that the absorption band of the lowest excited singlet state is centred at about 810 nm. Fig. 2 shows time-resolved decays at 810 nm excited by 355 nm, for 0 (without) and 9 V (with) biases. The decay times can be fitted by two exponential components convoluted with a Gaussian shape of the excitation pulse. The time constants (amplitudes in brackets) for 0 and 9 biases are 77±63 ps (0.22), 860±239 ps (0.78) and 47±19 ps (0.72), 899±506 ps (0.28), respectively. The results show that the time constants of the fast and slow decays are almost independent on the biases, but the amplitudes are a biases-dependent. The reasons may be that the electric fields accelerate the relaxation or dissociation of excitons population. We gratefully acknowledge DFG and NSFC (No. 20573030).