Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information

Dye-Sensitized Solar Cell from a New Organic n-Type Semiconductor/ Polyaniline Composite: Insight from Impedance Spectroscopy

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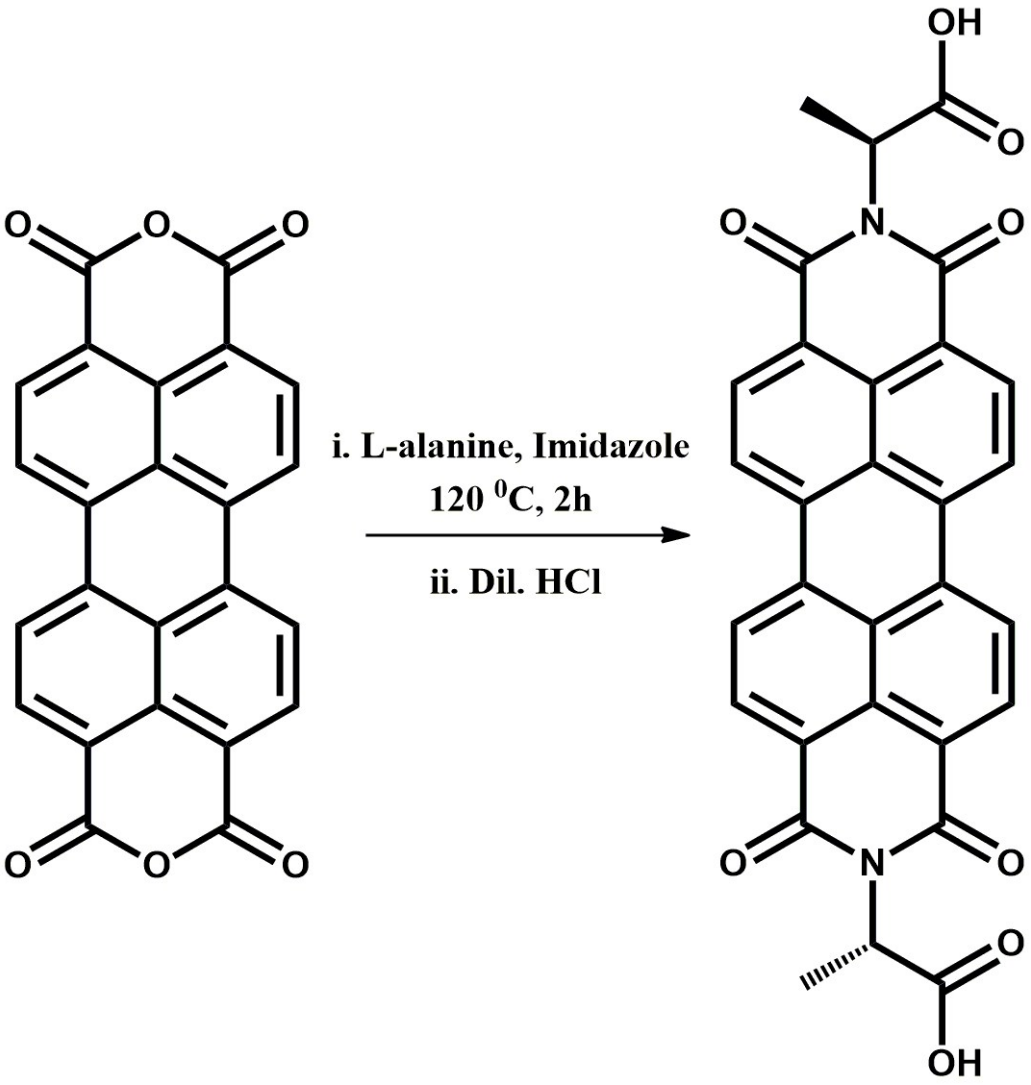
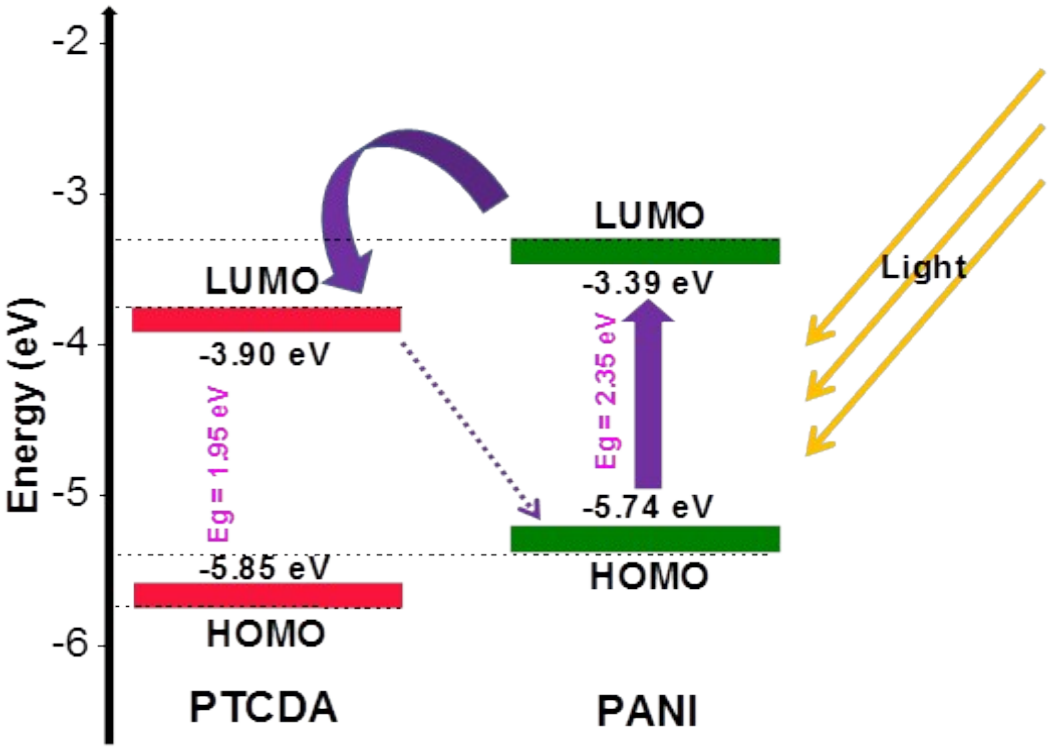


Scheme S1: Synthesis of PTCDA



Scheme S2: Mechanism of the photoconduction process of PANI-PTCDA composites under AM1.5 illumination

Table S1: DSSC characteristics of P15 based solar cell for aging at 40 ^{o}C for different times

Time (hr)	J_{sc} (mA/cm^2)	V_{oc} (V)	FF	η (%)
0	10.25	0.67	0.42	2.88
8	10.11	0.67	0.42	2.84
16	9.90	0.67	0.42	2.78
24	9.67	0.67	0.42	2.72
32	6.36	0.66	0.41	2.53
40	8.72	0.66	0.41	2.35
48	8.23	0.66	0.41	2.22

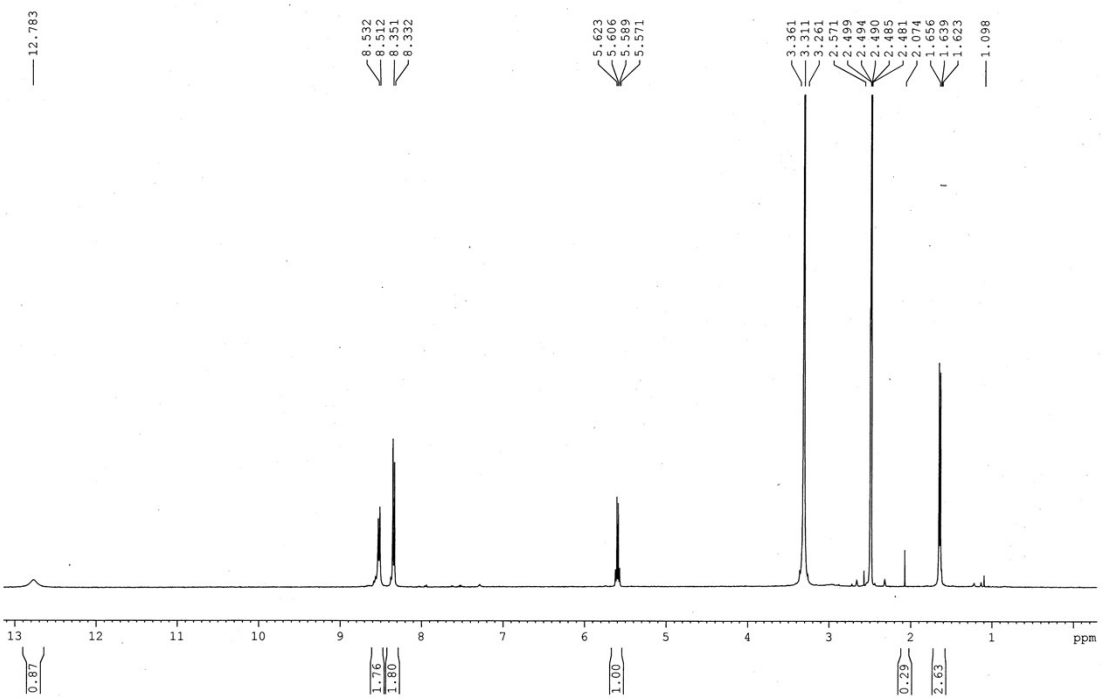


Fig. S1 : ^{1}H NMR spectrum of PTCDA in DMSO-d_6

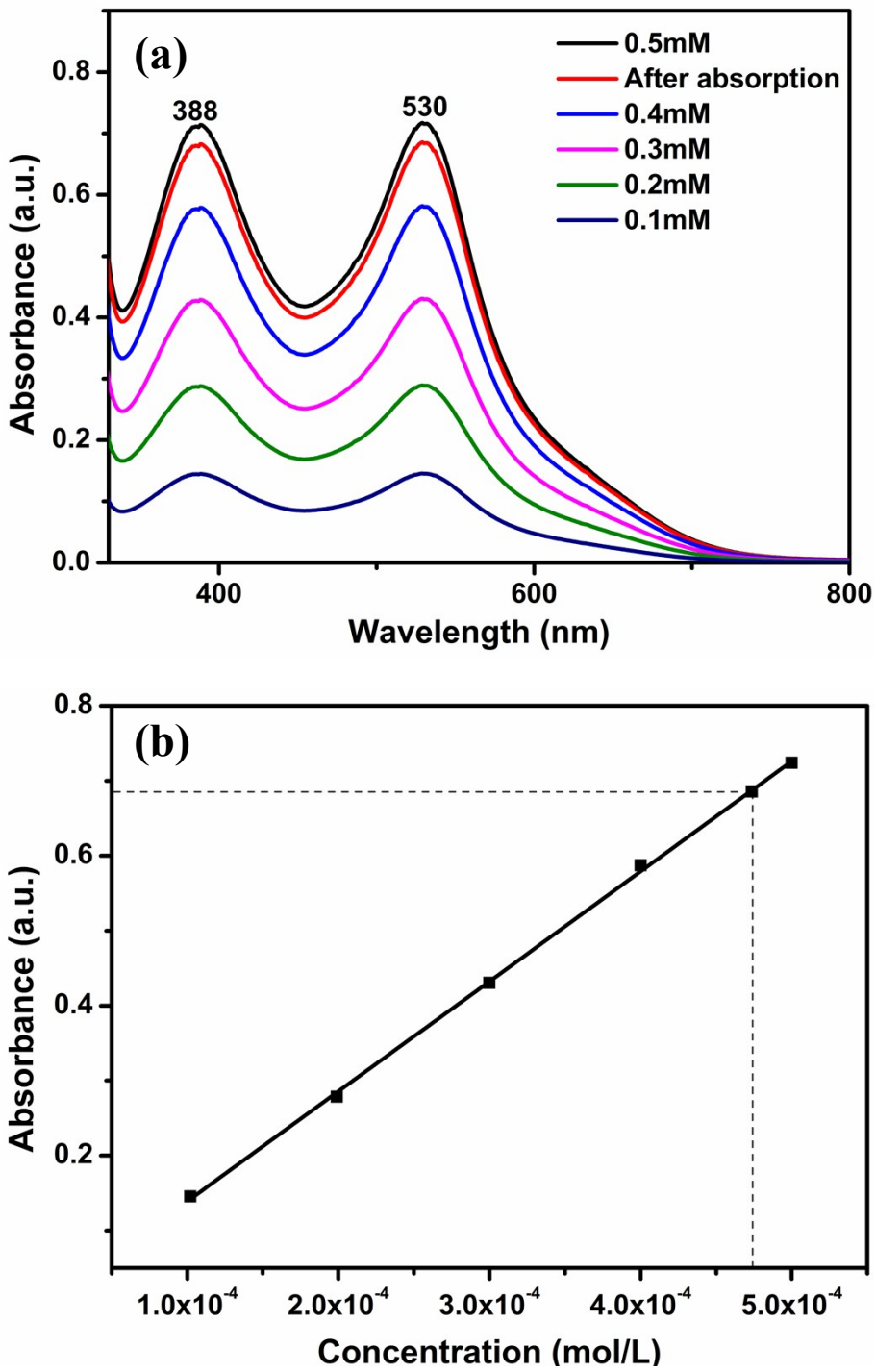


Fig. S2: (a) Absorbance spectra for N719 dye samples at different concentration in ethanol (b) Calibration curve for N719 dye samples at 530 nm along with the best fit curve.

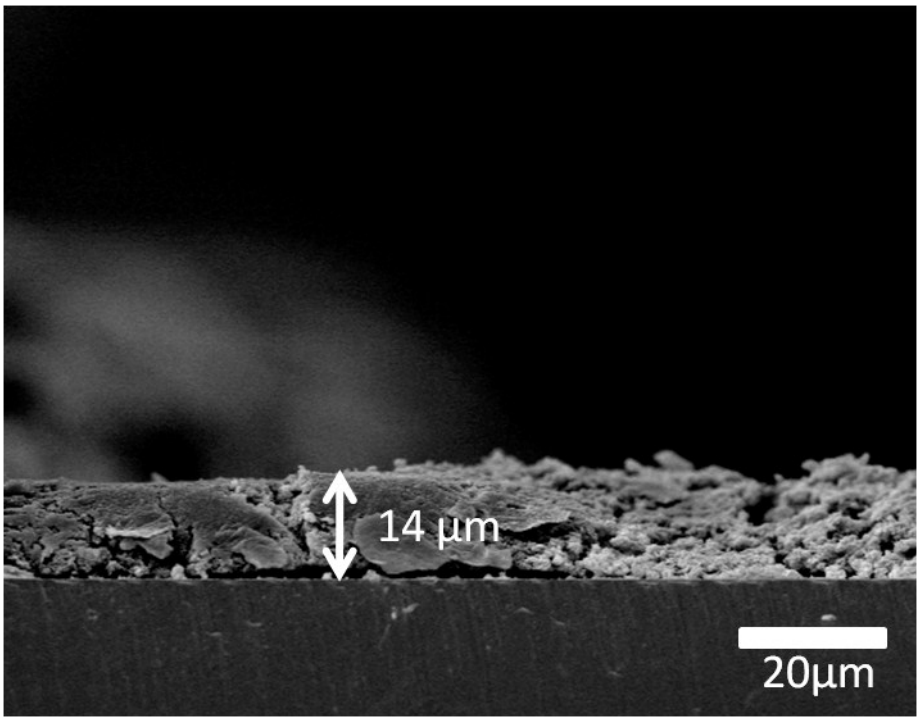


Fig. S3: Cross-sectional SEM image of active layer of P15 based DSSC device

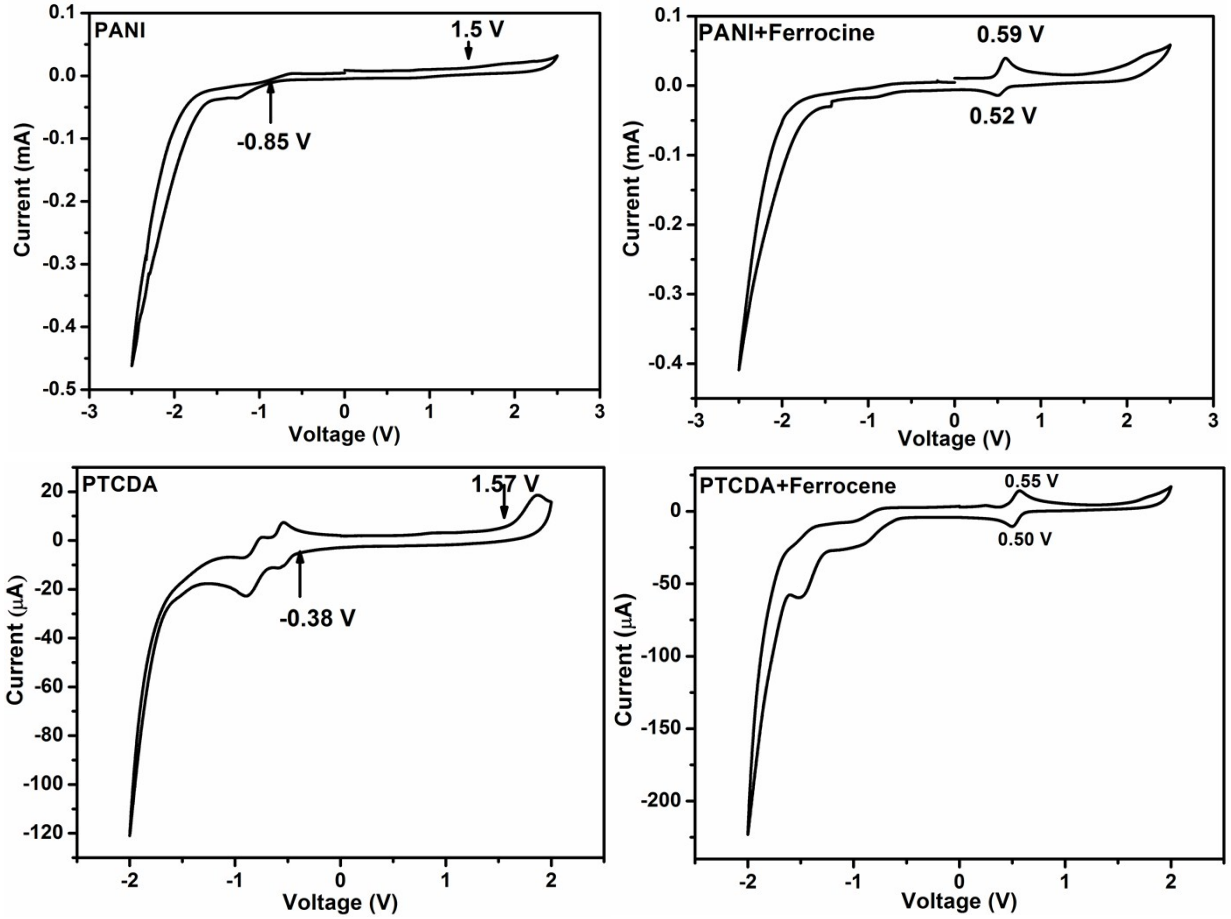


Fig. S4: Cyclic voltammogram plots of Pure PANI, PANI-Ferrocene, PTCDA and PTCDA-Ferrocene

The HOMO- LUMO levels are calculated according to the equation

$$HOMO = - [E_{ox}^{onset} - E_{Fc/Fc+}^{1/2} + 4.8] V$$

$$LUMO = - [E_{red}^{onset} - E_{Fc/Fc+}^{1/2} + 4.8] V$$

$E_{Fc/Fc+}^{1/2}$ of PANI-Ferrocene = 0.56 V

HOMO level of PANI= - 5.74 eV

LUMO level of PANI= -3.39 eV

Band gap of PANI= 2.35 eV

$E_{ferrocene}^{1/2}$ of PTCDA-Ferrocene = 0.525 V

HOMO level of PTCDA = - 5.85 V

LUMO level of PTCDA = -3.90 V

Band gap level of PTCDA = 1.95 eV

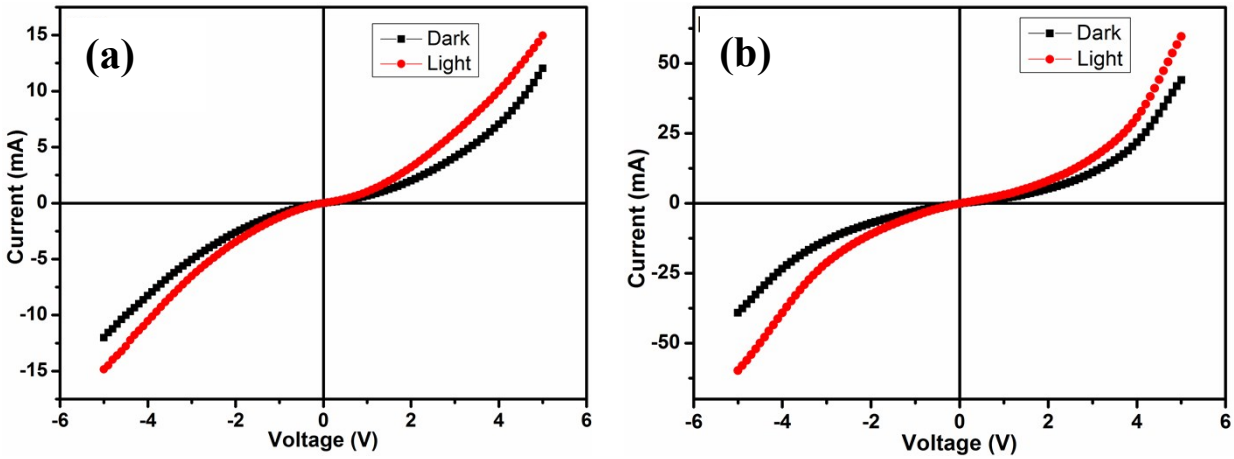


Fig. S5: Current-Voltage characteristics of (a) P10 and (b) P20 samples under dark and illumination condition.

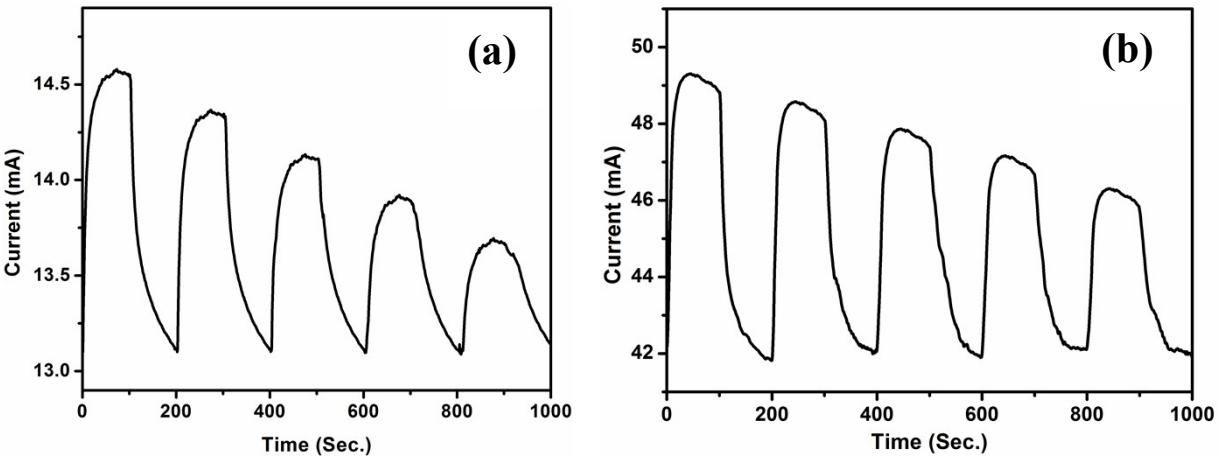


Fig. S6: On-Off cycle of photocurrent response of the (a) P10 and (b) P20 samples.

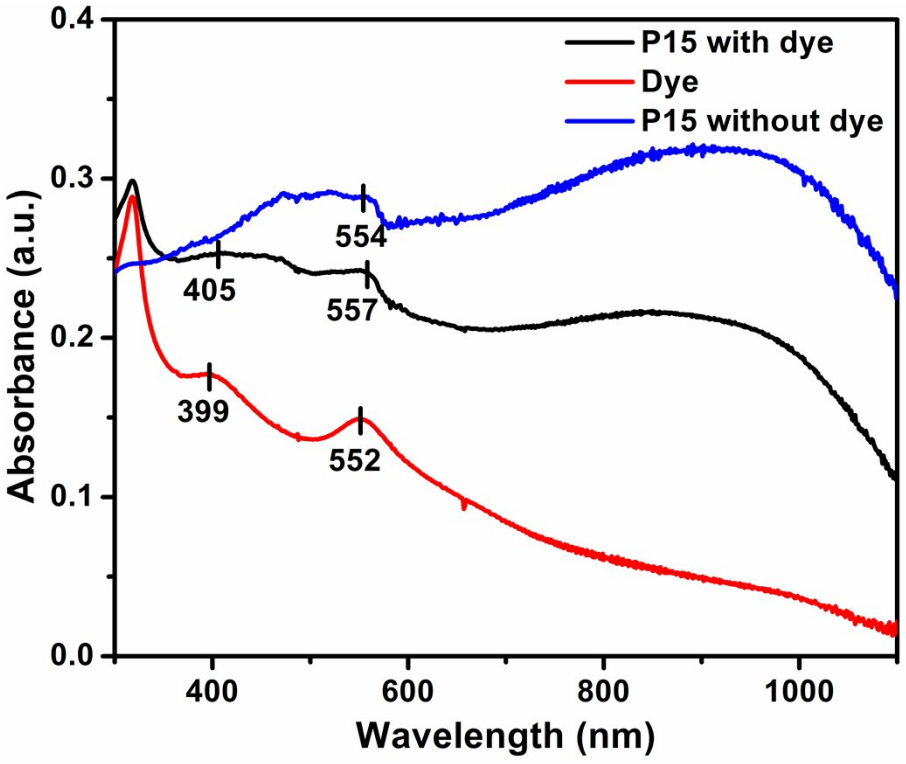


Fig. S7: Solid state UV-Vis spectra of N719 dye, P15 sample and the P15 sample after dye absorption