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

Supporting Information

Red-emissive Poly(phenylene vinylene)-derivated Semiconductors with Well-balanced Ambipolar Electrical Transporting Property

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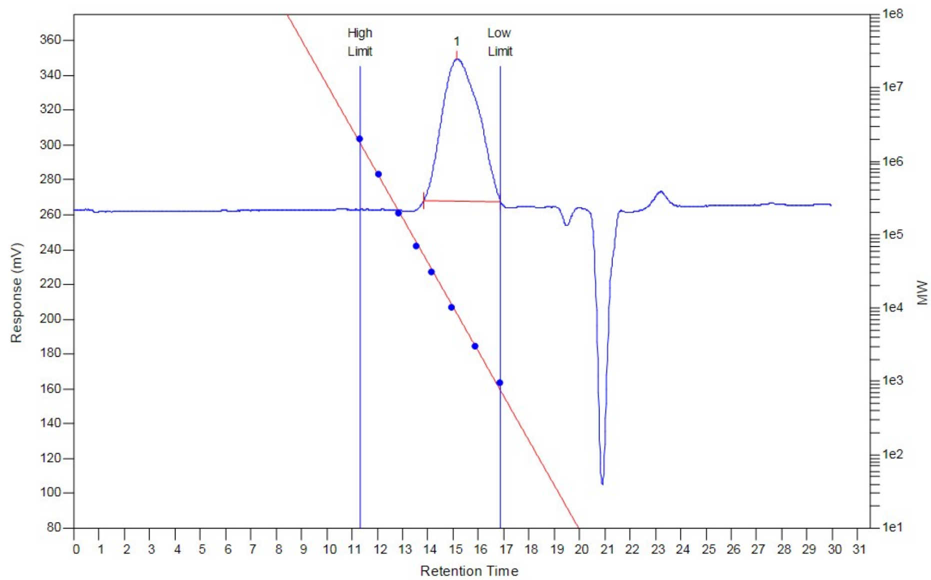
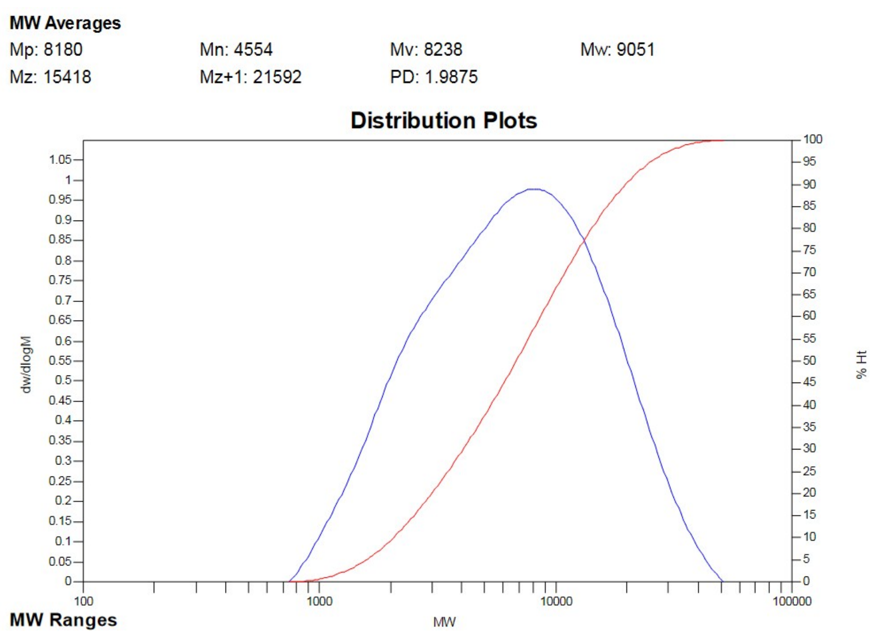
References

1. GPC experiments

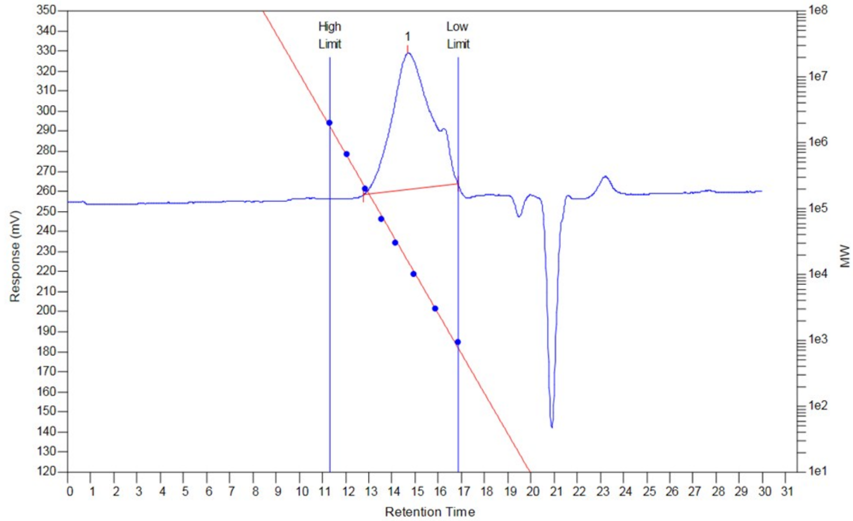
(a)



(b)



(c)



(d)

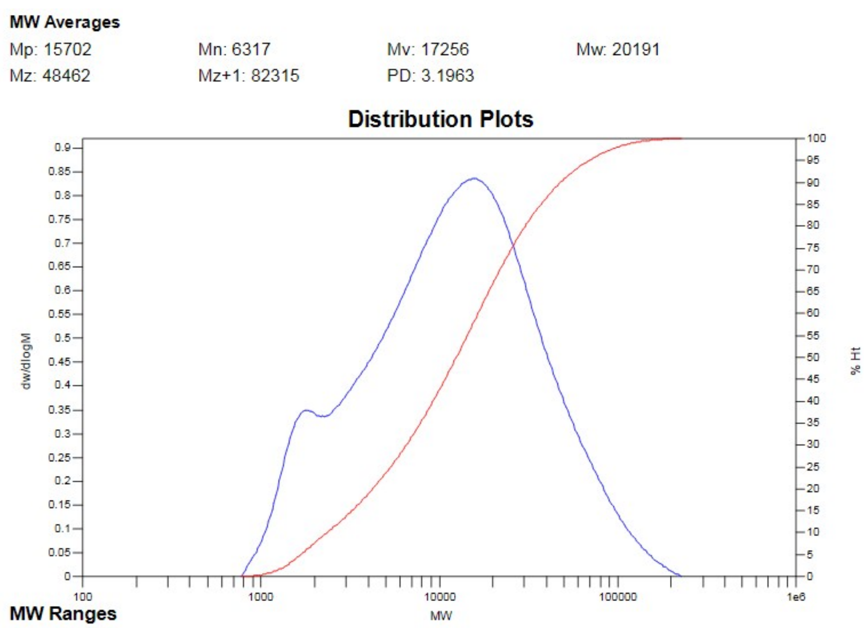


Figure S1. Gel Permeation Chromatography (GPC) trace of (a) PBPPV; (c) diPBPPV from refractive index (RI) detector. Molecular weight distribution plots of (b) PBPPV; (d) diPBPPV.

2. Thermal stability

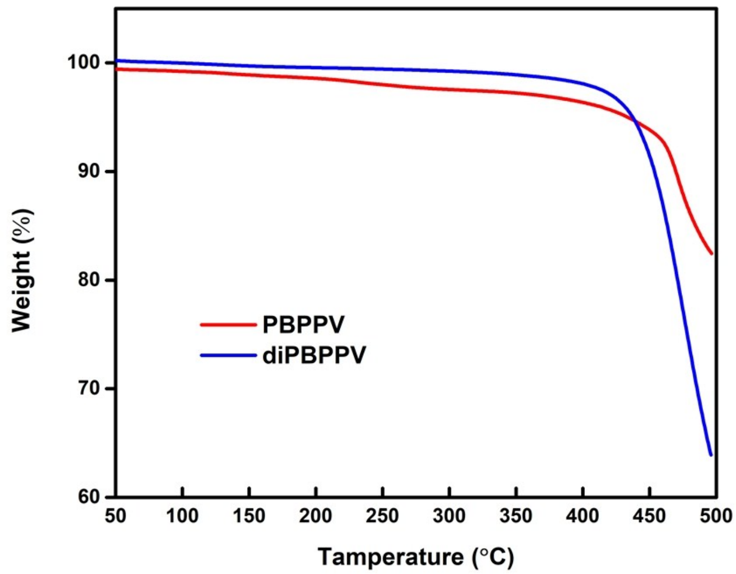


Figure S2. TGA plot of PBPPVs with a heating rate of 40 ºC min^{-1} under nitrogen atmosphere.

3. Electrochemical properties

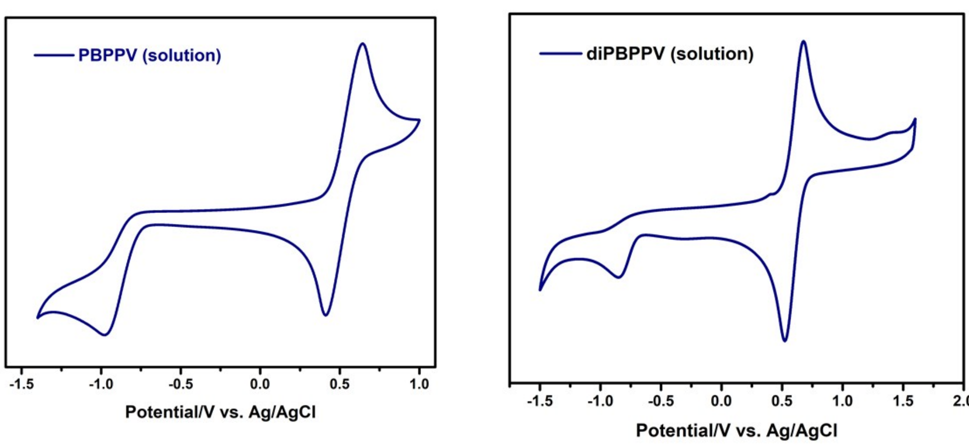
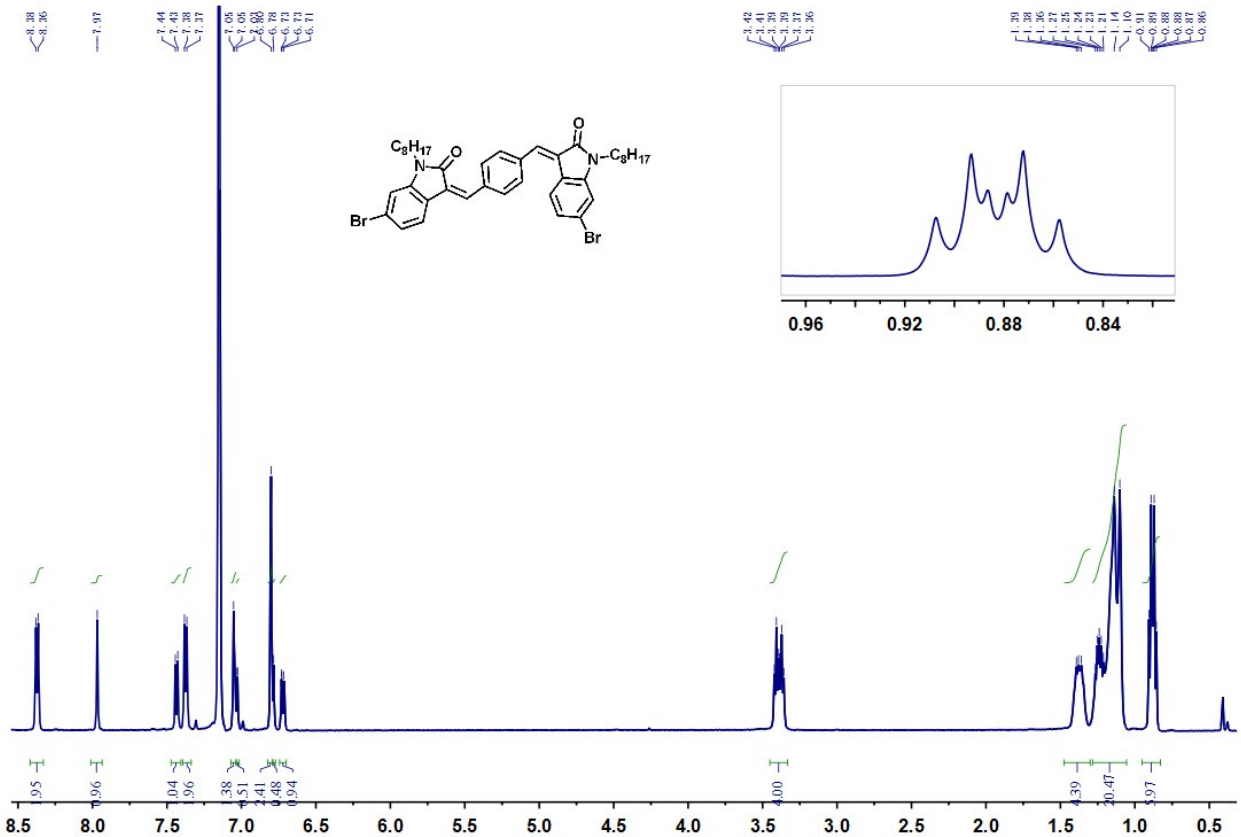


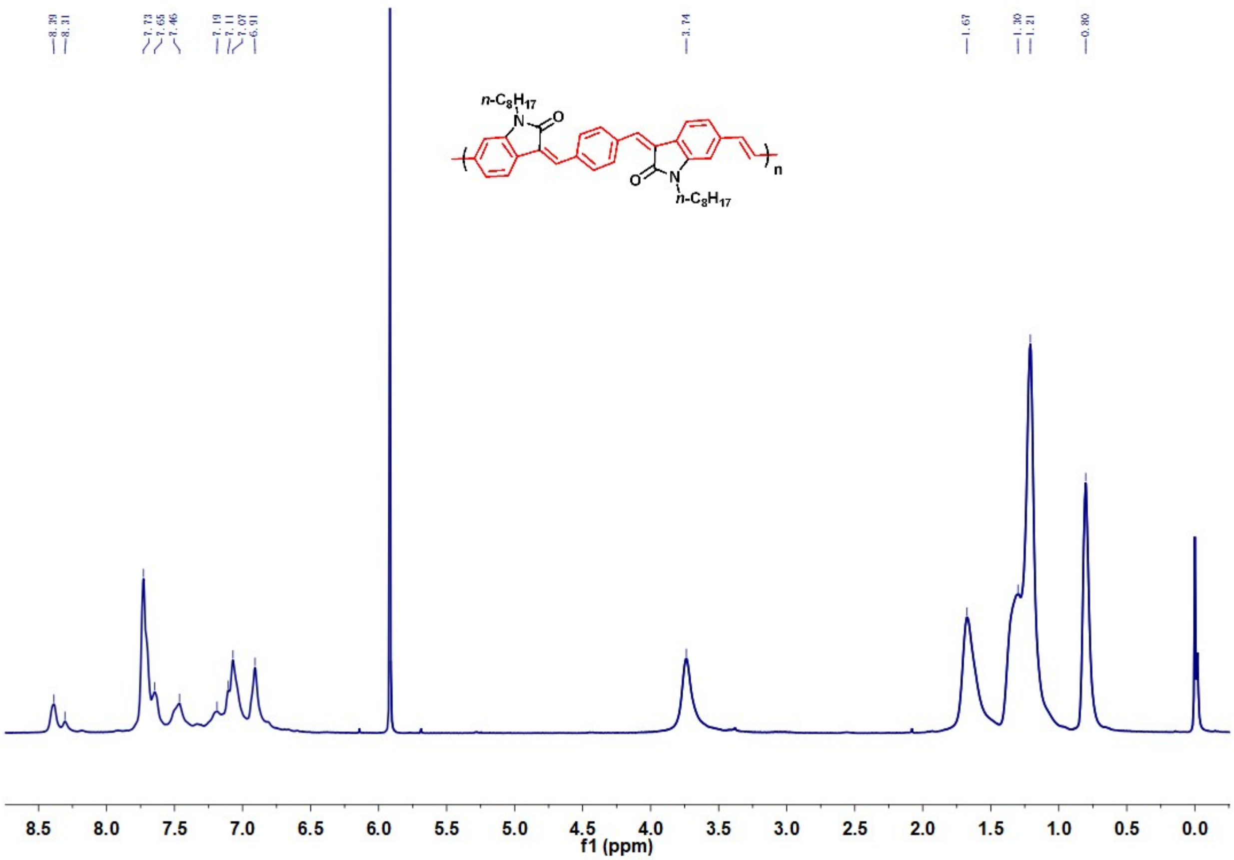
Figure S3. Cyclic voltammogram profile of PBPPVs. (0.1 M Bu_4NPF_6/CH_2Cl_2 with ferrocene at ν = 0.05 V/s.)

4. NMR experiments

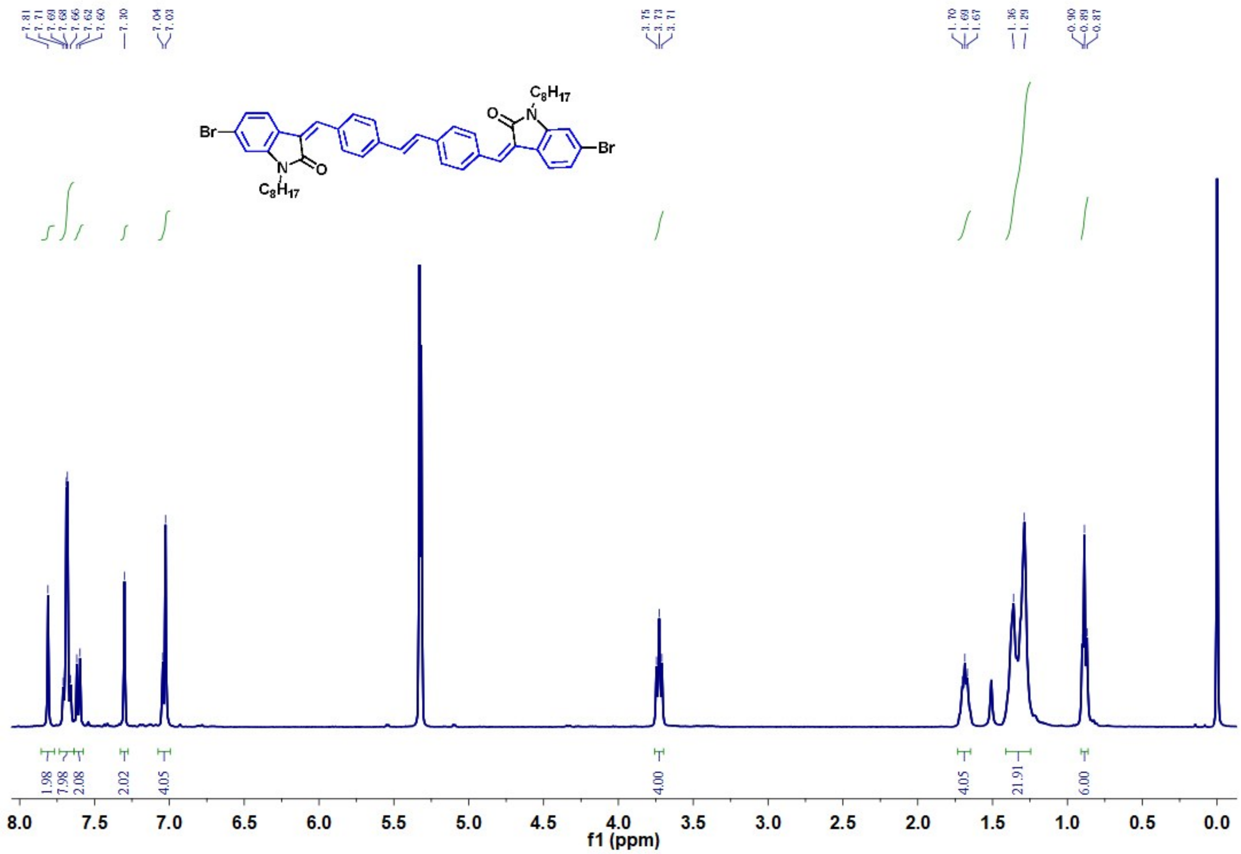
(a)



(b)


8.39
8.31
7.73
7.65
7.46
7.19
7.11
7.07
6.91
3.74
1.67
1.30
1.21
0.80
n-C8H17
N
O
O
N
n-C8H17
n
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

(c)



7.81
7.71
7.69
7.68
7.66
7.62
7.60
7.30
7.04
7.03
3.75
3.73
3.71
1.70
1.69
1.67
1.36
1.29
0.90
0.89
0.87
Br
O
N
C_8H_{17}
Br
1.98
7.98
2.08
2.02
4.05
4.00
4.05
21.91
6.00
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

(d)

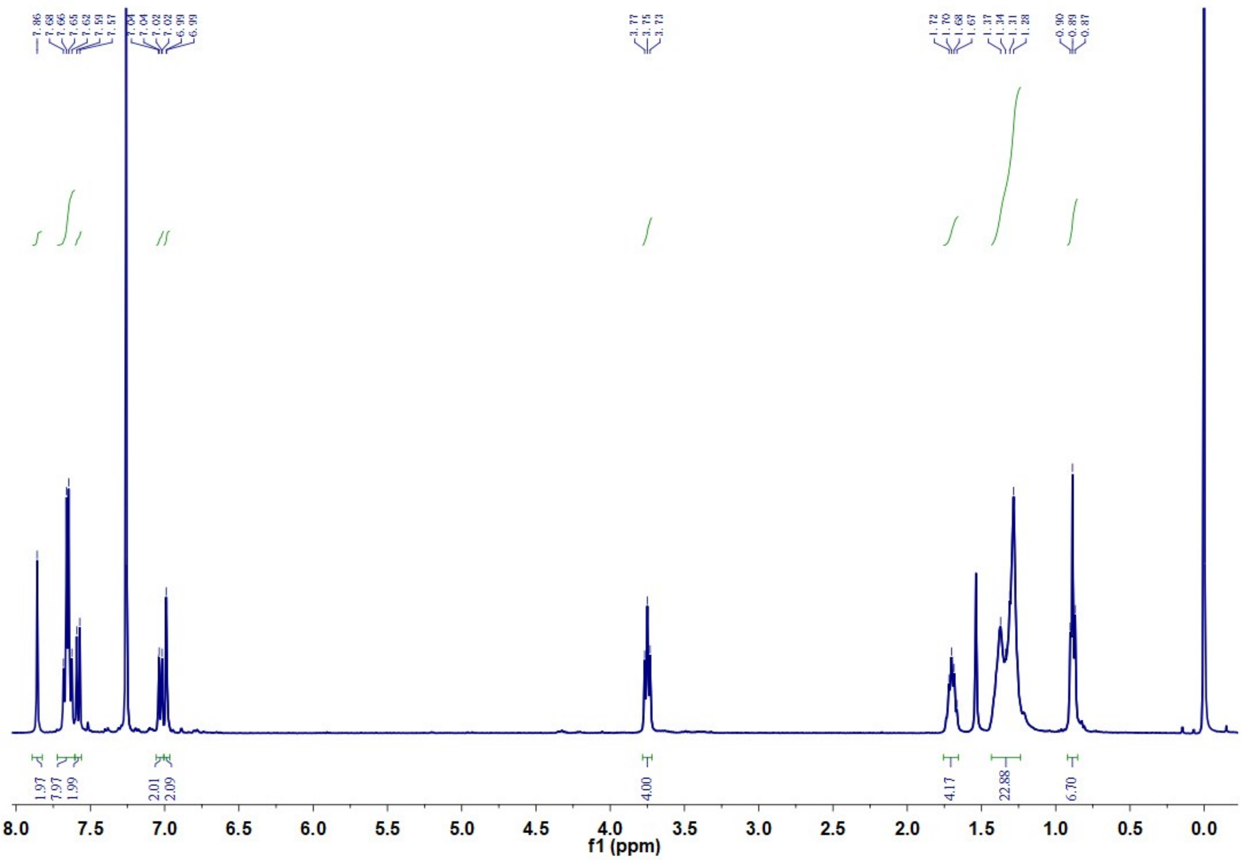
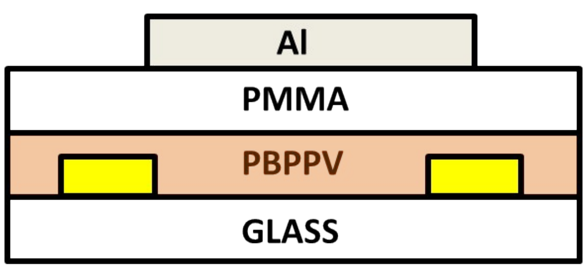


Figure S4. ^{1}H NMR spectra of (a) BPPV-2Br, (b) PBPPV, (c) diBPPV-2Br, (d) diPBPPV.

5. Device fabrication



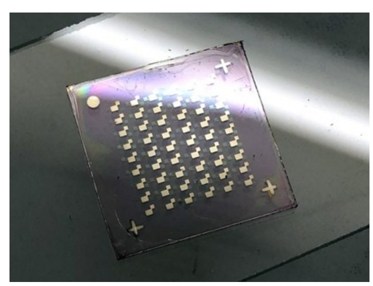


Figure S5. Diagram and photo of OFET devices.

6. Device performances on other conditions

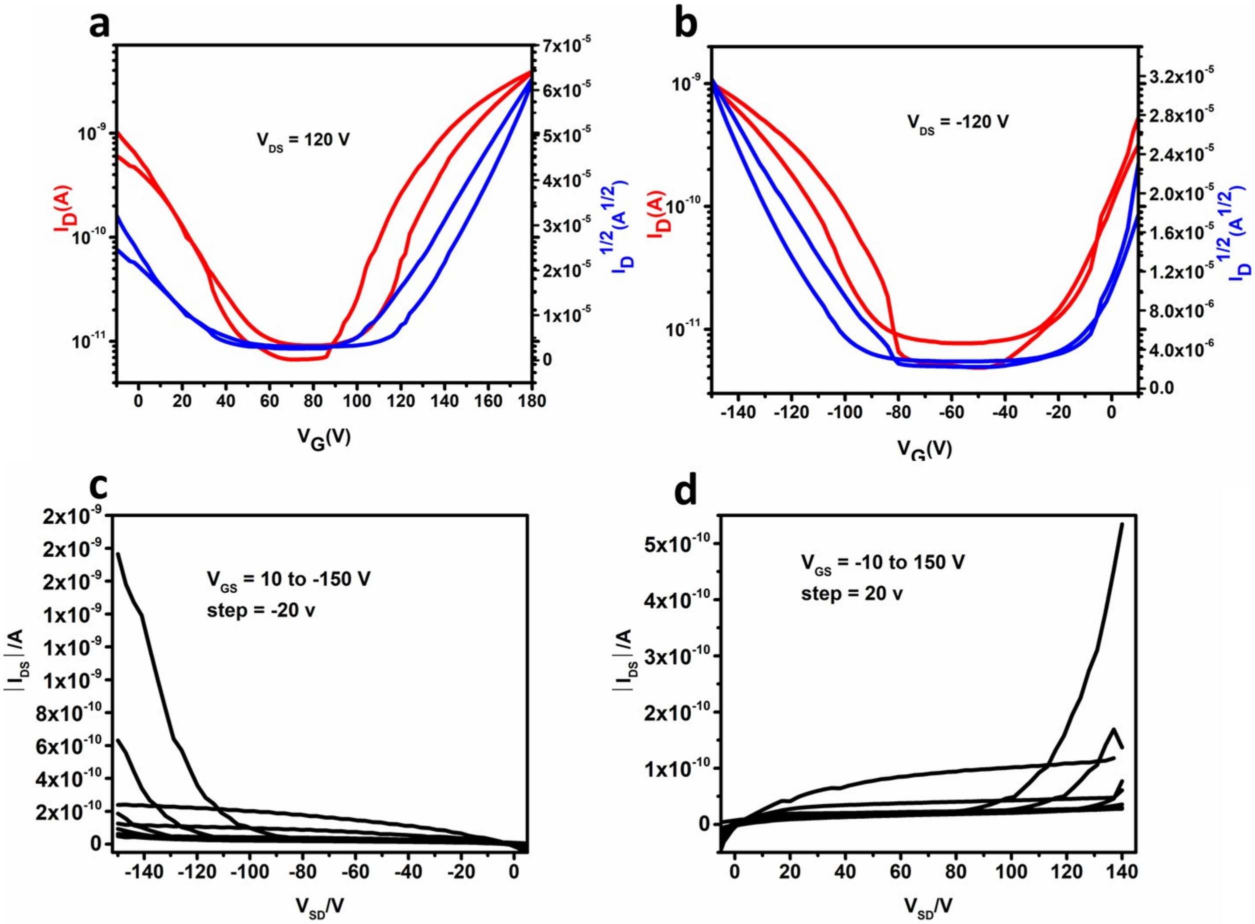


Figure S6. Transfer (top) and output (bottom) curves of TG/BC OFET devices based diPBPPV thin film (annealed at 150 ºC). Device parameters: channel width/length (W/L) = 10, C_i = 3.9 nF cm^{-2}.

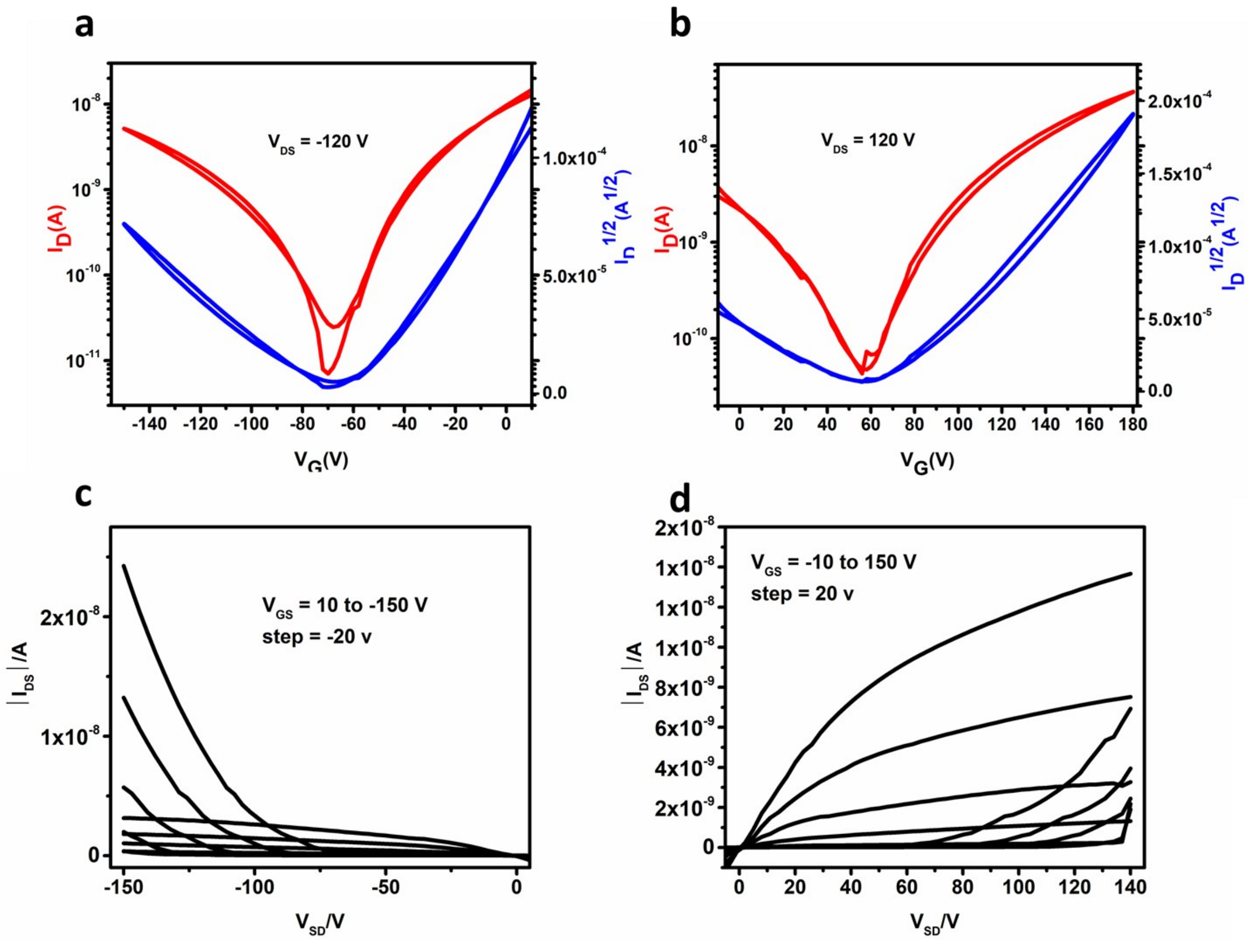


Figure S7. Transfer (top) and output (bottom) curves of TG/BC OFET devices based diPBPPV thin film (annealed at 200 ºC). Device parameters: channel width/length (W/L) = 10, C_i = 3.9 nF cm^{-2}.

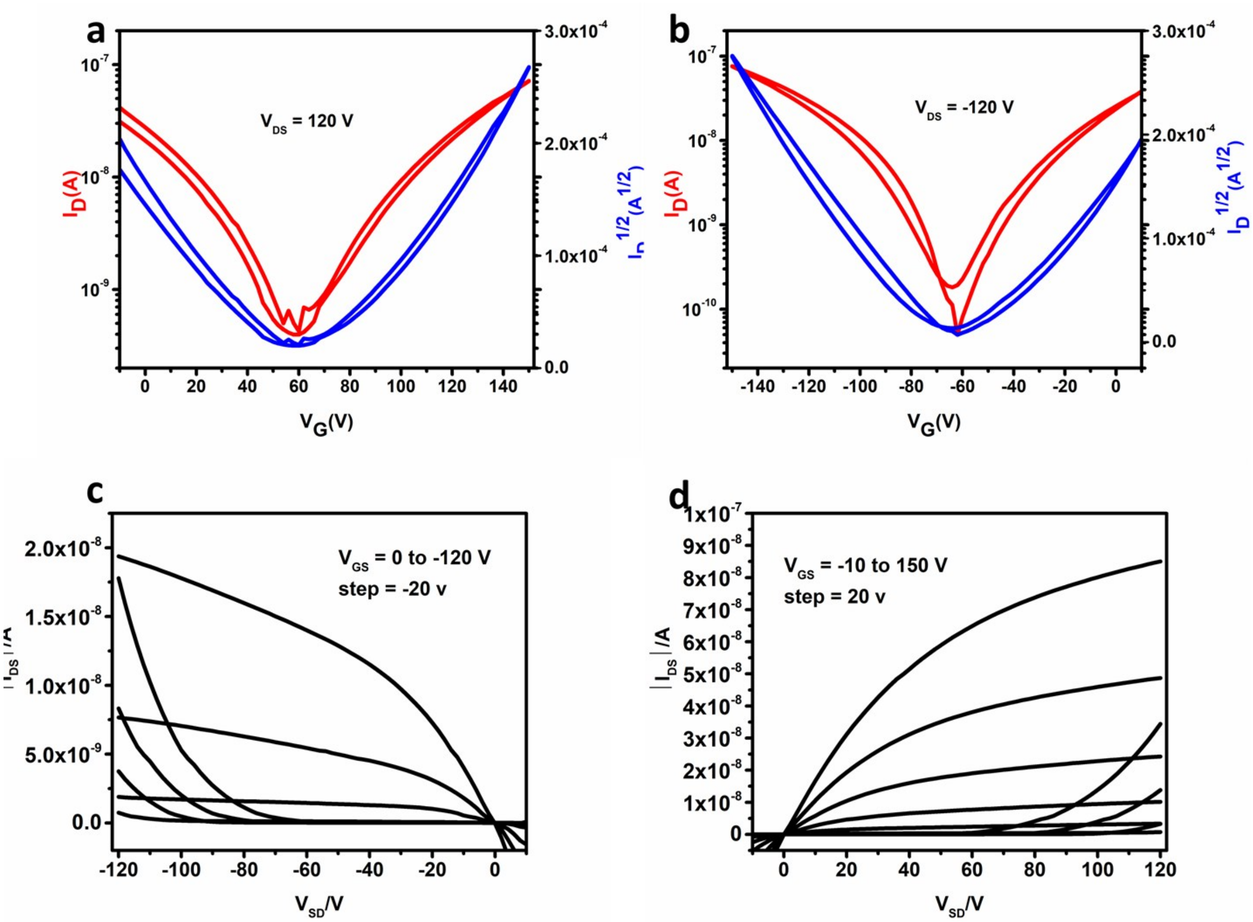
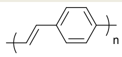
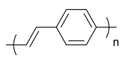
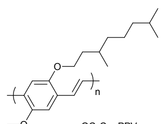
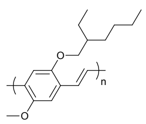
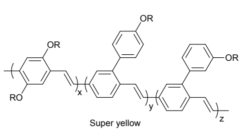
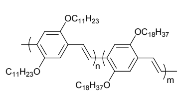
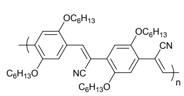
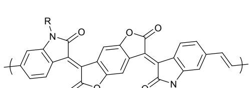
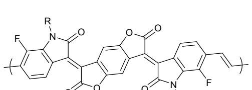
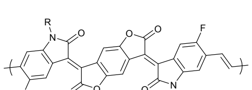
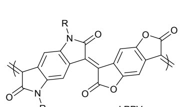
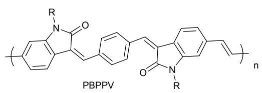
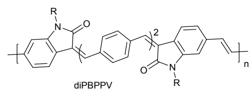


Figure S8. Transfer (top) and output (bottom) curves of TG/BC OFET devices based diPBPPV thin film (annealed at 280 ºC). Device parameters: channel width/length (W/L) = 10, C_i = 3.9 nF cm^{-2}.

7. Table S1 A summary of charge carrier mobility for PPV-based conjugated polymers reported so far

Polymer	Energy level	Charge Transfer property			Refs.
	HOMO/LUMO/band gap (eV)	μ_e (cm^2 $V^{-1}s^{-1}$)	μ_h (cm^2 $V^{-1}s^{-1}$)	Device structure	
 PPV	-5.2/-2.7/2.5	-	5.0×10^{-7}	SCLC	1
 PPV	-5.2/-2.7/2.5	10^{-4}	-	BG-TC, Ca/Ca	2
 OC_1C_{10}-PPV	-5.0/-2.8/2.2	3.0×10^{-3}	6.0×10^{-4}	Top contact, Au/Ca	3
 MEH-PPV	-5.0/-2.8/2.2	-	10^{-4}	Bottom contact, Au-on-Cr/Au-on-Al	4
 Super yellow	-4.8/-2.4/2.4	6.0×10^{-5}	3.0×10^{-4}	Top contact, Ag/Ca	5
	-	-	1.0×10^{-2}	BG-BC, Au/Au	6
 CN-PPV	-5.4/-3.2/2.2	4.0×10^{-5}	-	BG-TC, Ca/Ca	2, 7
 BDPPV	-5.83/-4.41/1.42	0.84	-	TG-BC, Au/Au, on SiO_2	8
 FBDPPV-1	-6.19/-4.26/1.46	1.39	-	TG-BC, Au/Au, on SiO_2	9
 FBDPPV-2	-6.22/-4.30/1.39	0.62	-	TG-BC, Au/Au, on SiO_2	
 LPPV	-5.99/-4.49/1.50	0.16	-	TG-BC, Au/Au, on SiO_2	10

	-5.56/-3.58/1.98	2.6×10^{-5}	2.0×10^{-5}	TG-BC, Au/Au, on glass	This work
	-5.59/-3.55/2.04	4.5×10^{-4}	3.0×10^{-4}	TG-BC, Au/Au, on glass	

8. Stability test for PBPPV-based devices

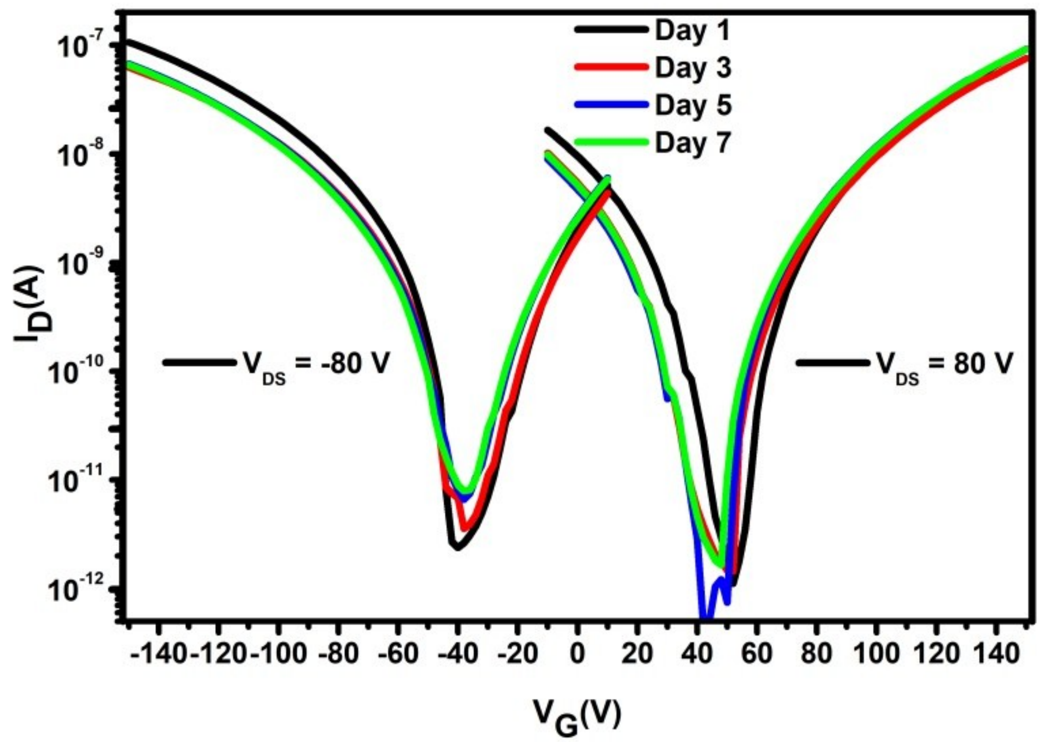


Figure S9. Stability test within one week for diPBPPV-based devices (device stored in air, humidity less than 30%, device parameters: channel width/length (W/L) = 10, C_i = 6.8 nF cm^{-2}, annealed at 280 °C)

References

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