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

Electronic Supporting Information

Triarylamine polymers of bridged phenylenes by (*N*-heterocyclic carbene)-palladium catalysed C-N coupling

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DFT Results

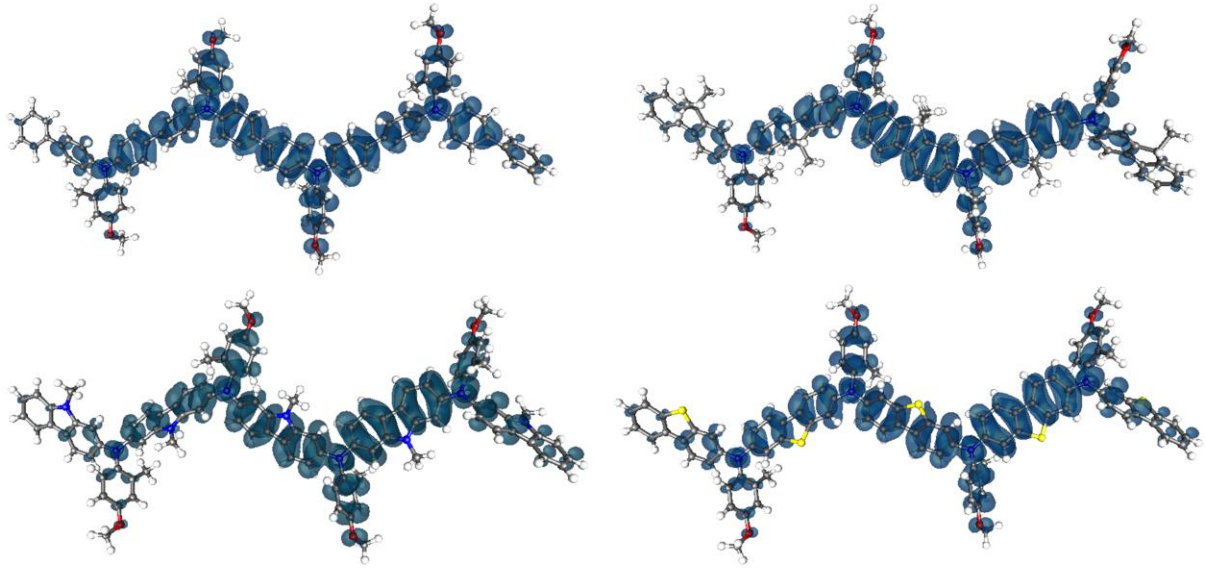

Figure S- 1 Highest occupied molecular orbital distribution for tetramers of polymer 2, 5, 8, 11.

FET Properties

FET Results for Bimodal Sample of Polymer 5

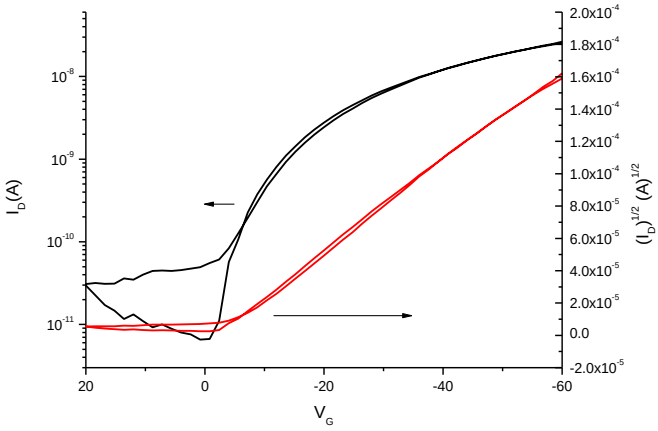

Figure S-2 Transfer characteristics of a bimodal sample of polymer 5 (L = 60 µm), M_n = 17,100 g/mol, M_w = 34,000 g/mol

Mobility (average of 7 devices): $\mu_{hole} = 6.9 \times 10^{-5}$ cm^2/V s
Mobility (best 3 devices): $\mu_{hole} = 4.9 \times 10^{-5}$ cm^2/V s

$V_{th} = -6$ V

Hysteresis = 1.3

On/Off ratio = 2×10^4

Transfer and output characteristics

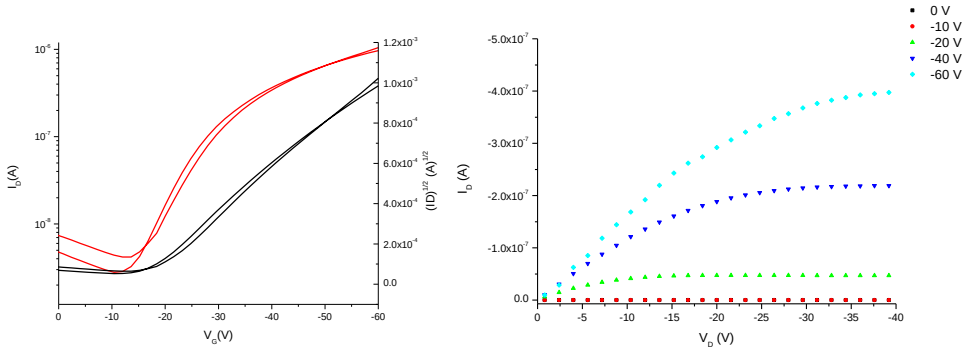

Figure S-3 Transfer Characteristics (*L* = 50 µm) and Output Characteristics (*L* = 60 µm) for 1

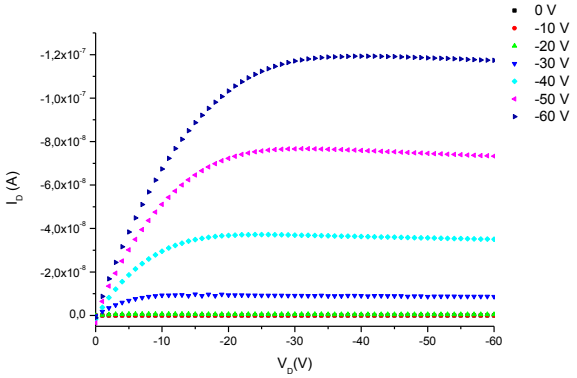

Figure S-4 Output characteristics for 2 (*L* = 50 µm)

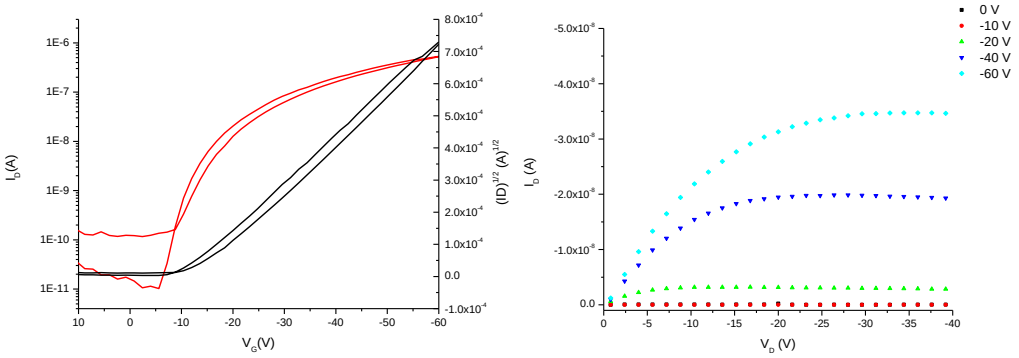

Figure S-5 Transfer Characteristics (*L* = 20 µm) and Output Characteristics (*L* = 20 µm) for 4

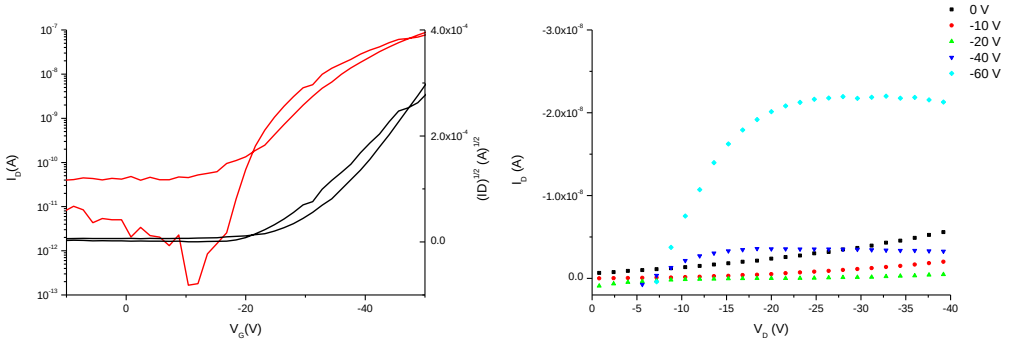

Figure S-6 Transfer Characteristics (*L* = 60 µm) and Output Characteristics (*L* = 60 µm) for 6

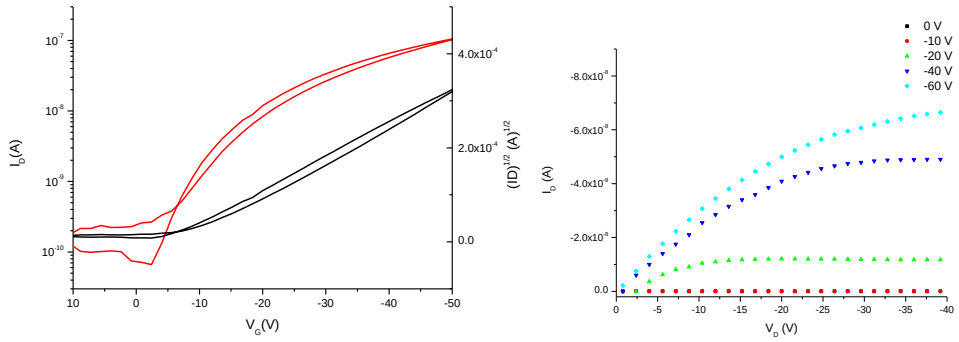

Figure S- 7 Transfer Characteristics (*L* = 60 µm) and Output Characteristics (*L* = 60 µm) for 7

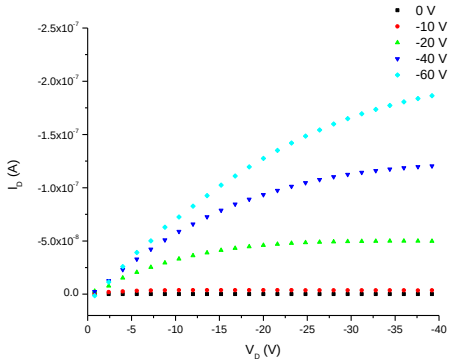

Figure S- 8 Output Characteristics (*L* = 60 µm) for 8

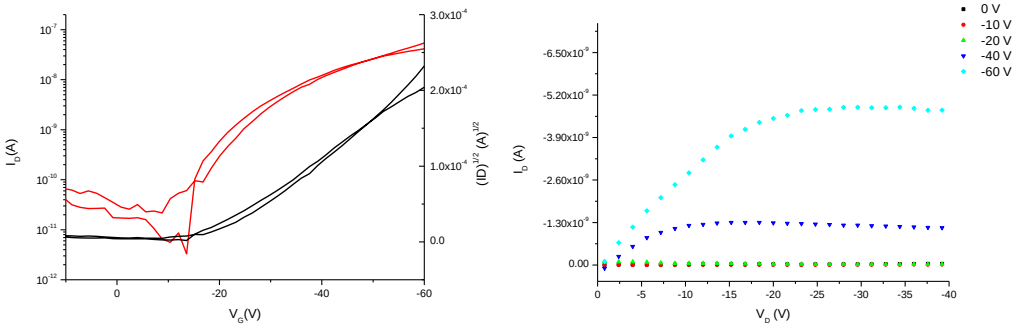

Figure S- 9 Transfer Characteristics (*L* = 30 µm) and Output Characteristics (*L* = 40 µm) for 9

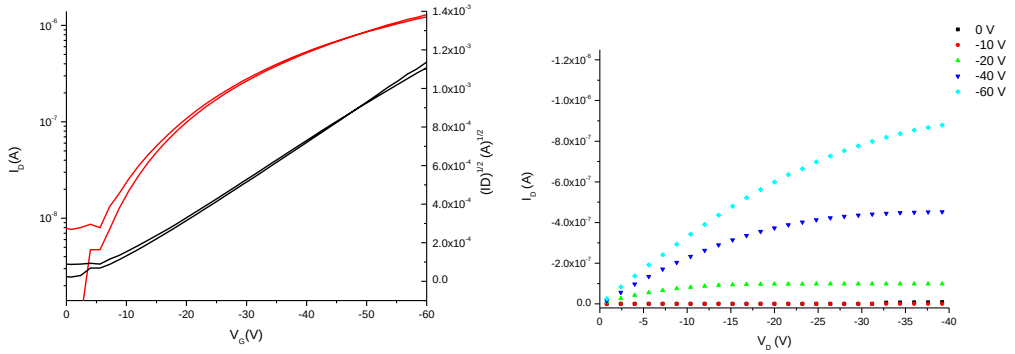

Figure S- 10 Transfer Characteristics (*L* = 60 µm) and Output Characteristics (*L* = 60 µm) for 10

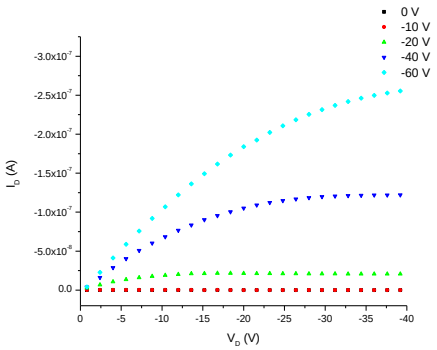

Figure S-11 Output Characteristics (*L* = 60 µm) for 11

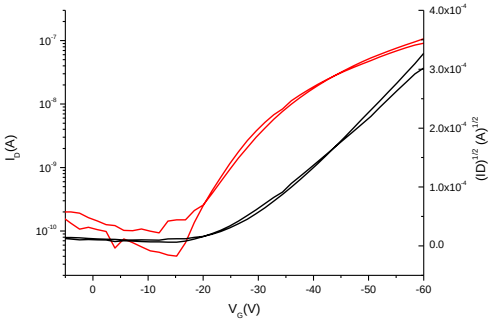

Figure S- 12 Transfer Characteristics (*L* = 20 µm) for 12

Polymer	**1**	**2**	**4**	**5**	**6**
Mobility ($cm^2/V \cdot s$)	**3.4×10^{-3}** $\pm 1 \times 10^{-5}$ 3.1×10^{-3} $\pm 3 \times 10^{-4}$	**9.6×10^{-4}** $\pm 2 \times 10^{-5}$ 8.9×10^{-4} $\pm 9 \times 10^{-5}$	**4.4×10^{-4}** $\pm 8 \times 10^{-5}$ 3.5×10^{-4} $\pm 1 \times 10^{-4}$	**4.7×10^{-3}** $\pm 5 \times 10^{-5}$ 3.6×10^{-3} $\pm 1 \times 10^{-3}$	**7.3×10^{-4}** $\pm 1 \times 10^{-4}$ 5.5×10^{-4} $\pm 2 \times 10^{-4}$
V_{th} (V)	-20 -20	-13 -14	-18 -18	-10 -11	-28 -26
Hysteresis	2 2	1.8 1.9	3 3	6 5	2.0 3.1
On/Off	4×10^4 1×10^5	1×10^3 1×10^3	5×10^3 9×10^3	1×10^4 2×10^4	1×10^4 6×10^3
Working devices	9/9	7/9	8/9	7/9	8/9

Table S1: FET properties of polymer **1-6**. Red values are averages of the three best devices; black values are averages of all working devices.

Polymer	8	7	9	10	11	12
Mobility ([cm^2/Vs)	**$6.7 \times 10^{-4} \pm 5.0 \times 10^{-5}$** $6.2 \times 10^{-4} \pm 5.5 \times 10^{-5}$	**$3.3 \times 10^{-4} \pm 1.8 \times 10^{-6}$** $3.0 \times 10^{-4} \pm 4.4 \times 10^{-5}$	**$5.4 \times 10^{-5} \pm 2.9 \times 10^{-6}$** $4.8 \times 10^{-5} \pm 7.6 \times 10^{-6}$	**$7.9 \times 10^{-4} \pm 8.9 \times 10^{-5}$** $7.7 \times 10^{-4} \pm 9.4 \times 10^{-5}$	**$2.8 \times 10^{-3} \pm 2.5 \times 10^{-4}$** $2.3 \times 10^{-3} \pm 7.9 \times 10^{-4}$	**$1.7 \times 10^{-4} \pm 8.2 \times 10^{-5}$** $1.3 \times 10^{-4} \pm 8.6 \times 10^{-5}$
V_{th} (V)	-11 -10	-9 -8	-23 -22	-8 -8	-12 -13	-2 -14
Hysteresis	3 3	3 3	2 2	1 1	2 1	3 2
On/off	8×10^2 8×10^2	1×10^3 3×10^3	5×10^3 4×10^3	2×10^3 2×10^3	9×10^3 7×10^3	6×10^3 3×10^3
Working devices	8/9	9/9	6/9	9/9	9/9	5/9

Table 2: FET properties of polymers **8**-**12**. Red values are averages of the three best devices; black values are averages of all working devices. Devices of **12** were fabricated using polymer solutions in TCE at 80 °C.

Differential scanning calorimetry

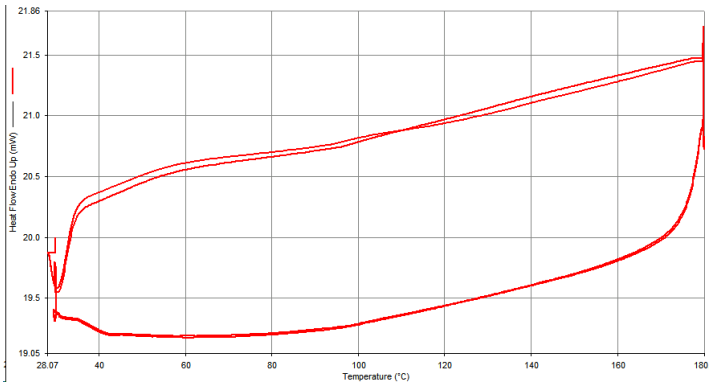

Figure S- 13 DSC curves for 1

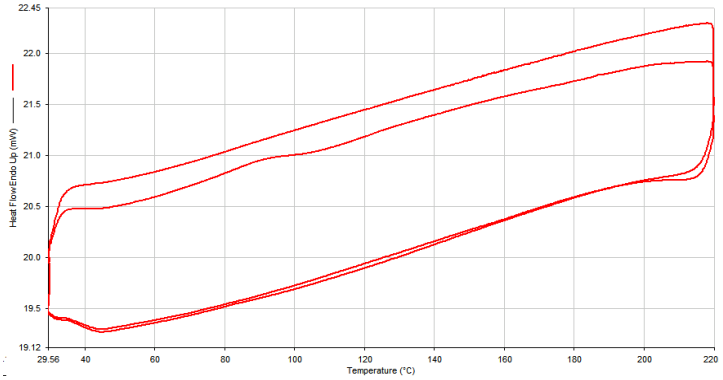

Figure S- 14 DSC curves for 2

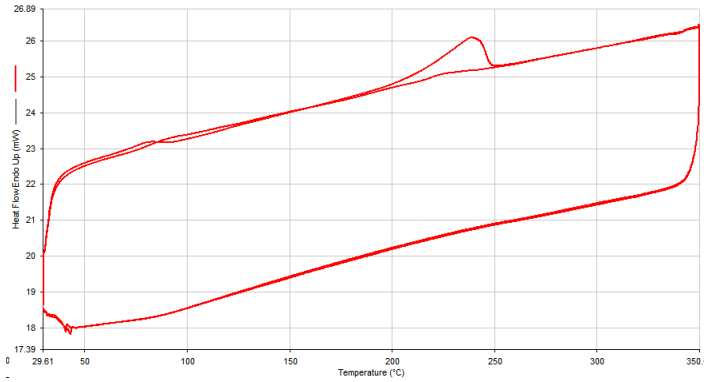

Figure S- 15 DSC curves for 4

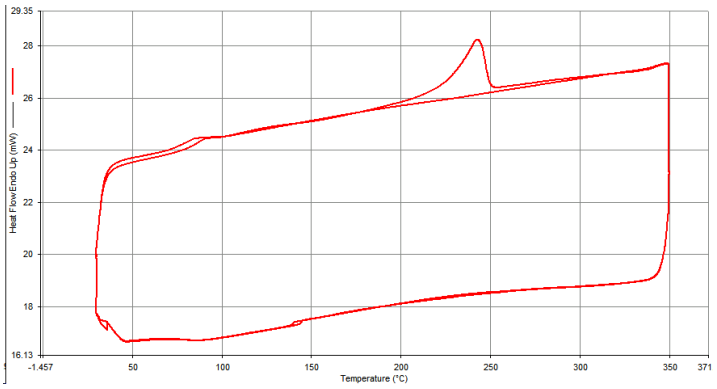

Figure S- 16 DSC curves for 5

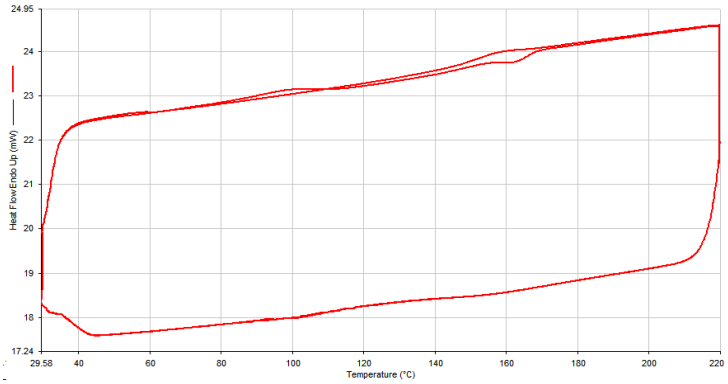

Figure S- 17 DSC curves for 8

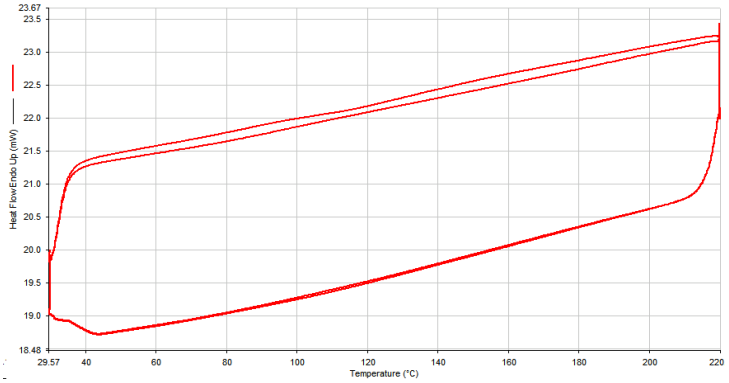

Figure S- 18 DSC curves for 11

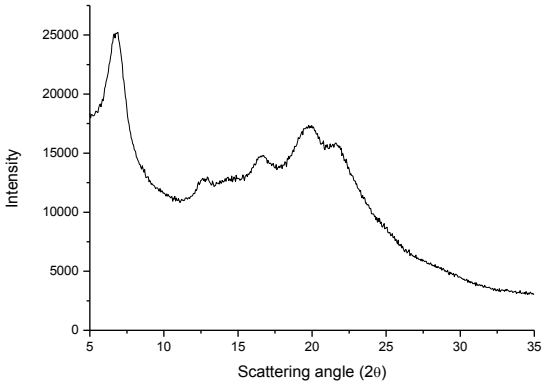

Figure S- 19 WAXS pattern of 5

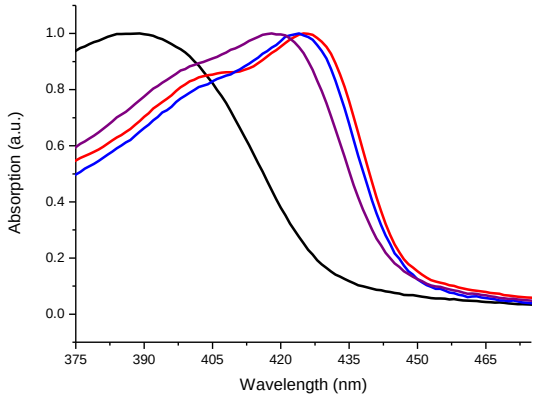

Figure S- 20 Film UV-Vis spectra of polymer 2 (black line), 5 (red), 8 (blue) and 11 (purple).

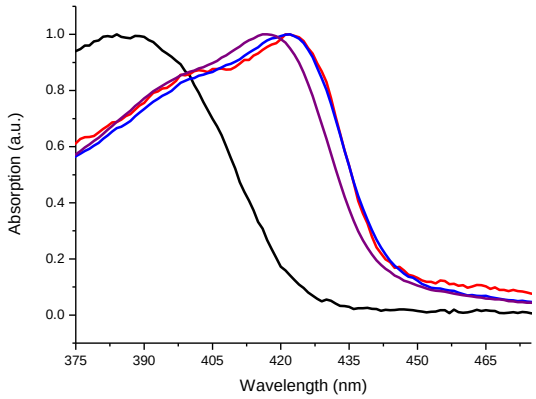

Figure S- 21 Film UV-Vis spectra of polymer 1 (black line), 4 (red), 7 (blue) and 10 (purple).