Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Solution-processable Low-bandgap 3-Fluorothieno[3,4-b]thiophene-2-carboxylate-based Conjugated Polymers for Electrochromic Applications

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NMR of Monomers and Polymers

2-butyloctyl 4, 6-dibromo-3-fluorothieno[3, 4-b]thiophene-2-carboxylate (2)

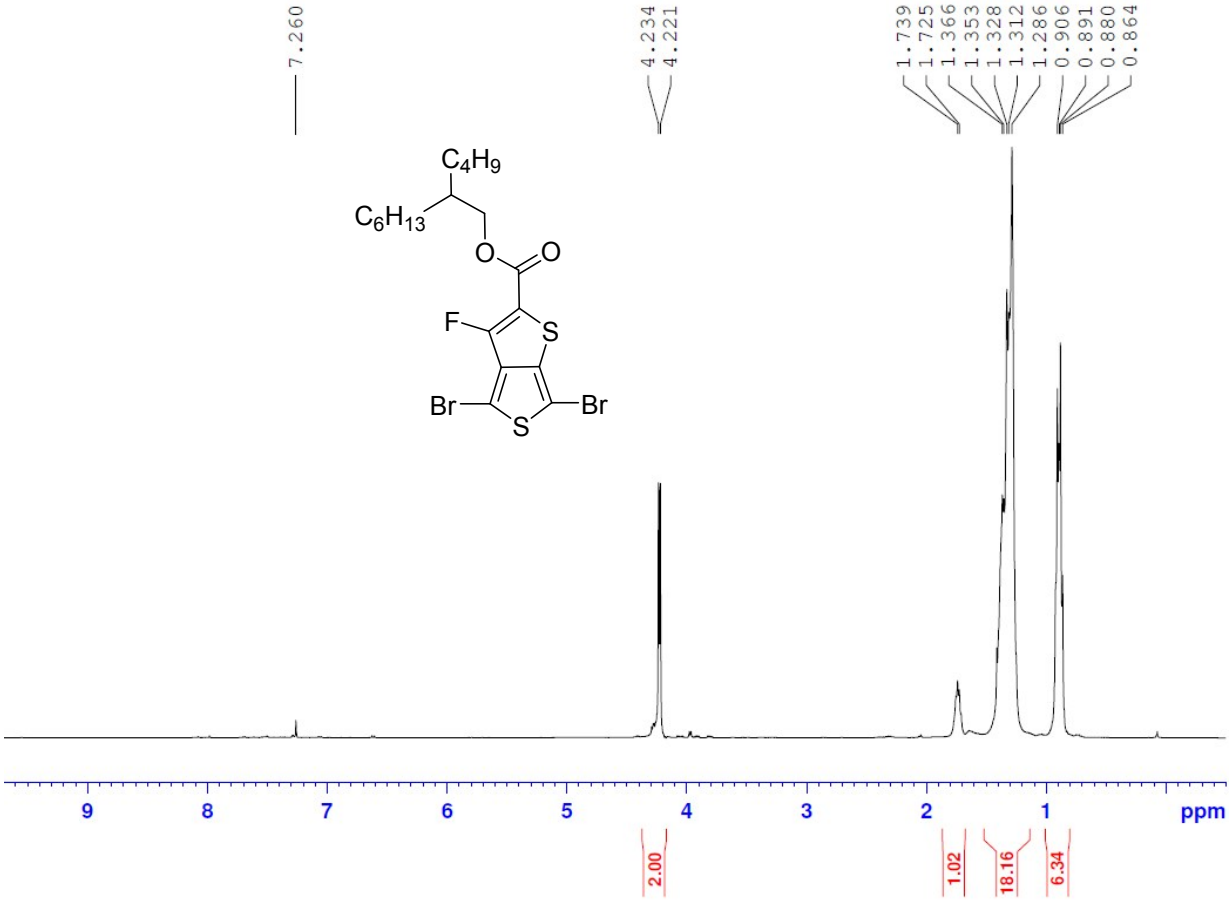


Figure S1 ^{1}H NMR spectrum of **2**

2-butyloctyl 3-fluoro-4, 6-di(thiophen-2-yl)thieno[3, 4-b]thiophene-2-carboxylate (3)

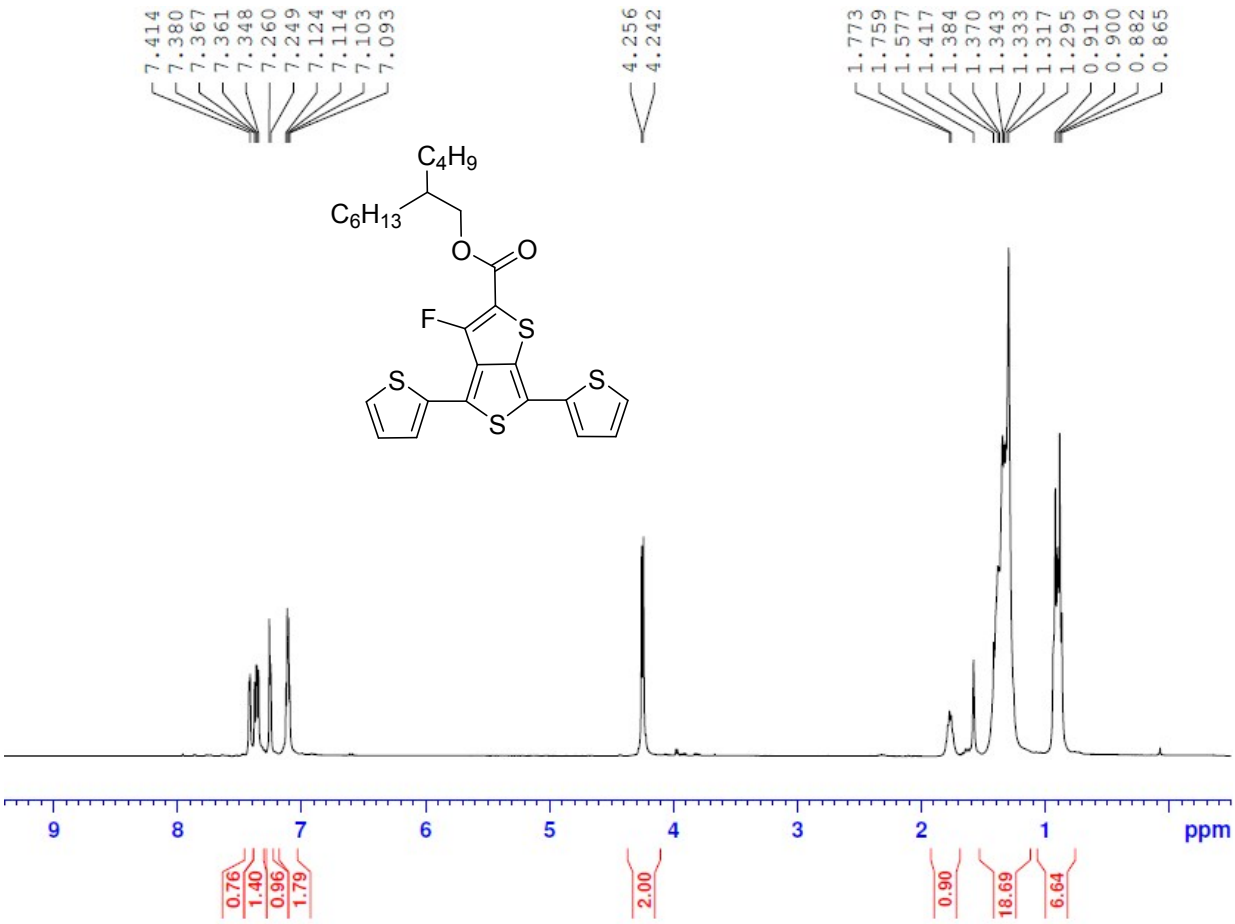


Figure S2 ^{1}H NMR spectrum of **3**

2-butyloctyl 4, 6-bis(5-bromothiophen-2-yl)-3-fluorothieno[3, 4-b]thiophene-2-carboxylate (4)

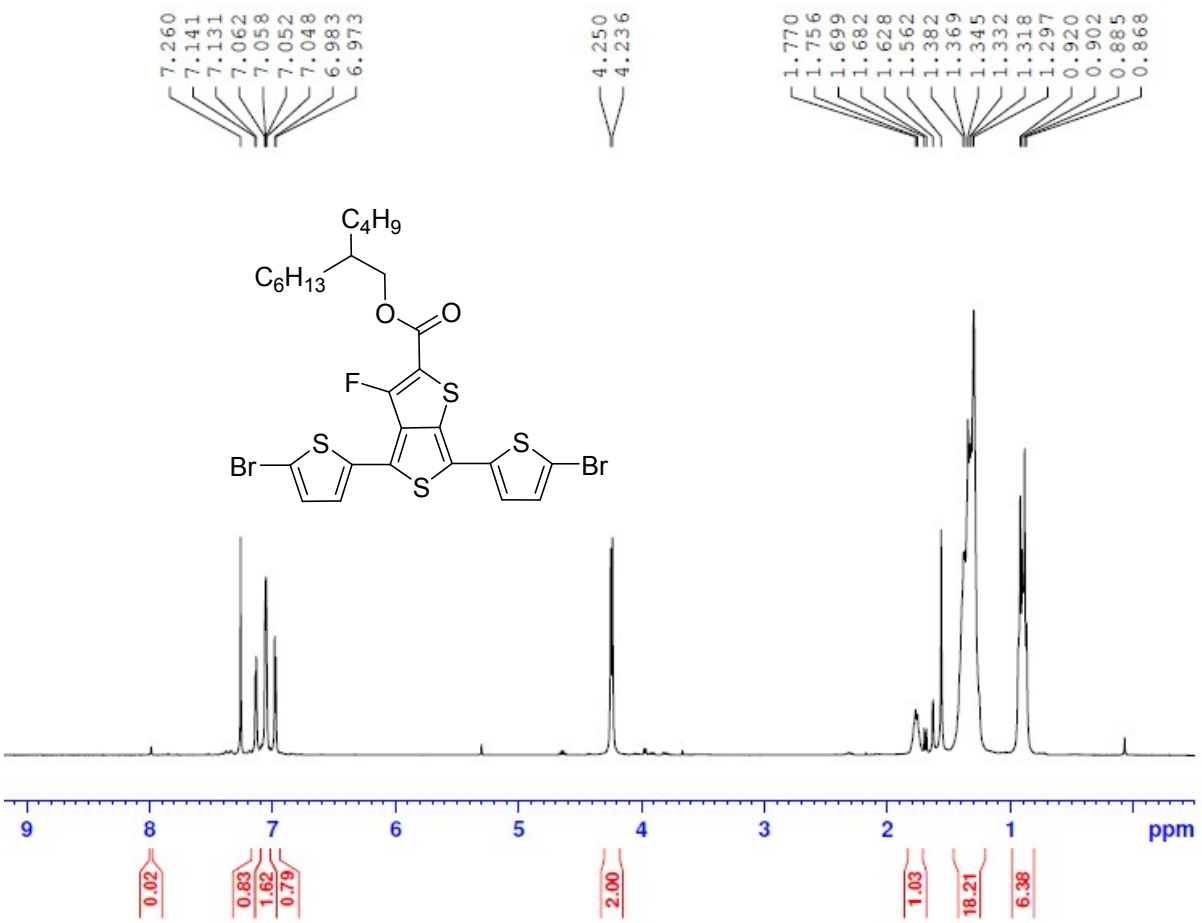


Figure S3 ^{1}H NMR spectrum of **4**

Monomers **5**, **6** and **7** were prepared according to literature reported method.[1,2]

Monomer **5**. ^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 4.15 (s, 4H), 0.89 (s, 18H).

Monomer **6**. ^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) 3.92 (t, J = 8.0 Hz, 4H), 1.72 (q, J = 7.2 Hz, 4H), 1.44-1.29 (m, 36H), 0.90 (t, J = 6.8 Hz, 6H), 0.34 (s, 18H).

Monomer **7**. ^{1}H NMR (400 MHz, $CDCl_3$) δ (ppm) δ (ppm) 3.74 (s, 4H), 1.28 (m, 40H), 0.90 (t, J = 6.8 Hz, 6H), 0.32 (s, 18H).

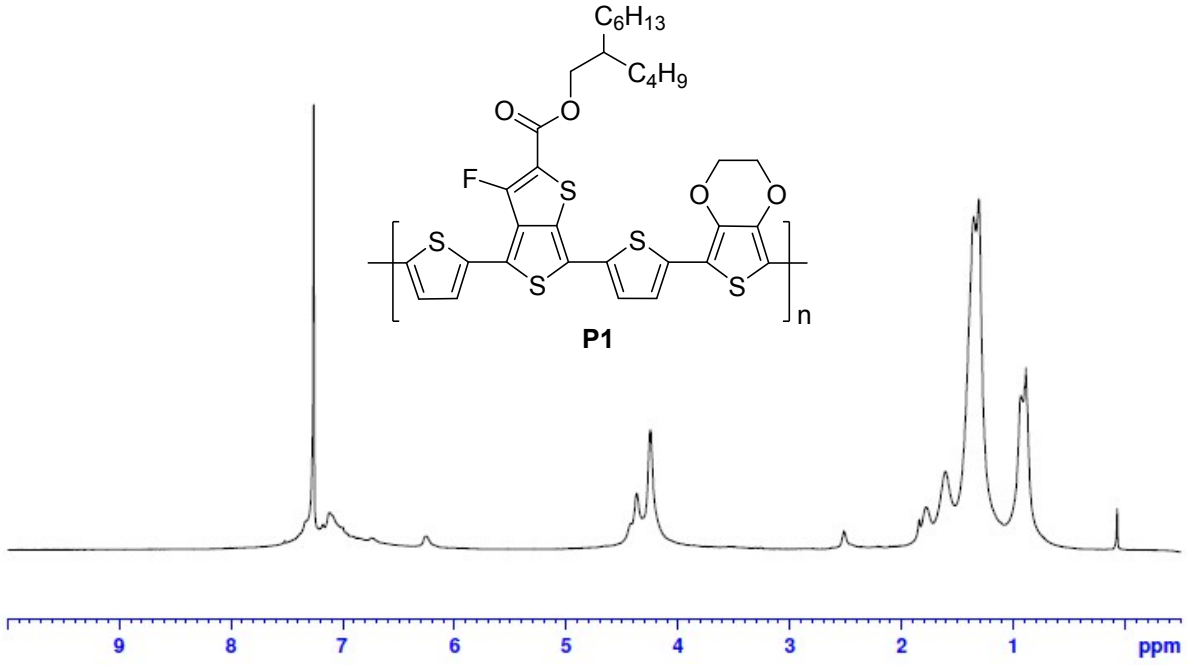


Figure S4 [1]H NMR spectrum of **P1**

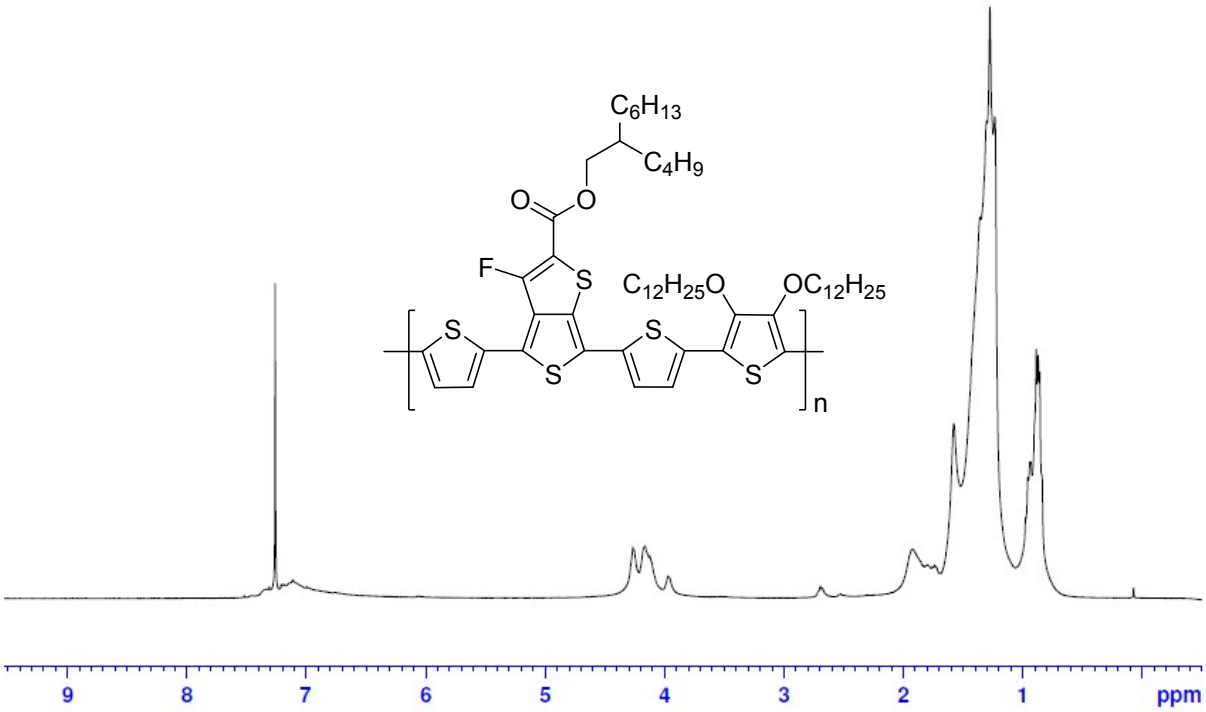


Figure S5 [1]H NMR spectrum of **P2**

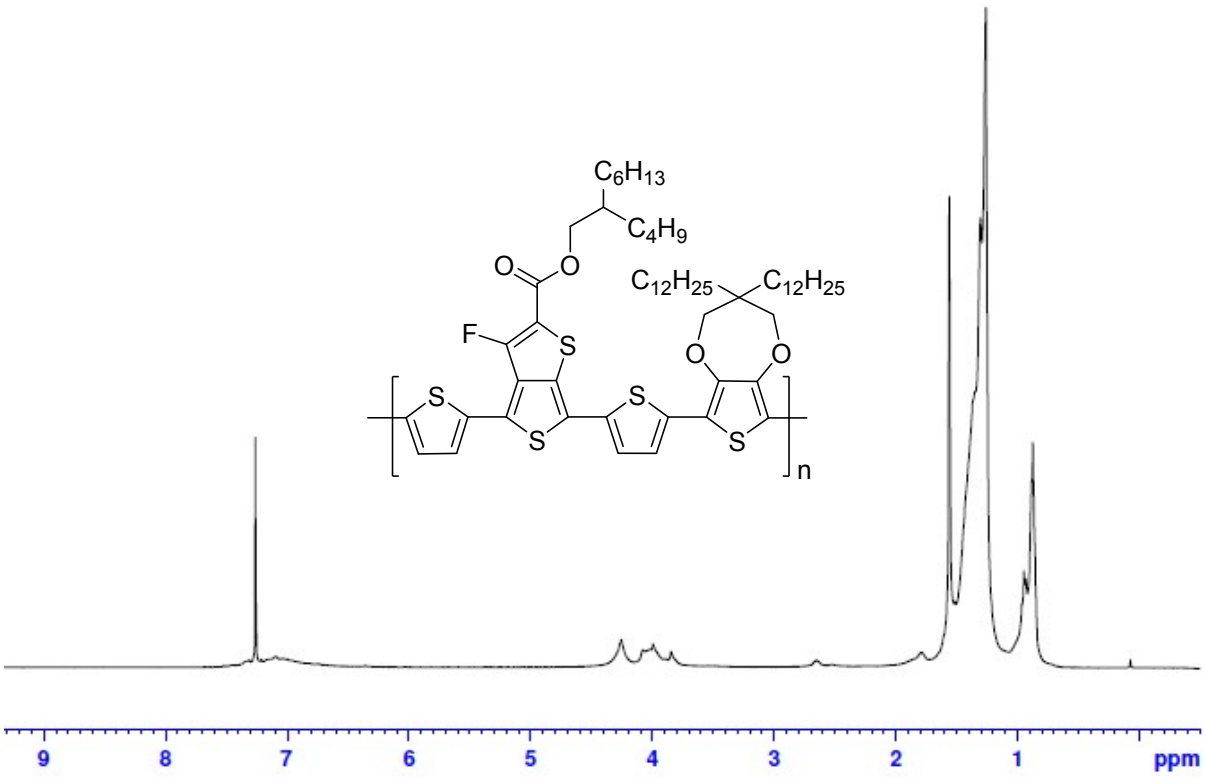
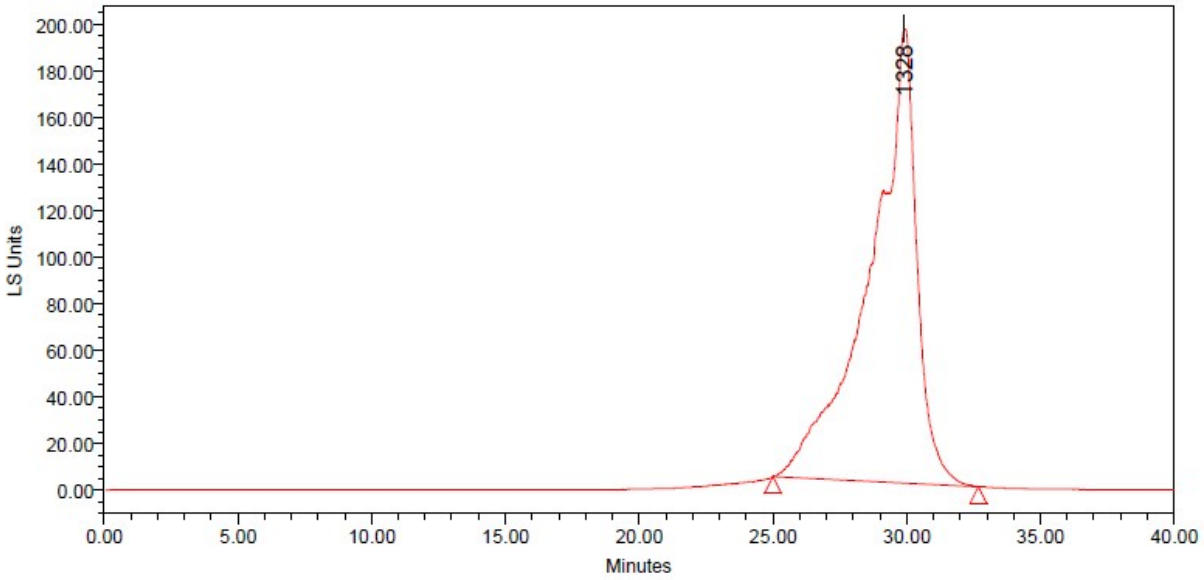


Figure S6 ^{1}H NMR spectrum of **P3**

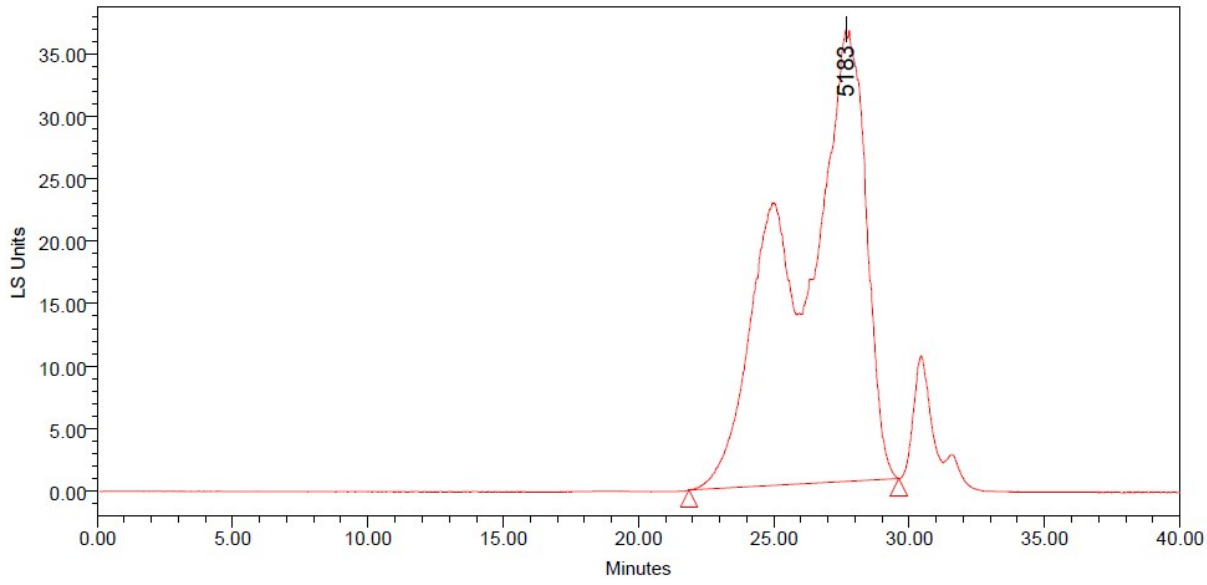
GPC and TGA Plots of Polymers



GPC Results

	Mn	Mw	MP	Mz	Mz+1	Polydispersity	Retention Time (min)
1	1810	2907	1328	5303	8482	1.605737	29.928

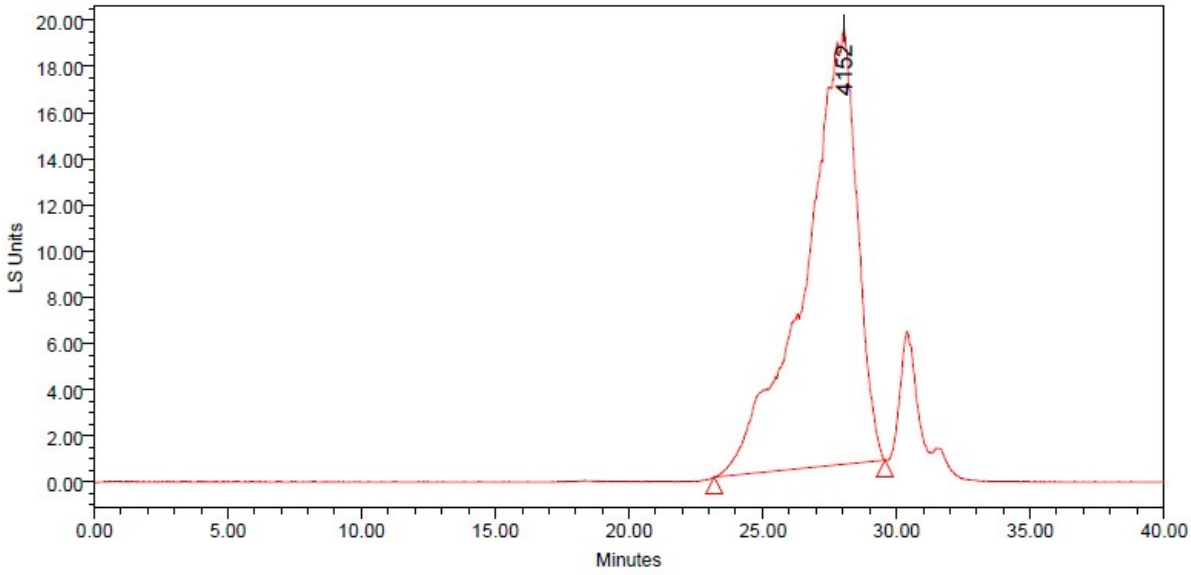
Figure S7 GPC chromatogram of **P1**.



GPC Results

	Mn	Mw	MP	Mz	Mz+1	Polydispersity	Retention Time (min)
1	7257	14271	5183	27417	42030	1.966429	27.657

Figure S8 GPC chromatogram of **P2**.



GPC Results

	Mn	Mw	MP	Mz	Mz+1	Polydispersity	Retention Time (min)
1	5458	8230	4152	14080	22138	1.507764	28.049

Figure S9 GPC chromatogram of **P3**.

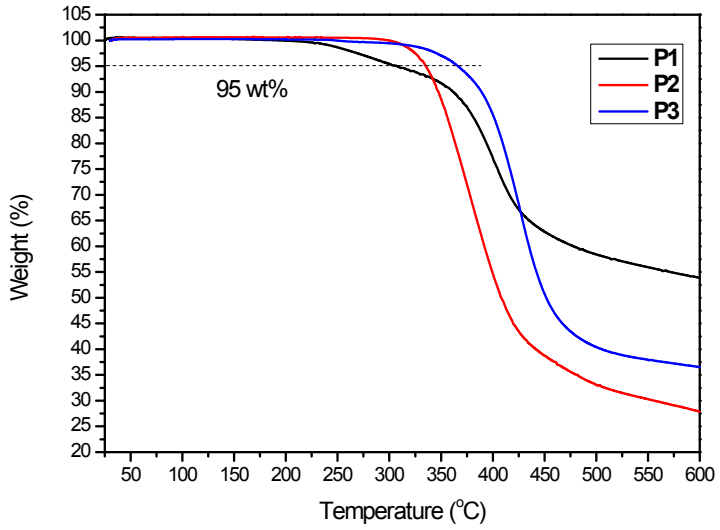


Figure S10 Thermograms of **P1-P3**.

Reference:

1 P. M. Beaujuge, S. V. Vasilyeva, D. Y. Liu, S. Ellinger, T. D. McCarley and J. R. Reynolds, *Chem. Mater.,* 2012, **24**, 255.
2 M. Turbiez, P. Frère, M. Allain, C. Videlot, J. Ackermann and J. Roncali, *Chem. Eur. J.*, 2005, **11**, 3742.