Supporting Information for

Multicolor Fluorescent Semiconducting Polymer Dots with Narrow Emissions and High Brightness

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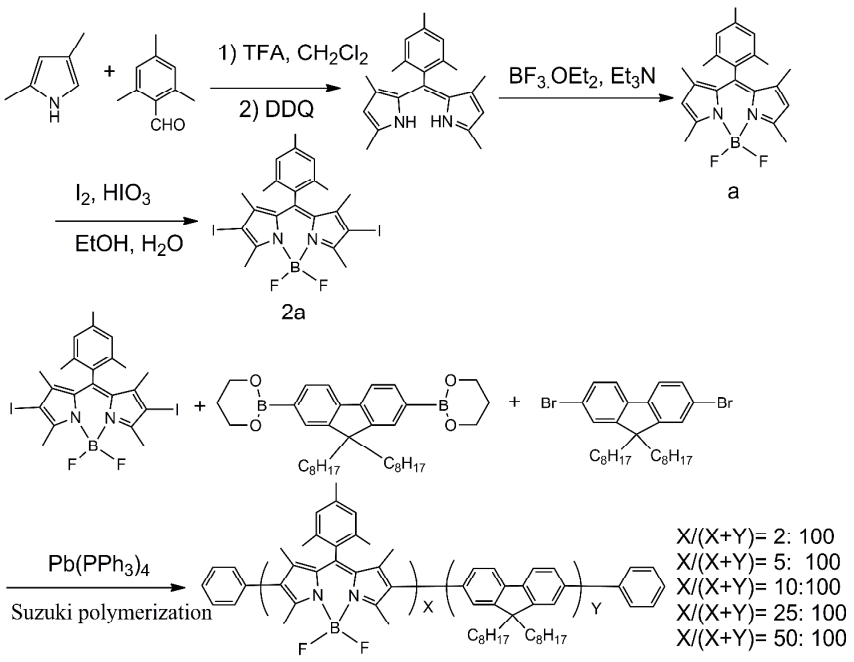
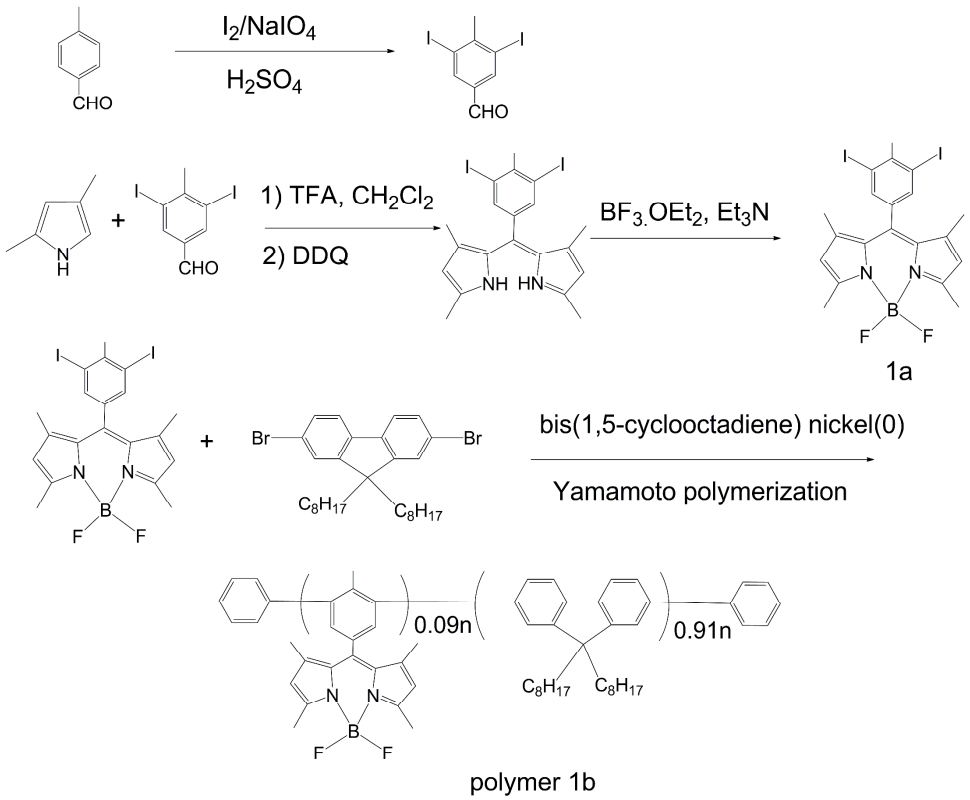
KEYWORDS Polymer dots • fluorescence • semiconducting polymer • bioimaging • narrow emission.



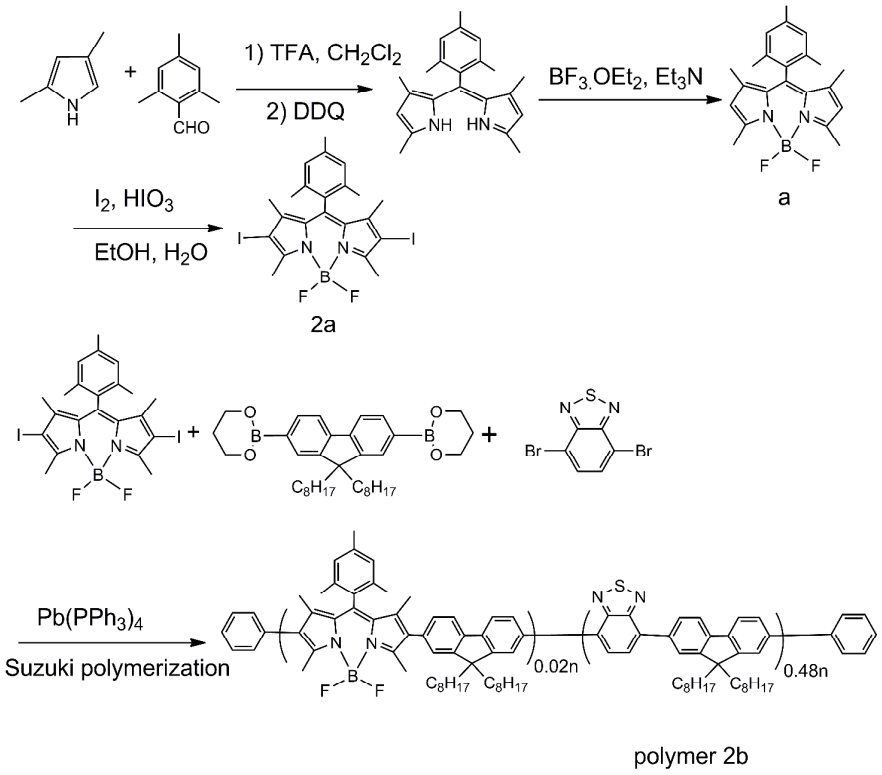
BODIPY fluorene copolymer series

Scheme S1. Synthesis of BODIPY monomer a, 2a, and BODIPY fluorene copolymer series

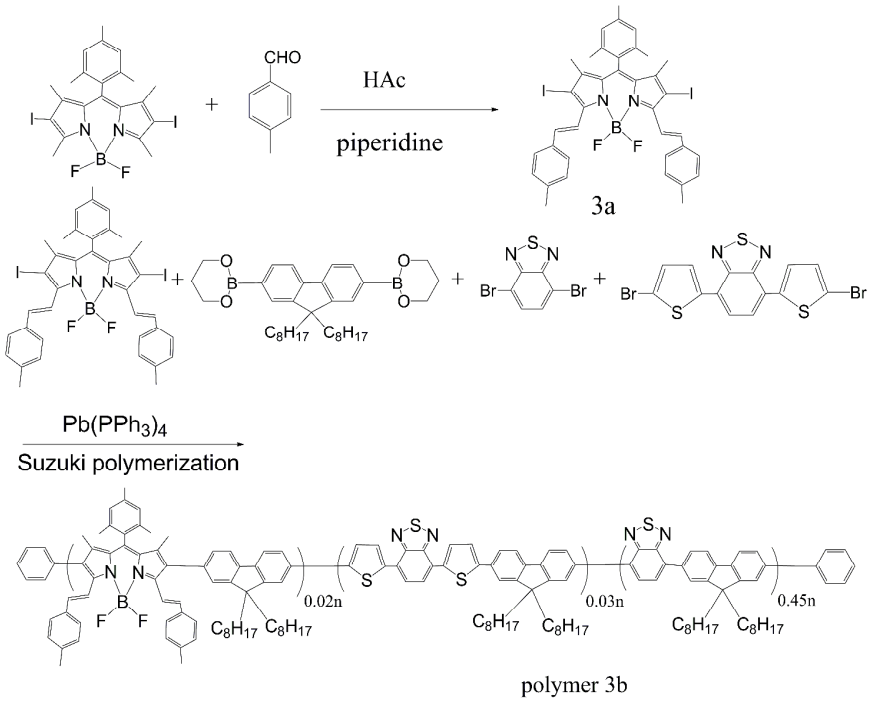


polymer 1b

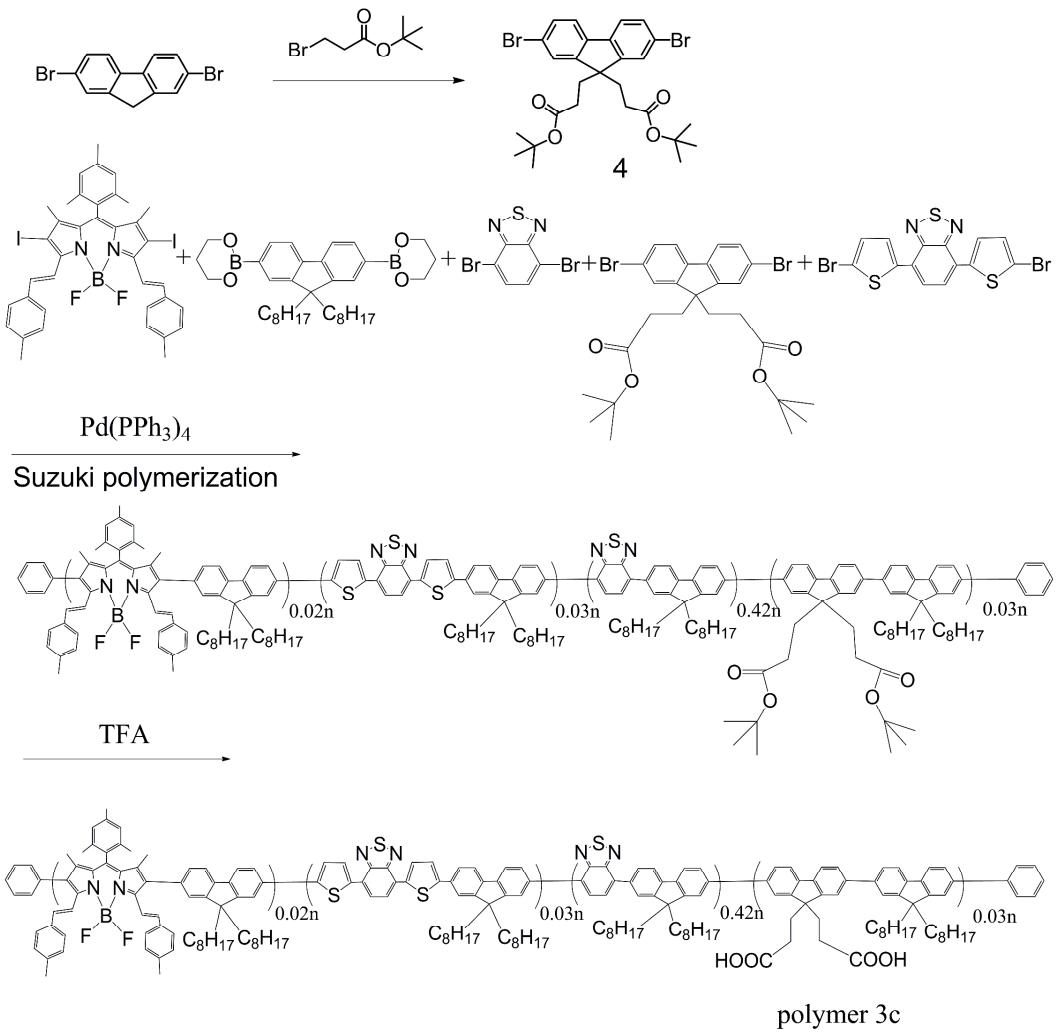
Scheme S2. Synthesis of monomer 1a and BODIPY fluorene copolymer 1b



Scheme S3. Synthesis of monomer 2a and BODIPY fluorene copolymer 2b



Scheme S4. Synthesis of monomer 3a and BODIPY fluorene copolymer 3b



Scheme S5. Synthesis of BODIPY fluorene copolymer 3c

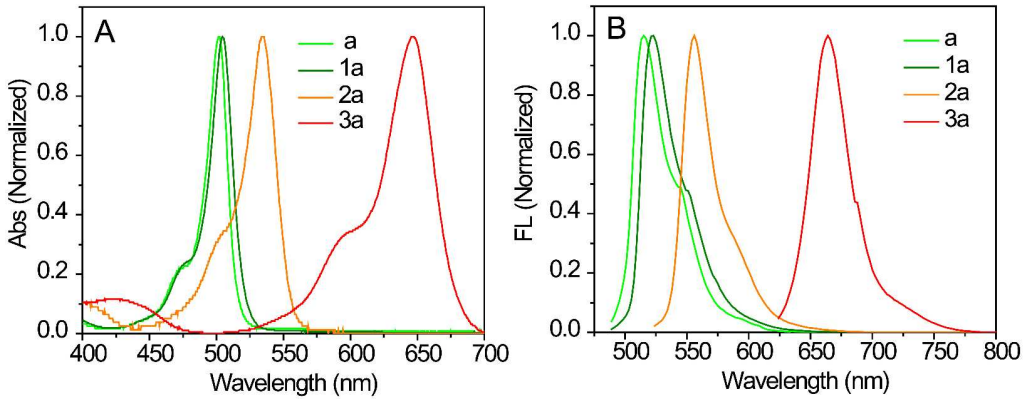


Figure S1. Absorption (A) and fluorescence (B) spectra of BODIPY monomer in THF solution.

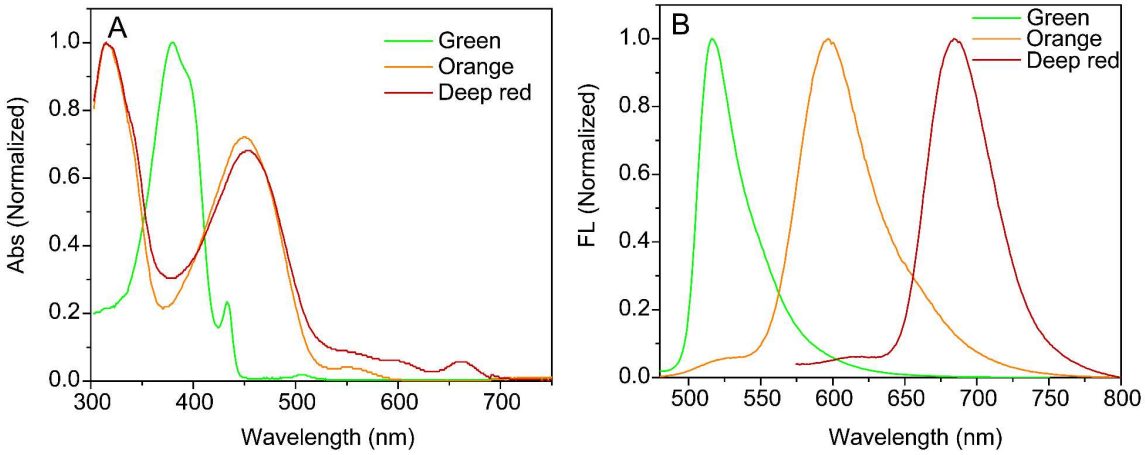


Figure S2. Absorption (A) and fluorescence (B) spectra of aqueous solutions of BODIPY Pdots of Polymer 1b (green), 2b (orange), and 3b (deep red). The excitation wavelength for Green, Orange, and Deep-Red Pdots was 405nm, 488nm, and 488nm, respectively.

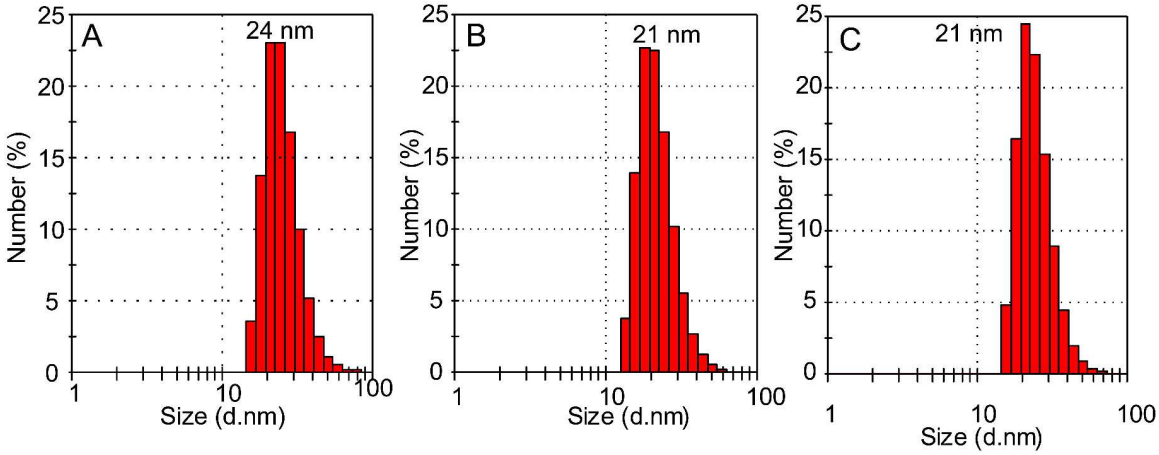


Figure S3. A-C: Histograms of the particle sizes measured by DLS for the BODIPY Pdots prepared from: Polymer **1b** (A); Polymer **2b** (B); Polymer **3b** (C).

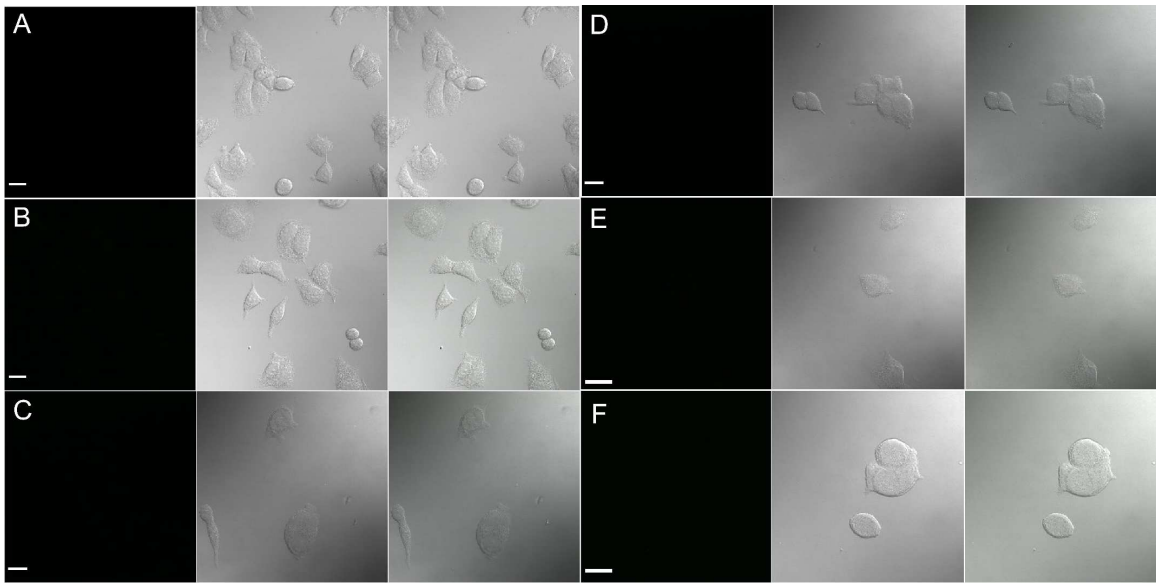


Figure S4. Confocal fluorescence microscopy images of MCF-7 breast-cancer cells. A-B: Negative control, where labeling was carried out under the same condition as positive labeling with BODIPY520 Pdot-SA (Figure 5a), but in the absence of EDC catalyst in the bioconjugation step (A) and in the absence of biotinylated primary antibody (B). C-D: Negative control, where labeling was carried out under the same condition as positive labeling with BODIPY600 Pdot-SA (Figure 5b), but in the absence of EDC catalyst in the bioconjugation step (C) and in the absence of biotinylated primary antibody (D). E-F: Negative control, where labeling was carried out under the same condition as positive labeling with BODIPY690 Pdot-SA (Figure 5c), but in the absence of EDC catalyst in the bioconjugation step (E) and in the absence of biotinylated primary antibody (F). Images from left to right: Fluorescence images from Pdot-SA; Nomarski (DIC) images; combined DIC and fluorescence images. All the scale bars represent 20 μm.

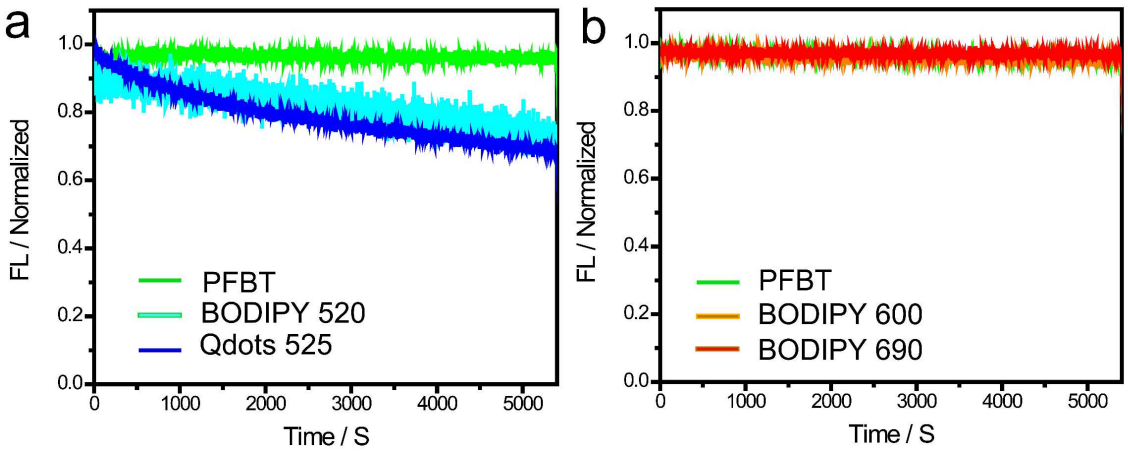


Figure S5. Photo-stability (normalized fluorescence intensity *vs.* time) of (a) PFBT/PS-PEG Pdots (green curve, λex = 405 nm), Qdots 525 (blue curve, λex = 405 nm), BODIPY520 Pdots (cyan curve, λex = 405 nm) in bulk aqueous solution, respectively; (b) PFBT/PS-PEG Pdots (green curve, λex = 488 nm), BODIPY 600 Pdots (orange curve, λex = 488 nm), BODIPY 690 Pdots (red curve, λex = 488 nm) in bulk aqueous solution, respectively.

Table S1. Spectroscopic Properties of BODIPY monomers in THF.

BODIPY monomer	$\lambda_{abs\ max}$ (nm)	$\lambda_{em\ max}$ (nm)	FWHM[a] (nm)	Φ_F[b]
a	502	515	36	0.98
1a	504.5	522	35	0.56
2a	534.5	556	28	0.026
3a	646.5	664	36	0.215

[a] Fluorescence full width at half-maximum peak height. [b] Absolute photoluminescence quantum yield

Table S2. Spectroscopic Properties of BODIPY Pdots in water.

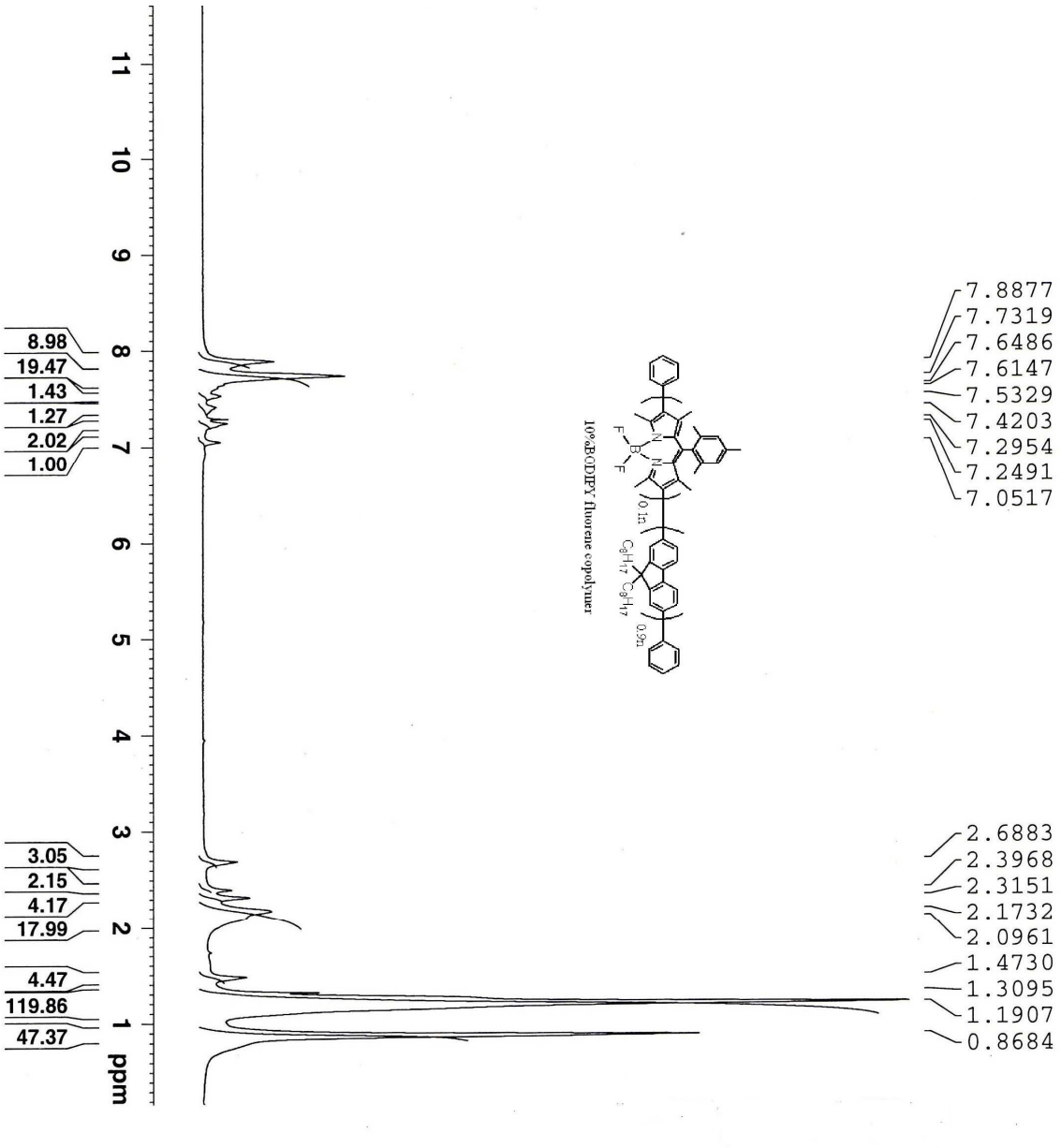
Polymer Pdots	$\lambda_{abs\ max}$(nm)	$\lambda_{em\ max}$(nm)	Life time (ns)	FWHM[a] (nm)	Φ_F[b]
Polymer **1b** Pdots	378, 504.5	516	3.11	41	0.35
Polymer **2b** Pdots	317, 455, 546,	596	1.08	55	0.13
Polymer **3c** Pdots	317, 450, 538, 653	688	1.60	53	0.19

[a] Fluorescence full width at half-maximum peak height. [b] Absolute photoluminescence quantum yield

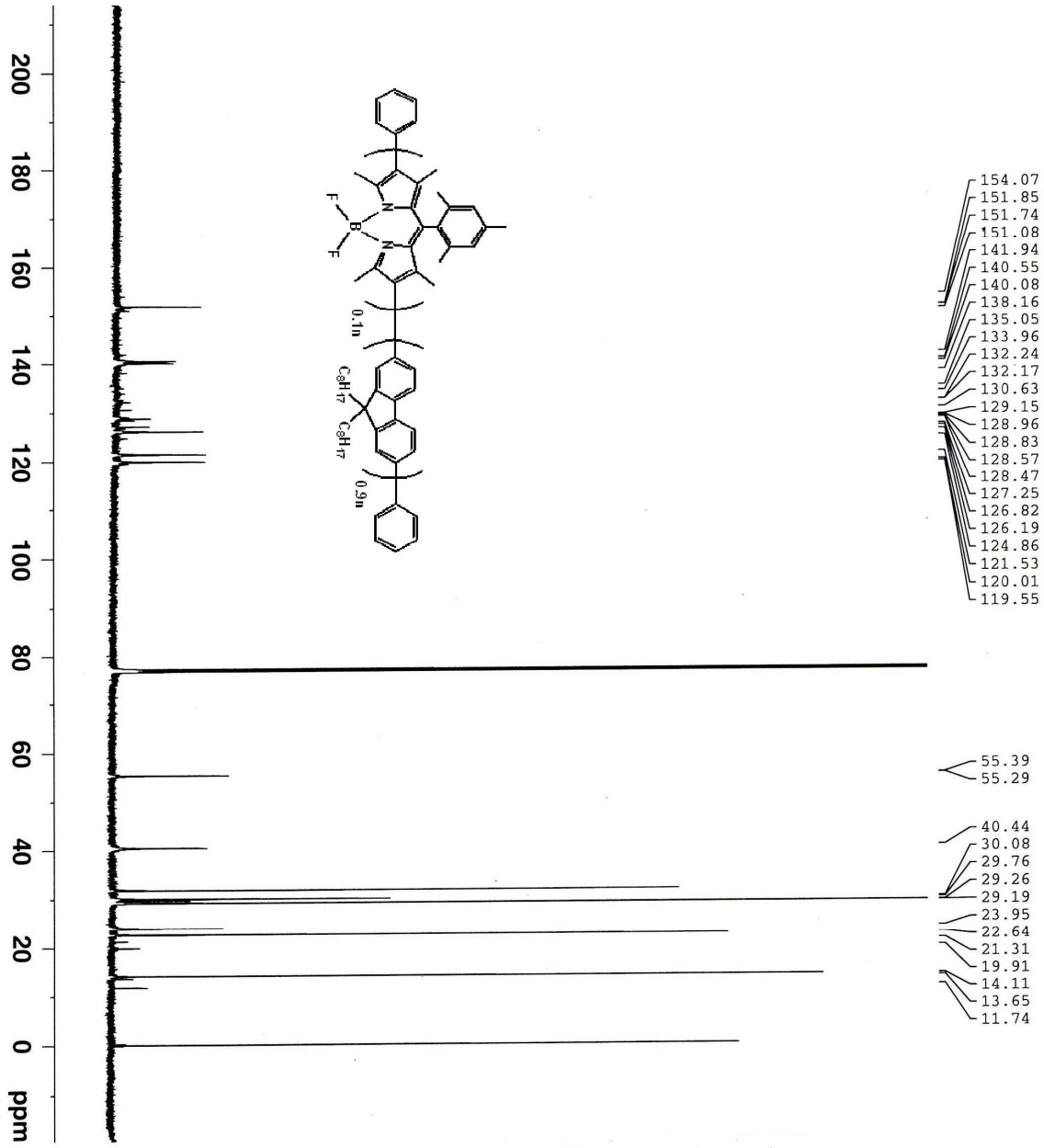
Table S3. Size, zeta potential, and photophysical properties of BODIPY520, 600, and 690 Pdots

Pdots	Size[a]	ξ[b]	Abs(10^{-13}cm^2) [c]	Φ[d]	B (CCD counts) [e]
BODIPY520	16	-48.9	2.50 (405nm)	35	33,000 (405nm)
BODIPY600	18	-36.3	1.50 (488nm)	13	7,000 (488nm)
BODIPY690	18	-36.9	1.68 (488nm)	19	/
PFBT	18	-45.1	1.72 (405nm) 2.09 (488nm)	30	23,000 (405nm) 21,000 (488nm)

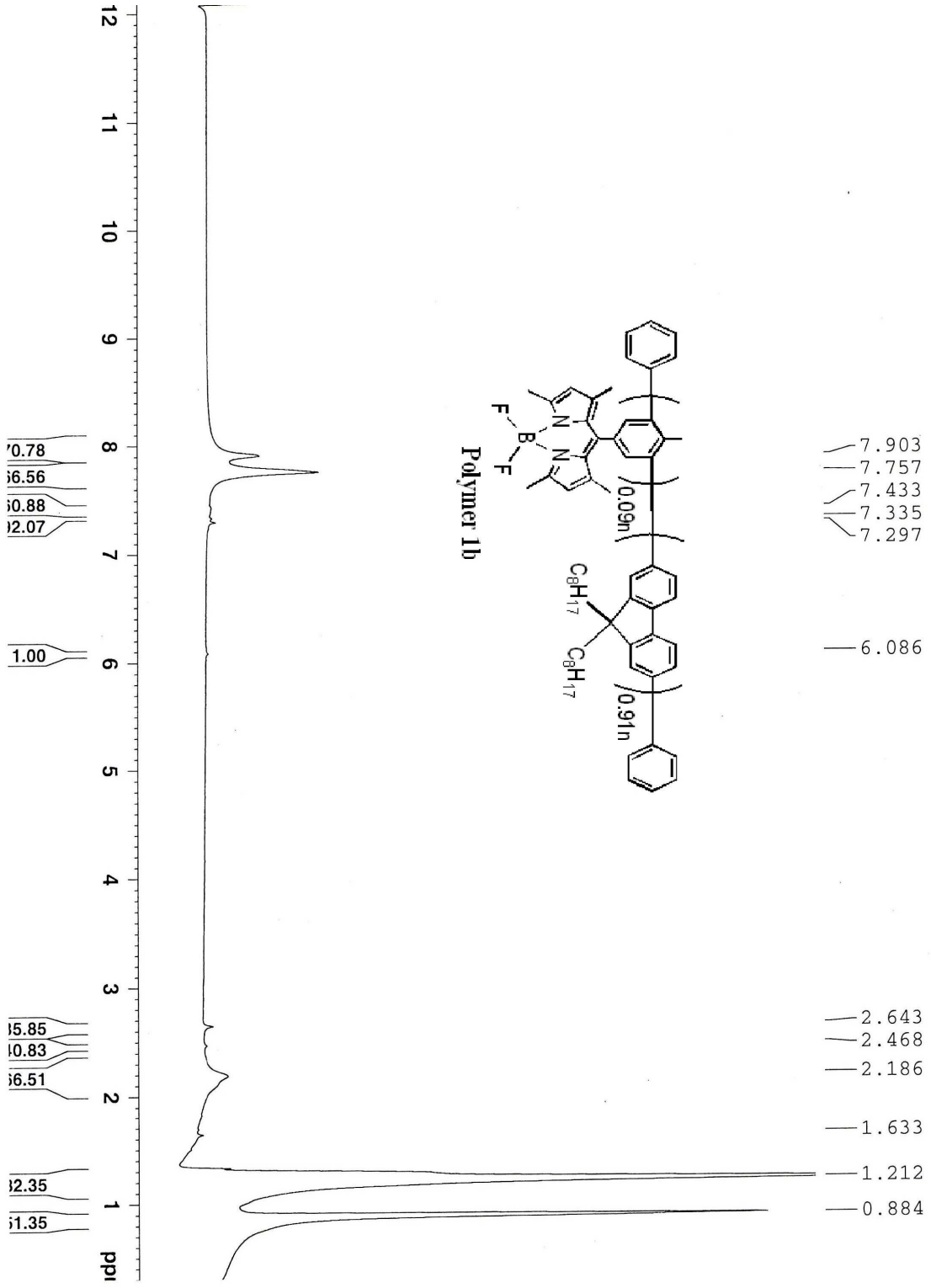
[a] Size was measured by DLS. [b] Zeta potential. [c] Absorption cross-section per single Pdot. [d] Absolute photoluminescence quantum yield. [e] Single particle brightness, for PFBT, the data at 405 nm and 488 nm were not measured at the same time, therefore, the conditions may be different; BODIPY520 and PFBT were measured under the same conditions; BODIPY600 and PFBT were measured under the same conditions



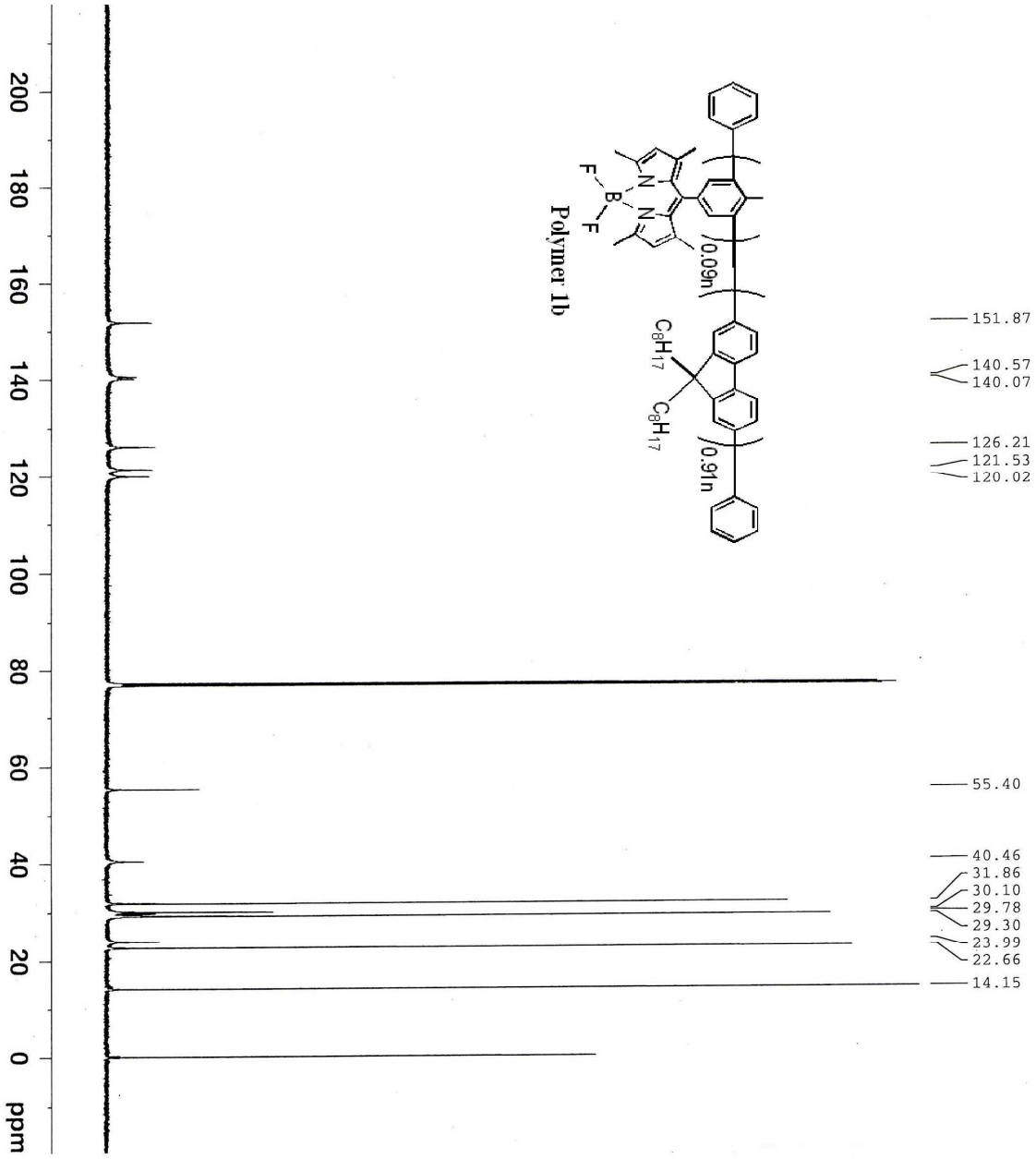
^{1}H-NMR of 10% BODIPY fluorine copolymer



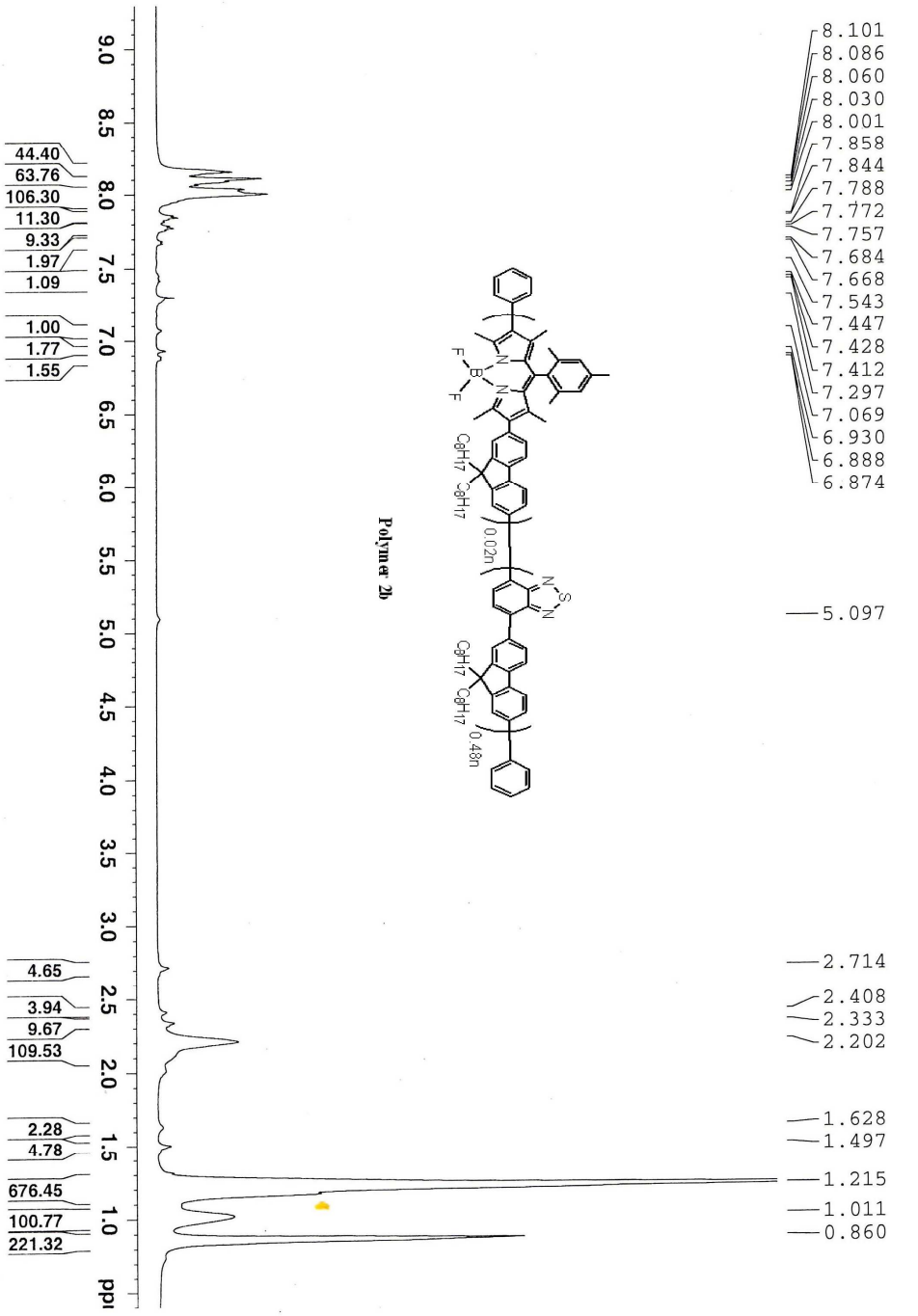
^{13}C-NMR of 10% BODIPY fluorine copolymer



^{1}H-NMR of polymer 1b



^{13}C-NMR of polymer 1b



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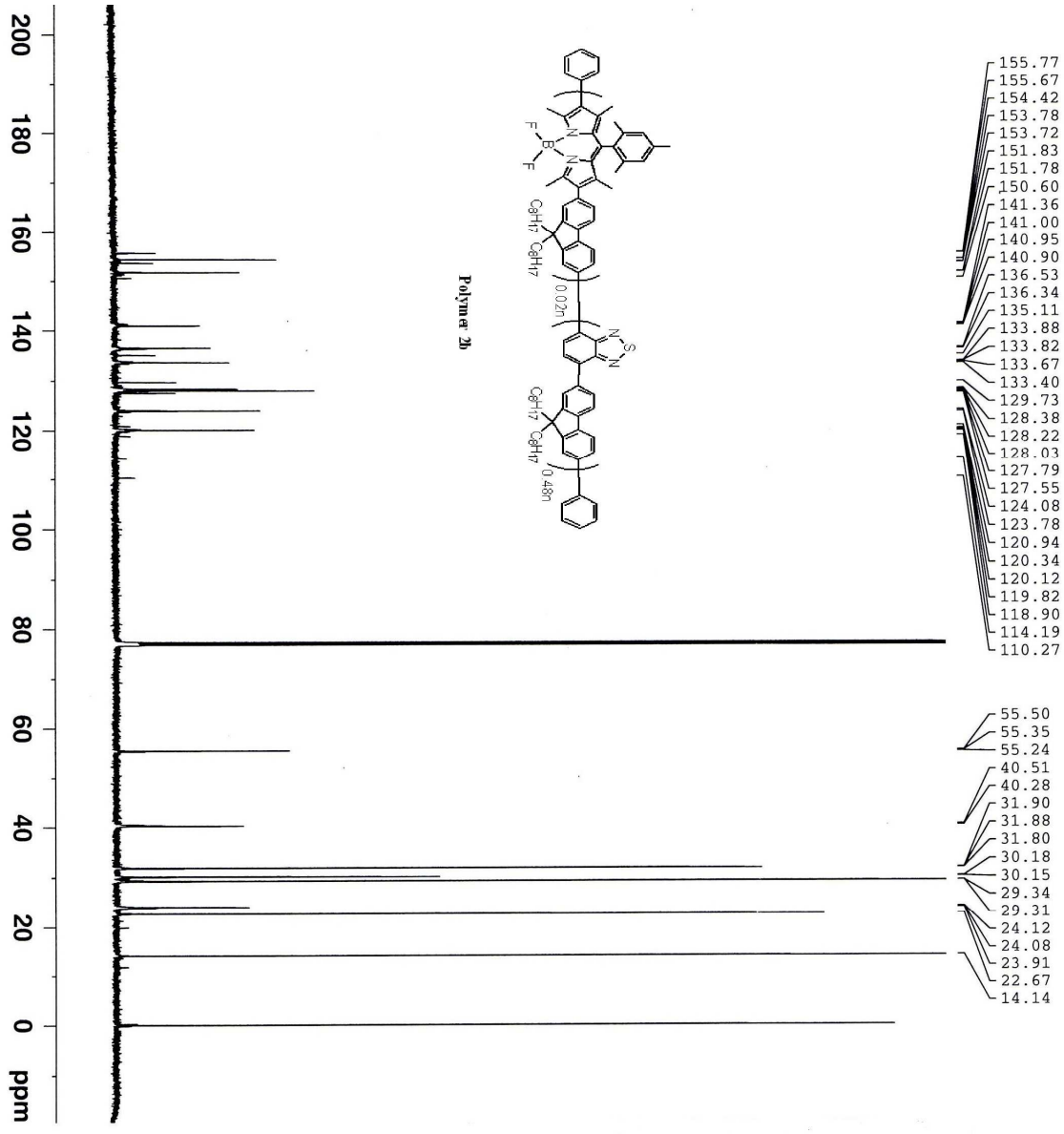

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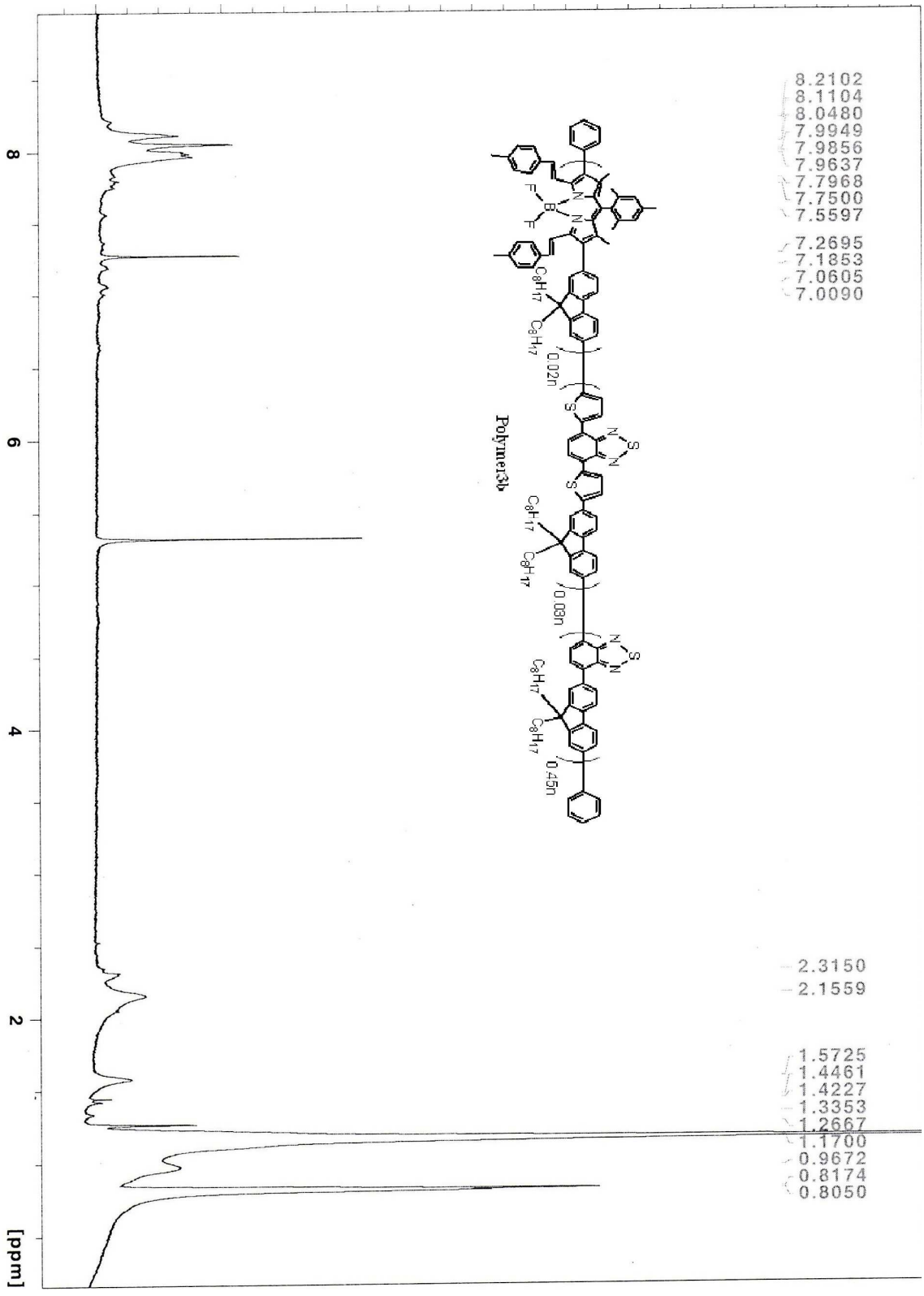

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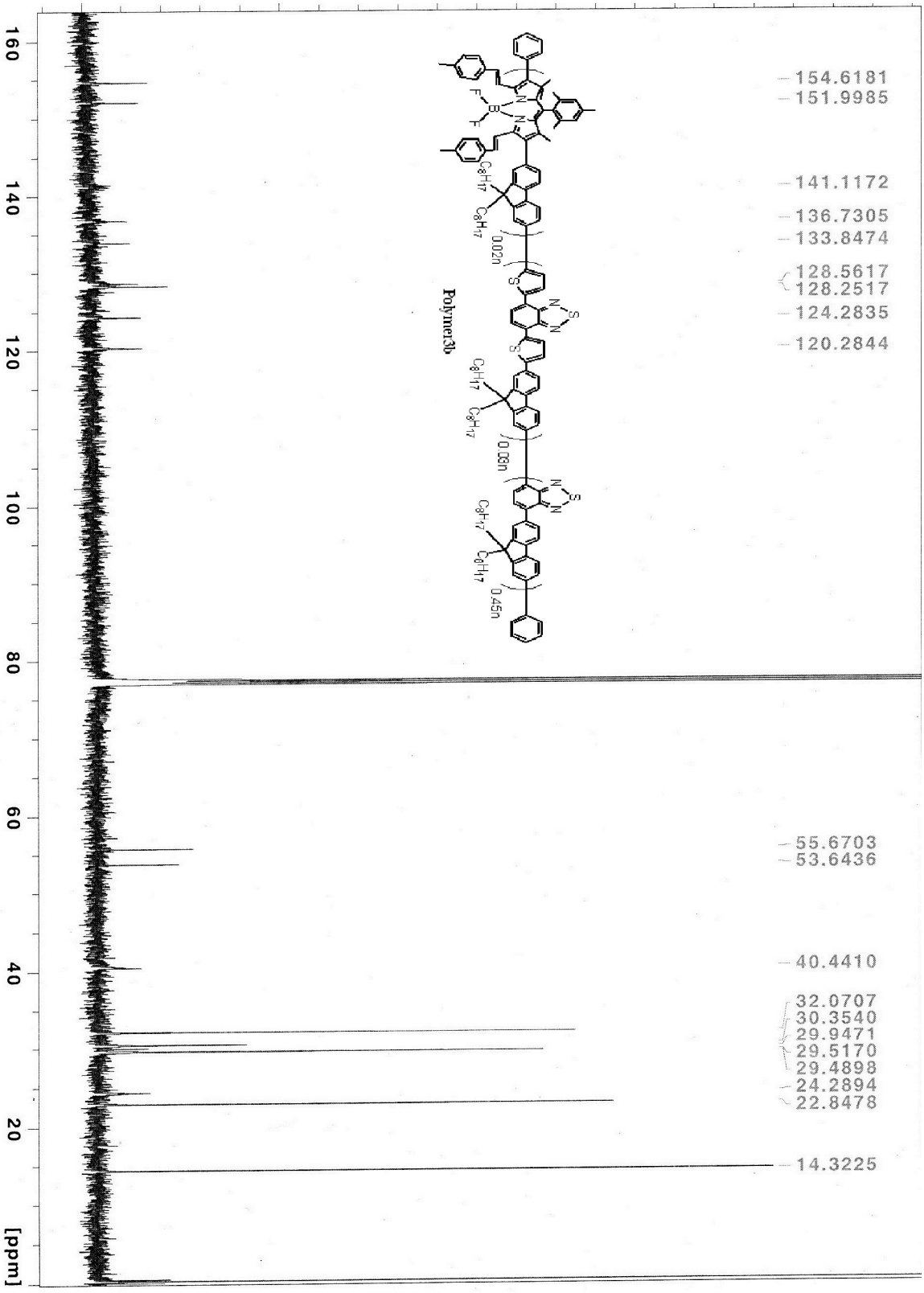

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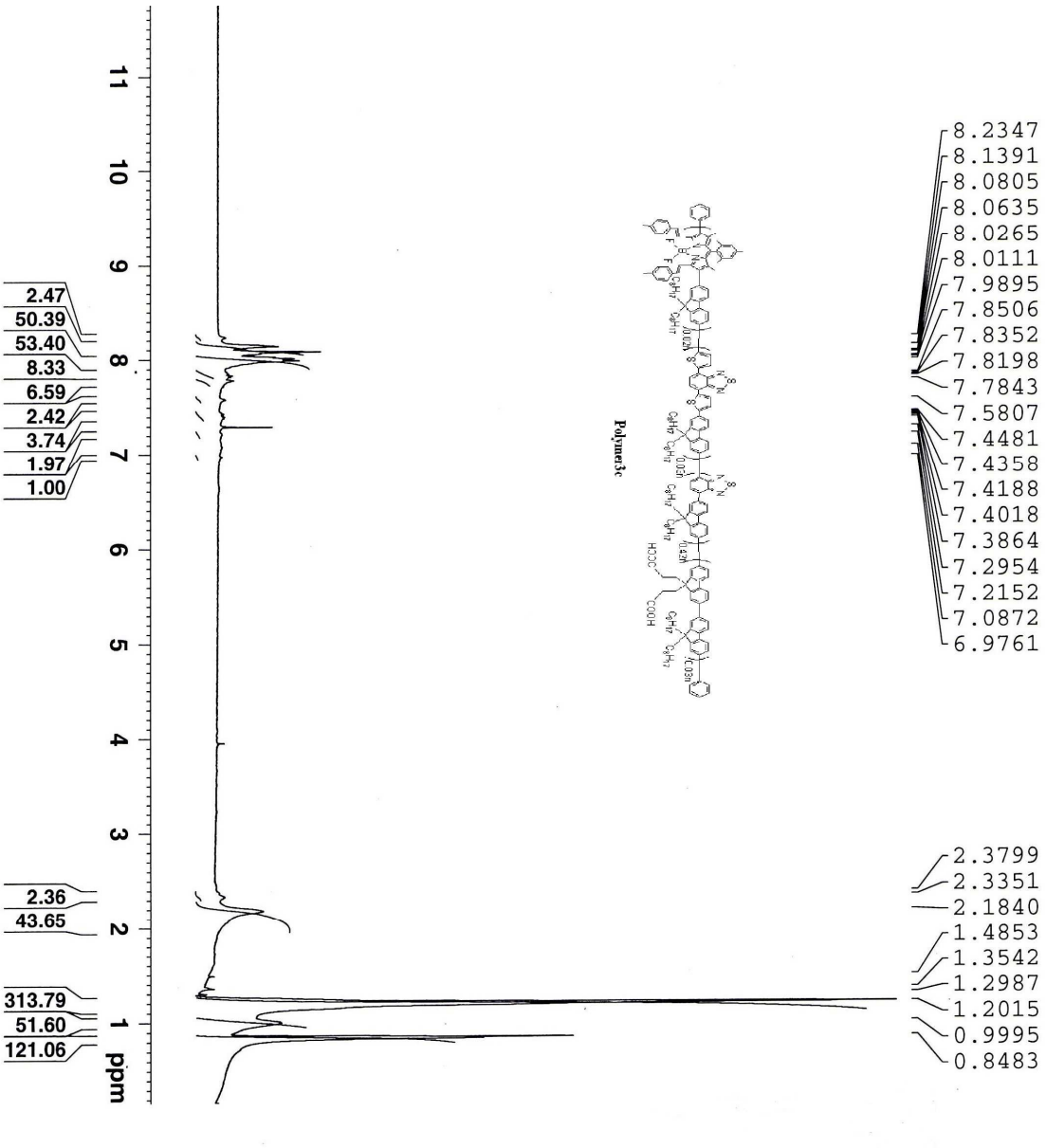
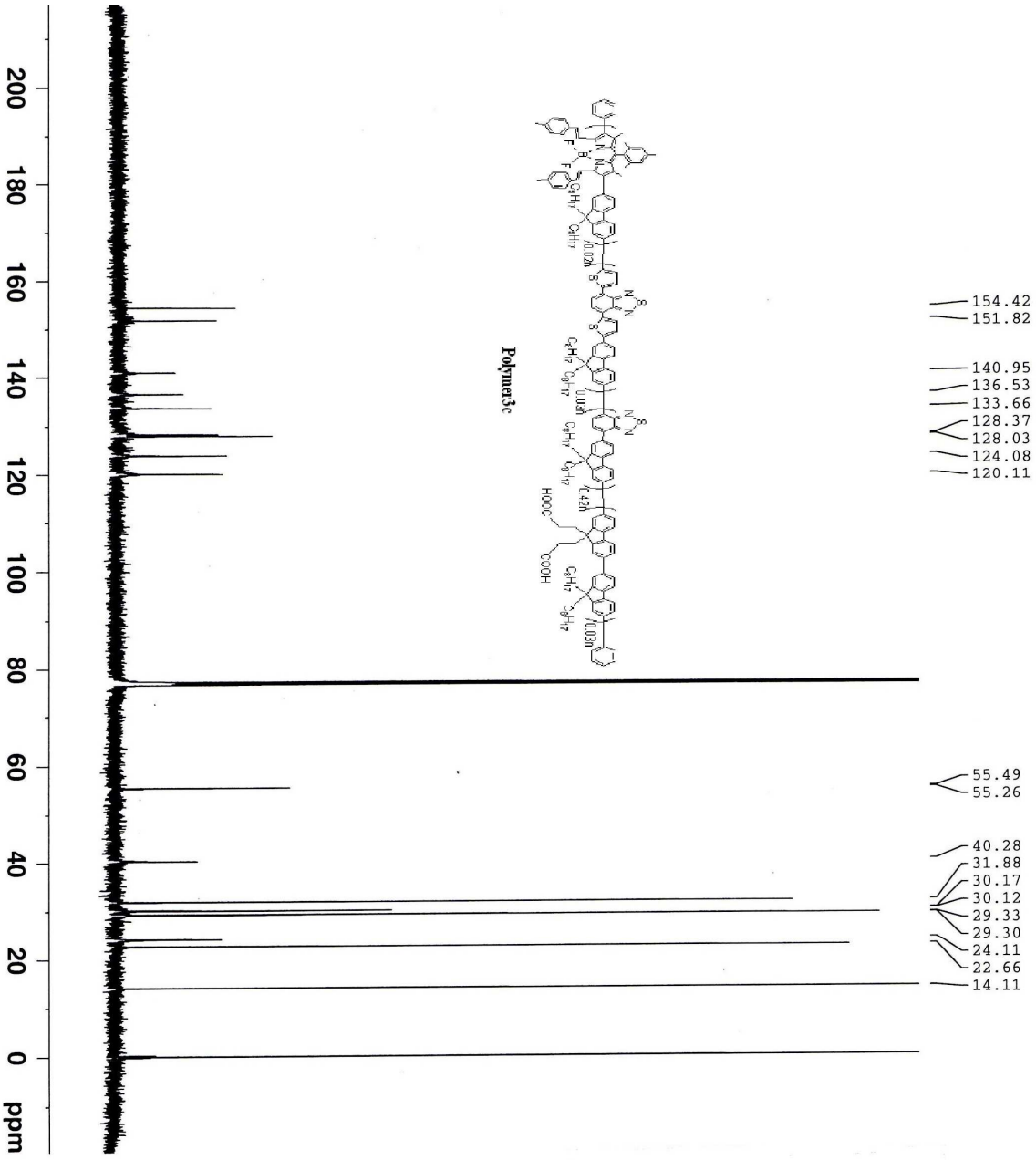


^{1}H-NMR of polymer 3c



^{13}C-NMR of polymer 3c