Electronic Supplementary Material (ESI) for Polymer Chemistry.

Supplementary Information

Synthesis of triphenylamine-containing conjugated polyelectrolyte and fabrication of fluorescence color-changeable, paper-based sensor strips for biothiol detection

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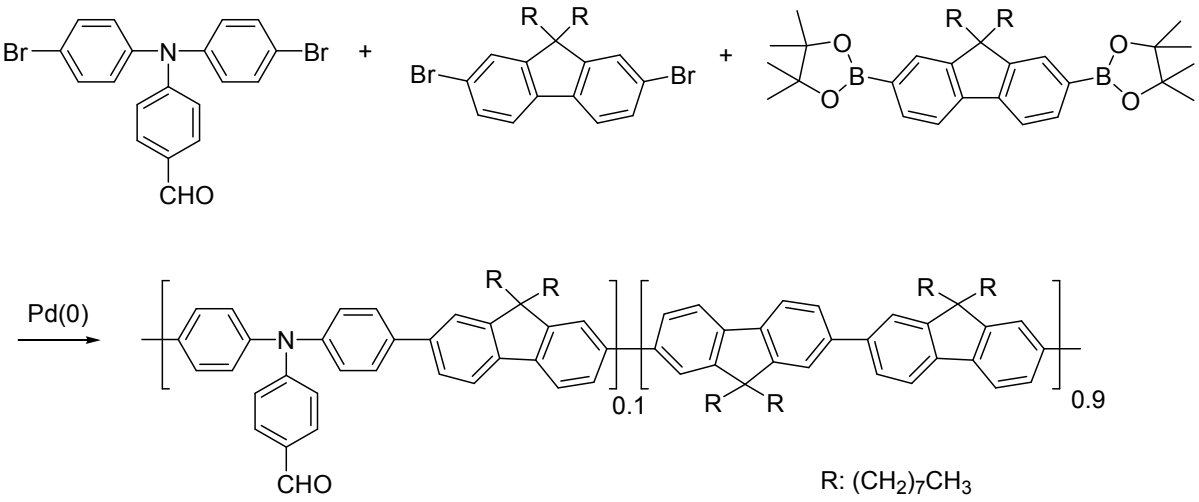
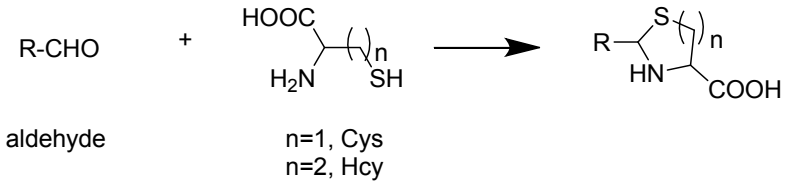


P3

Synthesis of **P3**

4-(Bis(4-bromophenyl)amino)benzaldehyde (0.132 g, 0.30 mmol), 9,9-dioctyl-2,7-dibromofluorene (0.27 g, 0.50 mmol), and 9,9-dioctylfluorene-2,7-diboronic acid bis(1,3-propanediol)ester (0.67 g, 1.20 mmol) were dissolved in a mixture of THF (10 mL), and 2 M aqueous K_2CO_3 solution (4 mL). After addition of tetrakis(triphenylphosphine)palladium(0) (3.5 mg, 0.003 mmol), the reaction mixture was stirred under argon at 100 °C for 48 h. After the reaction, the reaction mixture was cooled and slowly added to methanol (500 mL), and resulting precipitates were isolated by filtration. Then the precipitates were washed with methanol and extracted with acetone for 48 h in a Soxhlet apparatus to remove oligomers and catalyst residues (yield 0.42 g, 51%). ^{1}H NMR (300 MHz, $CDCl_3$) δ = 9.88 (s), 7.86–6.85 (m), 3.86–3.48 (m), 2.23–1.52 (m), 1.27–0.75 (m) ppm. ^{13}C NMR ($CDCl_3$): δ = 191.2, 152.0, 140.7, 140.3, 126.4, 121.7, 120.2, 77.7, 76.8, 70.8, 55.6, 32.0, 30.3, 24.1, 22.8 ppm. Anal. calcd for $C_{51.6}H_{76.5}N_{0.1}O_{0.1}$: C, 88.6%; H, 10.9%; N, 0.28%. Found: C, 87.9%; H, 10.0%; N, 0.30%. FT-IR (cm^{-1}): 3030 (C–H), 1697 (C=O), 1591 (C=C), 1462 (C=C), 1320 (C–N).



Scheme S1. Ring formation by reactions of aldehyde and biothiols.

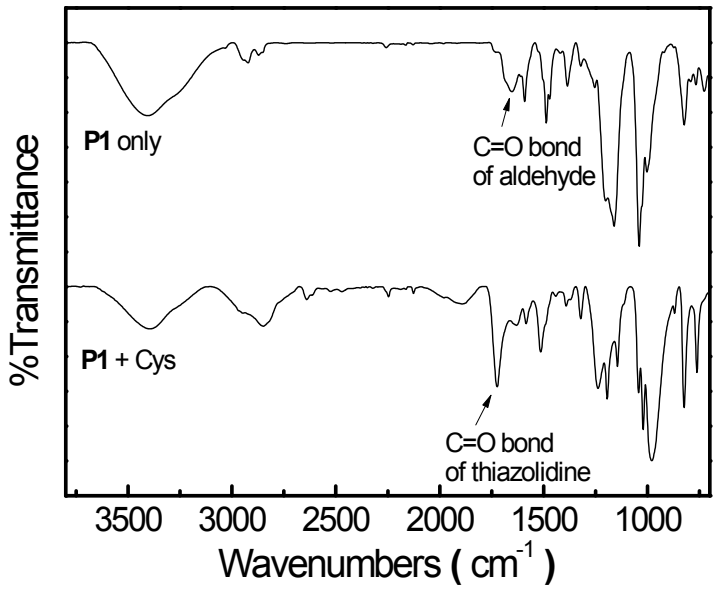
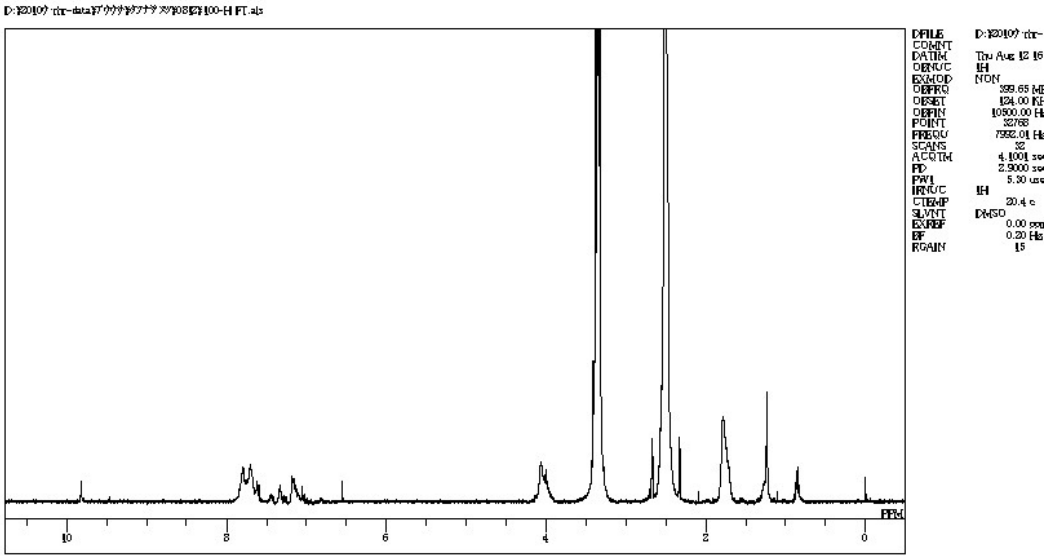


Fig. S1. FT-IR spectra of **P1** (top) and **P1** + Cys (bottom).

(A)



(B)

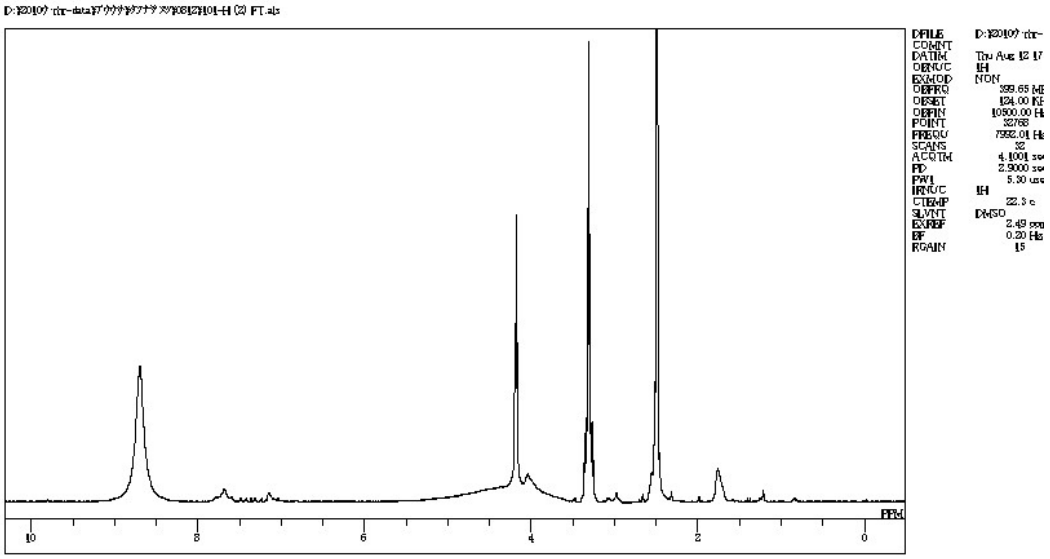
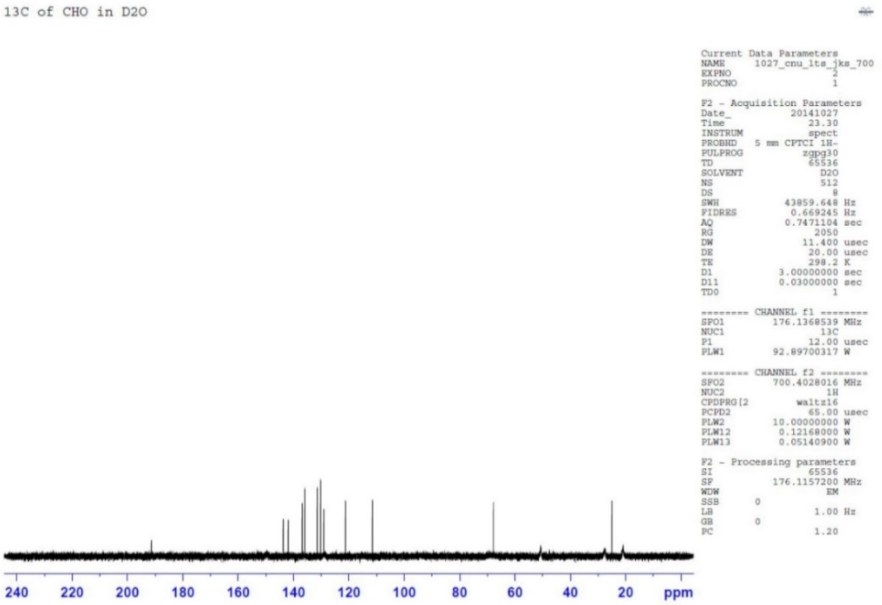


Fig. S2. ^{1}H NMR spectra of **P1** in the (A) absence and (B) presence of Cys.

(A)



(B)

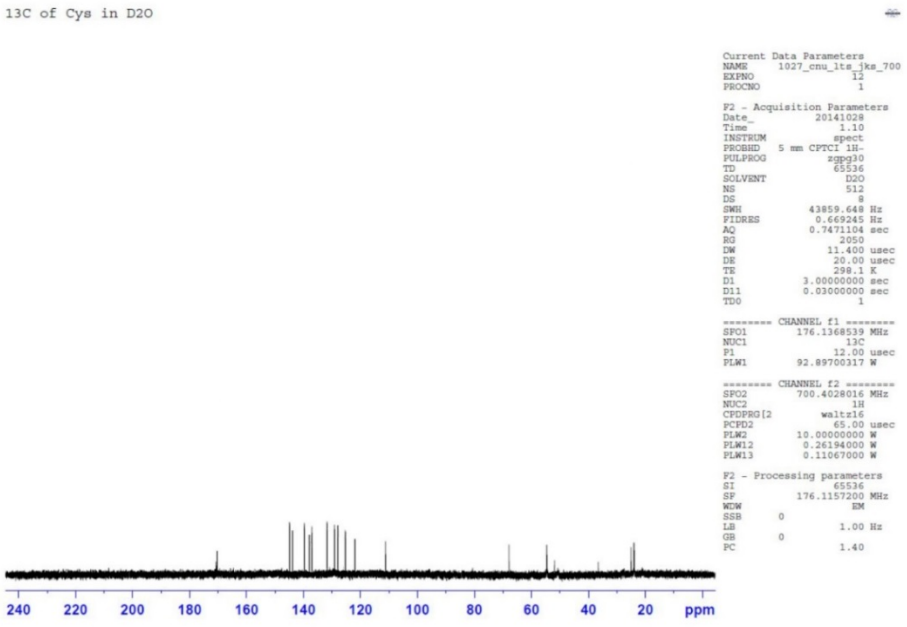
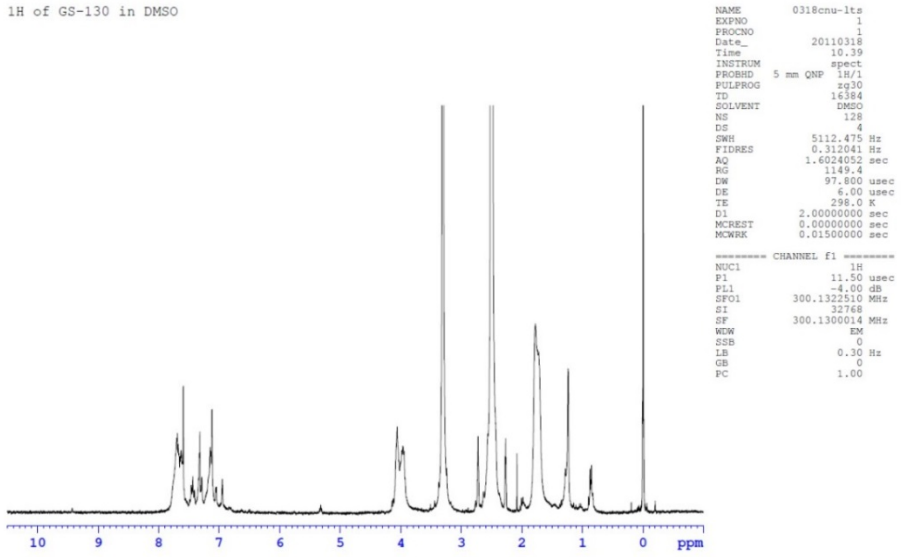


Fig. S3. ^{13}C NMR spectra of **P1** in the (A) absence and (B) presence of Cys.

(A)



(B)

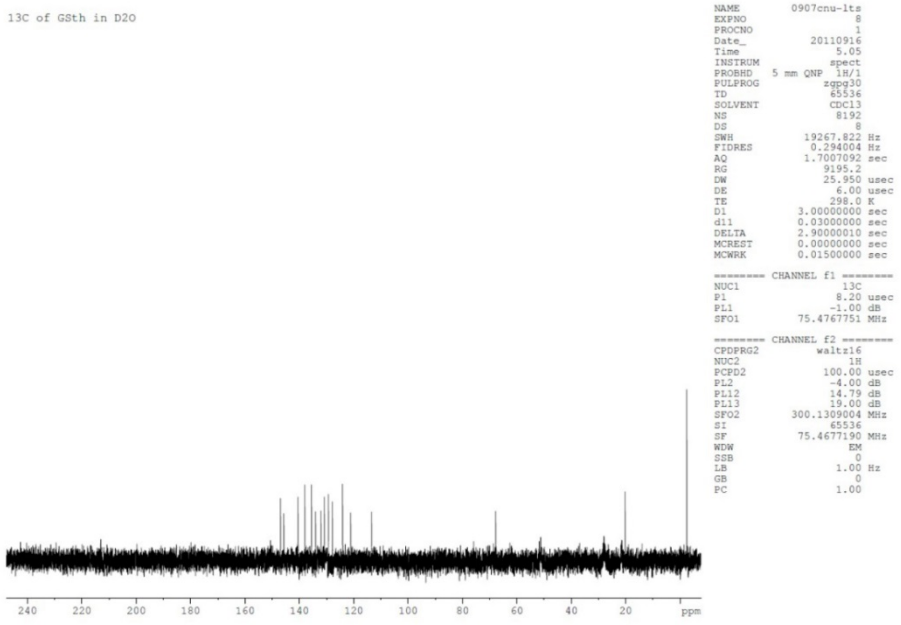


Fig. S4. (A) ^{1}H and (B) ^{13}C NMR spectra of **P2**.

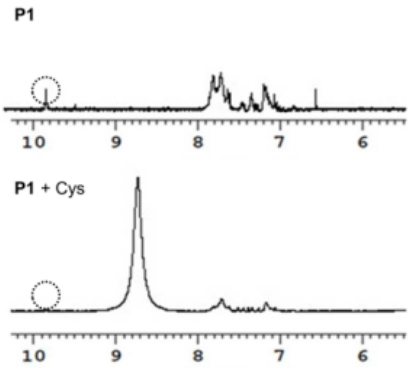


Fig. S5. Partial ^{1}H NMR spectral change of **P1** before and after addition of Cys (10 equiv.) in DMSO-d_6.

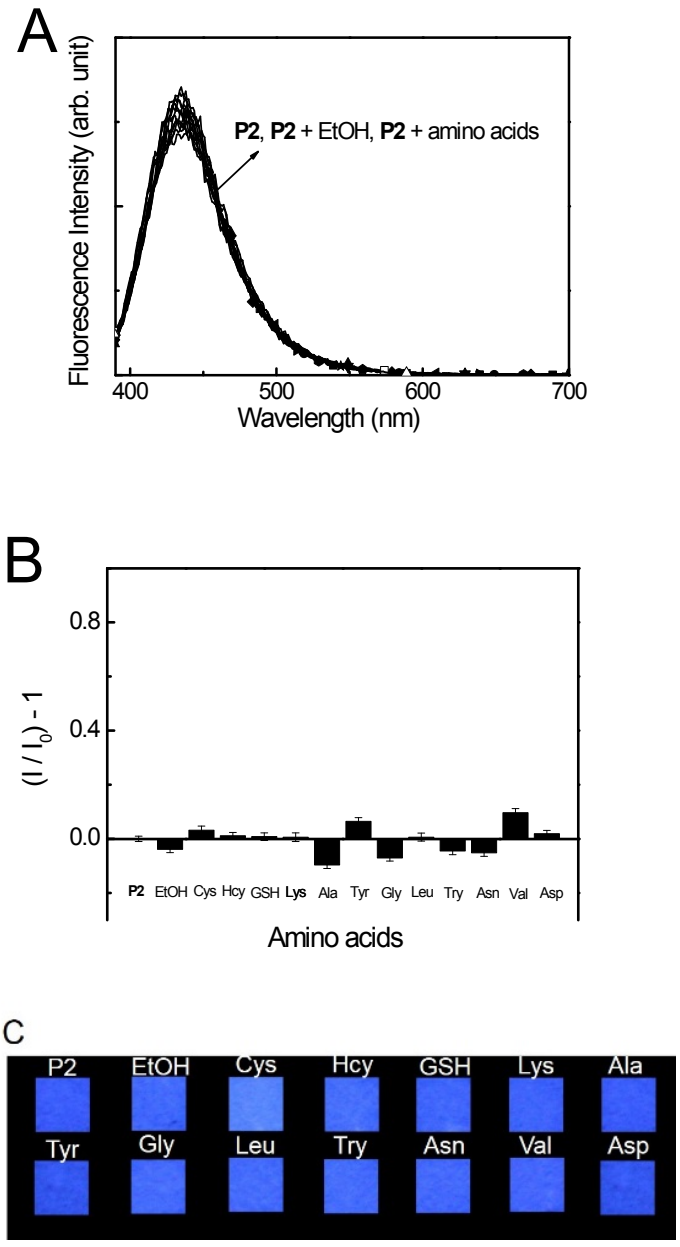


Fig. S6. (A) Changes in emission intensity of **P2** paper-based strips in the presence of various amino acids. **P2** paper strips were dipped in ethanol solutions of amino acids. Excitation wavelength λ_{ex} = 350 nm, (B) relative changes in fluorescence intensity of **P2** strips in the presence of ethanol and amino acids, and (C) photographs of **P2** paper-based strips in the presence of amino acids under UV light (365 nm). [amino acids] = 8×10^{-4} M. I_0 and I correspond to fluorescence intensities of **P2** strips at 433 nm before and after exposure to Cys, respectively.

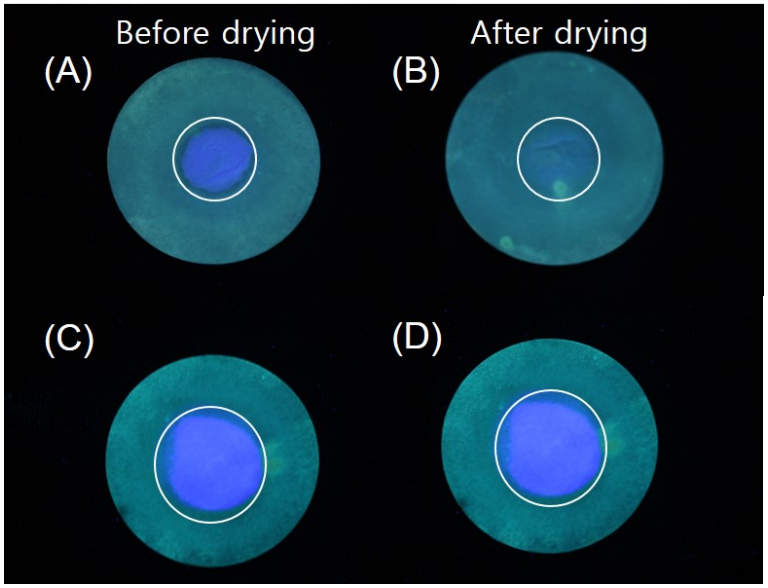


Fig. S7. Photographic images of **P1** paper strip upon exposure to water (A and B) and aqueous solution of Cys (C and D) before and after drying under UV irradiation (365 nm). White circles indicate the dropping regions.