Aggregation-Induced Emission (AIE) of poly(*1,4*-dihydropyridine) synthesized by Hantzsch Polymerization and Its Specific Detection for Fe^{2+} Ions

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Chemicals and reagents:

Ethylenediamine and *1,6*-hexanediamine were purchased from Tianjin Kemiou Chemical Reagent Co., Ltd. Glutaraldehyde and terephthalaldehyde were provided by Aladdin Company (Shanghai, China). Benzaldehyde, *1,4*-diaminobutane, acetylacetone, and *1,5*-glutaraldehyde were purchased from Shanghai McLean Biochemical Co., Ltd. (China). *n*-Butylamine, acetic acid and anhydrous magnesium chloride were provided by Tianjin Guangfu Technology Development Co., Ltd. *1,8*-diaminooctane and *1,10*-diaminodecane were provided by *J&K* Scientific Technology Co., Ltd. Unless otherwise stated, all chemicals and reagents were obtained from commercial suppliers and used as received without further purification.

Instruments and Measurements：

To obtain Fourier transform infrared spectra (FT-IR) of intermediates and PDPEs, we scanned in the wavenumber range of 400-4000 cm^{-1} using a Bruker Tensor 27 FT-IR spectrometer with a Specac Quest ATR accessory. ^{1}H NMRs (400 MHz) of the intermediates and PDPEs were recorded on a Bruker AVANCE III spectrometer at room temperature with tetramethylsilane (TMS) as an internal standard. The molecular weight (M_n) and polydispersity index (*PDI*) of prepared PDPEs were determined using a gel permeation chromatography (GPC) system (Agilent 1200). *N, N*-dimethylformamide (DMF) with 0.1% lithium bromide as the elution solvent and polystyrene as the molecular weight standard. The average sizes of aggregated particles in solutions of different ($V_{DMSO}/V_{ethyl\ acetate}$) were measured by dynamic light scattering (DLS) Zetasizer nano-ZSE.

Table S1. Different structures of synthesized PDPEs.

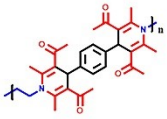
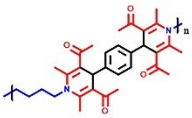
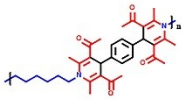
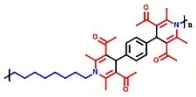
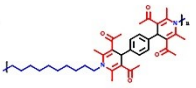
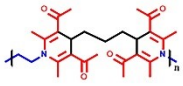
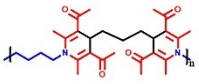
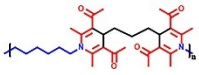
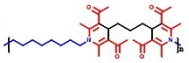
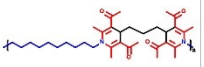
	X=1	X=2	X=3	X=4	X=5
phenyl	PDPE-TE 	PDPE-TB 	PDPE-TH 	PDPE-TO 	PDPE-TD 
propyl	PDPE-GE 	PDPE-GB 	PDPE-GH 	PDPE-GO 	PDPE-GD 

Table S2. Yield, M_n, *PDI* and quantum yield of PDPEs.

Sample	Yield (%)	$M_n \times 10^3$ g/mol	*PDI*	Quantum yield (%)
PDPE - TB	56.67	6.5	1.52	5.11
PDPE - TH	59.90	6.9	1.73	6.86
PDPE - TO	68.18	7.4	1.69	9.3
PDPE - TD	64.92	8.9	1.56	7.6
PDPE - GB	46.67	4.9	1.71	×
PDPE - GH	45.90	5.3	1.53	×
PDPE - GO	46.18	5.7	1.72	×
PDPE - GD	44.73	6.1	1.68	×

(× means the relative yield was too low.)

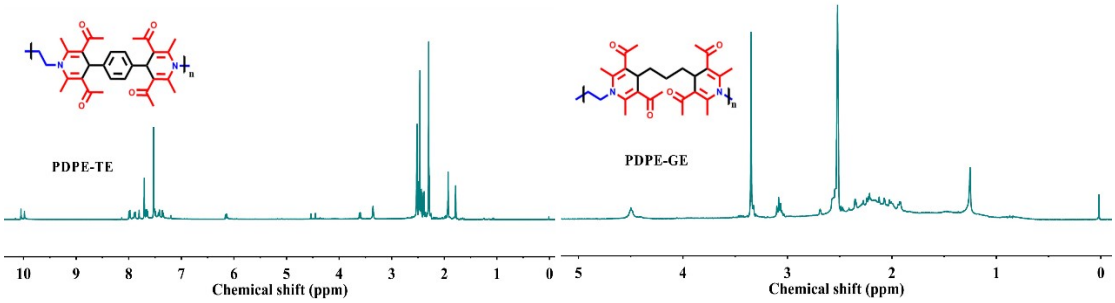


Figure S1. ^{1}H NMR spectra of PDPE-TE and PDPE-GE in DMSO$_{d6}$.

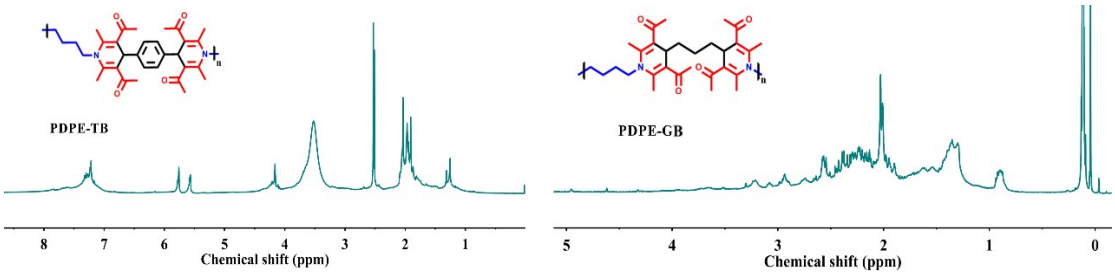


Figure S2. ^{1}H NMR spectra of PDPE-TB and PDPE-GB in DMSO$_{d6}$.

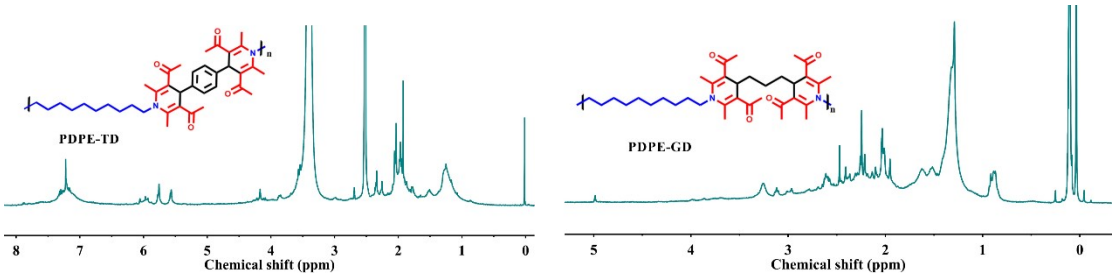


Figure S3. ^{1}H NMR spectra of PDPE-TD in DMSO$_{d6}$ and PDPE-GD in CDCl$_3$.

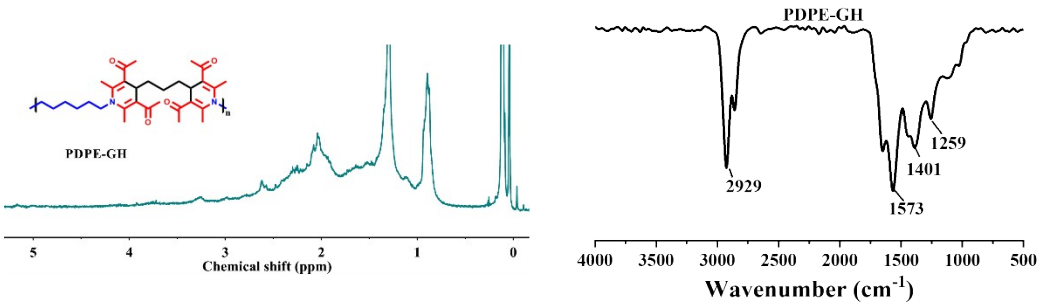


Figure S4. ^{1}H NMR spectra in CDCl$_3$ and FT-IR spectra of PDPE-GH.

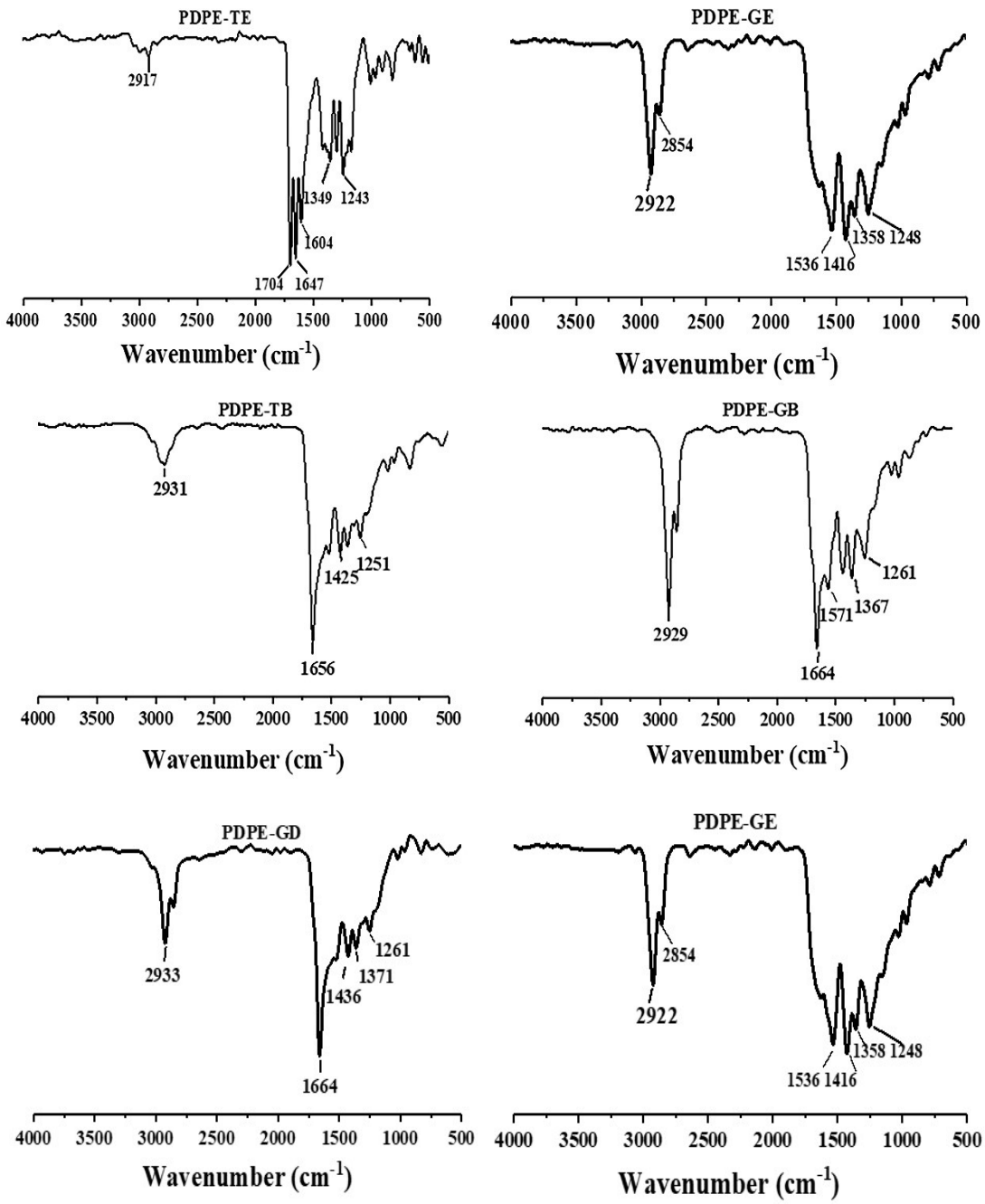


Figure S5. FT-IR spectra of PDPE-TE, PDPE-GE, PDPE-TB, PDPE-GB, PDPE-GD, and PDPE-GE.

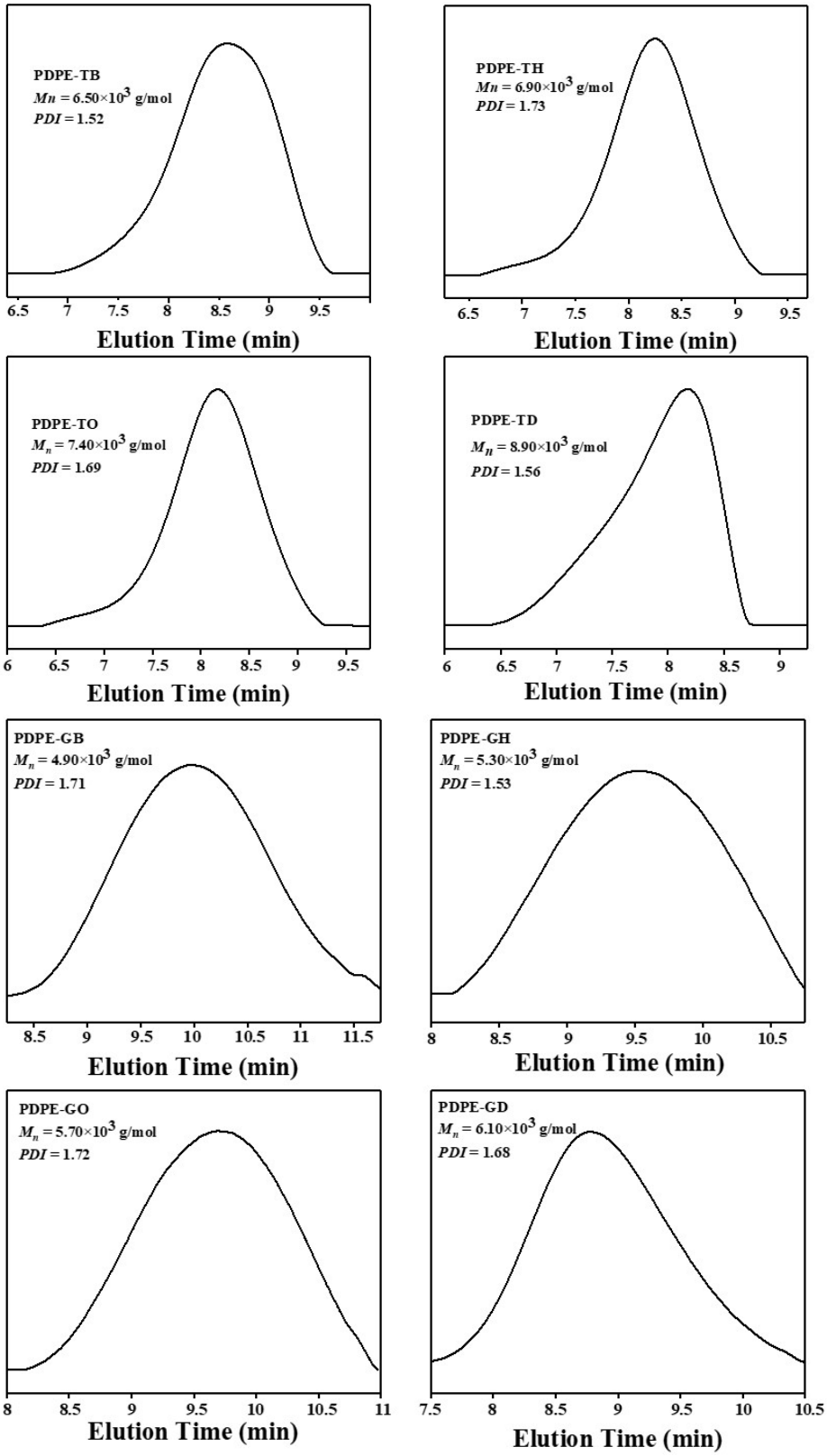


Figure S6. GPC curves of PDPEs.

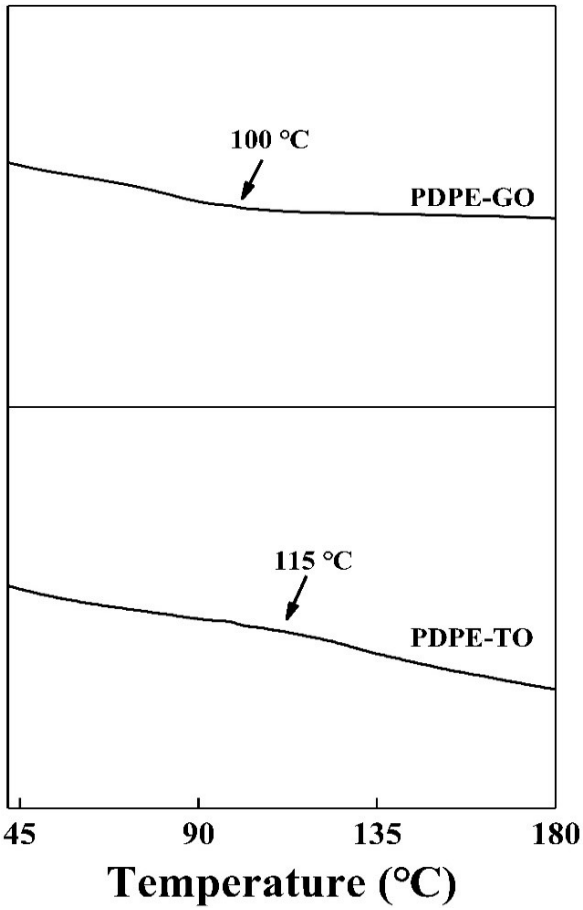


Figure S7. DSC curves of PDPE-GO and PDPE-TO.

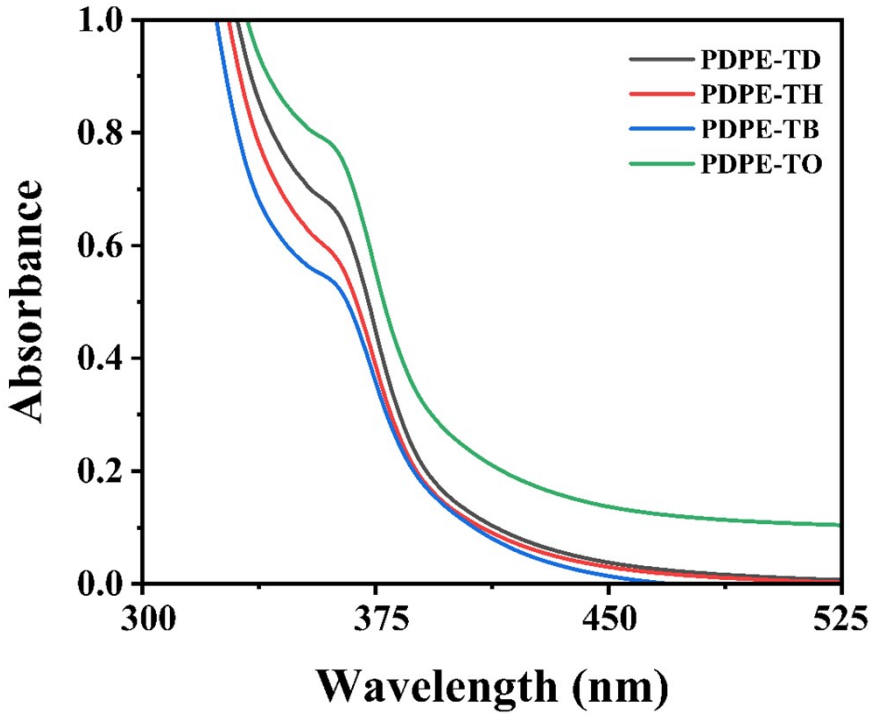


Figure S8. UV absorption of PDPEs (1×10^{-3} M) in DMSO solution.

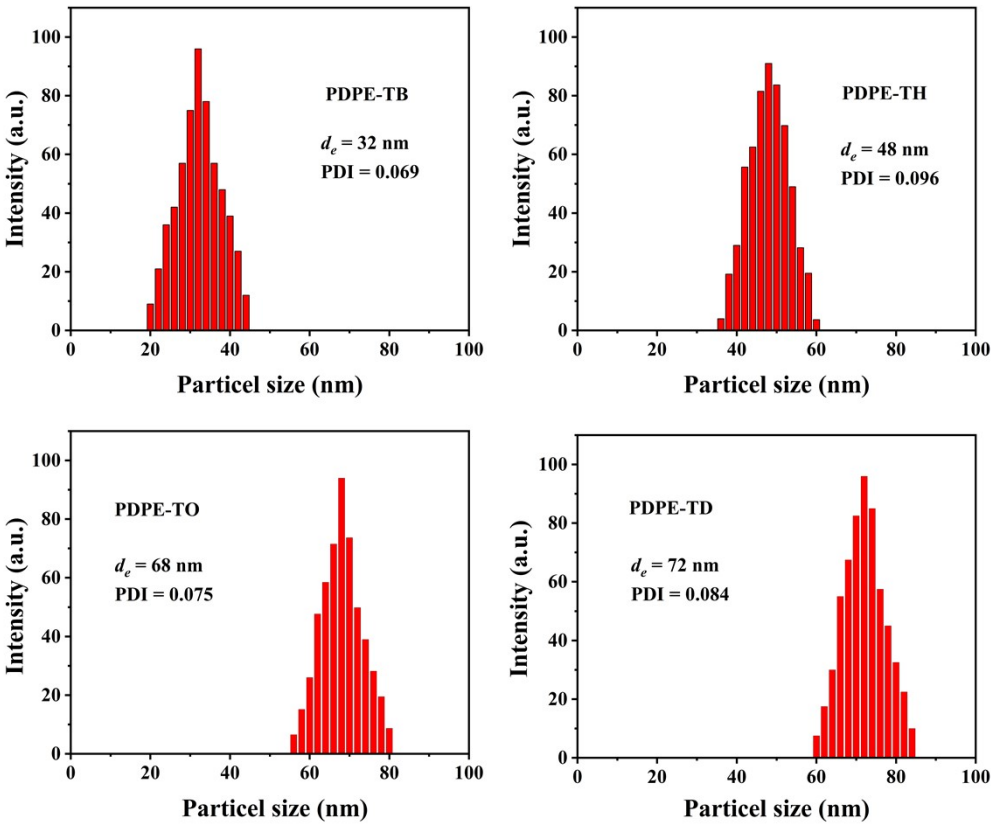


Figure S9. The particle size of PDPEs (1×10^{-3} M).

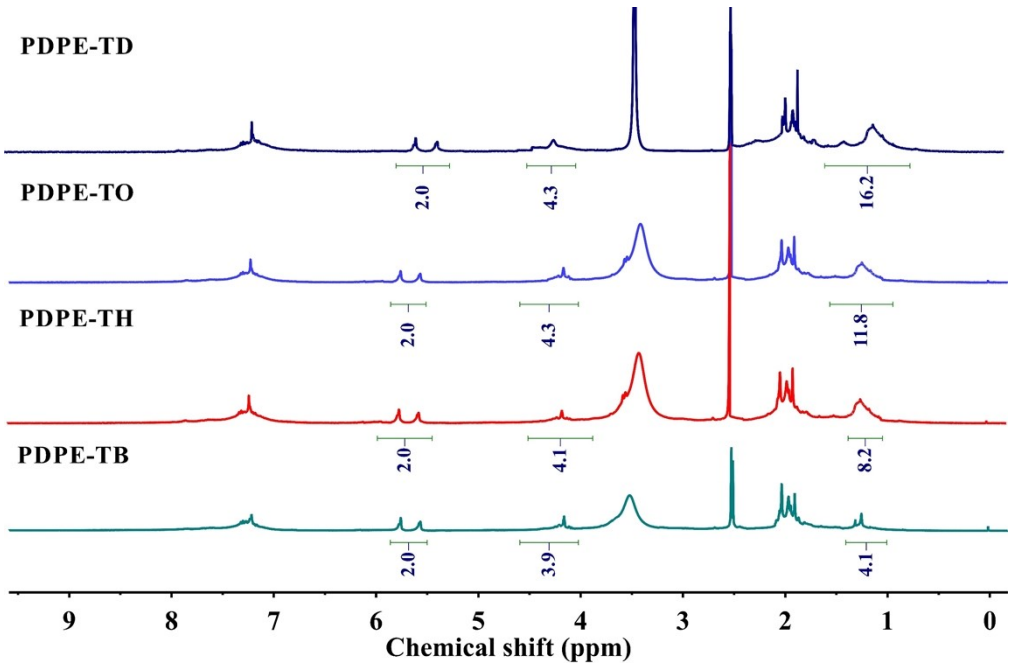


Figure S10. Ratio of chromophore characteristic peaks and alkyl chain characteristic peaks in NMR spectra of PDPEs in $DMSO_{d6}$.

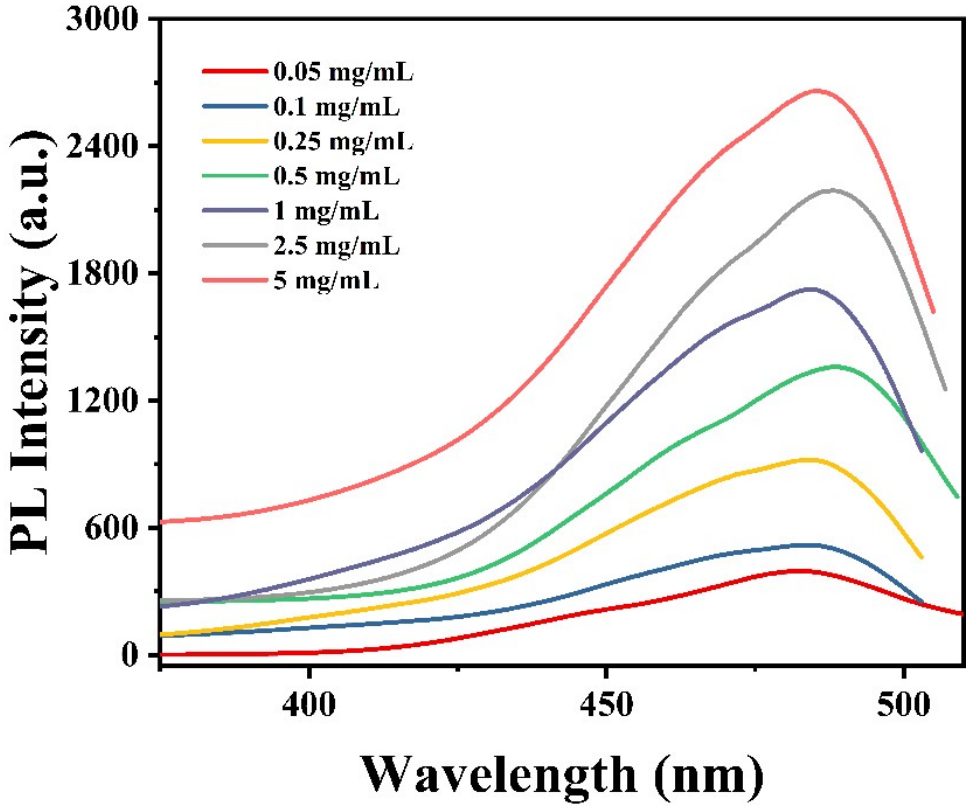


Figure S11. Excitation spectra of PDPE-TO at different concentrations.

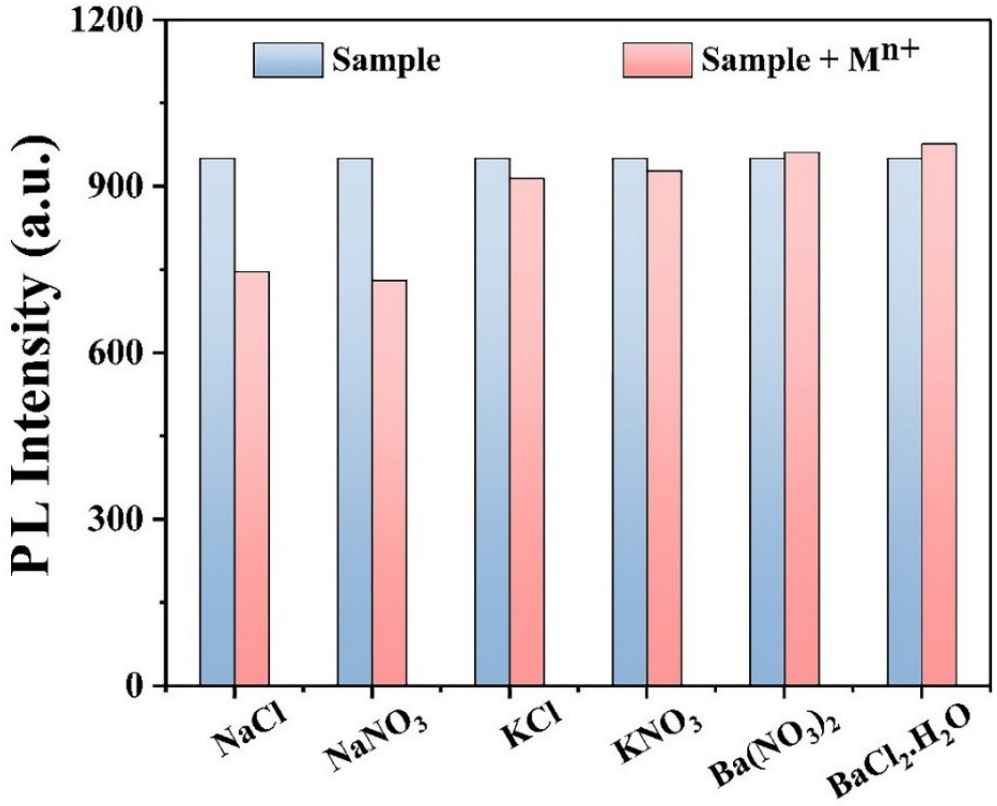


Figure S12. Effect of different anions on fluorescence of PDPE-TO solution.

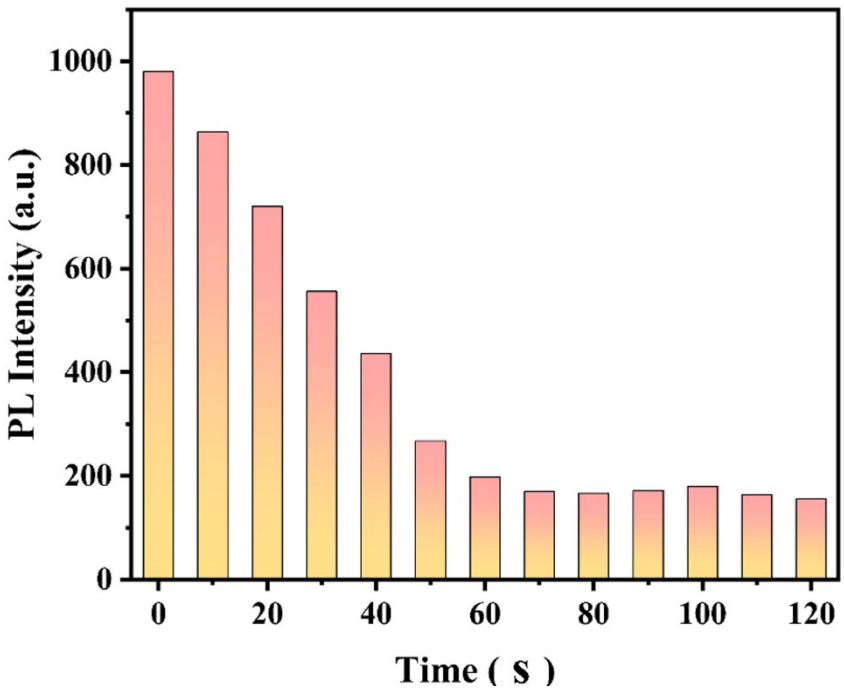


Figure S13. Changes of fluorescence intensity with time after adding Fe^{2+} ions (0.15 mM) to PDPE-TO.