Supporting Information

Multiregulated Color and Fluorescence of a Cyanostilbene-Based AIEgen by Light and pH

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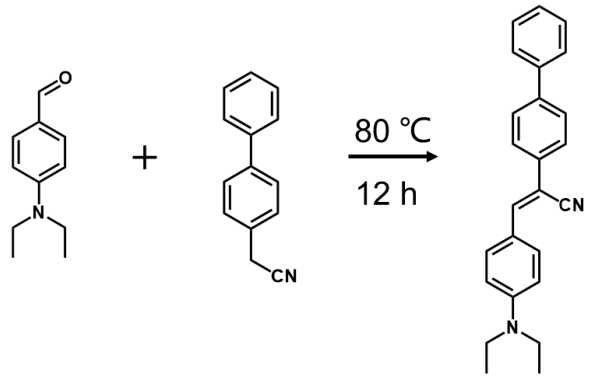

Scheme S1 Schematic diagram of the synthesis of *Z*-BDPA.

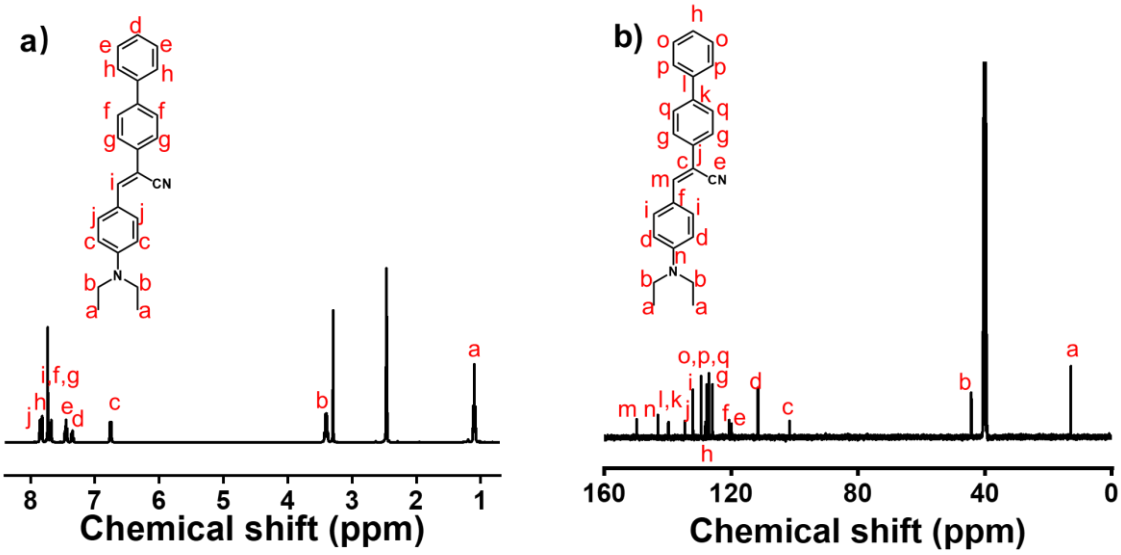

Figure S1 (a) ^{1}H NMR and (b) ^{13}C NMR spectra of *Z*-BDPA in DMSO-d_6.

^{1}H NMR (400 MHz, DMSO-d_6, δ) 7.91–7.72 (m, 8H), 7.49 (t, J = 7.6 Hz, 2H), 7.39 (t, J = 7.3 Hz, 1H), 6.80 (d, J = 9.1 Hz, 2H), 3.45 (q, J = 7.0 Hz, 4H), 1.14 (t, J = 7.0 Hz, 6H). ^{13}C NMR (101 MHz, DMSO-d_6, δ) 149.81, 143.09, 139.82, 139.70, 134.57, 132.07, 129.48, 127.66, 127.01, 125.90, 120.67, 119.86, 111.57, 101.61, 44.30, 12.94.

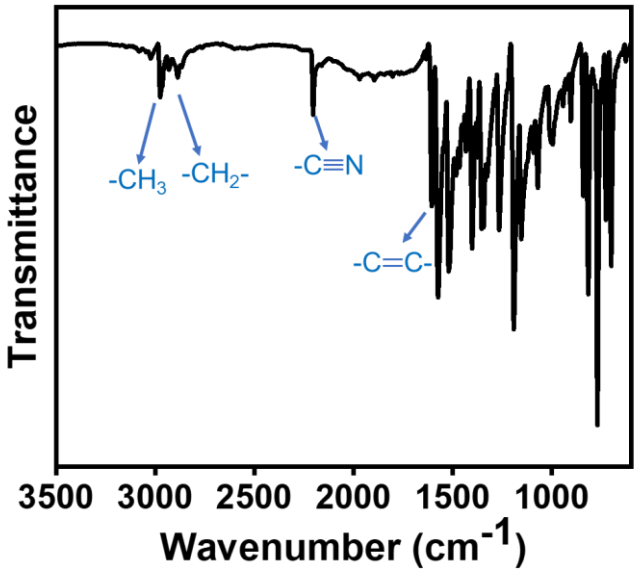

Figure S2 FTIR spectrum of *Z*-BDPA.

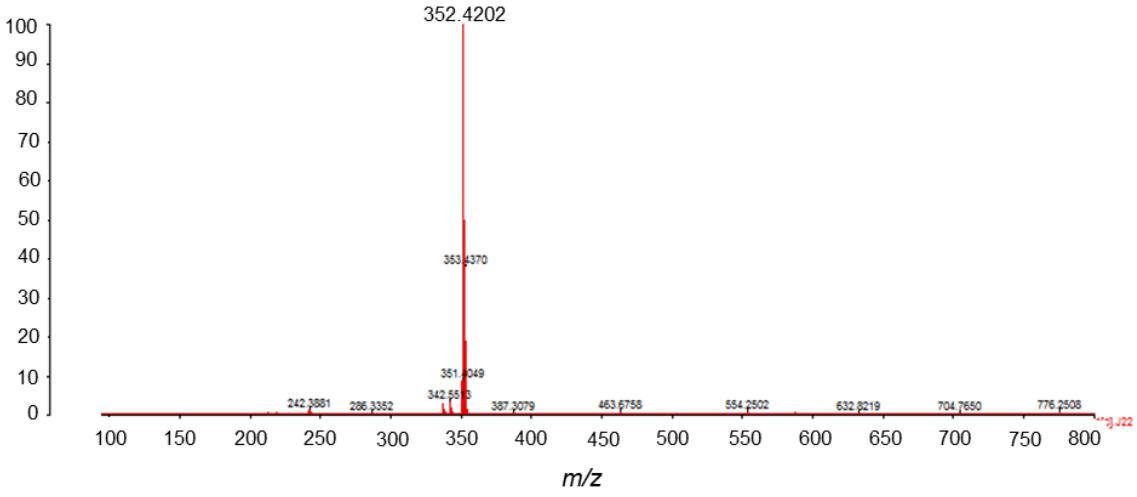

Figure S3 HR-MS spectrum of *Z*-BDPA (Mw=352).

Table S1. Crystal data for *Z*-BDPA (CCDC: 2168298).

Compound	*Z*-BDPA
Empirical formula	C25 H24 N2
Formula weight	352.19
Temperature/K	149.99
Space group	P 21/n
a/Å	12.6431(2)
b/Å	7.7993(2)
c/Å	19.2521(4)
α/°	90
β/°	97.367
γ/°	90
Volume/Å^3	1882.73
Z	4
ρ_{calc} g/cm^3	1.243
μ/mm^{-1}	0.544
F (000)	752.0
Crystal size/mm^3	0.2 × 0.15 × 0.1
Radiation	CuKα (λ = 1.54184)
2Θ range for data collection/°	7.924 to 147.72
Index ranges	-15≤h≤11, -9≤k≤9, -23≤l≤22
Reflections collected	12178
Independent reflections	3753 [R_{int}=0.0622, R_{sigma}=0.0496]
Data/restraints/parameters	3753/0/246
Goodness-of-fit on F^2	1.127
Final R indexes [I>=2σ (I)]	R_1=0.0777, wR_2=0.1798
Final R indexes [all data]	R_1=0.0932, wR_2=0.1847
Largest diff. peak/hole/e Å^{-3}	0.34/-0.34

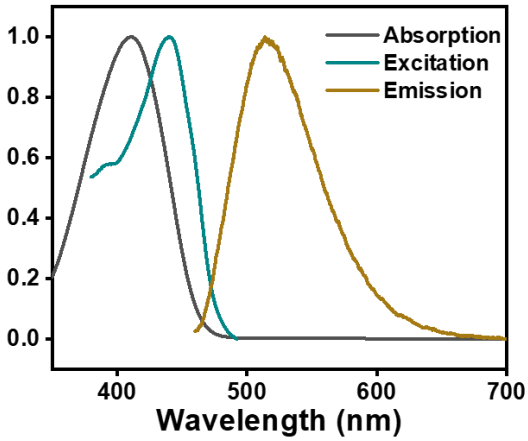

Figure S4 UV-vis absorption, excitation (emission at 515 nm) and emission spectra (excited at 440 nm) of *Z*-BDPA in THF.

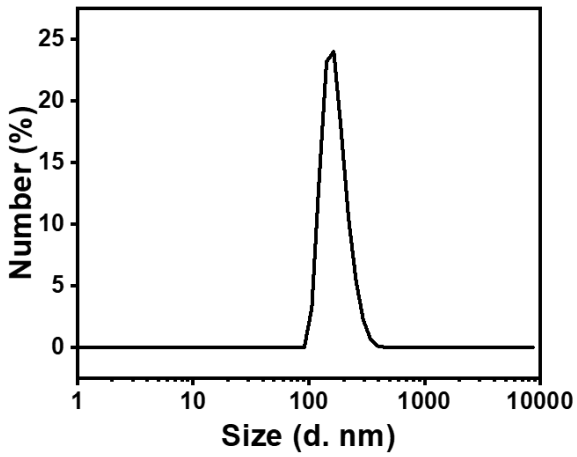

Figure S5 Size distributions for *Z*-BDPA in THF/H_2O mixture with 90 f_w.

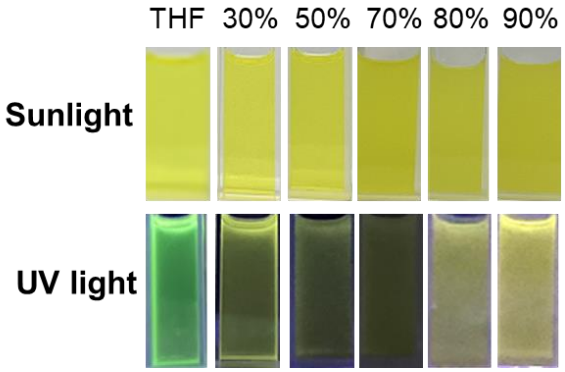

Figure S6 Photographs of *Z*-BDPA in THF and THF/H_2O mixture with different f_w.

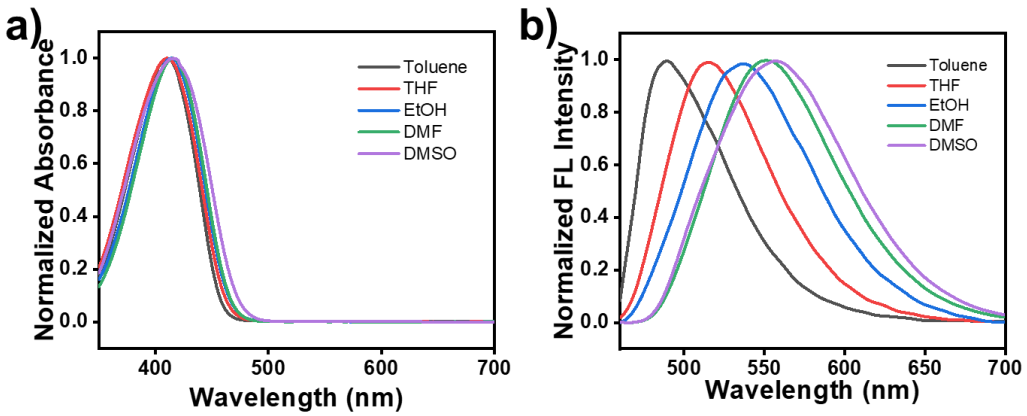

Figure S7 (a) Normalized UV-vis absorption spectra of *Z*-BDPA in different organic solvents with various polarity. (b) Normalized emission spectra of *Z*-BDPA in different organic solvents with various polarity, excited at 440 nm.

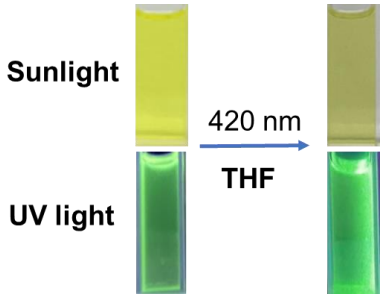

Figure S8 Photographs of *Z*-BDPA in THF before and after irradiation at 420 nm.

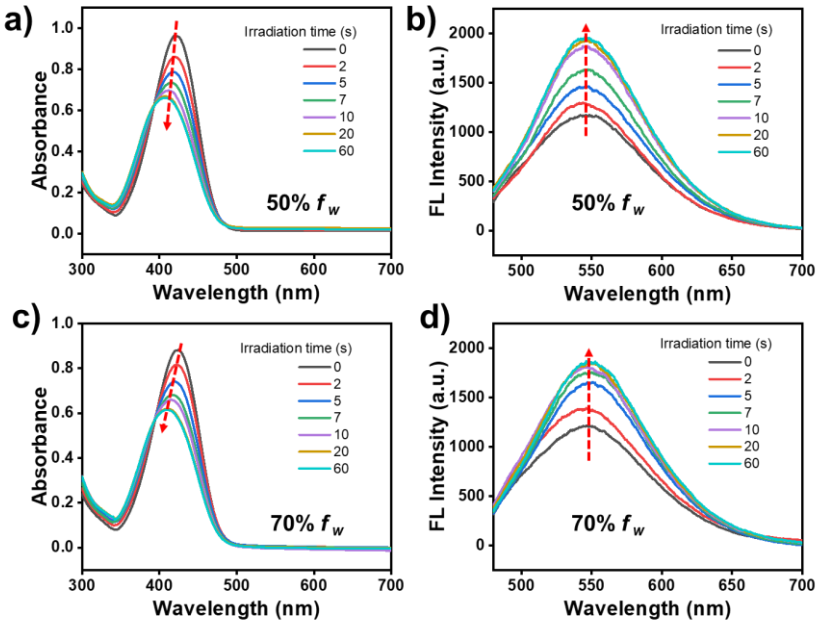

Figure S9 (a) UV-vis absorption and (b) emission spectra of *Z*-BDPA (10 μM) in THF/H_2O mixtures with 50% f_w upon 420 nm light irradiation for different time, excited at 440 nm. (c) UV-vis absorption and (d) emission spectra of *Z*-BDPA in THF/H_2O mixtures with 70% f_w upon 420 nm light irradiation for different time, excited at 440 nm.

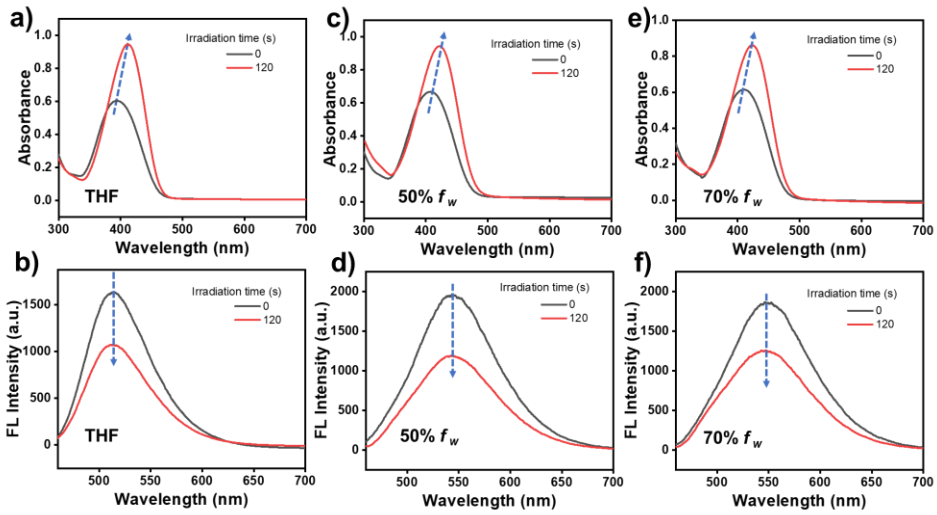

Figure S10 (a) Recovery UV-vis absorption and (b) recovery emission spectra of irradiated *Z*-BDPA (10 μM) in THF upon 365 nm light irradiation. (c) Recovery UV-vis absorption and (d) recovery emission spectra of irradiated *Z*-BDPA (10 μM) in THF/H_2O mixtures with 50% f_w upon 365 nm light irradiation. (e) Recovery UV-vis absorption and (f) recovery emission spectra of irradiated *Z*-BDPA (10 μM) in THF/H_2O mixtures with 70% f_w upon 365 nm light irradiation.

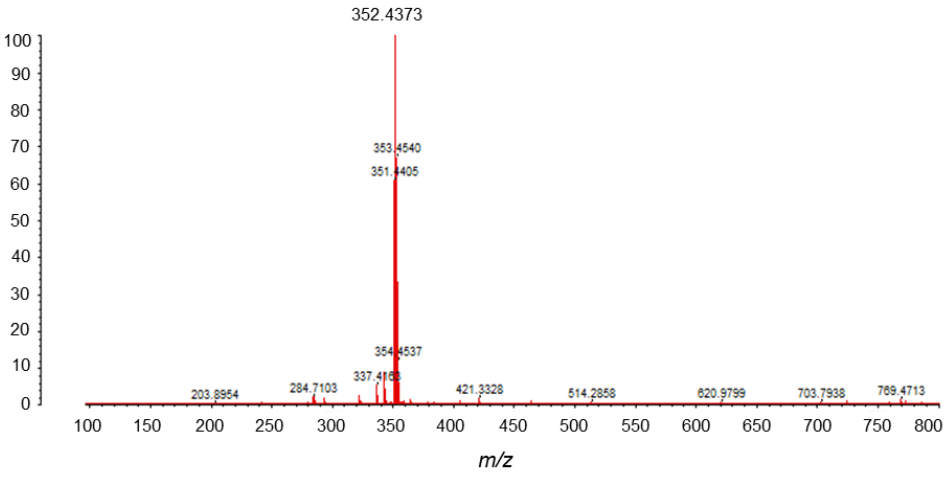

Figure S11 HR-MS spectrum of *Z*-BDPA in THF after irradiation with 420 nm light for 1 h.

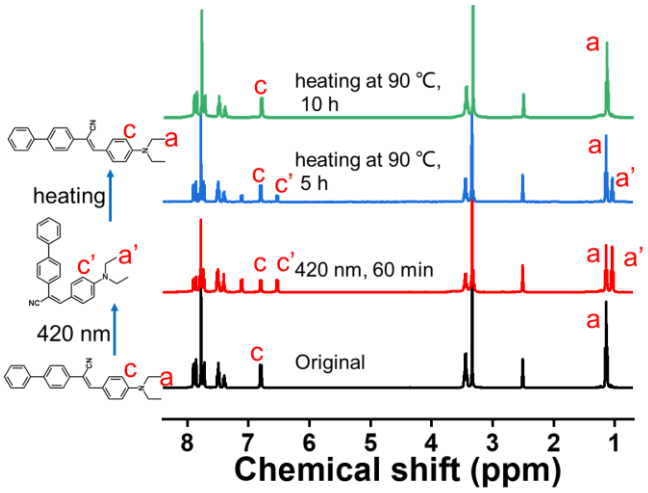

Figure S12 ^{1}H NMR spectra of *Z*-BDPA in DMSO-d_6 before and after irradiating with 420 nm light for 60 min and then heating at 90 ℃ for 5 h and 10 h.

Fig. S12 shows the 1H NMR spectra of Z-BDPA in DMSO-d6 before and after irradiating with 420 nm light for 60 min and then heating at 90 ℃ for 5 h and 10 h. The photoisomerized E-BDPA could be converted to the original Z-form after heating at 90 ℃ for 10 h.

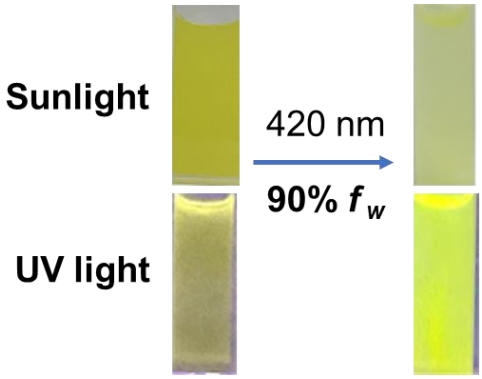

Figure S13 Photographs of *Z*-BDPA in THF/H_2O mixtures with 90% f_w before and after irradiation at 420 nm.

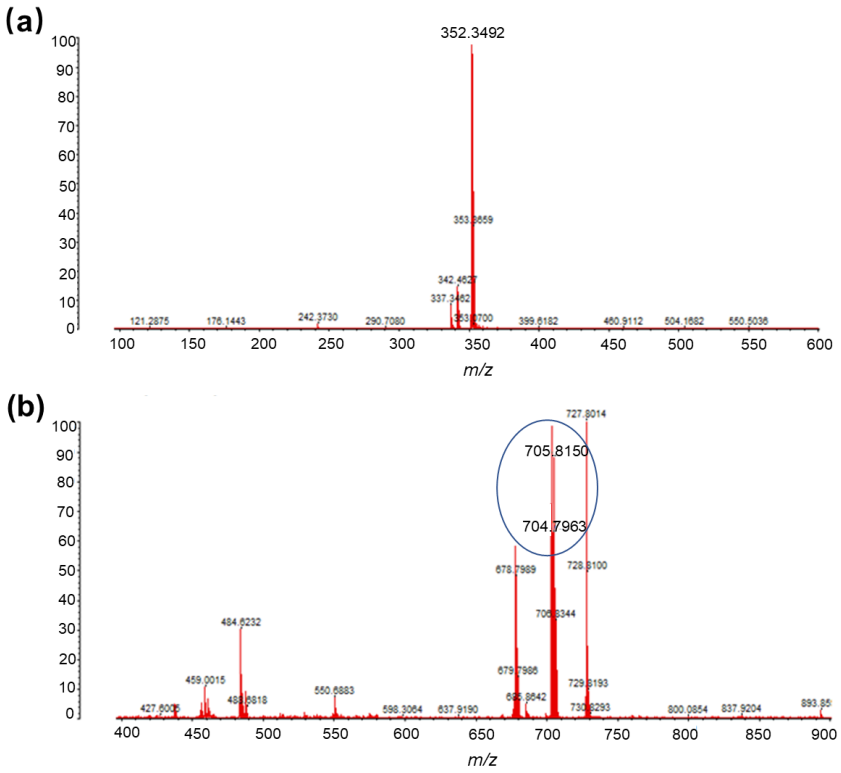

Figure S14 HR-MS of *Z*-BDPA in the THF/H_2O mixtures with 90% f_w before (a) and after (b) photo-irradiation at 420 nm for 1 h.

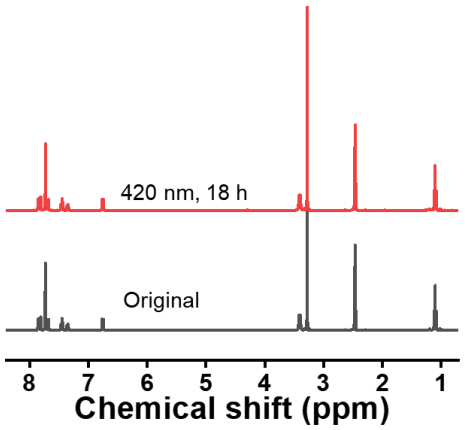

Figure S15 ^{1}H NMR spectra of *Z*-BDPA powder before and after irradiating with 420 nm light for 18 h.

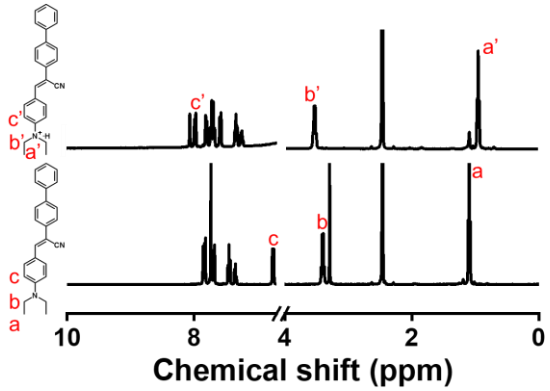

Figure S16 ^{1}H NMR spectra of *Z*-BDPA and *Z*-*p*-BDPA in DMSO-d_6.

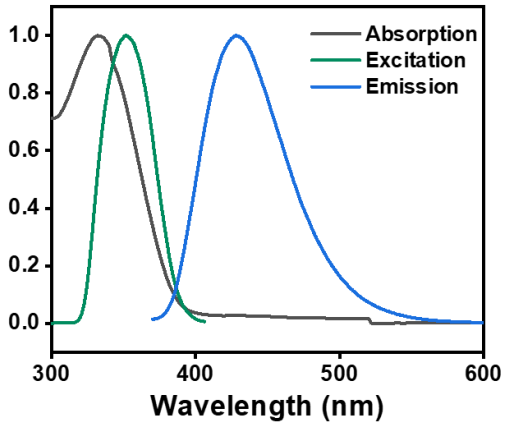

Figure S17 UV-vis absorption, excitation (emission at 430 nm) and emission spectra (excited at 350 nm) of *Z*-*p*-BDPA in THF.

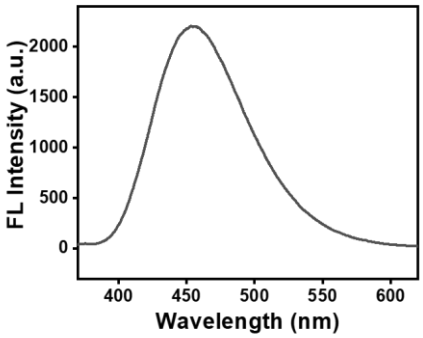

Figure S18 Emission spectra of *Z*-*p*-BDPA in THF/H_2O mixtures (f_w=90%) with pH 1 (excited at 350 nm).

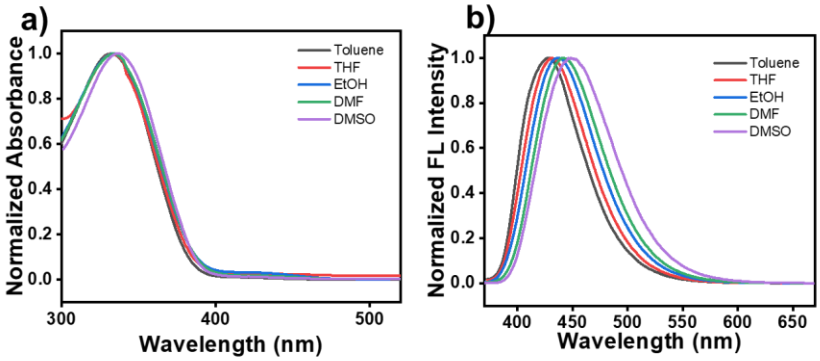

Figure S19 (a) Normalized UV-vis absorption spectra of *Z*-*p*-BDPA in different organic solvents with various polarity. (b) Normalized emission spectra of *Z*-*p*-BDPA in different organic solvents with various polarity, excited at 350 nm.

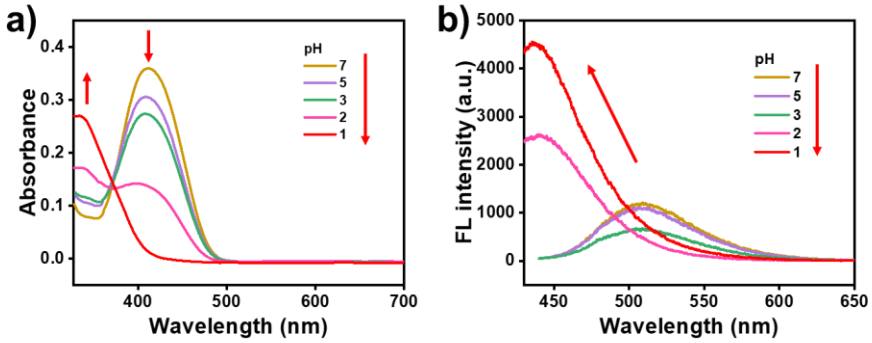

Figure S20 (a) UV-vis absorption and (b) emission spectra of *Z*-BDPA in THF with different pH values (excited at their optimal excitation wavelength).

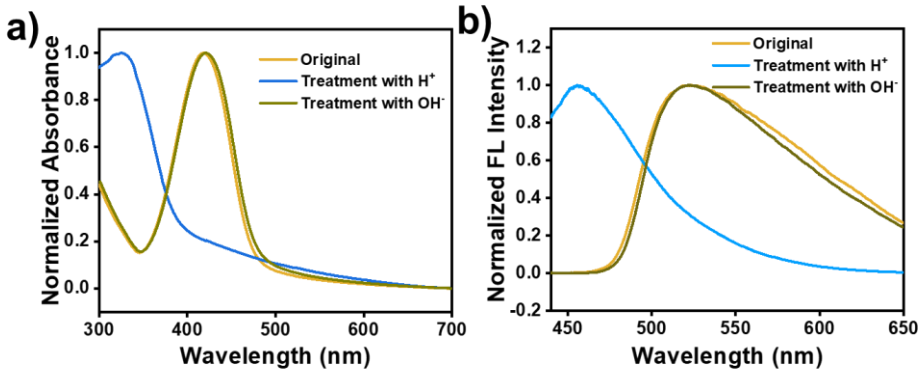

Figure S21 (a) Normalized UV-vis absorption and (b) normalized emission spectra of *Z*-BDPA in THF/H_2O mixtures (f_w=90%) before and after treatment with 1 M HCl and 10^{-3} M NaOH solution.

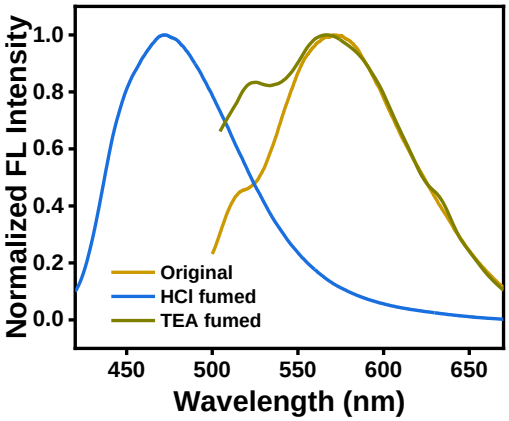

Figure S22 Normalized emission spectra of *Z*-BDPA powder before (excited at 440 nm) and after fuming with HCl and TEA vapor (excited at 350 nm).

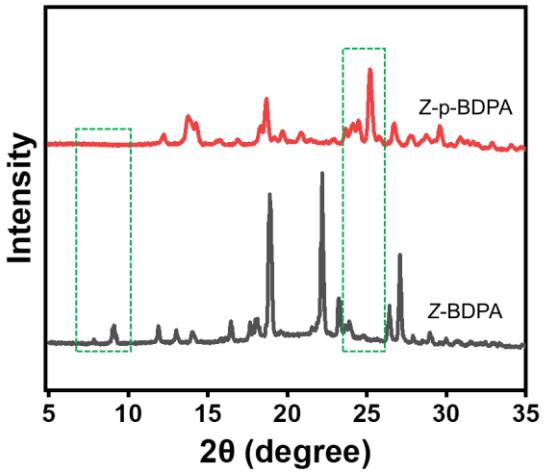

Figure S23 Powder X-ray diffraction (PXRD) patterns of *Z*-BDPA and *Z*-*p*-BDPA.

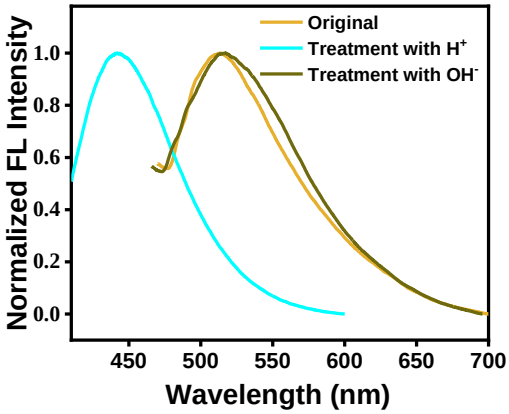

Figure S24 Normalized emission spectra of filter paper impregnated with *Z*-BDPA before (excited at 440 nm) and after ((excited at 350 nm)) treatment with 1 M HCl and 10^{-3} M NaOH solution.

Table S2 Photophysical properties data of *Z*-BDPA and *Z-p*-BDPA.

	Φ_F (%) Solid	Φ_F (%) Solution	Φ_F (%) 90% f_w	Abs λ_{max} (nm,THF)	Em λ_{max} (nm, THF)	Em λ_{max} (nm, Solid)
Z-BDPA	7.28	0.91	0.41	412	512	572
Z-p-BDPA	30.45	5.18	14.80	335	430	472

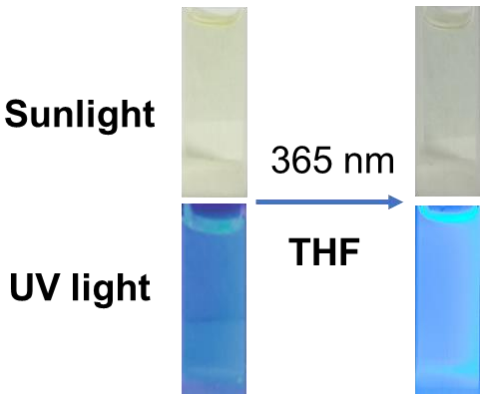

Figure S25 Photographs of *Z-p*-BDPA in THF (pH=1) before and after irradiation under 365 nm for 300 s.

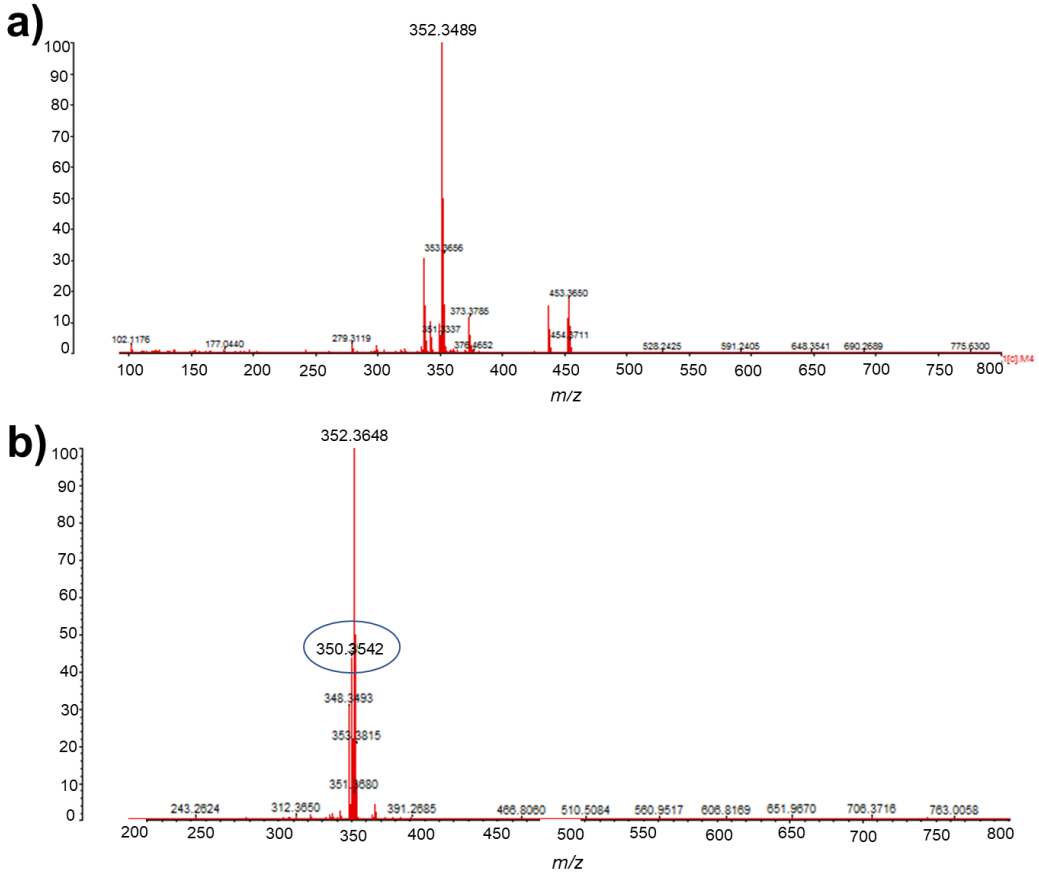

Figure S26 (a) HR-MS of *Z*-*p*-BDPA in THF after photo-irradiation at 365 nm for 10 min. (b) HR-MS of *Z*-*p*-BDPA in THF after photo-irradiation at 365 nm for 1 h.

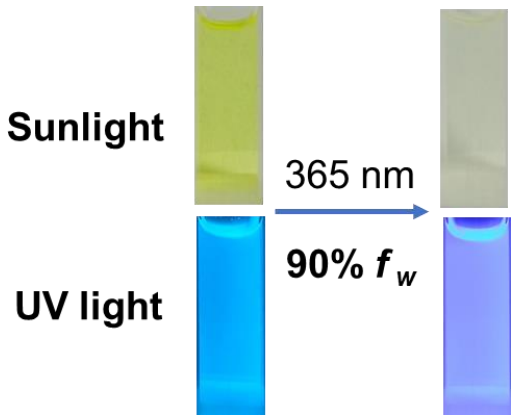

Figure S27 Photographs of *Z*-*p*-BDPA in THF/H_2O mixtures with 90% f_w (pH=1) before and after irradiation under 365 nm for 600 s.

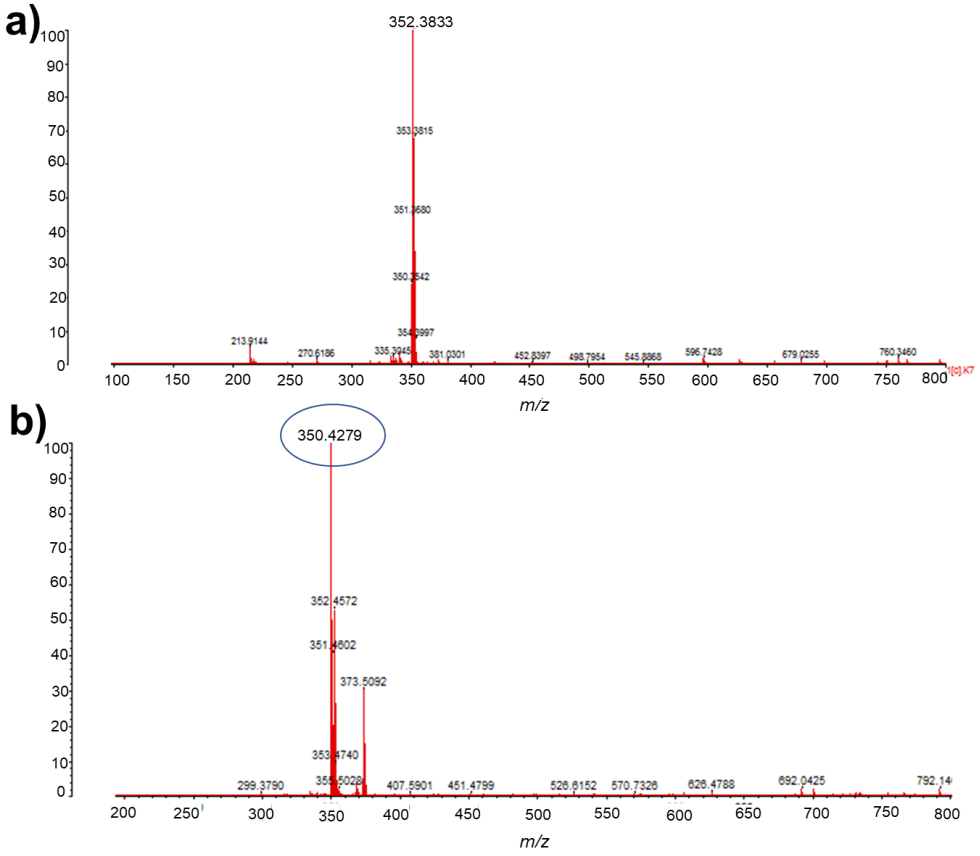

Figure S28 (a) HR-MS of *Z*-*p*-BDPA in the THF/H_2O mixtures with 90% f_w before photo-irradiation at 365 nm. (b) HR-MS of *Z*-*p*-BDPA in the THF/H_2O mixtures with 90% f_w after photo-irradiation at 365 nm.

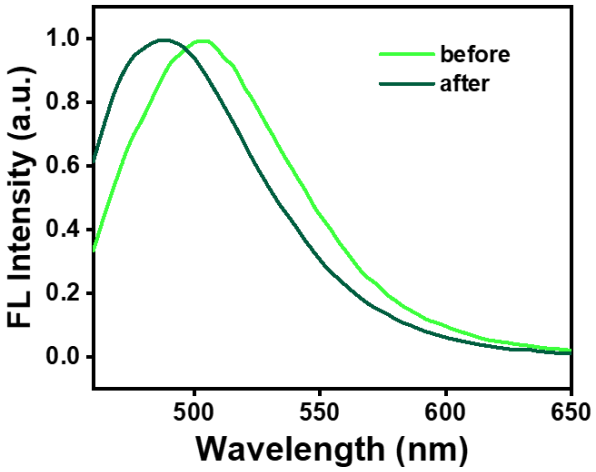

Figure S29 Normalized emission spectra of *Z*-BDPA doped polyvinyl butyral film before and after irradiation under 420 nm, excited at 440 nm.

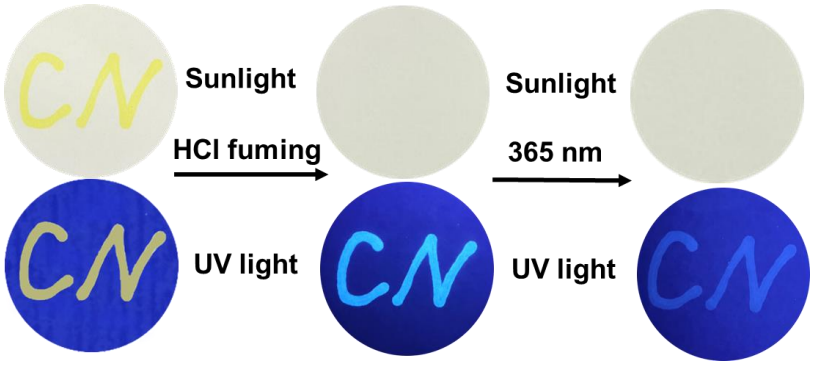

Figure S30 A security writing system based on *Z*-BDPA ink.