Electronic Supplementary Material (ESI) for Polymer Chemistry.

Electronic Supplementary Information

Photoswitchable fluorescent polymeric nanoparticles for rewritable fluorescence patterning and intracellular dual-color imaging with AIE-based fluorogens as FRET donors

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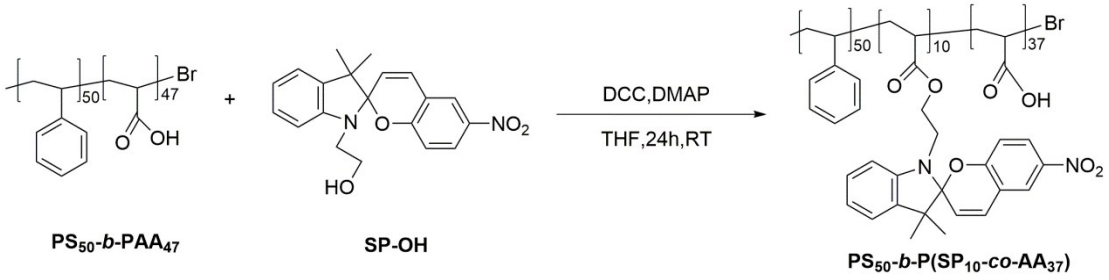
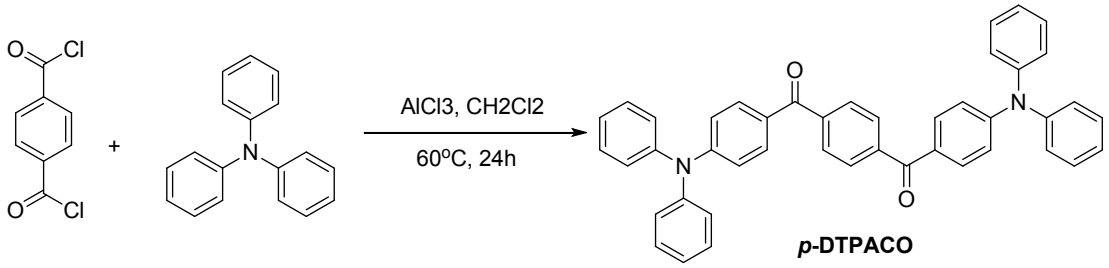


PS_{50}-*b*-PAA_{47} SP-OH PS_{50}-*b*-P(SP_{10}-*co*-AA_{37})

Scheme S1. Synthesis of amphiphilic photochromic copolymer PS_{50}-*b*-P(SP_{10}-*co*-AA_{37}).



Scheme S2. Synthesis of 4-phenylenebis((4-(diphenylamino)phenyl)methanone) (p-DTPACO).

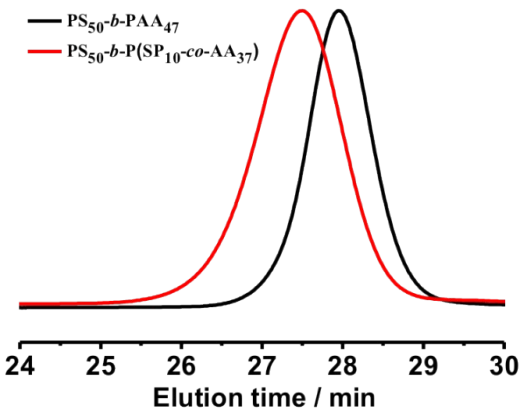


Figure S1. GPC trace of PS_{50}-*b*-PAA_{47} and PS_{50}-*b*-P(SP_{10}-*co*-AA_{37}).

Table S1. The molecular weight of PS_{50}-*b*-PAA_{47} and PS_{50}-b-P(SP_{10}-*co*-AA_{37})

Sample	M_n	M_W	PDI	SP units
PS_{50}-*b*-PAA_{47}[a]	6110	7260	1.19	0
PS_{50}-*b*-P(SP_{10}-*co*-AA_{37})[b]	10370	12270	1.18	10

[a] Provide by product supplier. [b] Estimated from ^{1}H NMR spectra.

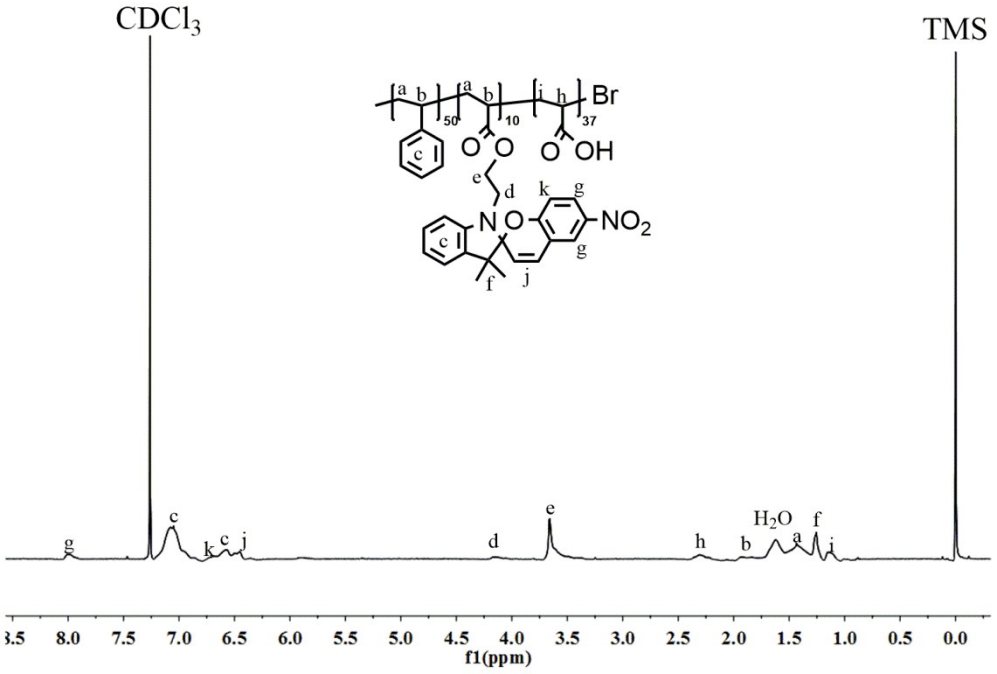


Figure S2. ^{1}H NMR spectra (in $CDCl_3$) of the target copolymer PS_{50}-*b*-P(SP_{10}-*co*-AA_{37}).

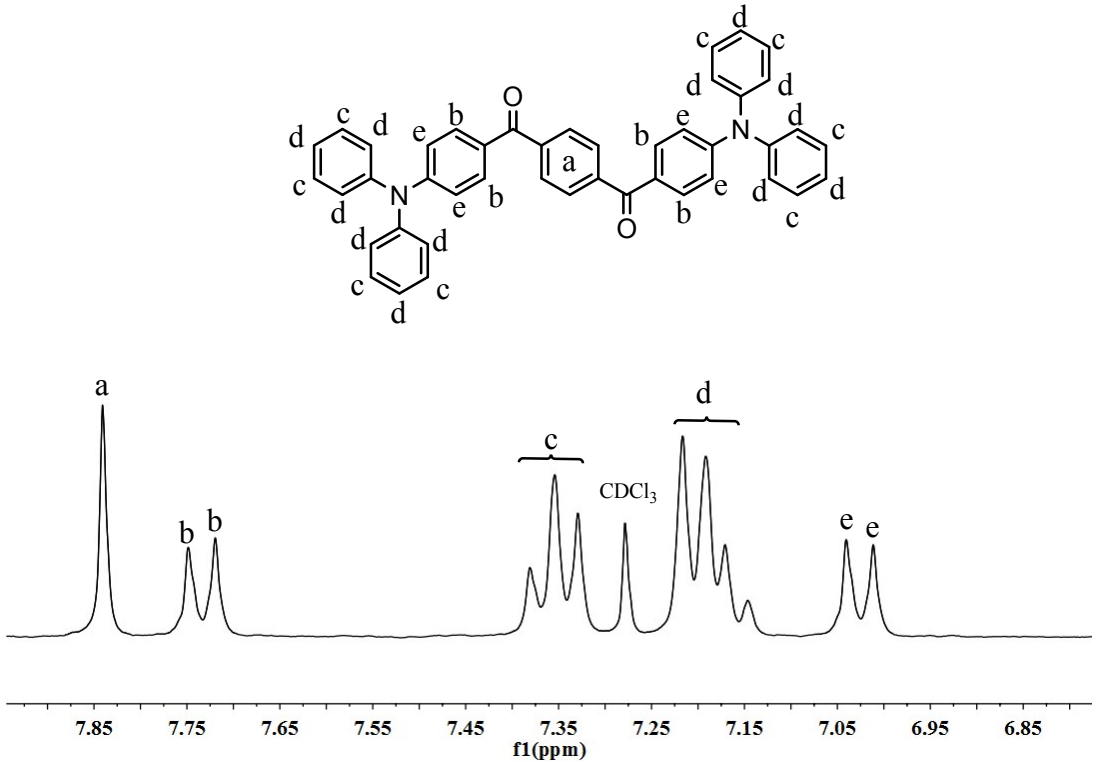


Figure S3. ^{1}H NMR spectra (in $CDCl_3$) of the p-DTPACO.

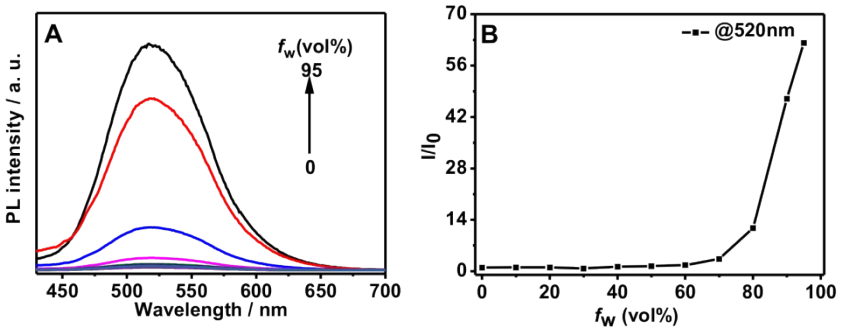
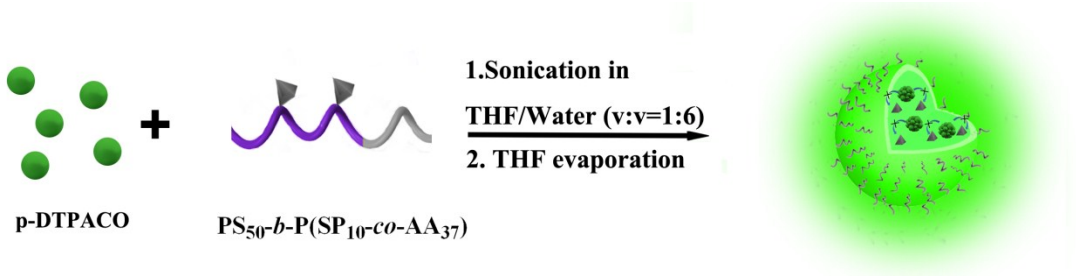


Figure S4. (A) The fluorescence emission spectra of p-DTPACO in water/THF mixtures with varied water content. (B) Plot of I/I_0 at 520 nm versus water content (f_w), where I_0 is the fluorescence intensity in pure THF solution. λ_{ex} = 410 nm.



Scheme S3. Schematic illustration of PFPNs formation in aqueous suspension.

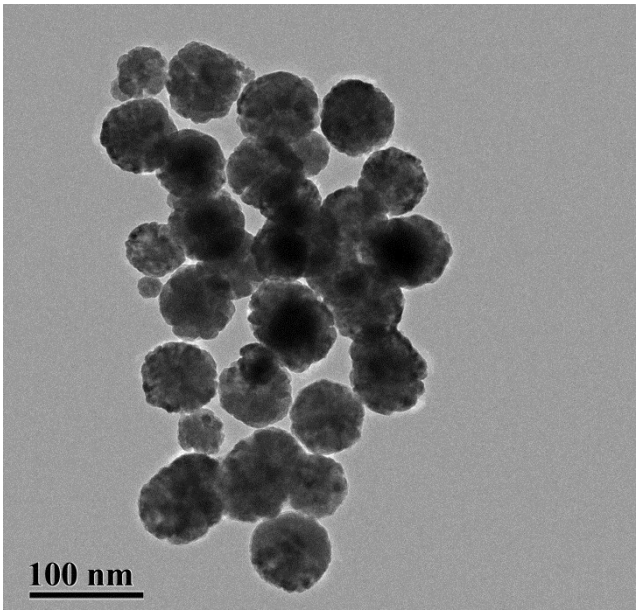


Figure S5. TEM image of a nanoparticle sample (NP-N4).

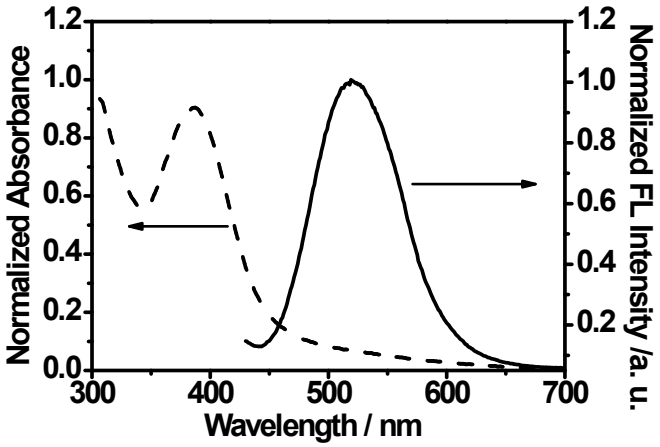


Figure S6. Normalized UV-vis absorption (dashed) and fluorescent (solid) spectra of nanoparticles contained only p-DTPACO.

Table S2. The photophysical properties of PFPNs (NP-N4).

Fluorophore	λ_{ab} (nm) [a]	ε ($mol^{-1} \cdot L \cdot cm^{-1}$) [a]	λ_{em}, nm ($\Phi_{F,}$ %) [b]	λ_{em}, nm ($\Phi_{F,}$ %) [c]
p-DTPACO (donor)	376	38400	520 (19.19)	520 (0.01)
spiropyran (acceptor)	340	8780	--	650 (8.66)

[a] Determined in dichloromethane;
[b] Emission maximum in nanoparticles dispersions (quantum yield given in the parentheses) before UV irradiation.
[c] Emission maximum in nanoparticles dispersions (quantum yield given in the parentheses) after 1 min UV irradiation.
Note: the quantum yields are measured by using an Edinburgh FLS920 (UK) fluorescence spectrometer equipped with an integrating sphere detector.

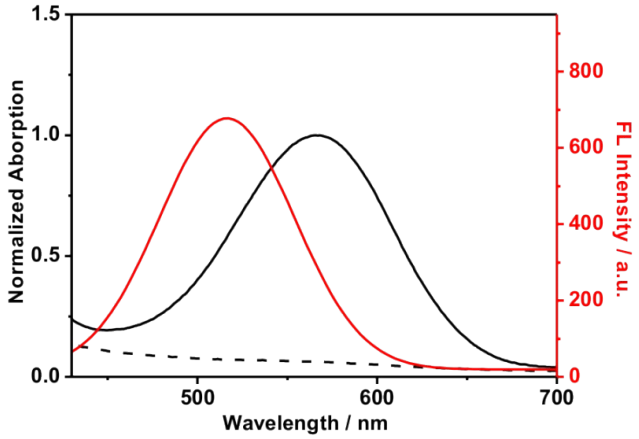


Figure S7. Absorption spectra of the SP state (black dashed curve) and MC state (black solid curve) of spiropyran units in polymer nanoparticles sample (NP-N1) and fluorescence emission spectra of nanoparticles contained only p-DTPACO (red solid curve).

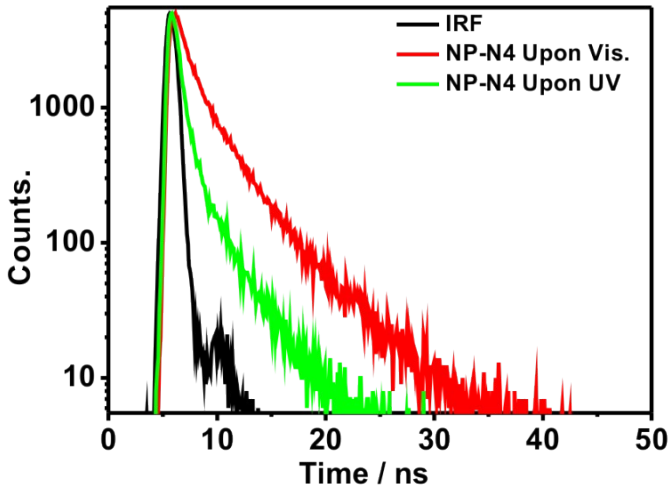


Figure S8. Fluorescence decay curves of the nanoparticles sample NP-N4 upon UV/vis light irradiation (0.125 mg/mL, λ_{ex} = 405 nm, detection wavelength = 520 nm).

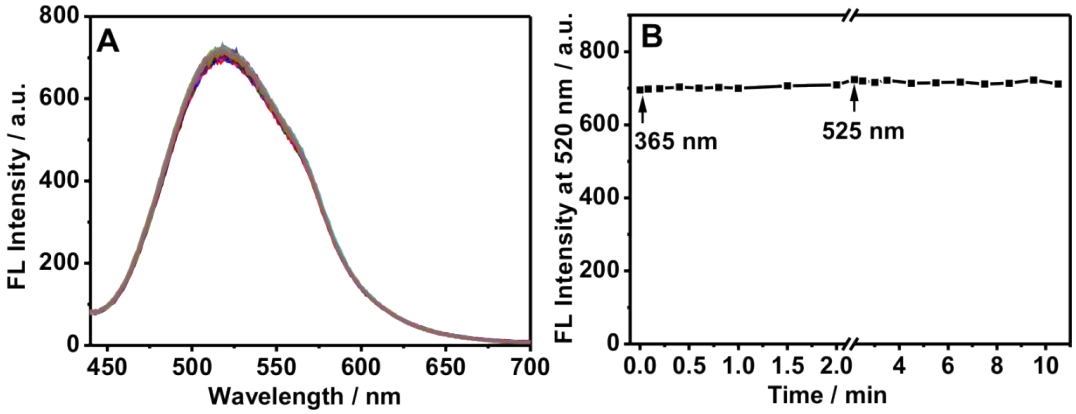


Figure S9. Fluorescent emission spectra (A) and intensity changes at 520 nm for the nanoparticles contained only p-DTPACO via irradiating with UV (365 nm) and visible light (525 nm).

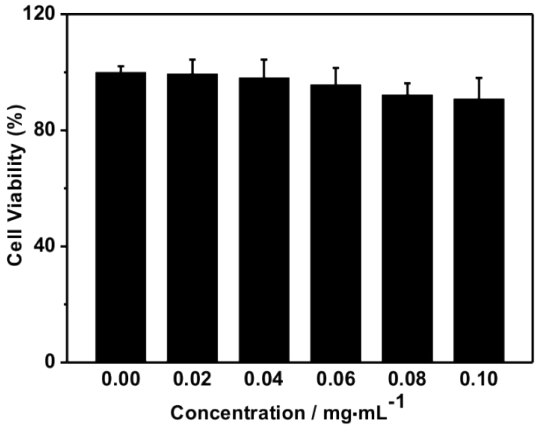


Figure S10. Cell viability of HeLa cells in the presence of NP-N4 at varied concentrations. The results are the mean standard deviation of eight separate measurements.

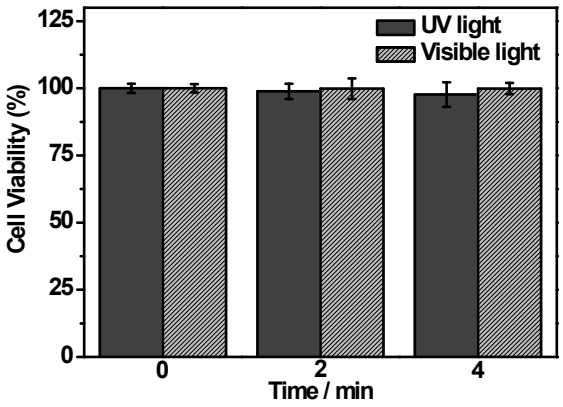


Figure S11. Cell viability of HeLa cells treated with the PFPNs (0.05 mg/mL) before and after irradiation with UV (365 nm, 2.8 mW/cm^2) and visible light (525 nm, 1.34 mW/cm^2) for 4 min, respectively; The results are the mean standard deviation of eight separate measurements.

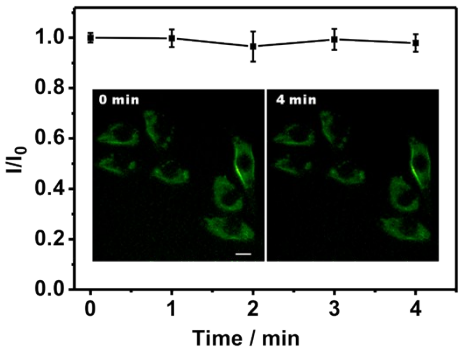


Figure S12. Photostability of the nanoparticles contained only p-DTPACO upon continuous irradiation by UV (365 nm, 2.8 mW/cm^2) for 0 to 4 min. I_0 is the initial fluorescence intensity and I is the fluorescence intensity of the sample after continuous scanning for designated time interval. The inset shows the corresponding fluorescence images at 0 and 4 min. Scale bar: 20 μm.