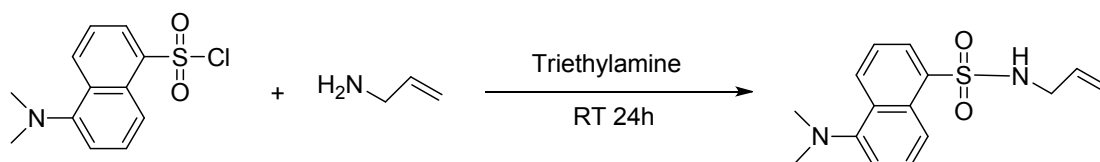


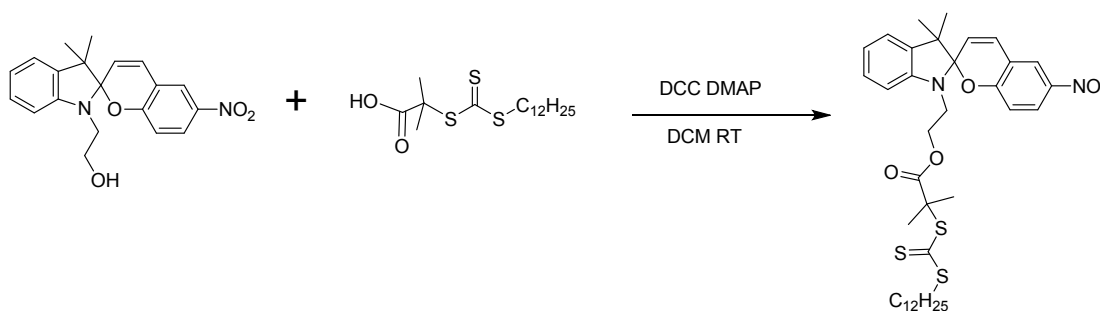
Supporting Information

Photochromic RAFT reagent helps constructing superior photoswitchable fluorescent polymeric nanoparticles for rewritable fluorescence patterning and intracellular dual-color imaging

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Scheme S1. Synthesis route of DNS.



Scheme S2. Synthesis route of SPTTC.

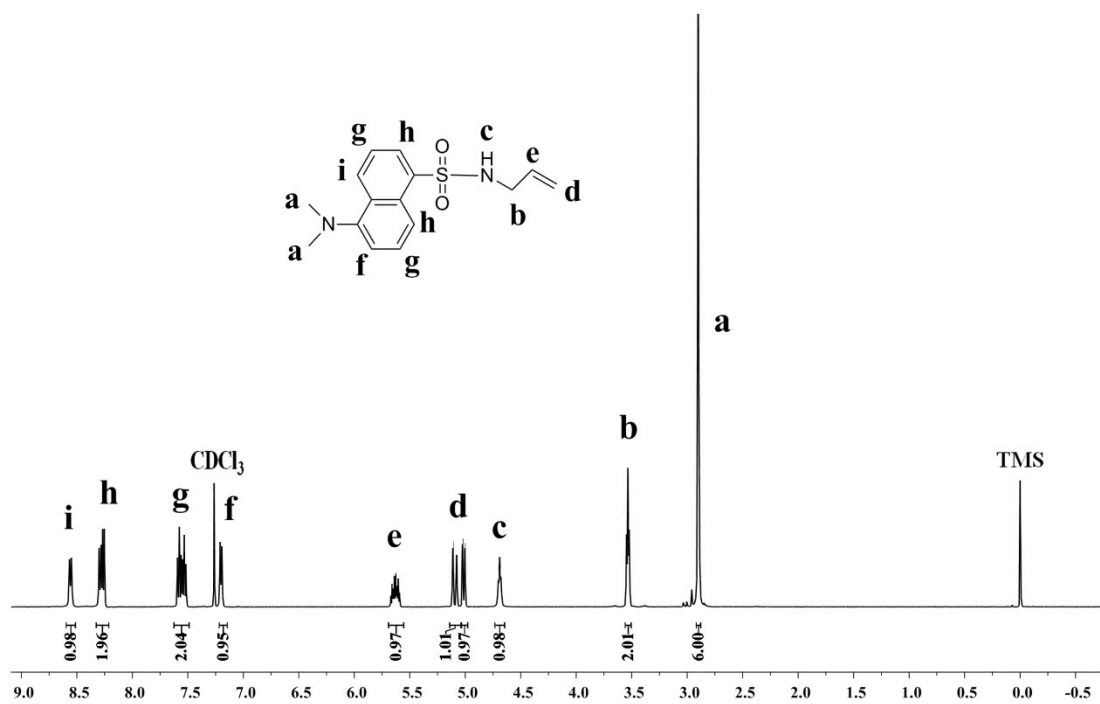


Figure S1. ¹H NMR spectrum of DNS.

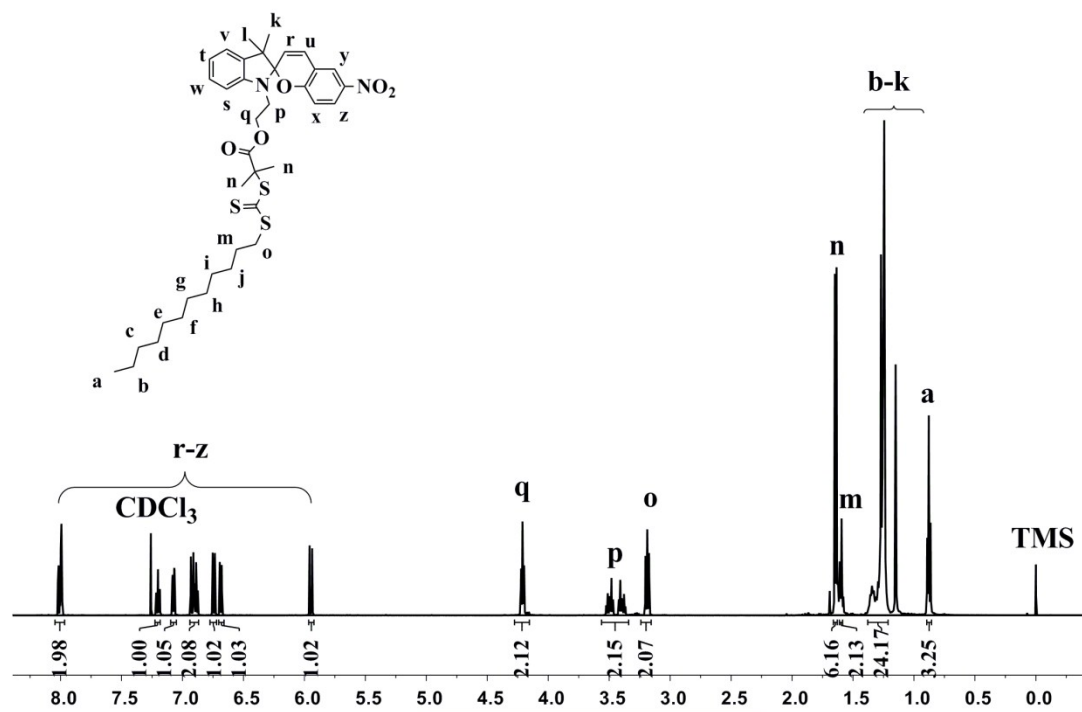


Figure S2. ¹H NMR spectrum of SPTTC.

Table S1. Composition and characteristics of polymer nanoparticles

No.	Feed concentration of DNS (mg/mL)	Feed concentration of acceptor (mg/mL)	Diameter ^c (nm)	M _n ^d	PDI ^d	E ^e	Conv. ^f (%)
NP-N0 ^a	0.4	0	78	107800	3.10	/	88.6
NP-N1	0.4	0.5	81	60900	2.09	55%	86.7
NP-N2	0.4	1.0	89	15200	1.18	73%	85.1
NP-N3	0.4	1.5	81	10500	1.09	91%	87.2
NP-N4	0.4	2.0	78	6000	1.08	91%	84.5
NP-NS	0	1.5	79	/	/	/	78.9
NP-C1 ^b	0.4	0.9	71	122100	2.20	83%	87.8

^aFrom NP-N0 to NP-NS, the St/HD/CTAC/AIBN feed is 0.500/0.050/0.100/0.006 g, respectively.

The acceptor is SPTTC; ^bFor NP-C1, the St/HD/CTAC/AIBN feed is 0.500/0.050/0.100/0.006 g, respectively. The acceptor is spiropyran-linked methacrylate [1-3].

The molar weight of the acceptor for NP-C1 is the same with NP-N3; ^cAverage nanoparticle diameter, determined by DLS;

^dThe number average molecular weight (M_n) and polydispersity index (PDI), determined by GPC;

^eThe energy transfer efficiency (E) determined by the equation: $E=[1-F/F_0]$, where F₀ and F are the maximum fluorescence intensity of the donor at 530 nm under visible or UV light irradiation, respectively.

^fThe monomer conversion was determined by according to Eq.: Conversion (%) = W_p/W_m × 100%, where W_p and W_m are the weight of the polymer produced and the monomer, respectively.

References:

- [1]. J. Chen, P. S. Zhang, G. Fang, C. Weng, J. Hu, P. G. Yi, X. Y. Yu and X. F. Li, *Polym. Chem.*, 2012, **3**, 685-693.
- [2]. J. Chen, P. S. Zhang, G. Fang, P. G. Yi, F. Zeng and S. Z. Wu, *J. Phys. Chem. B*, 2012, **116**, 4354-4362.
- [3]. J. Chen, P. S. Zhang, G. Fang, P. G. Yi, X. Y. Yu, X. F. Li, F. Zeng and S. Z. Wu, *J. Phys. Chem. B*, 2011, **115**, 3354-3362.

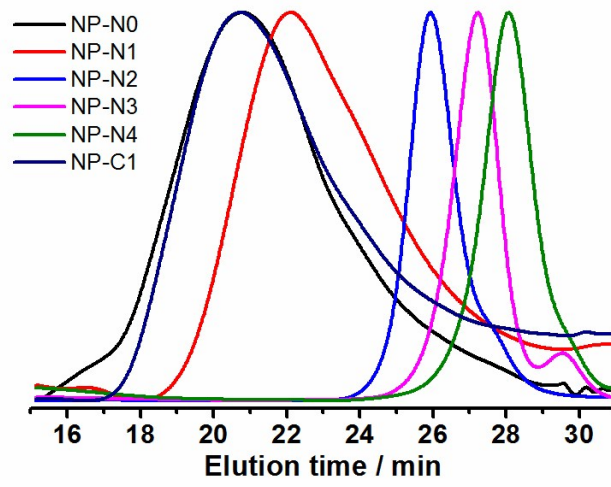


Figure S3. GPC curves for NP-N0, NP-N1, NP-N2, NP-N3, NP-N4, NP-C1

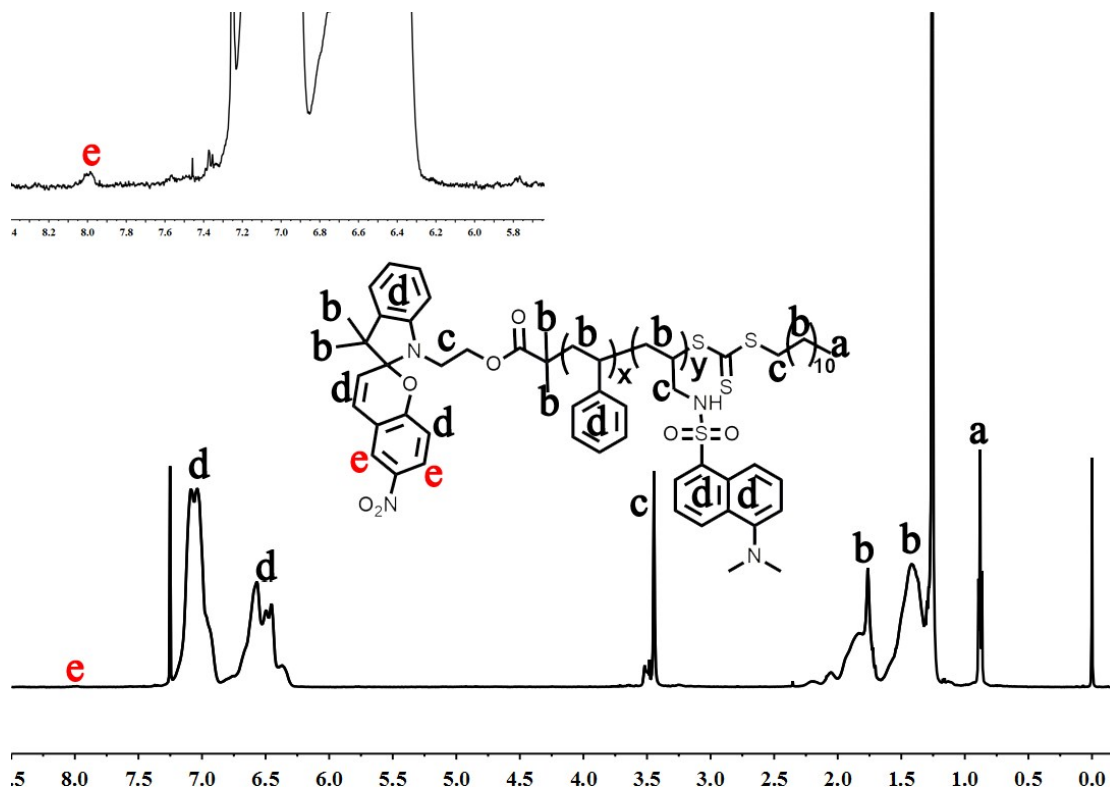


Figure S4. ¹H NMR spectrum of NP-N3.

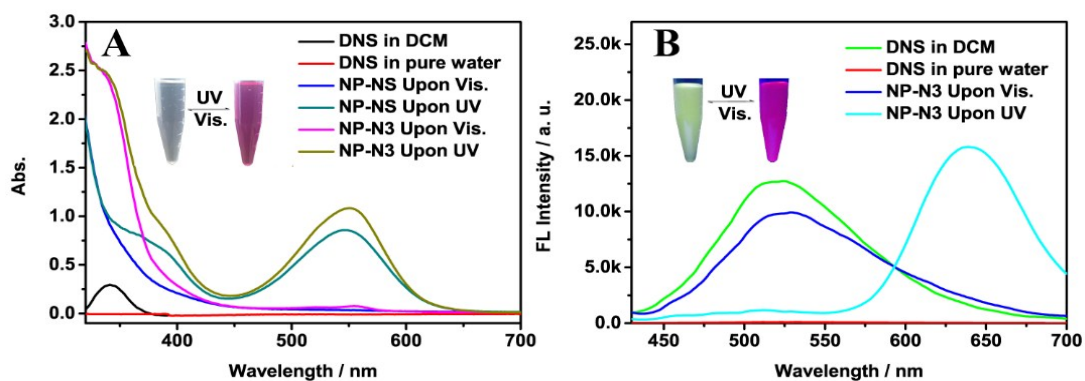


Figure S5. (A) Absorption spectra of DNS dye in pure water and dichloromethane, together with a PFPNs sample (NP-N3) and a SPTTC contained nanoparticle sample (NP-NS) upon UV or visible light; (B) Fluorescence emission spectra of DNS dye in pure water and dichloromethane and the sample NP-N3 upon UV or visible light ($\lambda_{\text{ex}}=410$ nm). Inset of figures: Photographs of NP-N3 after visible light irradiation and UV irradiation under the ambient light (A) or 365 nm UV light environment (B). Note: all the nanoparticles dispersions are dialyzed 3 times against water before measurement.

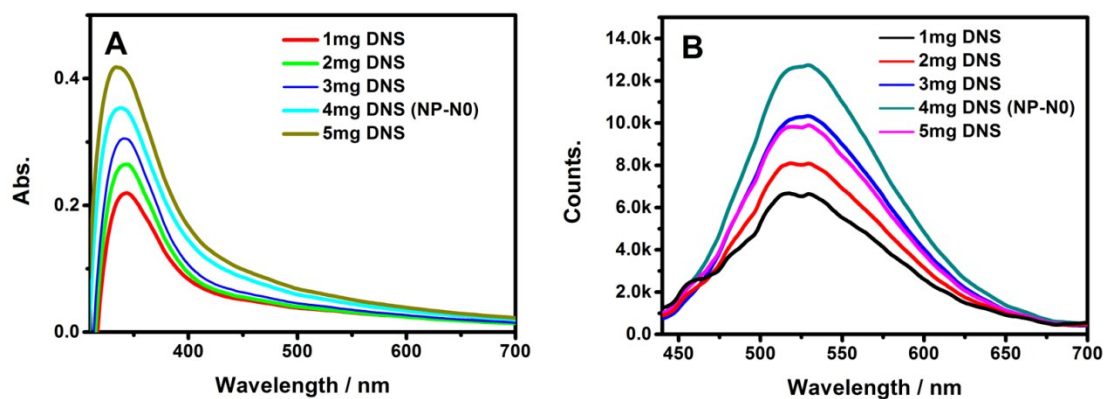


Figure S6. Absorption (A) and fluorescence emission (B) spectra ($\lambda_{\text{ex}}=410$ nm) of DNS-contained nanoparticles samples with different DNS feed contents.

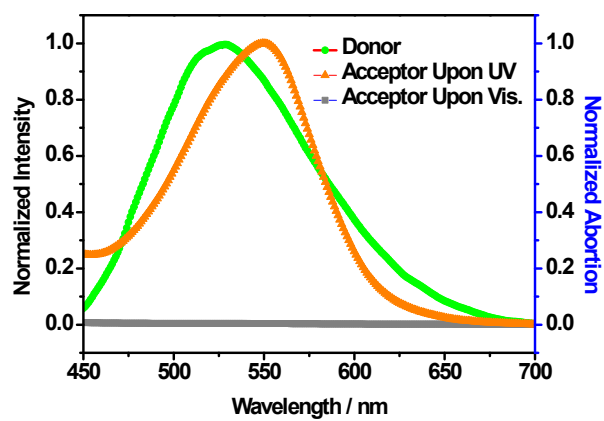


Figure S7. Fluorescence emission spectrum of donor (DNS in nanoparticles, NP-N0, $\lambda_{\text{ex}}=410$ nm) and absorption spectrum of the SP or MC form of SPTTC (acceptor, NP-NS) in nanoparticles.

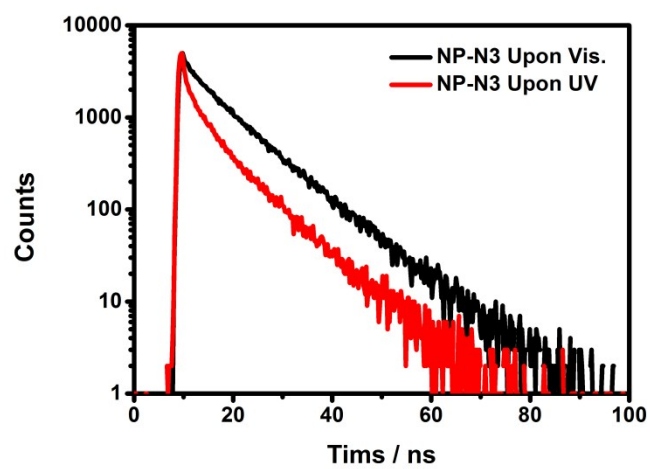


Figure S8. Fluorescence decay curves of NP-N3 upon UV/visible light irradiation (λ_{ex} = 405 nm, wavelengths of the detection: 530 nm).

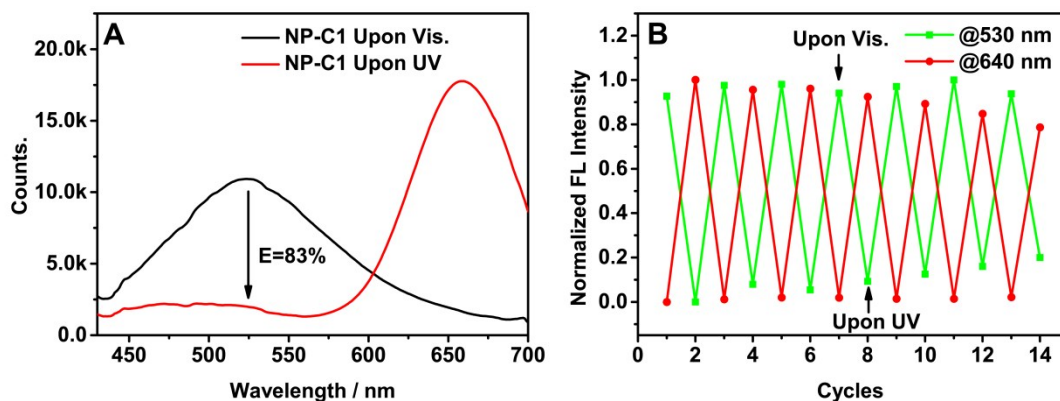


Figure S9. (A) Fluorescence emission spectra of a PFPNs sample NP-C1 ($C_{\text{PFPNs}}=0.3$ wt%) modulated by UV (365 nm) or visible light (525 nm) irradiation; (B) Photoinduced switching cycles of PFPNs (NP-C1) under alternative illumination of UV for 3 min and visible light for 5 min, $\lambda_{\text{ex}}=410$ nm, 25°C.

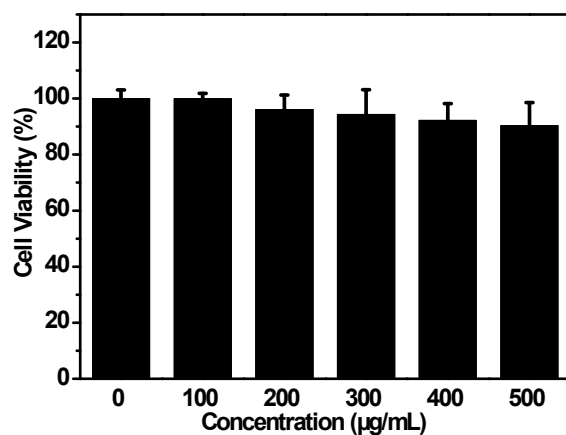


Figure S10. Cell viability of HeLa cells in the presence of the nanoparticle sample NP-N3 at varied concentrations. The results are the mean standard deviation of eight separate measurements.