Supplementary Information

Oxidation and temperature dual responsive polymers based on phenylboronic acid and *N*-isopropylacrylamide motifs

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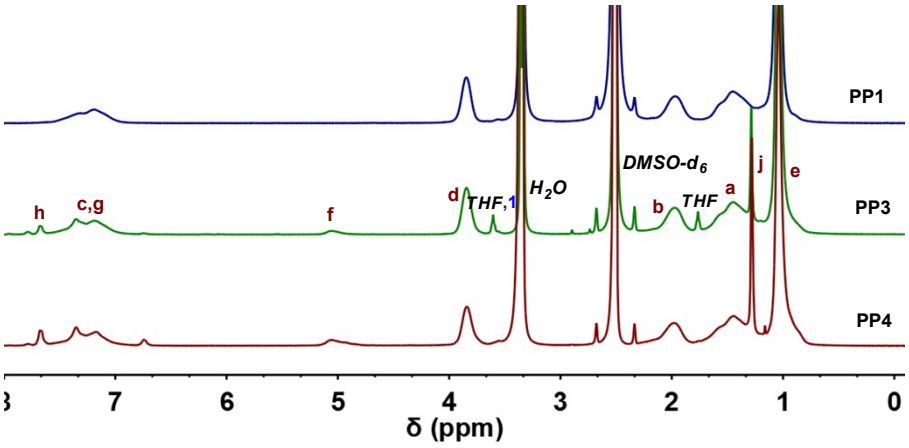

Fig. S1 ^{1}H NMR spectra of **PP1**, **PP3** and **PP4** in DMSO-d_6. Molar ratio of **M1** to **M2** in copolymers **PP1** to **PP4** is calculated by comparing the integration intensities of peak d (~3.8 ppm) to peak f (~5.0 ppm).

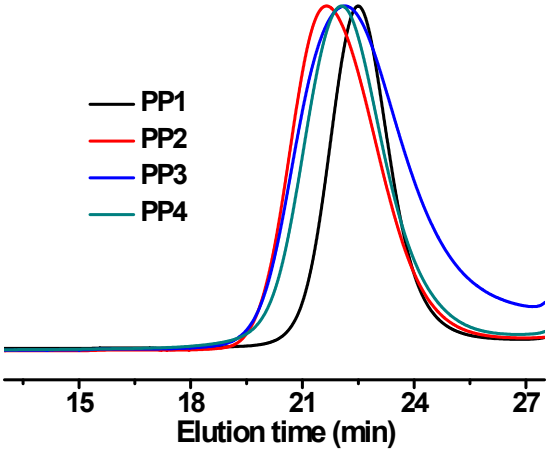

Fig. S2 GPC curves of **PP1–PP4** with THF as the eluent.

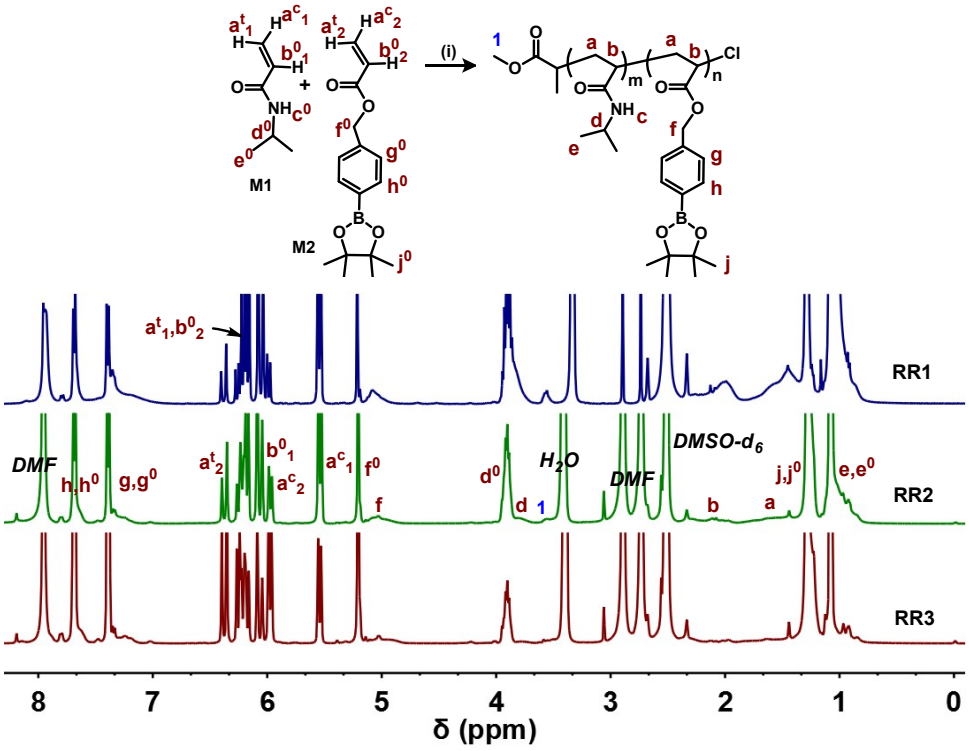

Fig. S3 *In situ* ^{1}H NMR spectra of polymerization mixture in DMSO-d_6. (i) MCP, CuCl, Me_6TREN, DMF, 60 °C, 24 h.

Formula: $$\log\frac{c(M1)}{c(M1)_0}=\frac{r_1}{1-r_1}\log\frac{c(M_1)_0c(M_2)}{c(M_2)_0c(M_1)}-\frac{1-r_1r_2}{(1-r_1)(1-r_2)}\log\frac{(r_2-1)\dfrac{c(M_2)}{c(M_1)}-r_1+1}{(r_2-1)\dfrac{c(M_2)_0}{c(M_1)_0}-r_1+1}$$

Table S1. Estimation of the Reactivity Ratios of Monomers [a]

Run	M1/M2 in feed ratio	Conversion(%) [b]	
		M1	M2
RR1	90/10	39.0	43.0
RR2	70/30	14.3	18.5
RR3	50/50	15.0	14.0

[a] Reactions were performed in DMF at 60 °C, $[M]_0$ = 40 wt %, [M]:[MCP]:[CuCl]:[Me_6TREN] = 100:0.5:1:1. [b] Their conversion was calculated by the formula: $\alpha_{M1} = (I_{d+d0}-I_a^{c}{}_1)/I_{d+d0} \times 100\%$, $\alpha_{M2} = (I_{f+f0}-2I_a^{t}{}_2)/I_{f+f0} \times 100\%$, respectively.

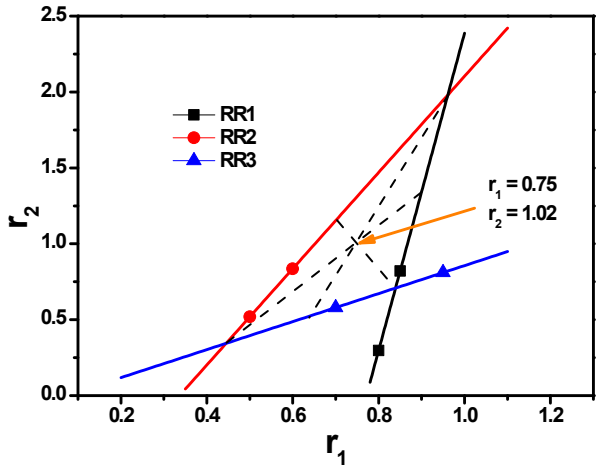

Fig. S4 Monomer reactivity ratios estimated by Mayo-Lewis method.

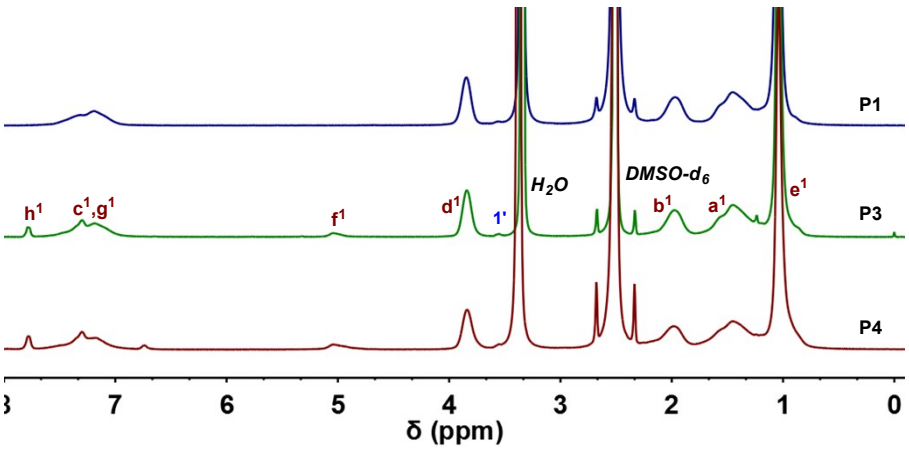

Fig. S5 ^{1}H NMR spectra of **P1**, **P3** and **P4** (without pinacol ester) in DMSO-d_6. Molar ratio of **M1** to **M2** in copolymers **P1** to **P4** is calculated by comparing the integration intensities of peak d^1 (~3.8 ppm) to peak f^1 (~5.0 ppm). Their DP was calculated by the formula: $DP = (6I_d^1+3I_f^1)/(2I_{1'})$, where I_d^1, I_f^1 and $I_{1'}$ denote the integration intensity of peak d^1 (~3.8 ppm), peak f^1 (~5.0 ppm) and peak 1' (~ 3.6 ppm), respectively.

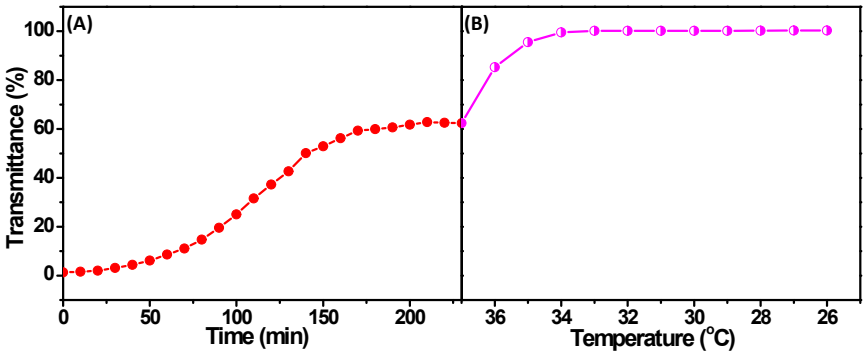

Fig. S6 (A) Plots of transmittance vs oxidation time of copolymer **P2** (1.0 mg/mL) in 50 mM PB solution (pH 7.4) with H_2O_2 (10 mM) at 37 °C. (B) Plots of transmittance vs temperature for the completely decomposed **P2** in the same buffer solution.

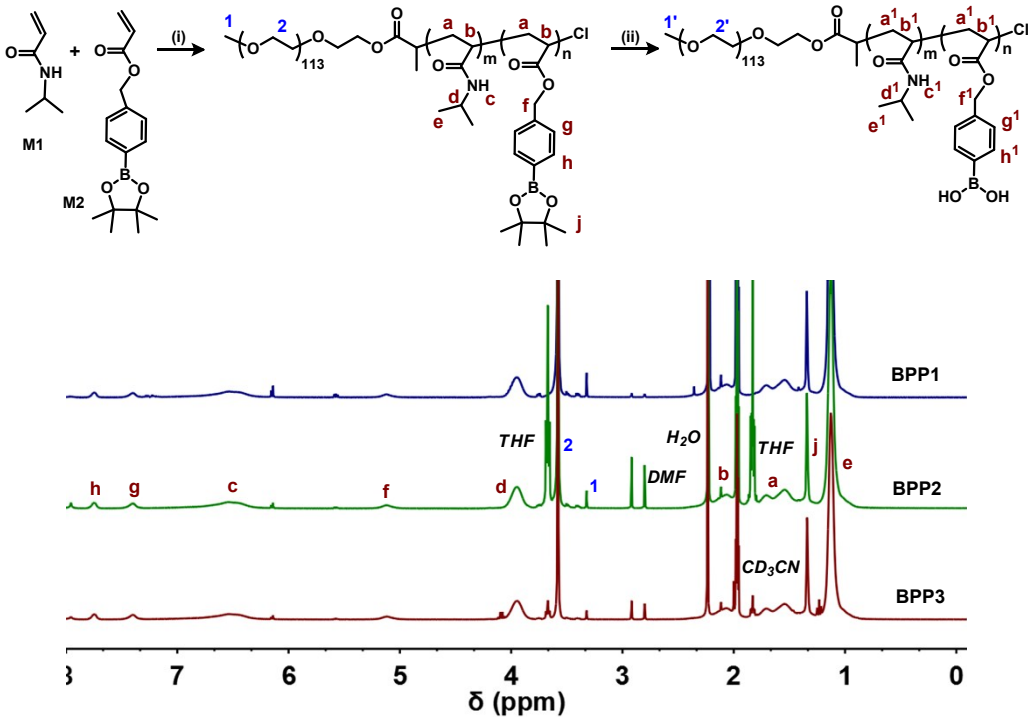

Fig. S7 ^{1}H NMR spectra of **BPP1–BPP3** (with pinacol ester) in CD_3CN. Molar ratio of **M1** to **M2** in copolymers **BPP1** to **BPP4** is calculated by comparing the integration intensities of peak d (~3.9 ppm) to peak f (~5.1 ppm).

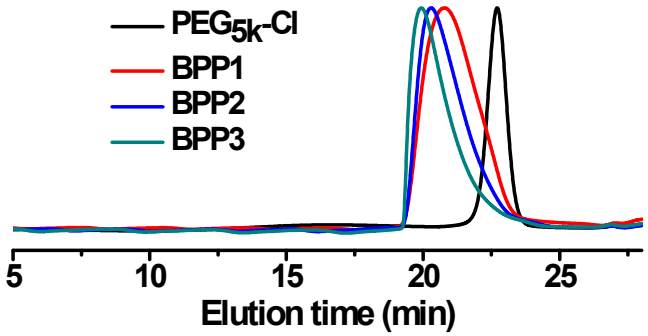

Fig. S8 GPC curves of **BPP1–BPP3** (with pinacol ester) and $mPEG_{113}$-Cl.

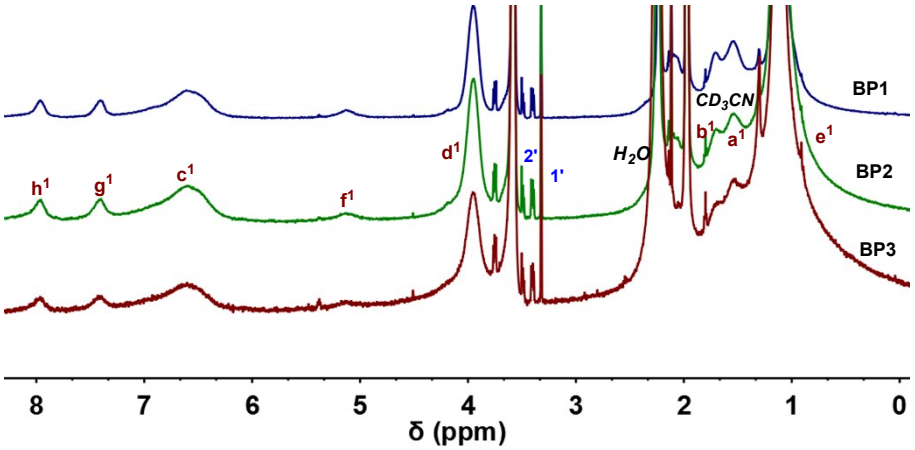

Fig. S9 ^1H NMR spectra of **BP1–BP3** (without pinacol ester) in CD_3CN. Molar ratio of **M1** to **M2** in copolymers **BP1** to **BP4** is calculated by comparing the integration intensities of peak d^1 (~3.9 ppm) to peak f^1 (~5.1 ppm). Their DP was calculated by the formula: $DP = (6I_d^1+3I_f^1)/(2I_{1'})$, where I_d^1, I_f^1 and $I_{1'}$ denote the integration intensity of peak d^1 (~3.9 ppm), peak f^1 (~5.1 ppm) and peak 1' (~ 3.3 ppm), respectively.

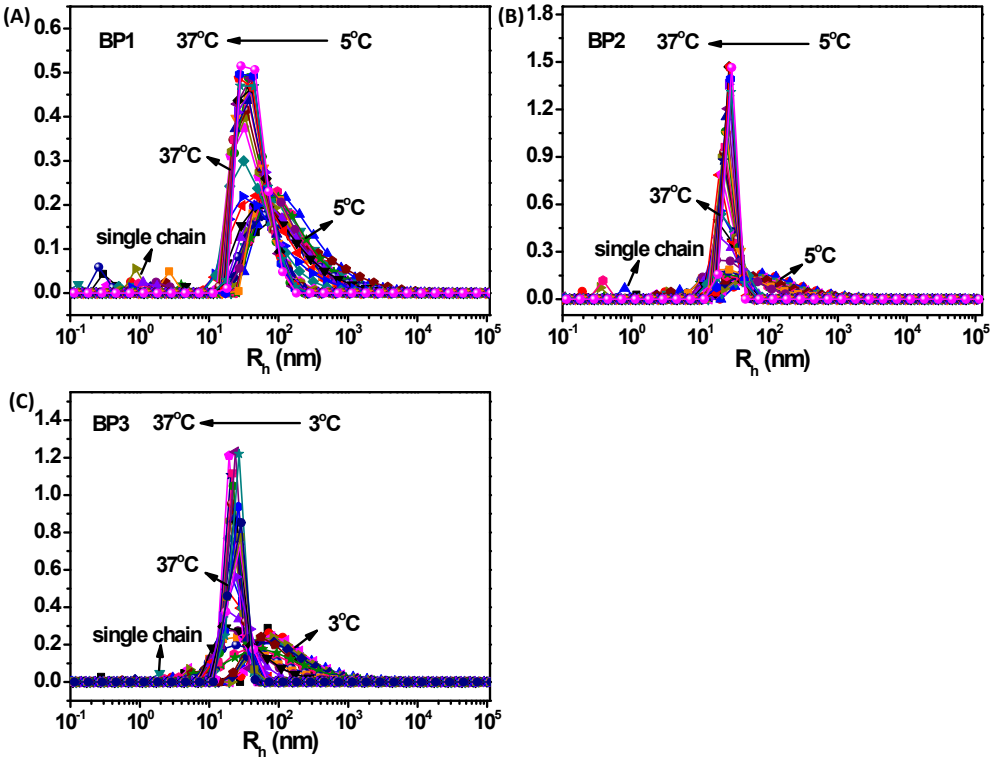

Fig. S10 CONTIN analyses of **BP1–BP3** nanoparticles (0.1 mg/mL) in 50 mM PB solution (pH 7.4) at various temperatures with the slow heating procedure. Detection angle: 90°.

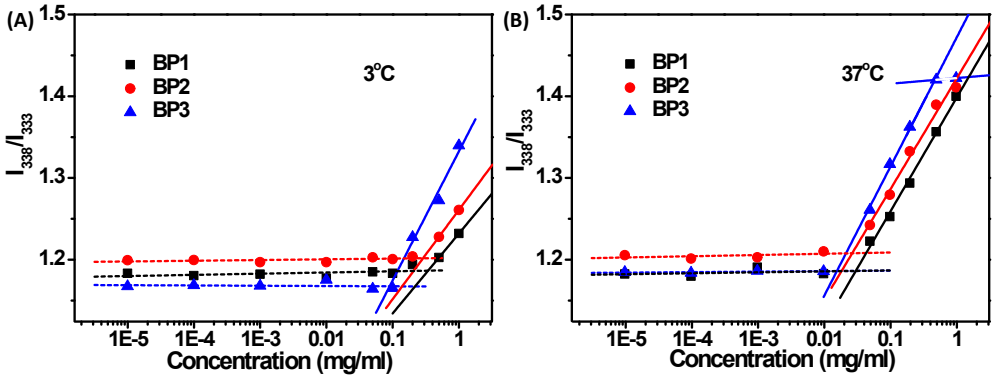

Fig. S11 Relationship between I_{338}/I_{333} ratio of pyrene and the concentration of **BP** copolymers at (A) 3 °C and (B) 37 °C. Pyrene was dissolved (or dispersed) in **BP1–BP3** aqueous solution with the concentration of 1.0 x 10^{-6} mM.

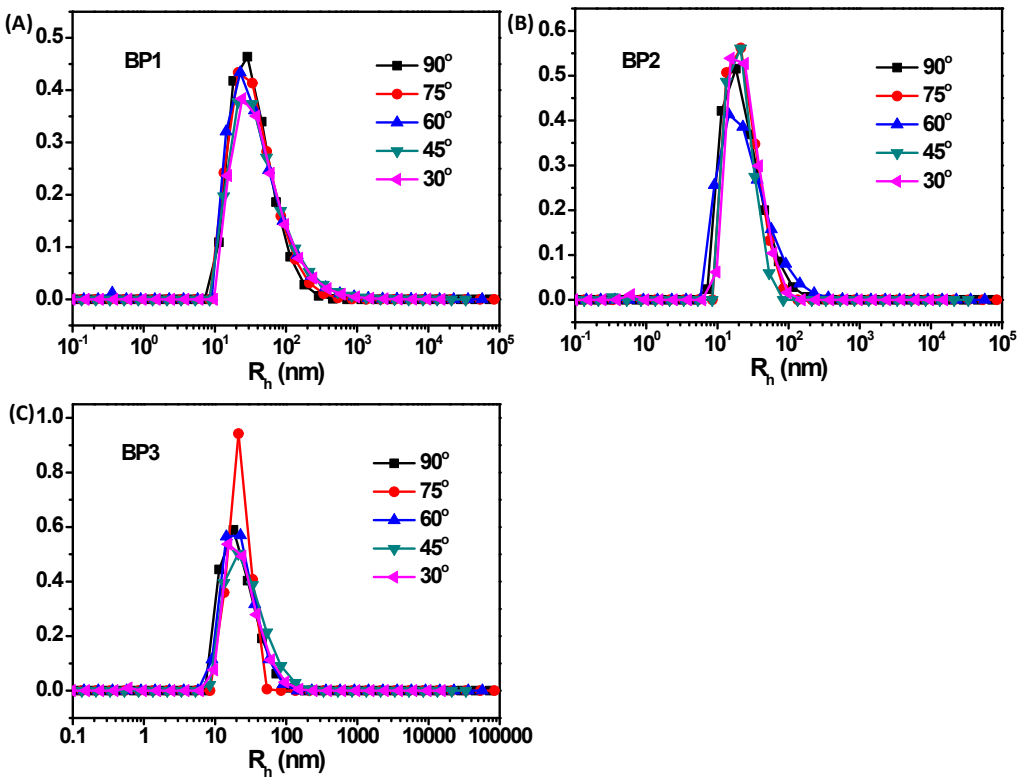

Fig. S12 Size distribution of **BP1–BP3** nanoparticles (0.1 mg/mL) in 50 mM PB solution (pH 7.4) at 37 °C. The nanoparticles were prepared by the fast heating process.

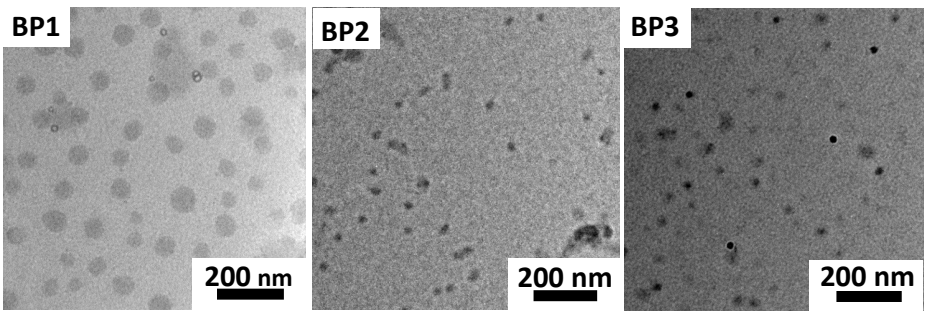

Fig. S13 TEM photographs of **BP1–BP3** nanoparticles (0.1 mg/mL) formed in 50 mM PB solution (pH 7.4) at 37 °C.

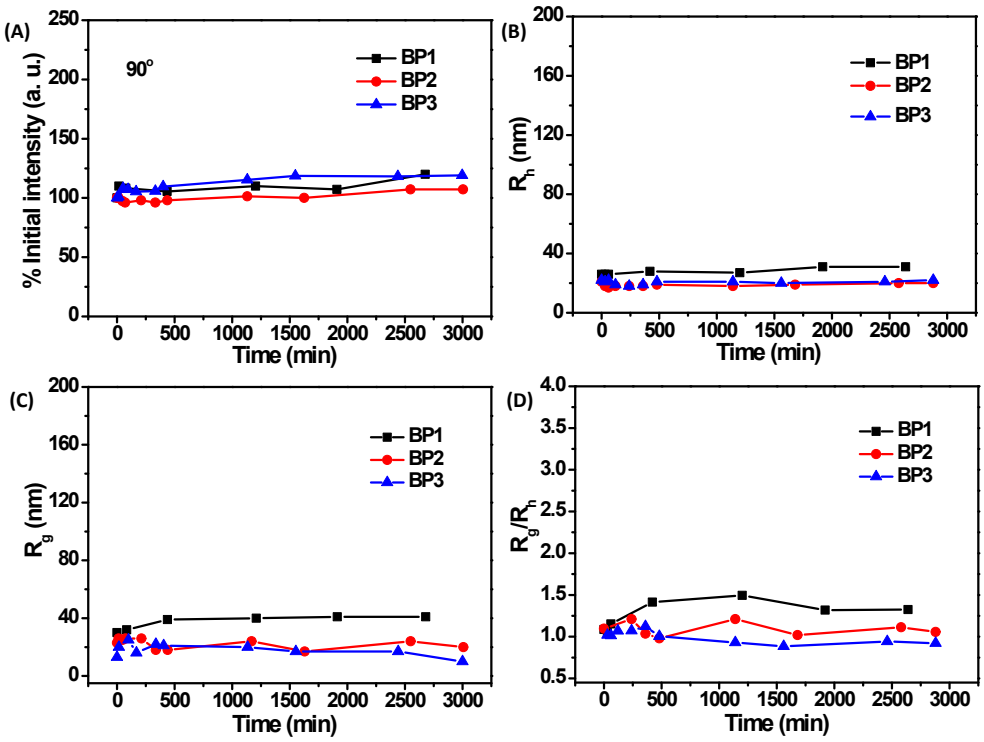

Fig. S14 (A) excess scattered intensity, (B) R_h, (C) R_g, and (D) R_g/R_h of **BP1–BP3** nanoparticles (0.1 mg/mL) in 50 mM PB solution (pH 7.4) incubated for different times at 37 °C, without H_2O_2.

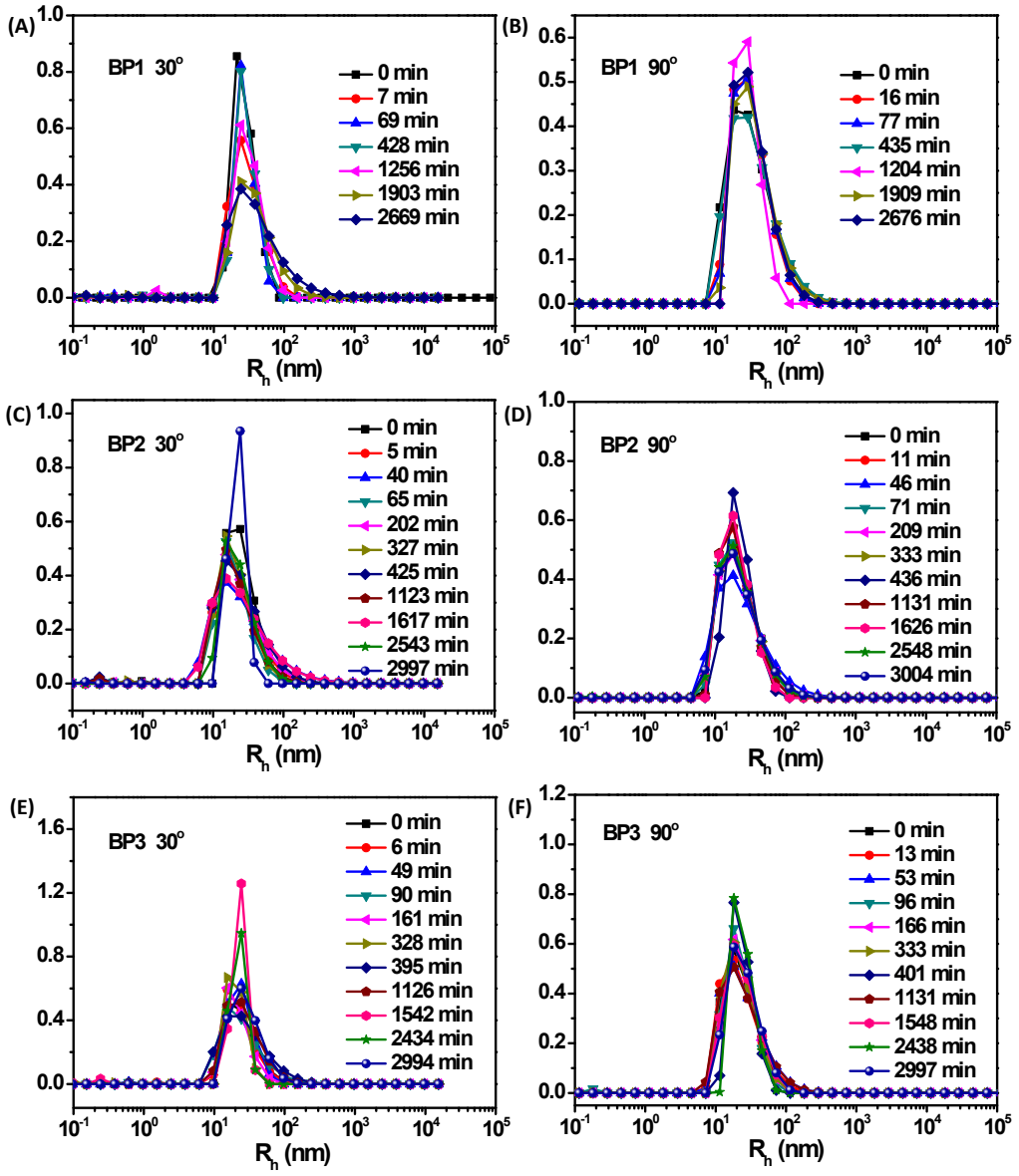

Fig. S15 CONTIN analyses of **BP1–BP3** (0.1 mg/mL) nanoparticles in 50 mM PB solution (pH 7.4) incubated for different times at 37 °C, without H_2O_2. Detection angle: 30° and 90°.

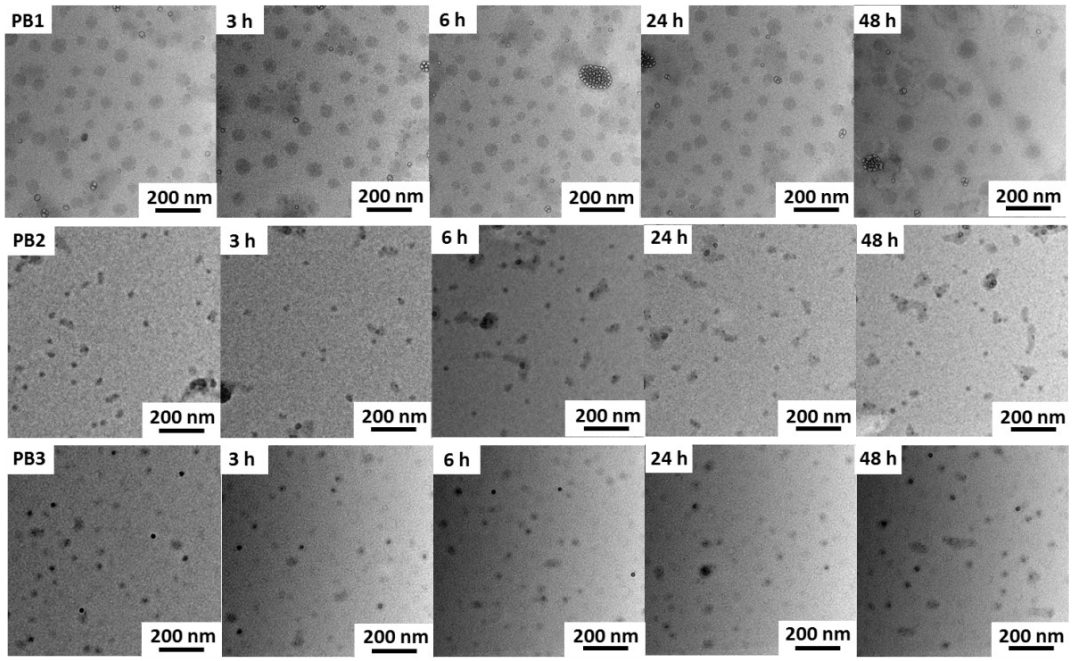

Fig. S16. TEM photographs of **BP1–BP3** nanoparticles (0.1 mg/mL) formed in 50 mM PB solution (pH 7.4) and incubated for various times at 37 ^{o}C, without H_2O_2.

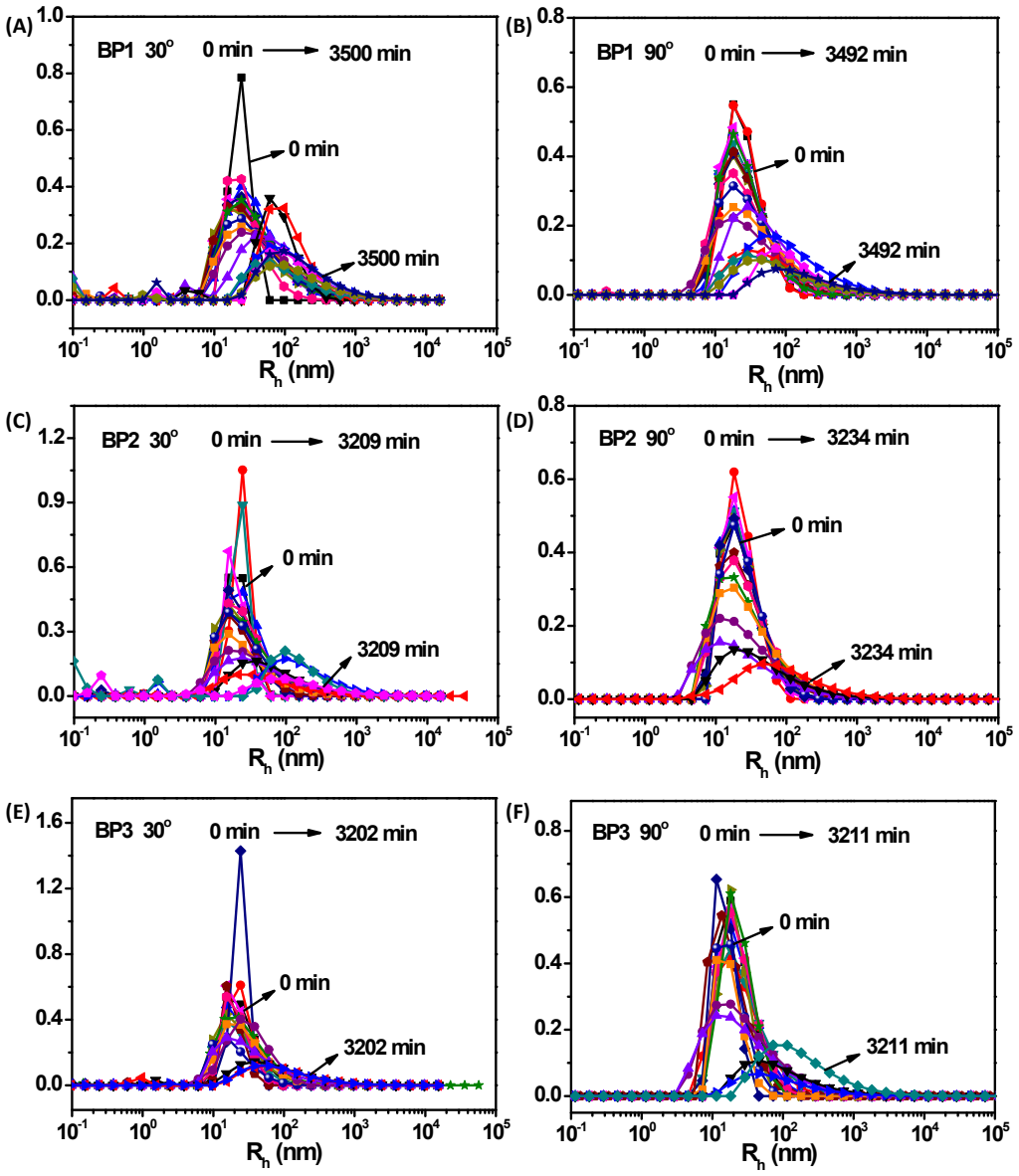

Fig. S17 CONTIN analyses of **BP1–BP3** (0.1 mg/mL) nanoparticles in 50 mM PB solution (pH 7.4) incubated for different times at 37 °C, with 0.5 mM H_2O_2 at 37 °C. Detection angle: 30° and 90°.

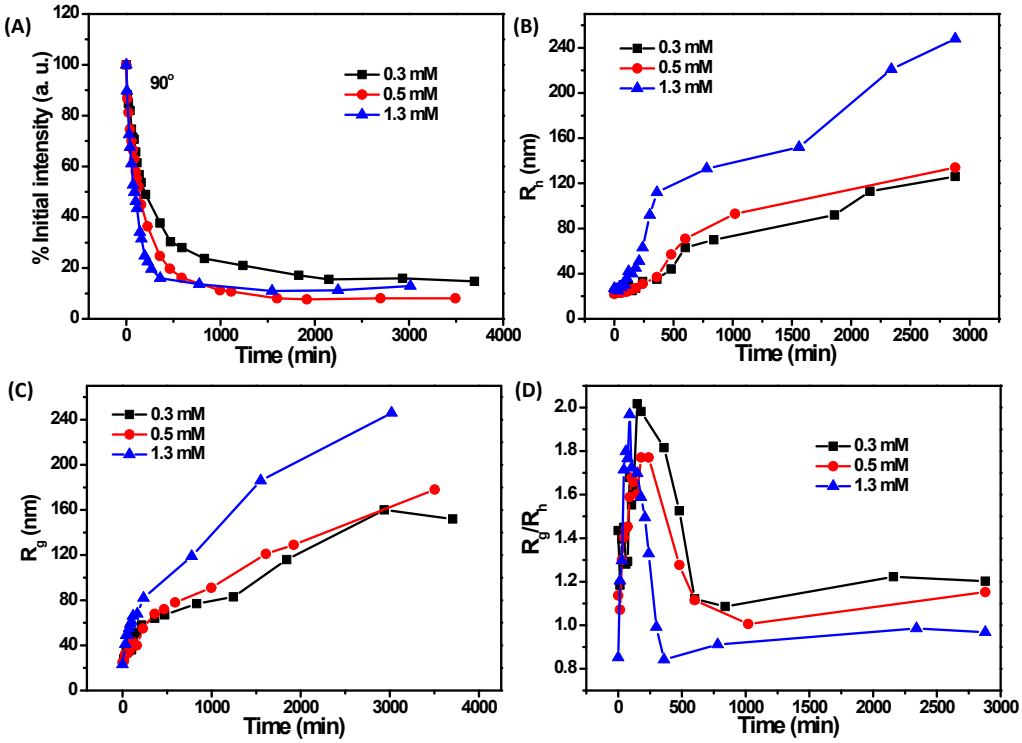

Fig. S18 (A) excess scattered intensity, (B) R_h, (C) R_g, and (D) R_g/R_h of **BP1** nanoparticles (0.1 mg/mL) in PB solution (50 mM, pH 7.4) incubated for different times at 37 °C, with different concentrations of H_2O_2, 37 °C.

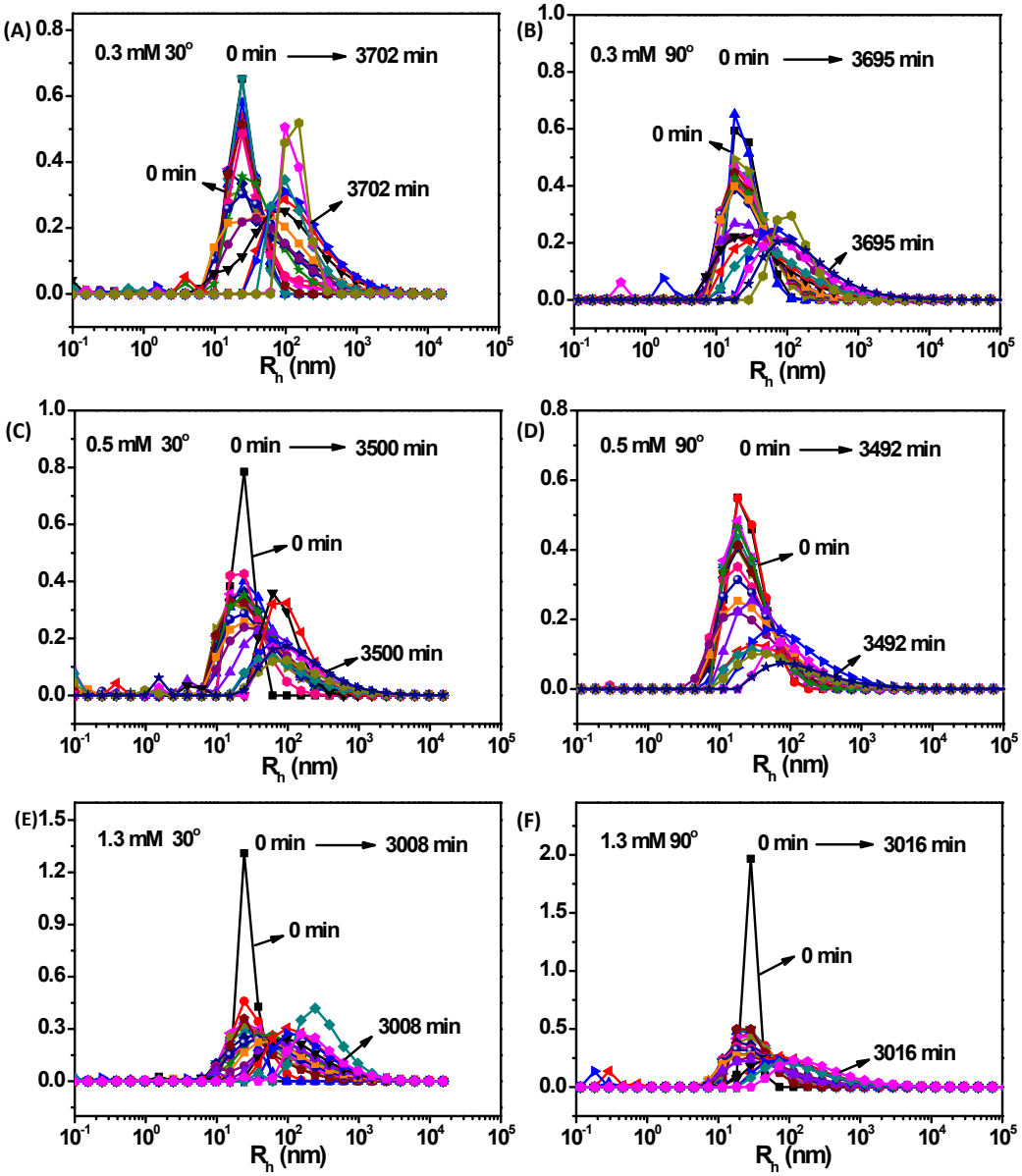

Fig. S19 CONTIN analyses of of **BP1** nanoparticles (0.1 mg/mL) in PB solution (50 mM, pH 7.4) incubated for different times at 37 °C, with different concentrations of H_2O_2, 37 °C. Detection angle: 30° and 90°.

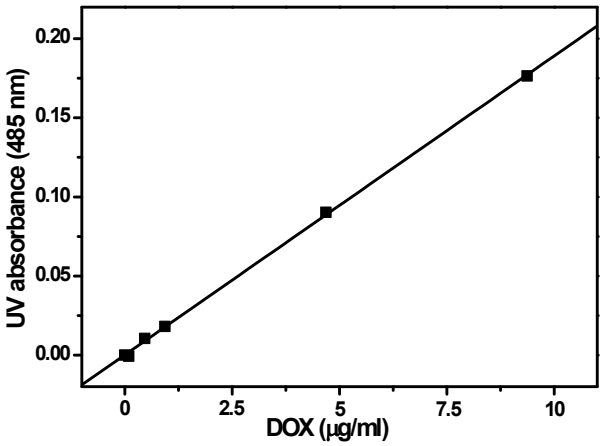

Fig. S20 The calibration curve of DOX in 10 mM PB solution (pH 7.4).

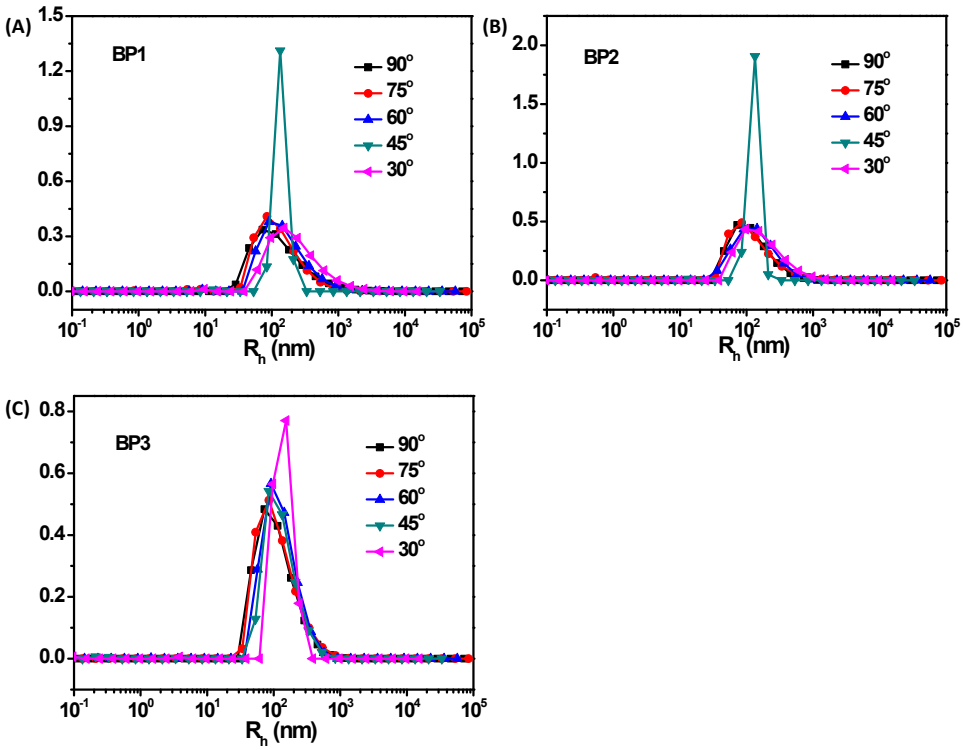

Fig. S21 Size distribution of the DOX-loaded **BP1–BP3** nanoparticles (0.1 mg/mL) in 10 mM PB solution (pH 7.4) at 37 °C.

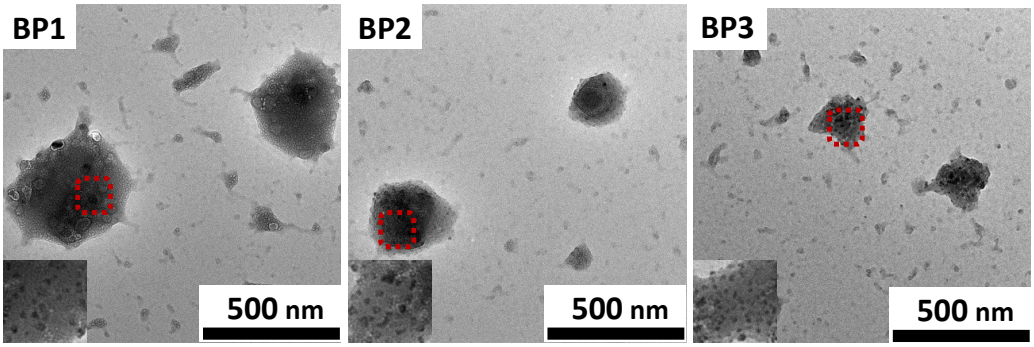

Fig. S22 TEM photographs of the DOX-loaded **BP1**–**BP3** nanoparticles (0.1 mg/mL) formed in 50 mM PB solution (pH 7.4) at 37 °C.

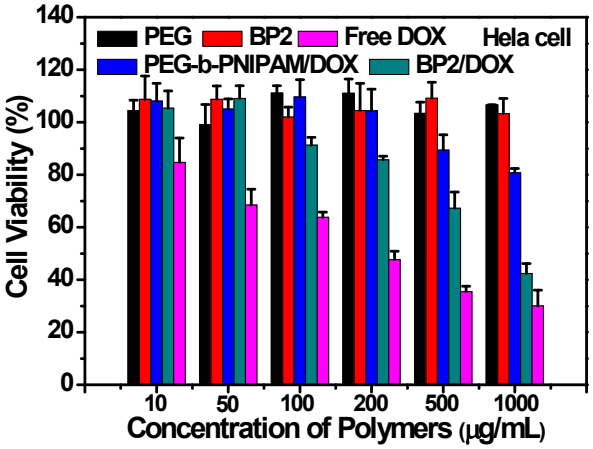

Fig. S23 Cell viability of Hela cells measured by CCK-8 assay at 37 °C. The DOX-loading contents of the drug-loaded **BP2** and PEG-*b*-PNIPAM nanoparticles were 3.0 wt% and 3.3 wt%, respectively. The concentrations of DOX are 0.3, 1.5, 3.0, 6.0, 15 and 30 μg/mL, respectively.