

Supporting Information:

Unimolecular micelles of pH-responsive star-like copolymers for co-delivery of anticancer drugs and small-molecular photothermal agents: a new drug-carrier for combinational chemo/photothermal cancer therapy

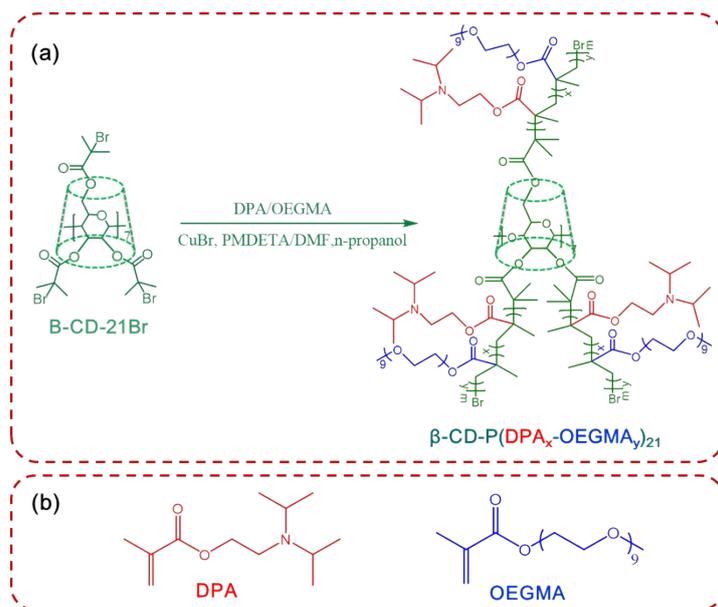
Tao Jia,[‡] Shuo Huang,[‡] Cangjie Yang, Mingfeng Wang*

School of Chemical and Biomedical Engineering, Nanyang Technological University,

62 Nanyang Drive, Singapore 637459

[‡] Tao Jia and Shuo Huang contributed equally to this work.

*Email - mfwang@ntu.edu.sg, mingfengwang08@gmail.com



Scheme S1. The synthetic route to CPDO-*n* (*n* = 1, 2, 3) (a); chemical structures of the monomers DPA and OEGMA.

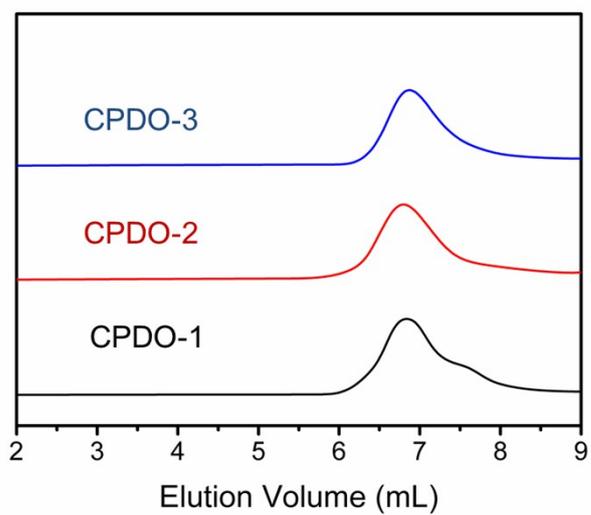


Figure S1. GPC traces of CPDO-1, CPDO-2 and CPDO-3.

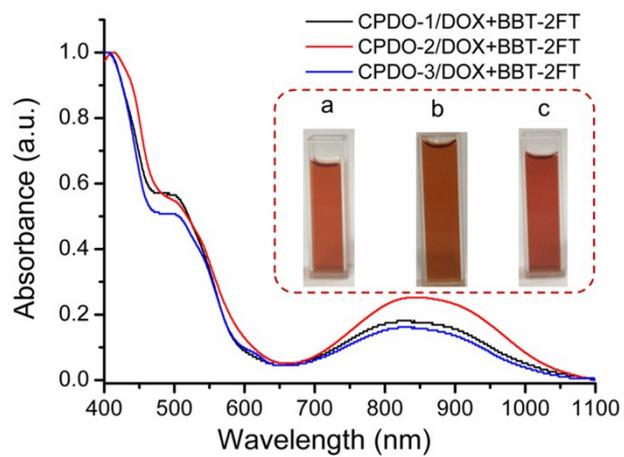


Figure S2. The UV-vis absorption spectrum of micelles CPDO-1/[DOX + BBT-2FT], CPDO-2/[DOX + BBT-2FT] and CPDO-3/[DOX + BBT-2FT] in water, $C_{\text{CPDO-n}} = 100 \mu\text{g mL}^{-1}$.

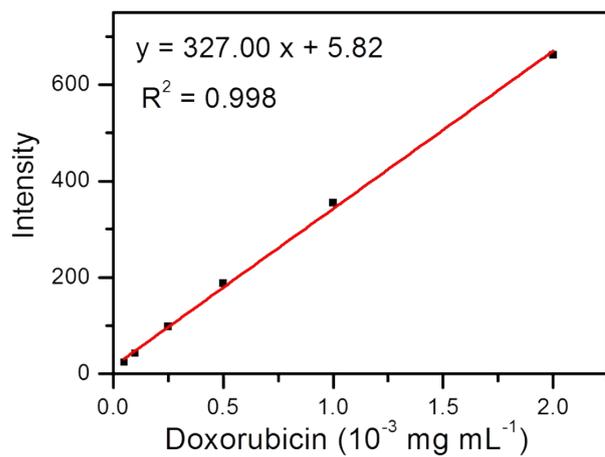


Figure S3. The calibration curve of fluorescence emission intensity at 550 nm versus the concentration of DOX in DMSO. ($\lambda_{\text{ex}} = 495 \text{ nm}$)

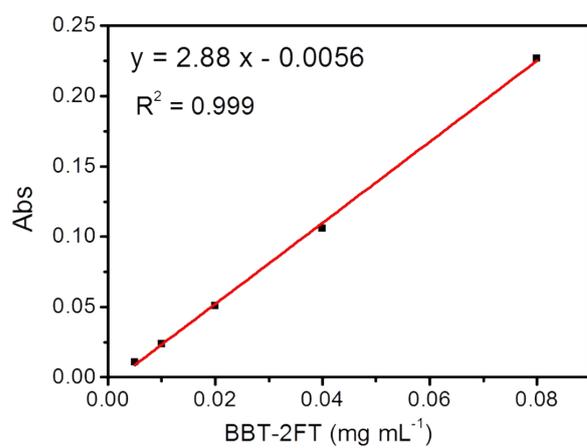


Figure S4. The calibration curve of the NIRlight absorbance at 800 nm versus the concentration of BBT-2FT in THF.

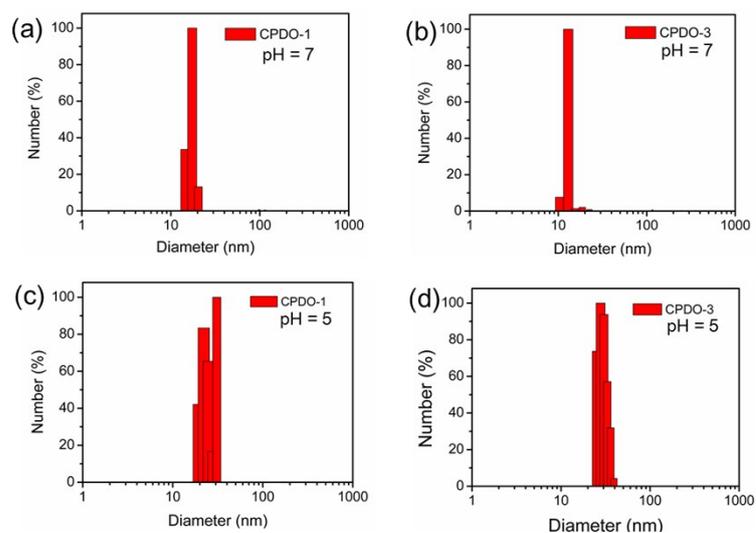


Figure S5. DLS histograms of unimolecular micelles in water, (a) CPDO-1 pH = 7; (b) CPDO-3 pH = 7; (c) CPDO-1 pH = 5; (d) CPDO-3 pH = 5; (Concentration = $50 \mu\text{g mL}^{-1}$).

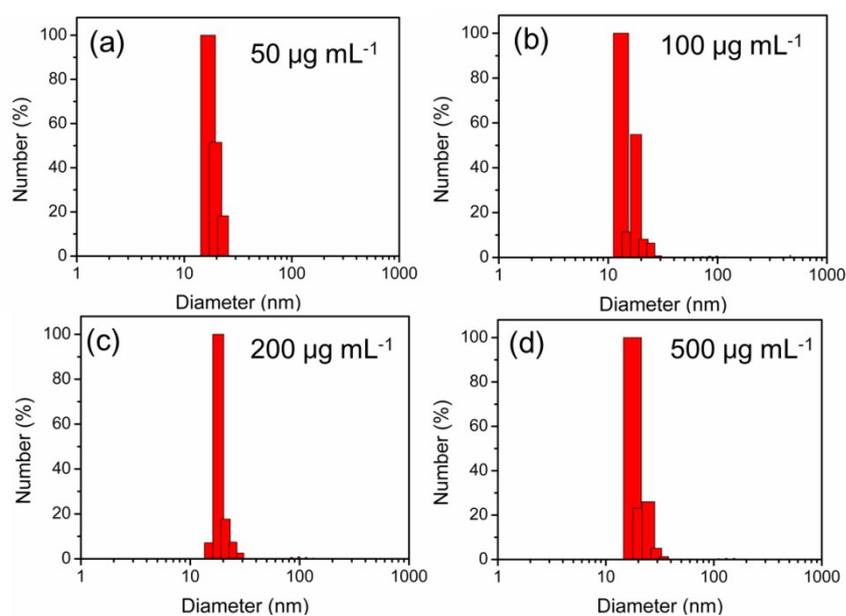


Figure S6. DLS histograms of unimolecular micelles CPDO-2 with different concentrations in water, (a) 50 $\mu\text{g mL}^{-1}$; (b) 100 $\mu\text{g mL}^{-1}$; (c) 200 $\mu\text{g mL}^{-1}$; (d) 500 $\mu\text{g mL}^{-1}$.

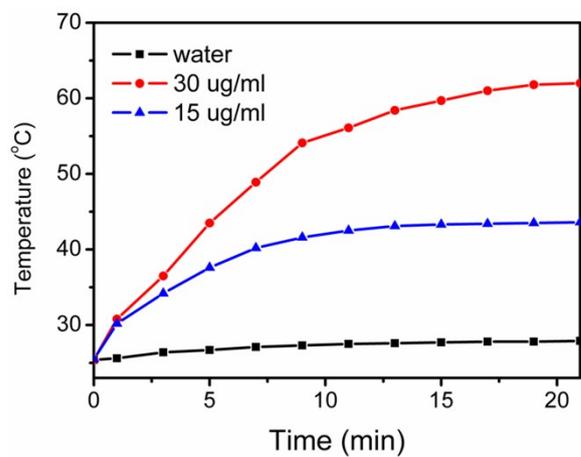


Figure S7. The photo-thermal property of CPDO-2/[DOX + BBT-2FT] under NIR laser irradiation.

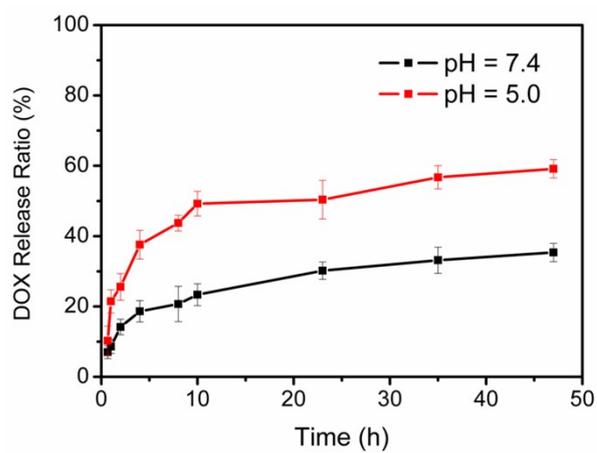


Figure S8. *In vitro* drug release of CPDO-2/DOX micelles in PBS at pH 7.4 or pH 5.0 at 37 °C without laser irradiation.

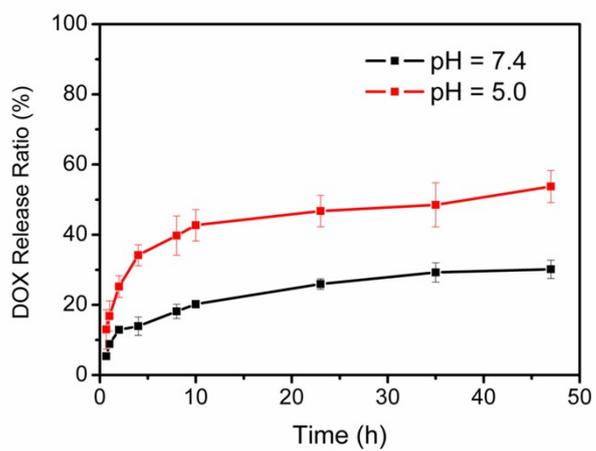


Figure S9. *In vitro* drug release of CPDO-2/[DOX + BBT-2FT] micelles in PBS at pH 7.4 or pH 5.0 at 37°C without laser irradiation.

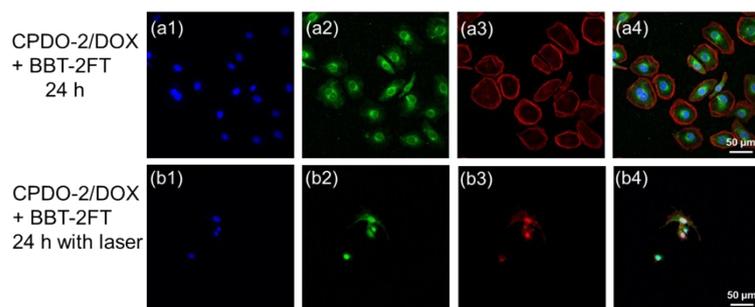


Figure S10. Drug internalization and localization in HeLa cells after incubation with CPDO-2/[DOX + BBT-2FT] for 24 h (a1-a4) and with NIR laser irradiation (b1–b4). The fluorescence of DAPI, DOX, and Alexa Fluor 633 phalloidin (for labeling F-actin in the cell membrane) was pseudolabeled with blue, green, and red, respectively.

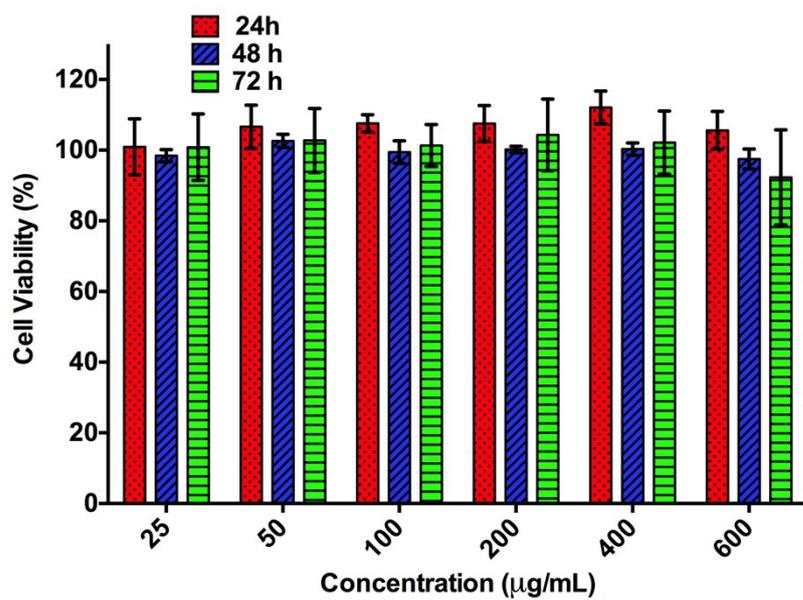


Figure S11. Cell viability of HeLa cells after treatment with the polymer CPDO-2 at various concentrations tested by PrestoBlue assay.

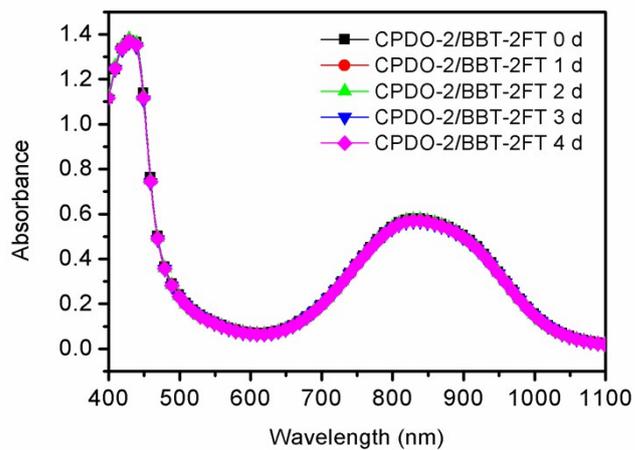


Figure S12. UV-vis absorption spectra of the micelles CPDO-2/BBT-2FT ($C_{\text{BBT-2FT}} = 22.6 \mu\text{g mL}^{-1}$) in water after being incubated at 37 °C over different periods.

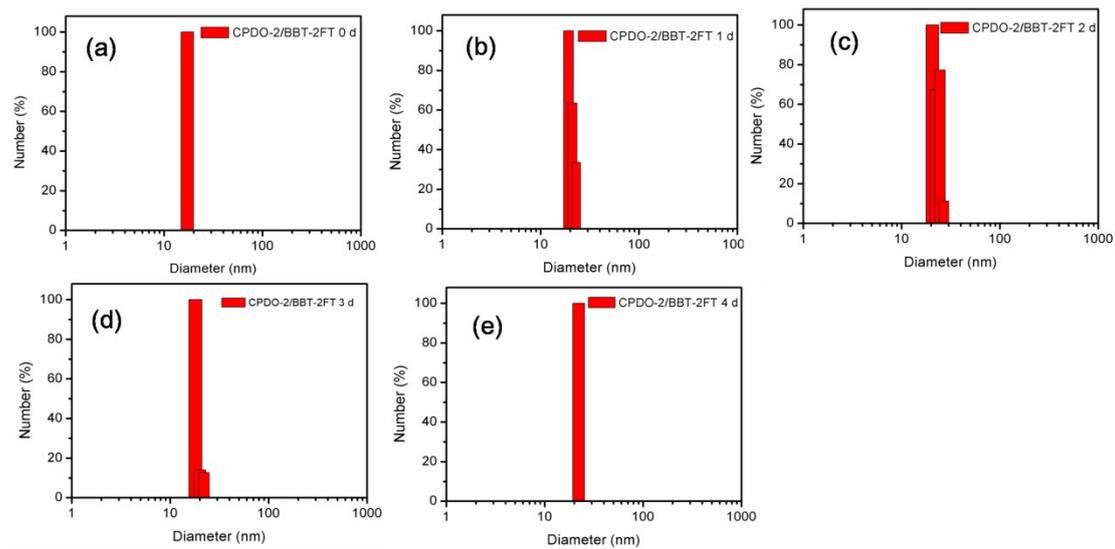


Figure S13. Representative DLS histograms of CPDO-2/BBT-2FT micelles ($C_{\text{BBT-2FT}} = 22.6 \mu\text{g mL}^{-1}$) in water after being incubated at 37 °C over different periods.

Table S1. The encapsulating capacity of three polymers CPDO-n (n = 1, 2, 3).

	DOX		BBT-2FT	
	LC (%)	EE (%)	LC (%)	EE (%)
CPDO-1/DOX + BBT-2FT	6.97	52.31	3.41	34.10
CPDO-2/DOX + BBT-2FT	8.87	66.50	4.02	40.20
CPDO-3/DOX + BBT-2FT	7.97	59.81	3.72	37.20

Table S2. The encapsulating information of CPDO-2 micelles with DOX or BBT-2FT.

	DOX		BBT-2FT	
	LC (%)	EE (%)	LC (%)	EE (%)
CPDO-2/DOX	10.11	75.84		
CPDO-2/BBT-2FT			5.94	59.41
CPDO-2/DOX + BBT-2FT	8.87	66.50	4.02	40.20

Table S3. The DLS results of CPDO-2 micelles at different concentrations in water.

C ($\mu\text{g mL}^{-1}$)	50	100	200	500
Mean Diam (nm)	18.4	19.4	21.5	22.3

Table S4. DLS results of the micelles CPDO-2/BBT-2FT ($C_{\text{BBT-2FT}} = 22.6 \mu\text{g mL}^{-1}$) in water after being incubated at 37 °C over different periods.

Time (d)	0	1	2	3	4
Mean Diam (nm)	17.9	20.7	22.8	19.0	22.5
PDI	0.14	0.13	0.16	0.15	0.16