Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.

Supporting Information

Hierarchical nanocomposites of graphene oxide and PEGylated protoporphyrin as carriers to load doxorubicin hydrochloride for trimodal synergistic therapy

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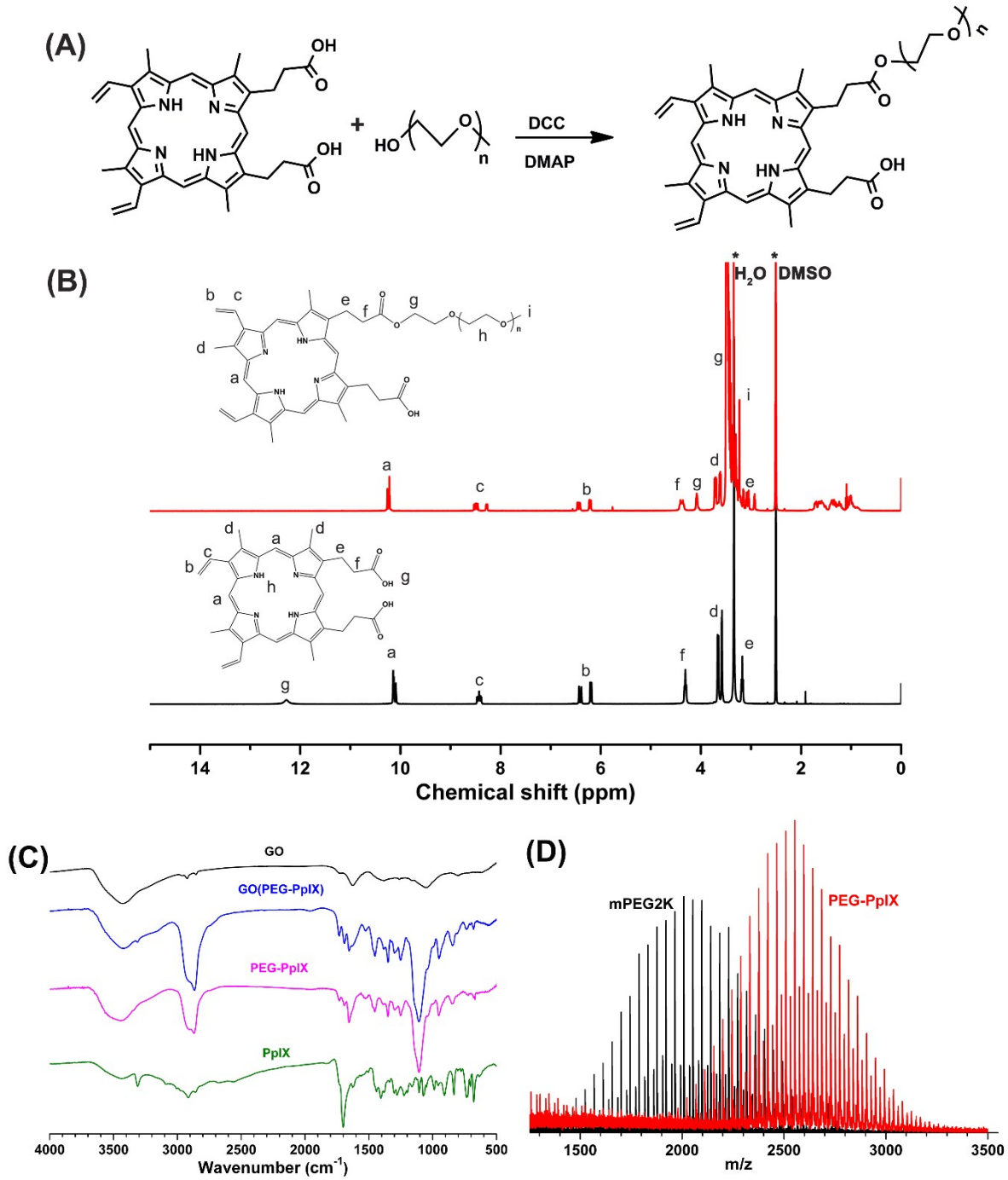

Fig. S1. The synthetic route (A) of PEG-PpIX and its characterization by ^{1}H NMR (B), FT-IR (C), and MS (D).

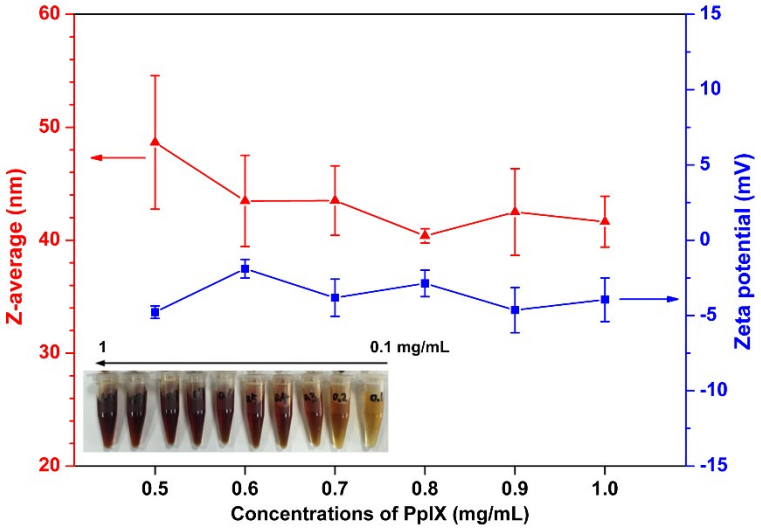

Fig. S2. The sizes and zeta potentials of PEG-PpIX micelles with different concentrations of PEG-PpIX; the inset was the photographs of PEG-PpIX micelle solutions with different concentrations of PEG-PpIX.

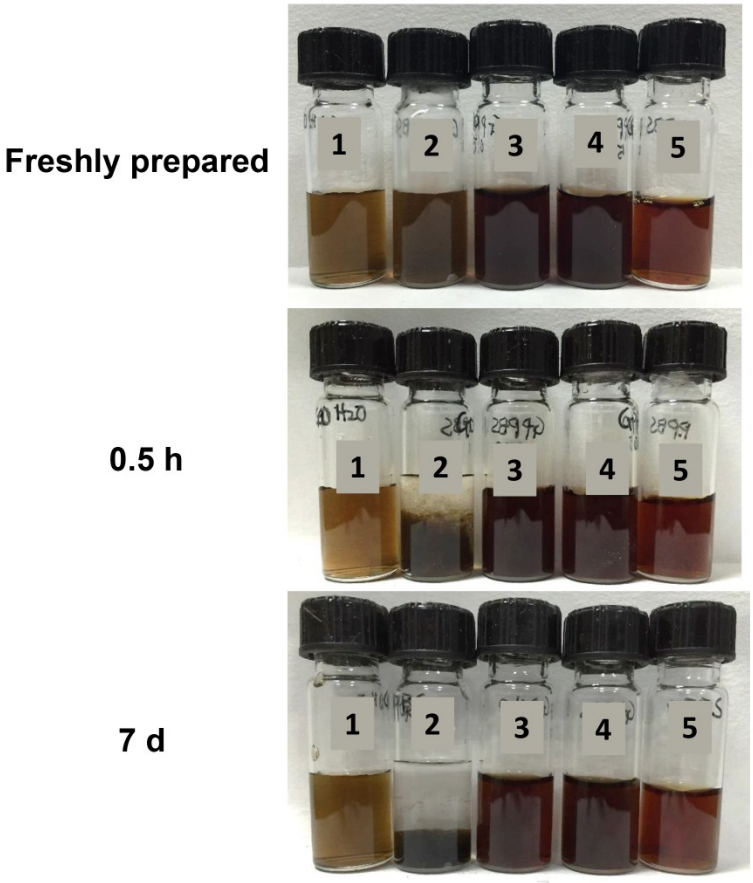

Fig. S3. Photographs of the GO in H_2O (1), GO in PBS (2), GO(PEG-PpIX) in H_2O (3), GO(PEG-PpIX) in PBS (4), PEG-PpIX in PBS (5) stored in different time intervals (freshly prepared, half an hour, and seven days after preparation).

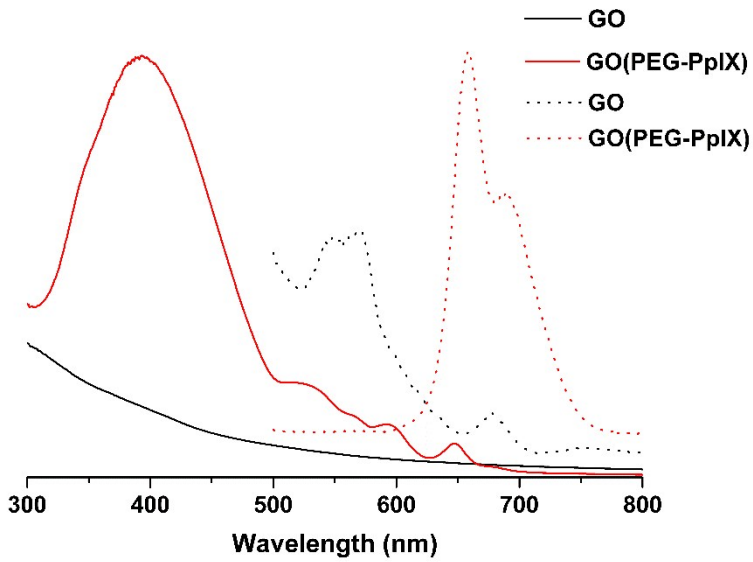

Fig. S4. UV-vis absorption (solid line) and fluorescence emission (dot line) of GO and GO(PEG-PpIX).

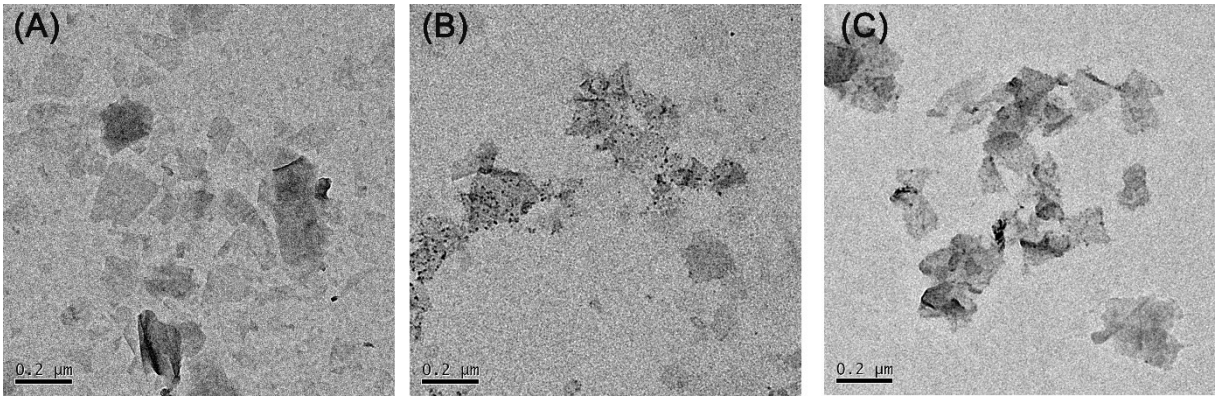

Fig. S5. TEM images of GO (A), GO(PEG-PpIX) (B) and DOX/GO(PEG-PpIX) (C).

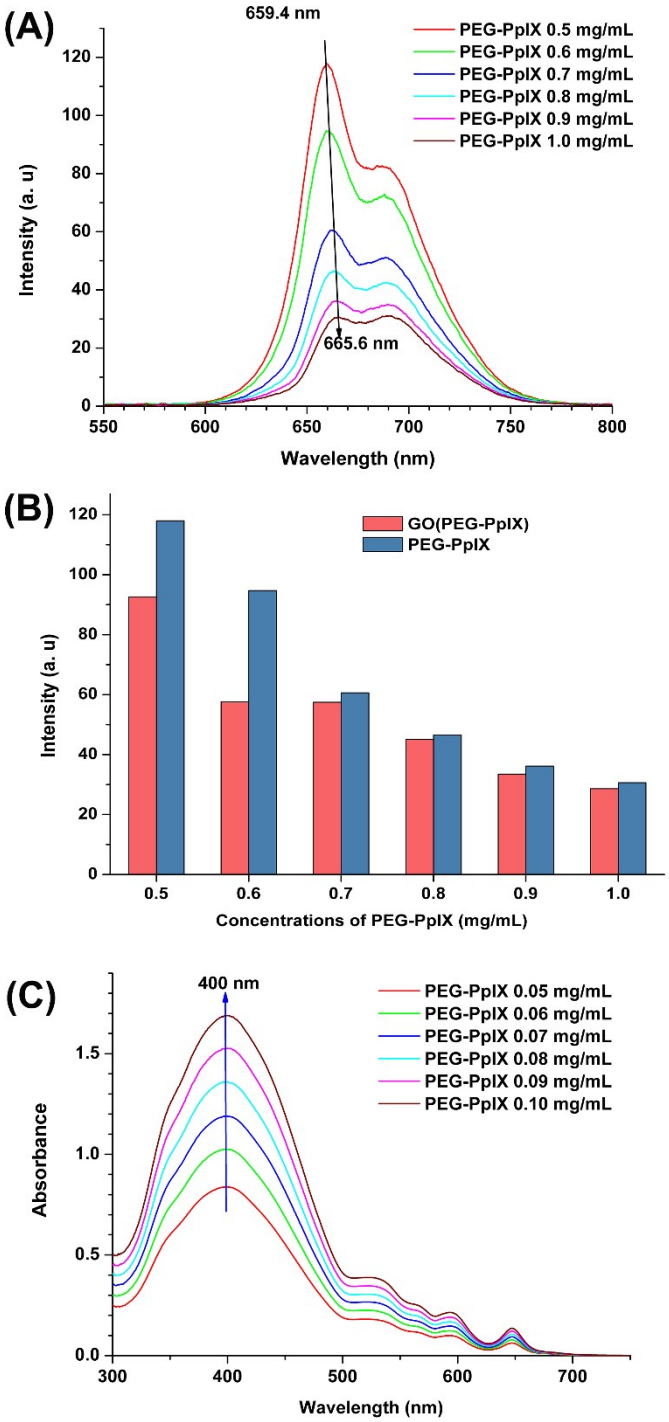

Fig. S6. (A) The fluorescence spectra of PEG-PpIX micelle and (B) the fluorescence quenching phenomenon comparasion with GO(PEG-PpIX). (C) The UV-vis absorption of PEG-PpIX micelle.

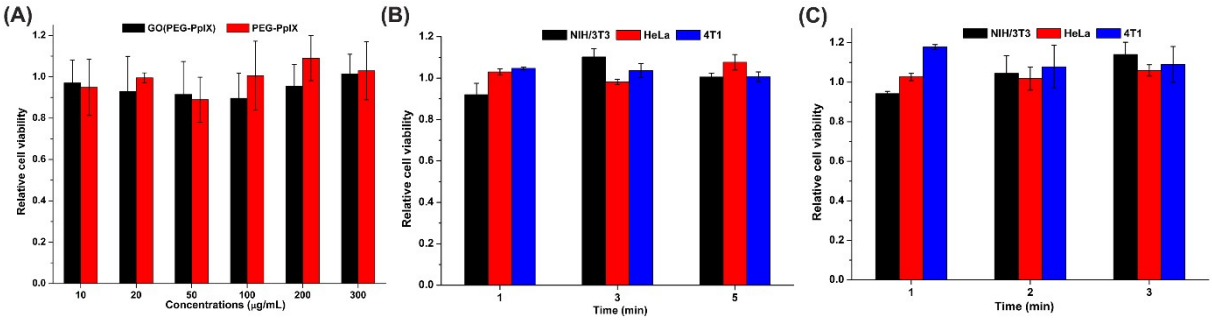

Fig. S7. (A) The cytotoxicity of blank nanocomposite GO(PEG-PpIX) and PEG-PpIX micelleagainst NIH/3T3 cells for a 48 h incubation. Cell viability of NIH/3T3, 4T1, and HeLa cells exposed to 625 nm (B) and 808 nm (C) light irradiation for different time lengths without co-incubation with nanocoposite.

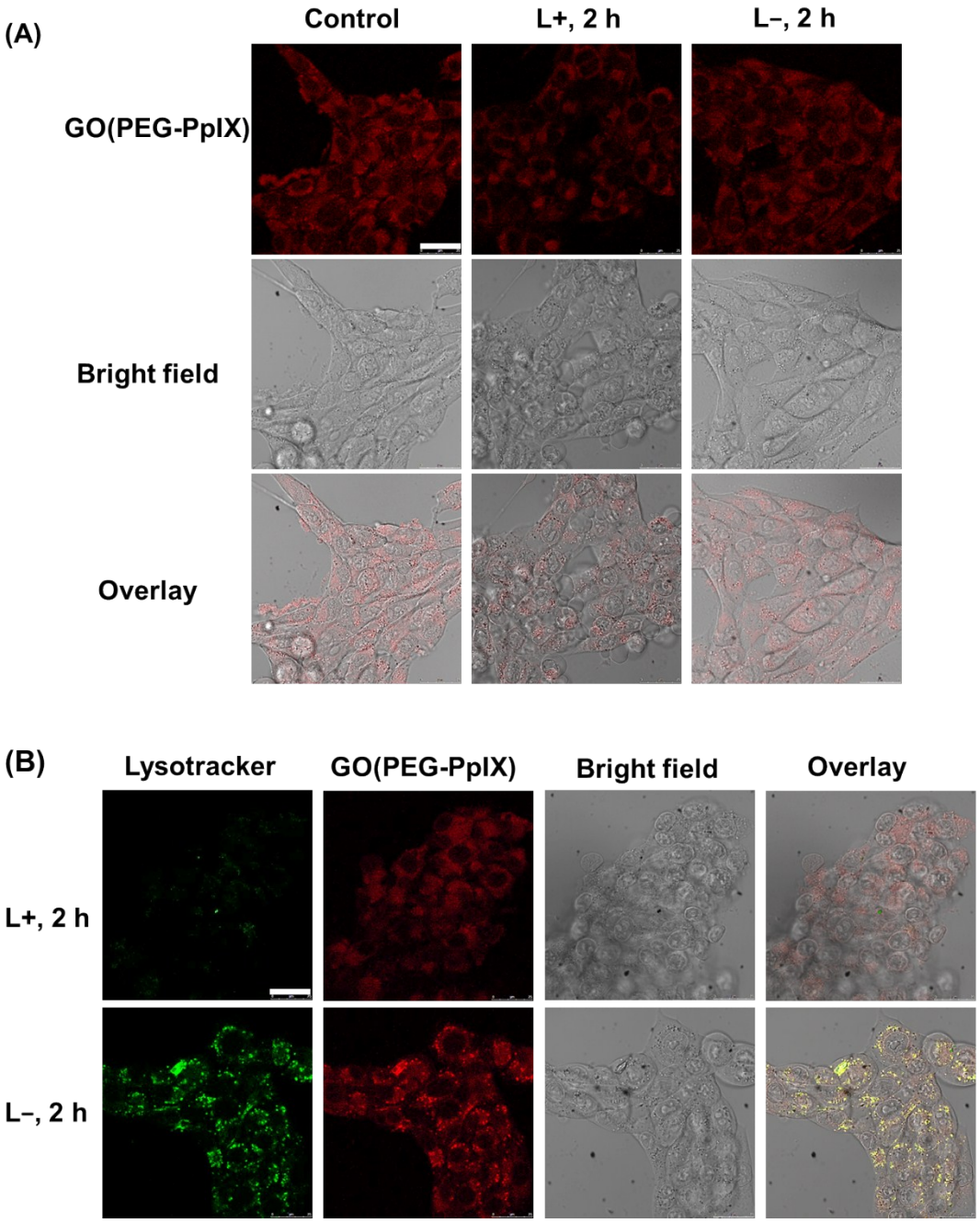

Fig. S8. CLSM images of 4T1 cells coincubated with GO(PEG-PpIX) for 2 h with (L+) and without (L–) light irradiation (625 nm, 50 mW,30 s). All cells were coinbated with GO(PEG-PpIX) for 4 h before treatment. The bar was 25 μm.

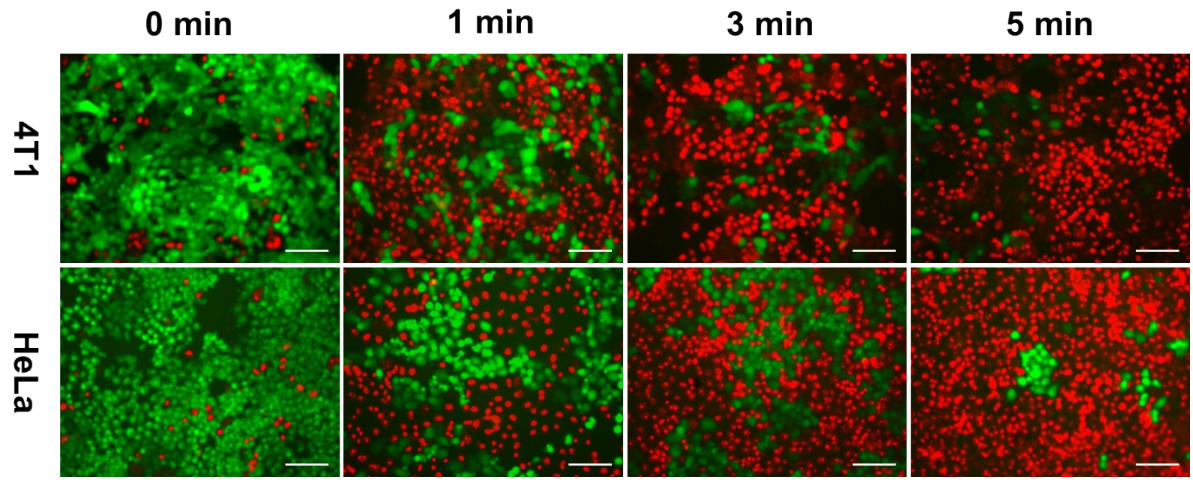

Fig. S9. Fluorescence images of 4T1 and HeLa cells treated with GO(PEG-PpIX) without or with PDT for 1, 3, and 5 min. The cells were stained with calcein-AM/PI after PDT. The bar was 200 μm.

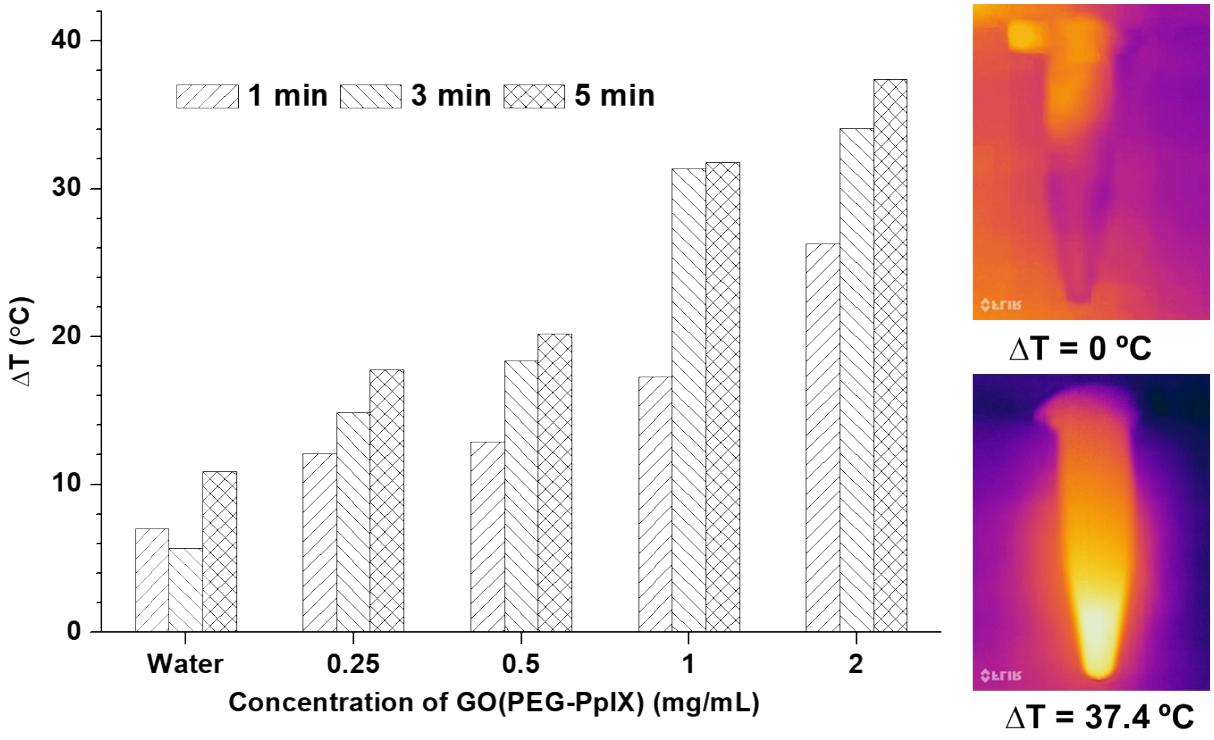

Fig. S10. Photothermal performance of GO(PEG-PpIX) with different concentrations. The graphs are the typical infrared thermal image of water without light treatment and GO(PEG-PpIX) (2 mg/mL in H_2O) after light irradiation for 5 min.

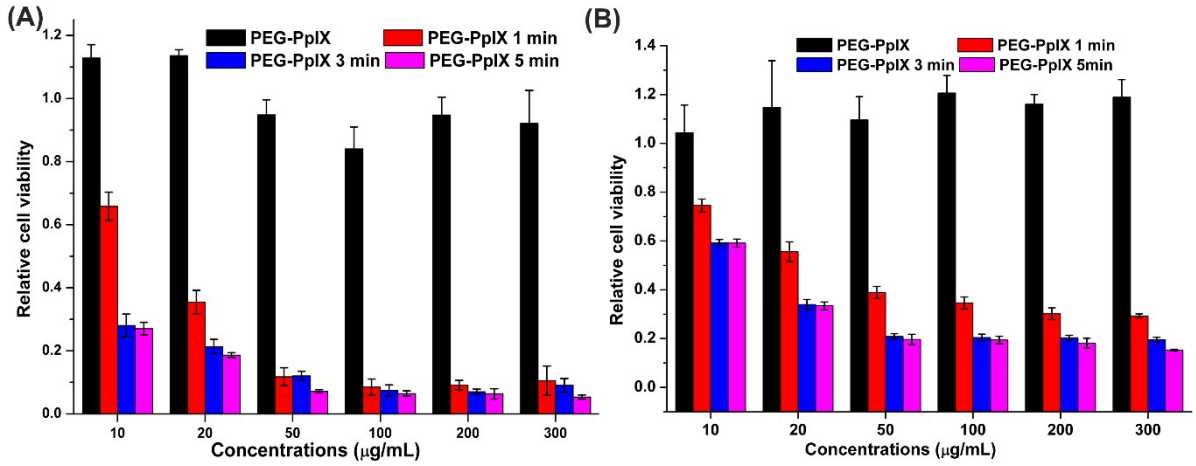

Fig. S11. Phototoxicity of PEG-PpIX nanoparticles against 4T1 cells (A) and HeLa cells (B) after PDT.

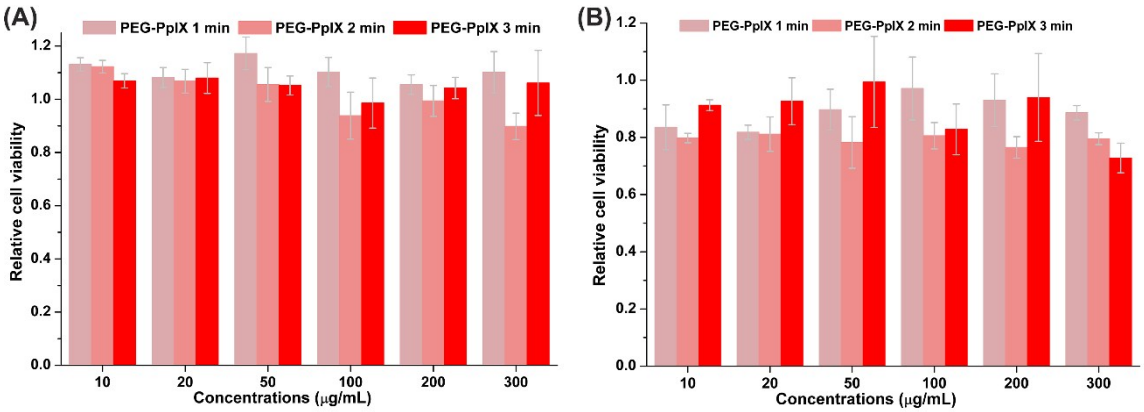

Fig. S12. Cell viability of 4T1 cells (A) and HeLa cells (B) incubated with PEG-PpIX micelles with 808 nm NIR irradiation.

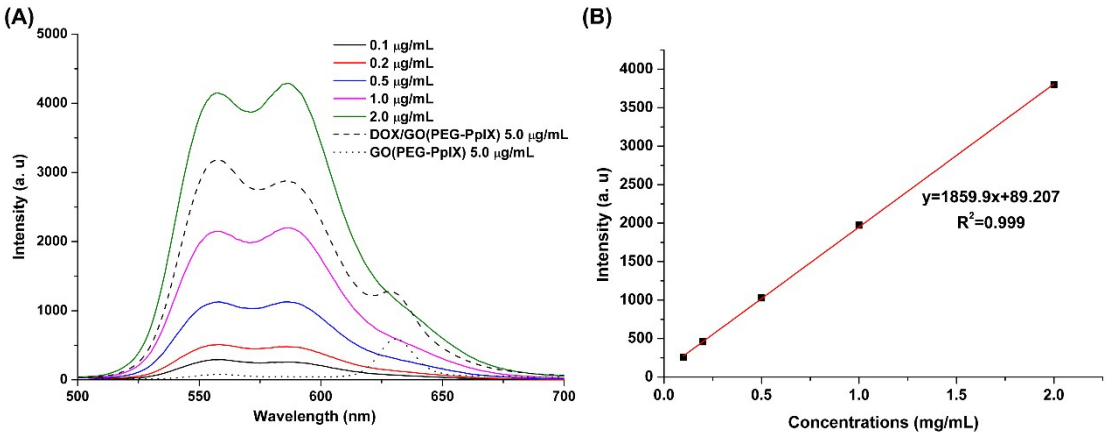

Fig. S13. Fluorescence spectra of DOX (A) and its standard curve (B) in DMSO.

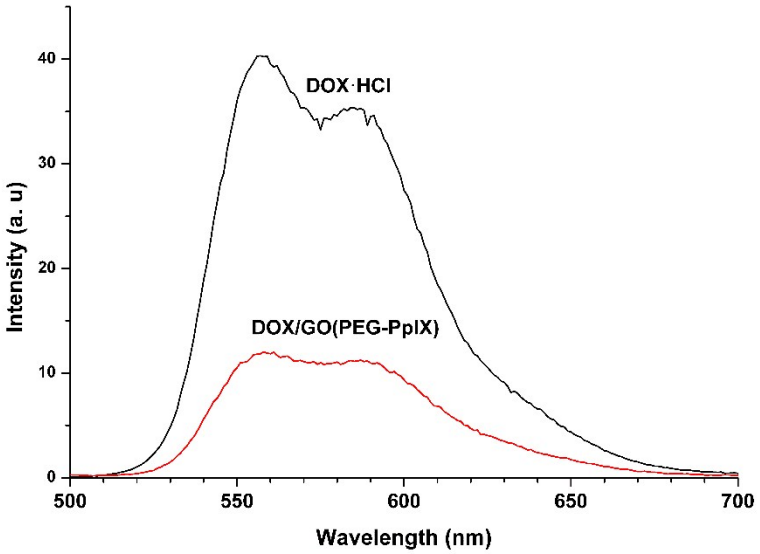

Fig. S14. Fluorescence intensity of DOX·HCl and DOX/GO(PEG-PpIX) nanocomposite.

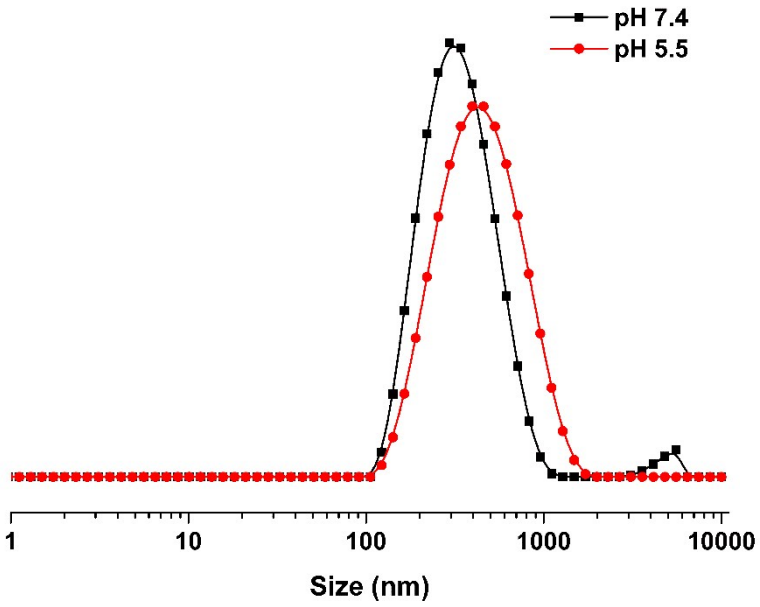

Fig. S15. The sizes of DOX/GO(PEG-PpIX) after drug release in different pH conditions.

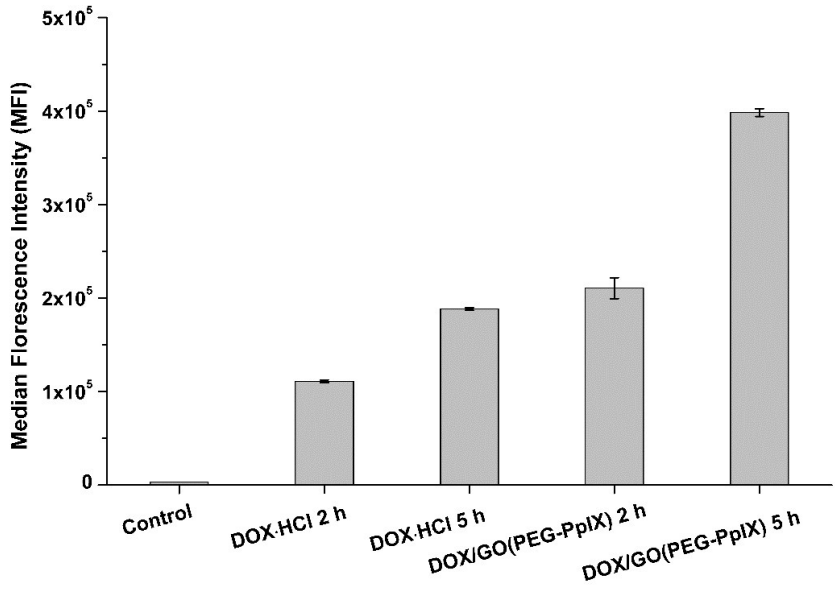

Fig. S16. Quantitative analysis of DOX accumulation in 4T1 cells by flow cytometry.

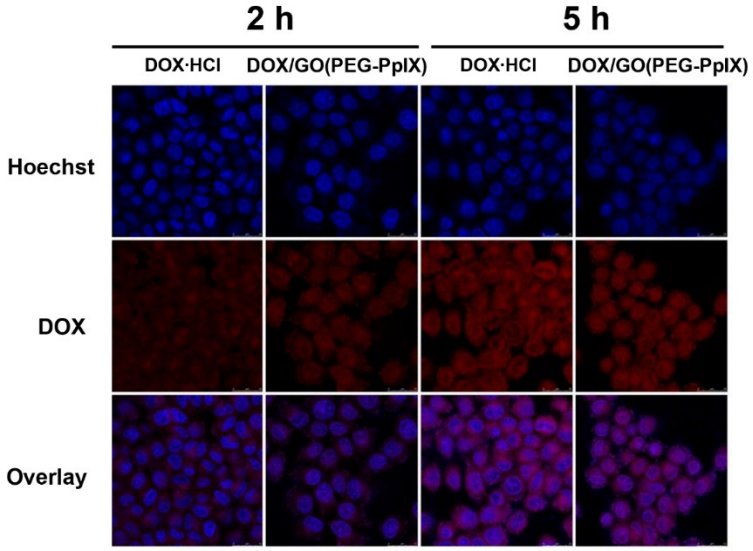

Fig. S17. CLSM images of HeLa cells after coincubation of DOX·HCl and DOX/GO(PEG-PpIX) for 2 and 5 h.

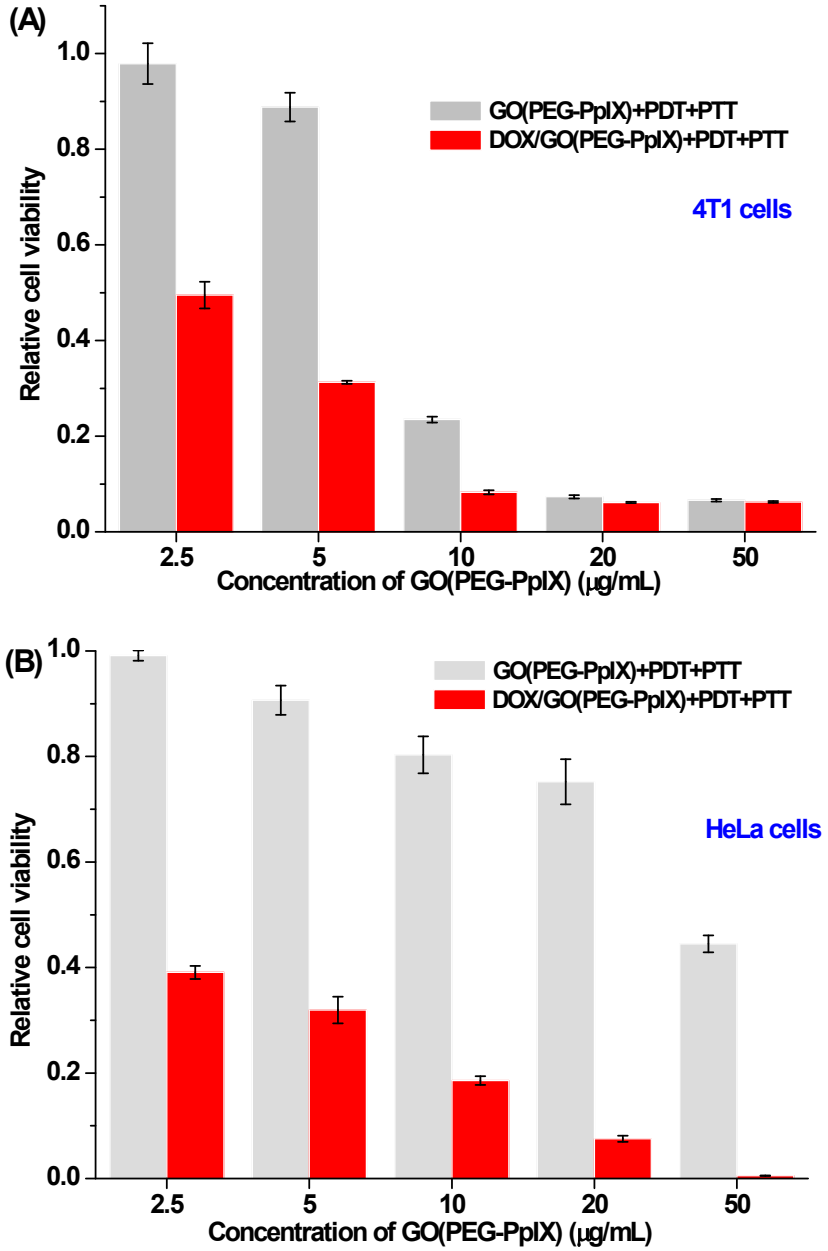

Fig. S18. The cytotoxicity of GO(PEG-PpIX) and DOX/GO(PEG-PpIX) against 4T1 (A) and HeLa (B) cells with light irradiation (625 and 808 nm) (n = 5).

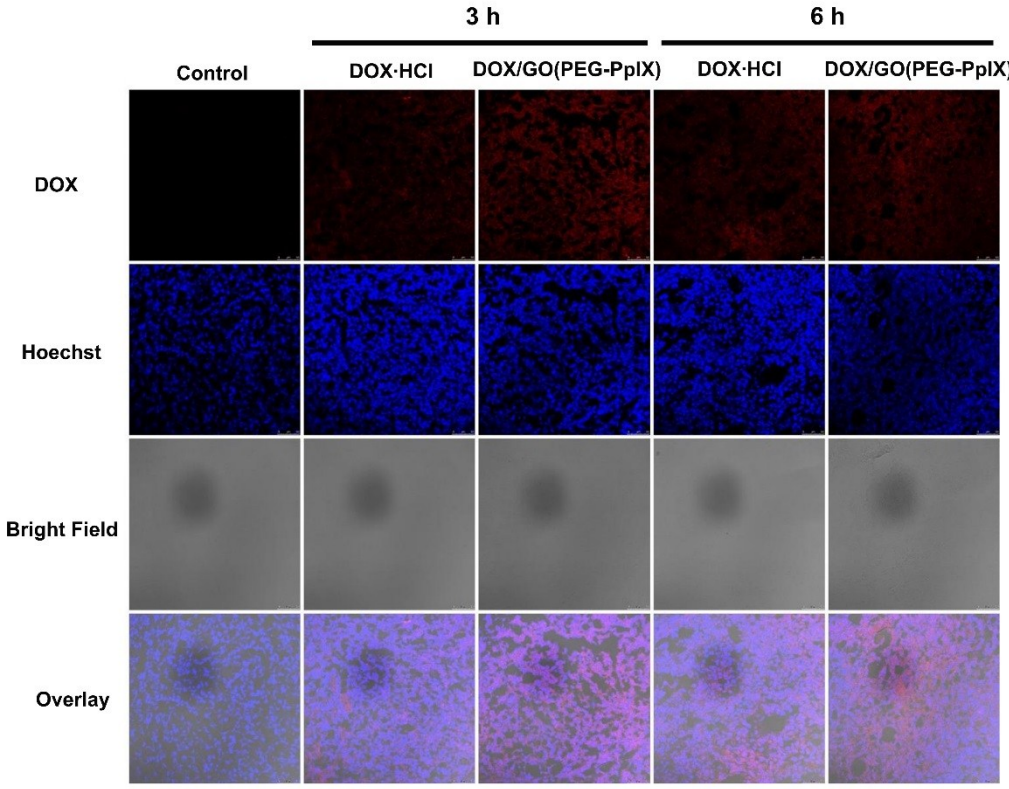

Fig. S19. Fluorescence images of DOX in tumor of mice killed after 6 h post injection of DOX·HCl and DOX/GO(PEG-PpIX). Saline was injected and used as a control. The cell nuclei were stained with Hoechst 33342.

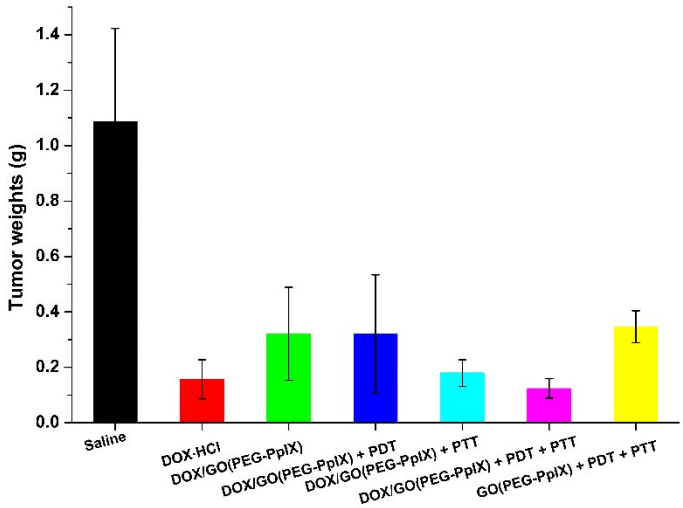

Fig. S20. The average tumor weights of each group at the 22nd day after administration.

Fig. S21. Typical photographs of 4T1 tumor-bearing mice at different day intervals after various treatments.

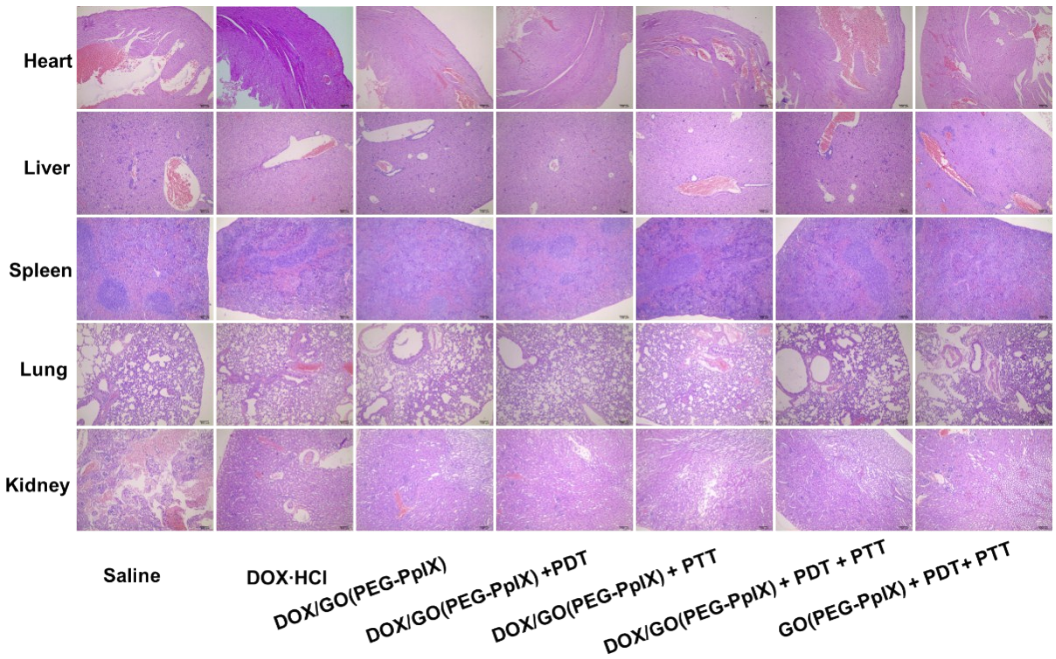

Fig. S22. H&E staining results of main organs exfoliated from tumor bearing mice that were treated with different formulations.