

## Electronic Supplementary Information

### Phthalocyanine Functionalized Poly(Glycidyl Methacrylate) Nano-assemblies for Photodynamic Inactivation of Bacteria

Wei Tong,<sup>a,b,c,†</sup> Yanhua Xiong,<sup>a,b,c,†</sup> Shun Duan,<sup>a,b,c</sup> Xiaokang Ding,<sup>a,b,c\*</sup> and Fu-Jian Xu<sup>a,b,c\*</sup>

<sup>a</sup>State Key Laboratory of Chemical Resource Engineering, Beijing University of Chemical Technology, Beijing 100029 China

<sup>b</sup>Key Laboratory of Carbon Fiber and Functional Polymers (Beijing University of Chemical Technology), Ministry of Education, Beijing 100029 China

<sup>c</sup>Beijing Laboratory of Biomedical Materials, Beijing Advanced Innovation Center for Soft Matter Science and Engineering, Beijing University of Chemical Technology, Beijing 100029 China

<sup>†</sup>W.T. and Y.X. contributed equally to this work.

\*To whom all correspondence should be addressed:

E-mail: dingxk@mail.buct.edu.cn (X.D.); xufj@mail.buct.edu.cn (F.J.X)

#### ORCID

Xiaokang Ding: 0000-0002-6705-4148

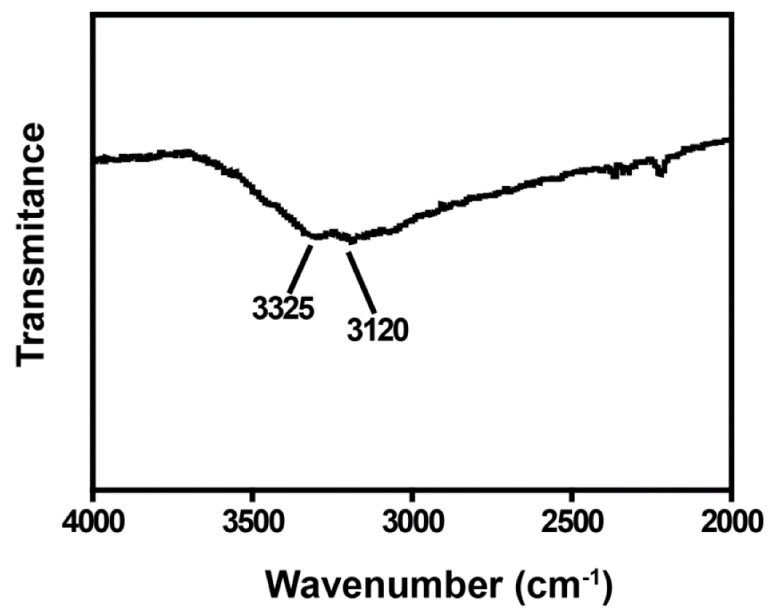
Fu-Jian Xu: 0000-0002-1838-8811

**Synthesis of ZnMAPc.** Briefly, 4-nitrophthalic anhydride (NPA, 0.965 g, 5.0 mmol), phthalic anhydride (PA, 5.18 g, 35.0 mmol), ammonium molybdate tetrahydrate (0.3 g, 0.24 mmol), zinc chloride (1.36 g, 10.0 mmol) and urea (25 g, 416.7 mmol) were added in to a 250 mL round bottom flask and heated to 200 °C in an oil bath. After the solid melted, 0.5 g of anhydrous ammonium chloride and 4 g of anhydrous sodium carbonate were added into the flask. Then, the reaction was kept at 200 °C with constant stirring for 4 h until no bubbles can be observed in the reaction. Next, the crude product was sequentially treated with HCl solution (100 mL, 1 M) and NaOH solution (100 mL, 1 M) and kept boiling for 1 h, respectively, to remove the byproducts and unreacted precursors. After centrifugation, the crude product was washed with copious of deionized water to neutralization, and the product of zinc(II) mononitrophthalocyanine (ZnMNPc) was obtained after lyophilization. Next, 0.758 g of ZnMNPc and 2.88 g of Na<sub>2</sub>S·9H<sub>2</sub>O was added into a flask containing 15 mL of dimethylformamide (DMF). The reaction was sat in an oil bath at 60 °C with constant stirring. After 1 h, the resultant product was washed with copious of deionized water to neutralization and lyophilized to obtain the final product of ZnMAPc. Figure S1 shows the FTIR spectrum of ZnMAPc, and the absorption peaks 3325 cm<sup>-1</sup> and 3120 cm<sup>-1</sup> indicate the presence of primary amine functional group. This result is in accordance with our earlier result, except that the tetra-amino groups result in higher absorption intensities at the featured wavenumbers.<sup>S1</sup>

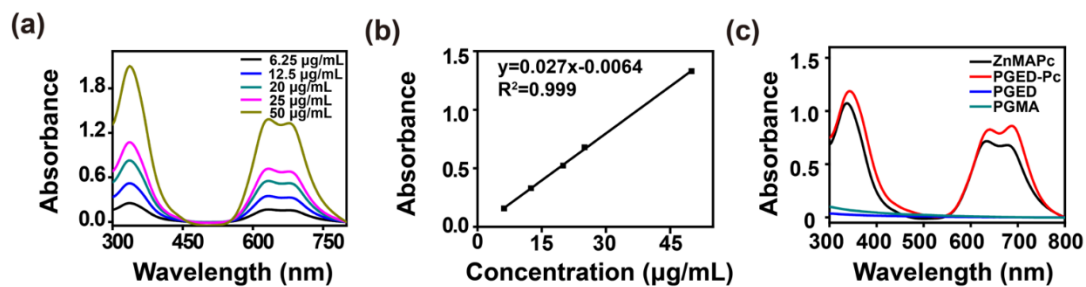
**Detection of <sup>1</sup>O<sub>2</sub> in DMSO.** The generation of <sup>1</sup>O<sub>2</sub> in DMSO was determined by the oxidative bleaching experiment of 1,3-diphenylisobenzofuran (DPBF).<sup>S1</sup> Briefly,

200  $\mu$ L of deionized water containing 2 mg/mL of PGED-Pc was transferred into a 6-well microplate containing 5.8 mL of DPBF (1 mg/mL) solution in DMSO. Next, the 6-well microplate was exposed to light illumination ( $700\pm 10$  nm,  $150\text{ mW cm}^{-2}$ ). After a period of time, 200  $\mu$ L of the mixture solution (or deionized water as control) was taken out from the microplate, and diluted with 4 mL of deionized water. The UV-Vis absorbance of the diluted solution was determined by using UV-Vis spectrophotometer (Shimadzu UV-2600) at 410 nm.

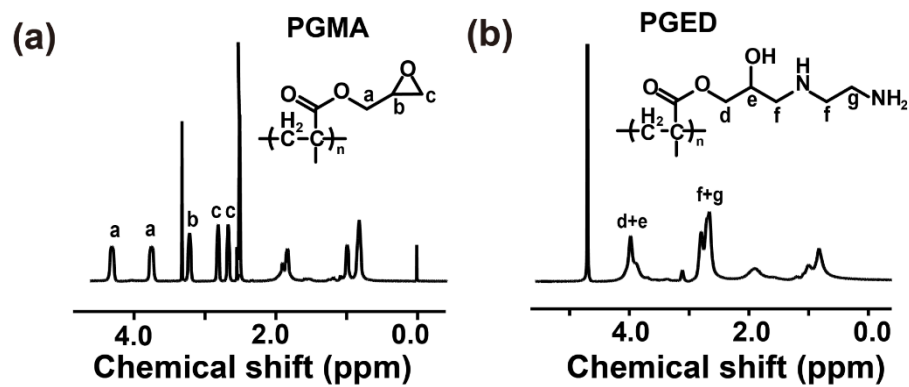
**Miscellaneous.** The size of genomic DNA of *E. coli* and *S. aureus* were obtained from NCBI: [https://www.ncbi.nlm.nih.gov/nuccore/NZ\\_CP032667.1](https://www.ncbi.nlm.nih.gov/nuccore/NZ_CP032667.1) (for *E. coli*) and [https://www.ncbi.nlm.nih.gov/genome/?term=txid93061\[Organism:exp\]](https://www.ncbi.nlm.nih.gov/genome/?term=txid93061[Organism:exp]) (for *S. aureus*). The above websites were accessed on 5 Nov. 2018.



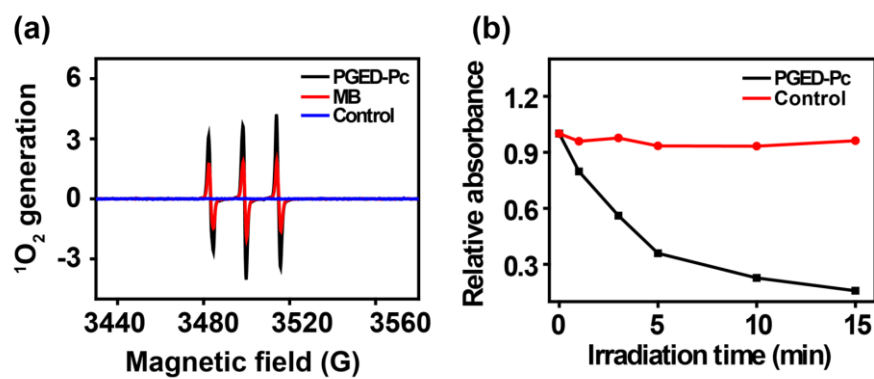
**Fig. S1** FTIR spectrum of ZnMAPc.



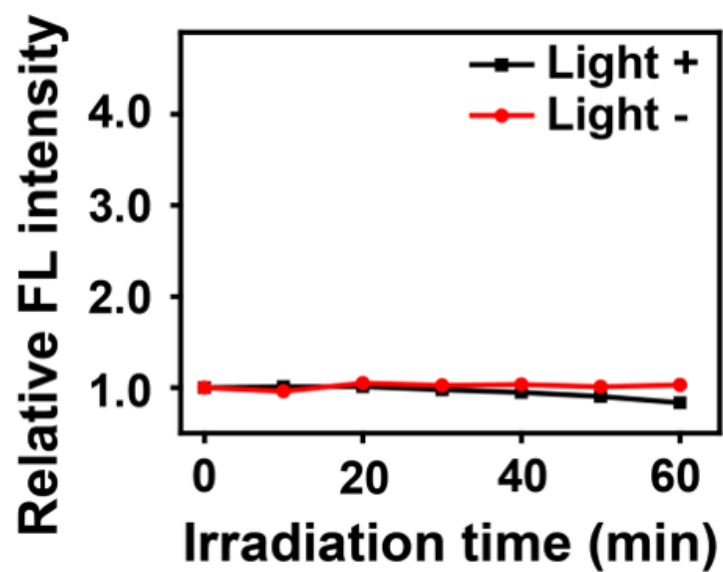
**Fig. S2** (a) UV-Vis spectra, (b) calibration curve of ZnMAPc, and (c) full UV-Vis spectrum of the materials.



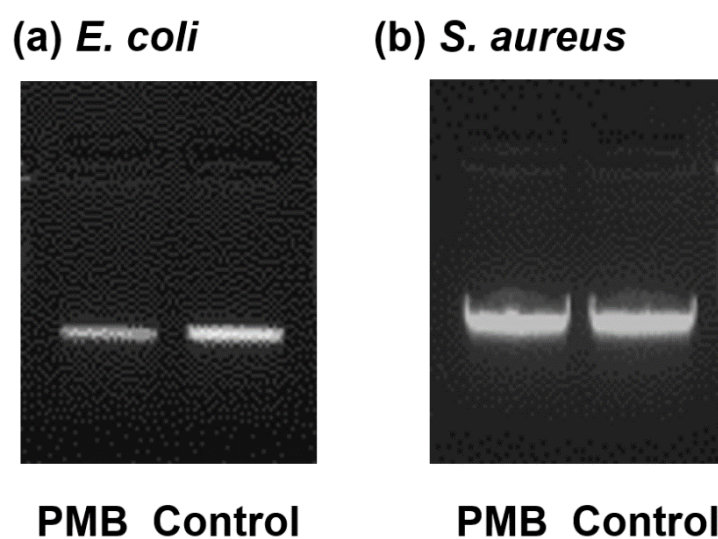
**Fig. S3**  $^1\text{H}$ NMR spectra of (a) PGMA and (b) PGED



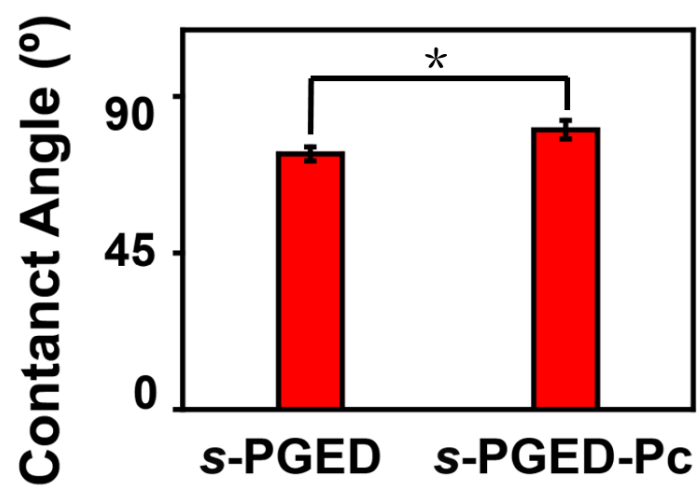
**Fig. S4** Generation of  $^1\text{O}_2$  in DMSO by using (a) ESR and (b) oxidative bleaching of DPBF.



**Fig. S5** Generation of  $\bullet\text{OH}$  in aqueous solution with or without light illumination.



**Fig. S6** Agarose gel electrophoresis of genomic DNA extracted from (a) *E. coli* and (b) *S. aureus* after incubated with PMB (16  $\mu\text{g/mL}$  for *E. coli* and 8  $\mu\text{g/mL}$  for *S. aureus*).



**Fig. S7** Water contact angle measurements of *s*-PGED and *s*-PGED-Pc ( $p < 0.05$ ).

## Reference

(S1) Sun, Y.; Hu, H.; Zhao, N.; Xia, T.; Yu, B.; Shen, C.; Xu, F.-J., Multifunctional Polycationic Photosensitizer Conjugates with Rich Hydroxyl Groups for Versatile Water-Soluble Photodynamic Therapy Nanoplateforms. *Biomaterials* **2017**, *117*, 77-91.