

## Supporting Information

### Graphdiyne-Hemin Mediated Catalytic System for Wound Disinfection and Accelerated Wound Healing

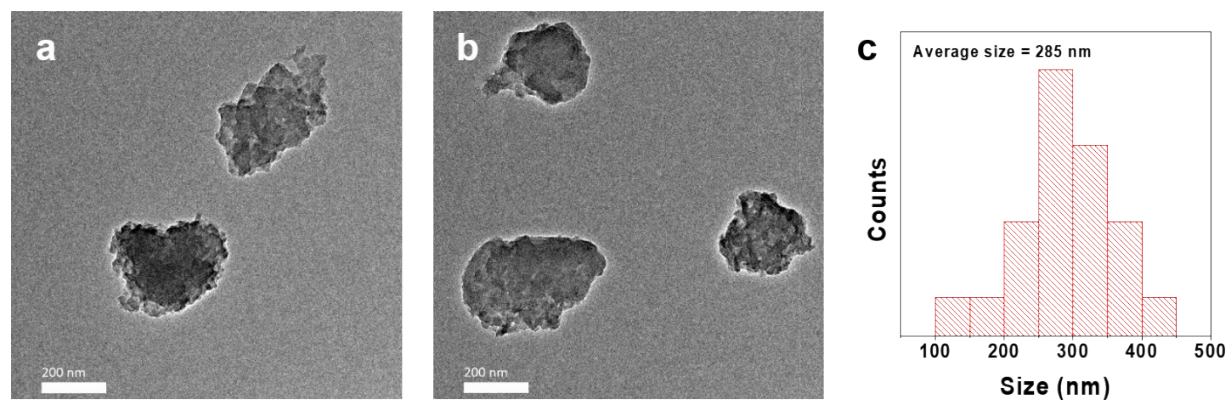
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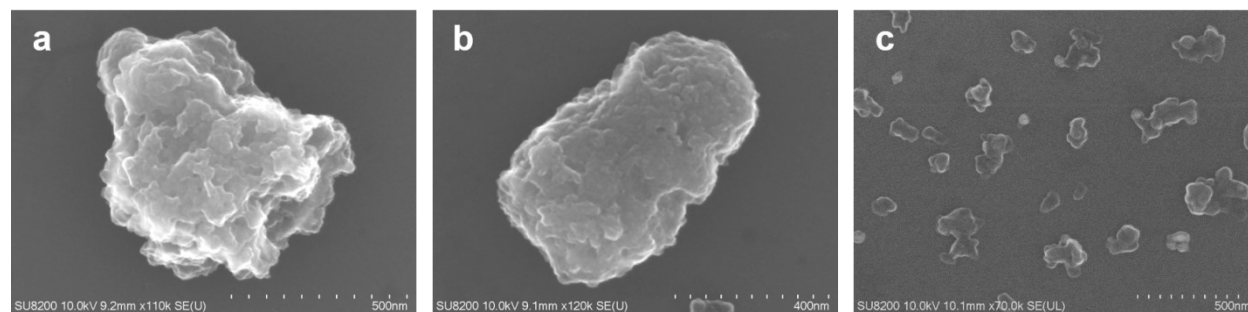
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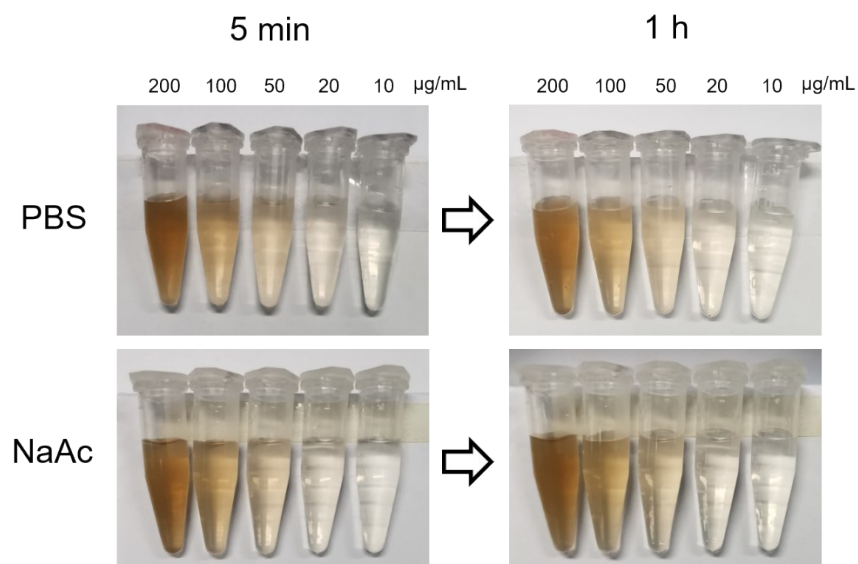
‡These authors contributed equally to this work.



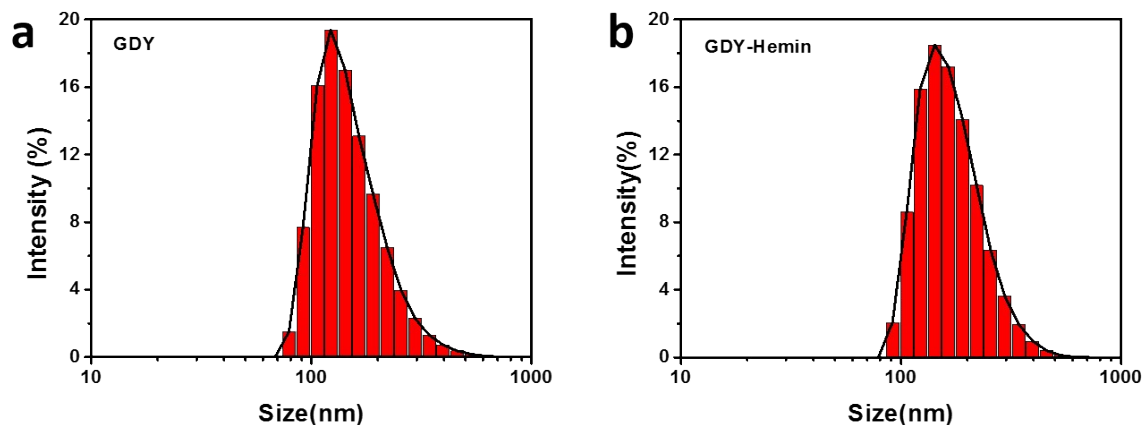
**Fig. S1** (a) TEM image of GDY. (b) TEM image of GDY-Hemin and (c) Statistical size distribution of GDY-Hemin.



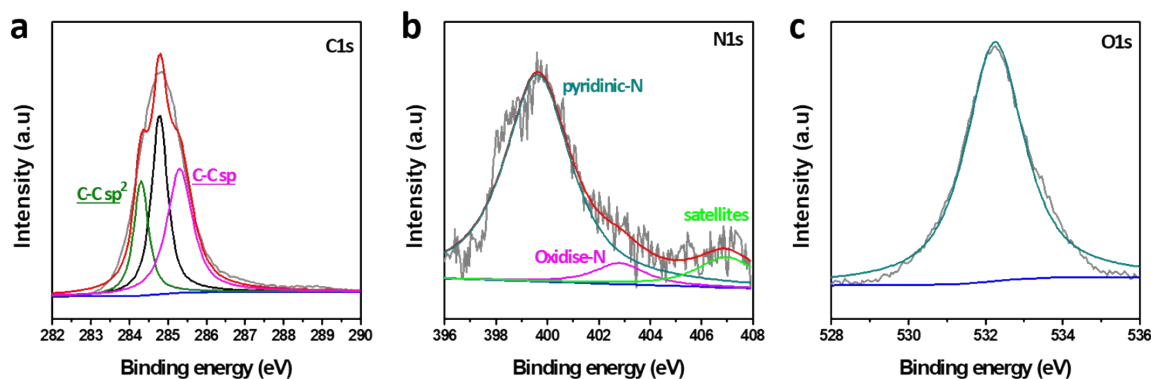
**Fig. S2** SEM images of (a) GDY and (b-c) GDY-Hemin.



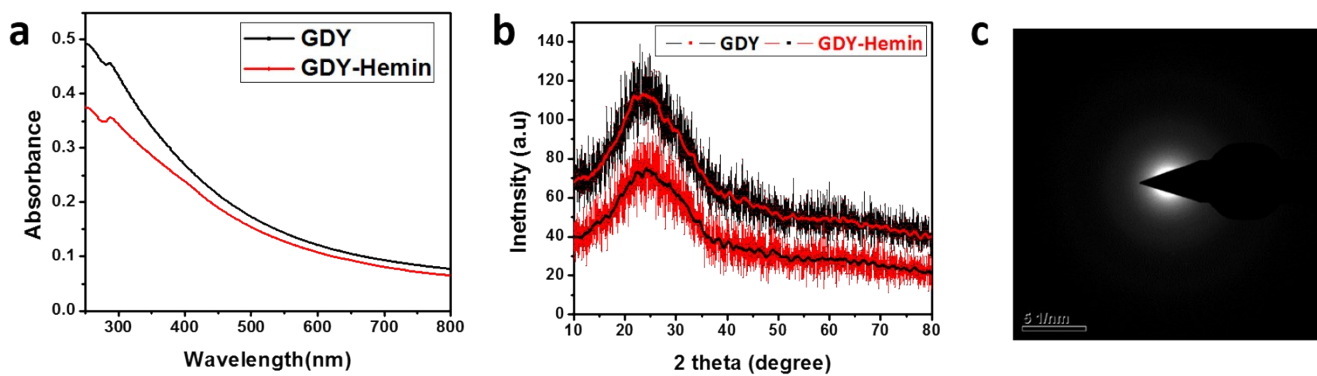
**Fig. S3** Images of GDY-Hemin dispersed in different buffer solution.



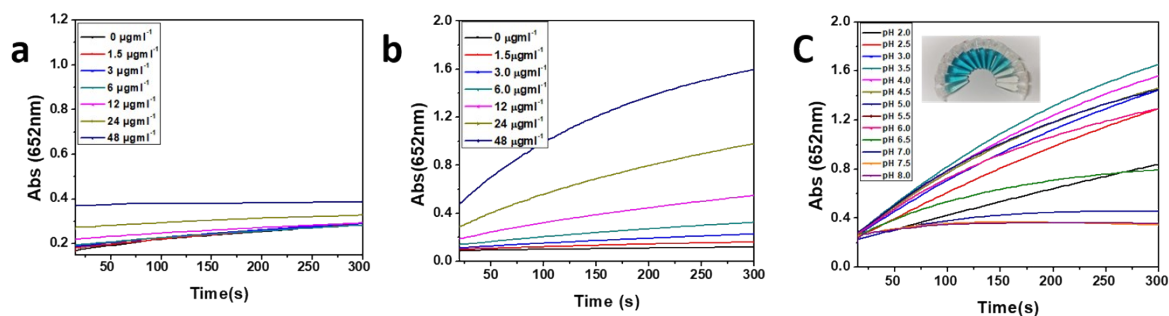
**Fig. S4** Hydrodynamic size distribution of (a) GDY and (b) GDY-Hemin.



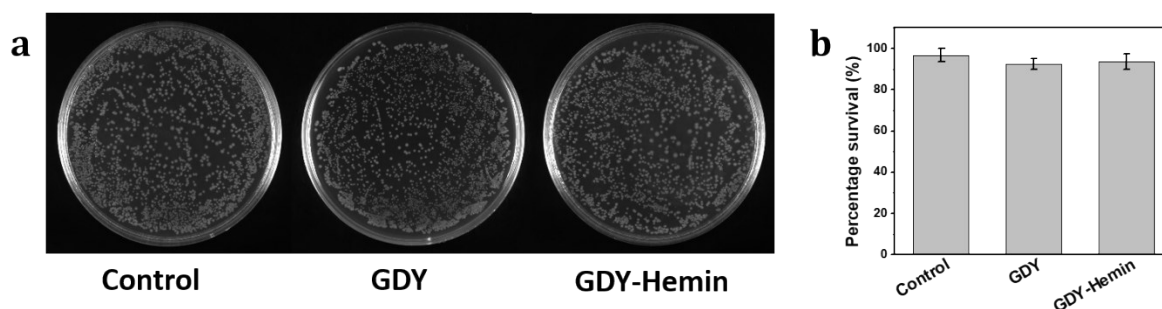
**Fig. S5** High resolution (a) C1s, (b) N1s, and (c) O1s XPS spectra of GDY-Hemin.



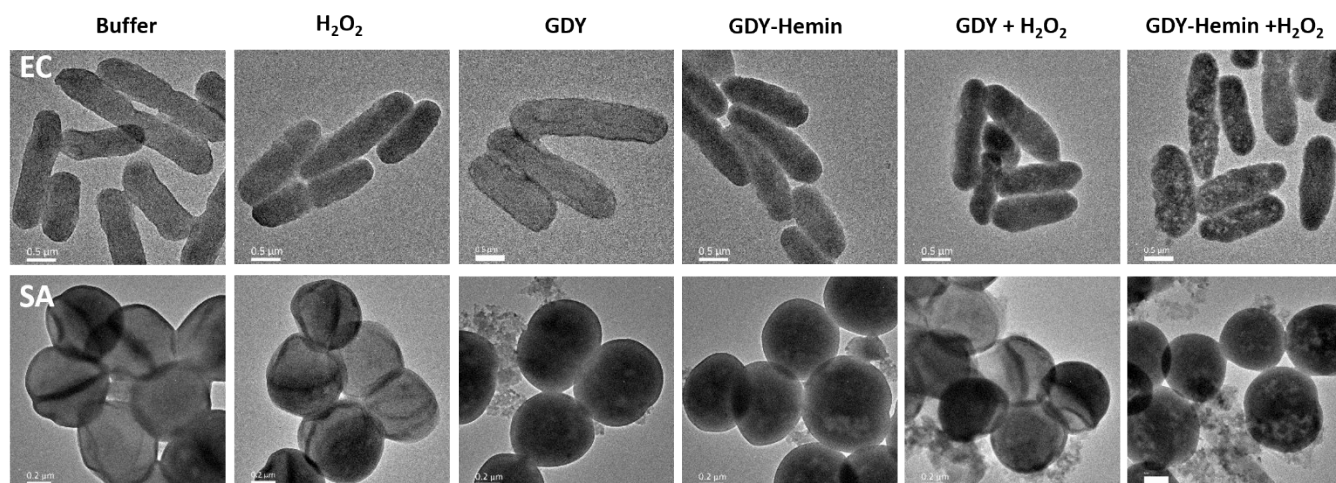
**Fig. S6** Characterization of GDY and GDY-Hemin. (a) UV-Vis spectra, (b) XRD spectra, (c) SAED pattern of GDY-hemin.



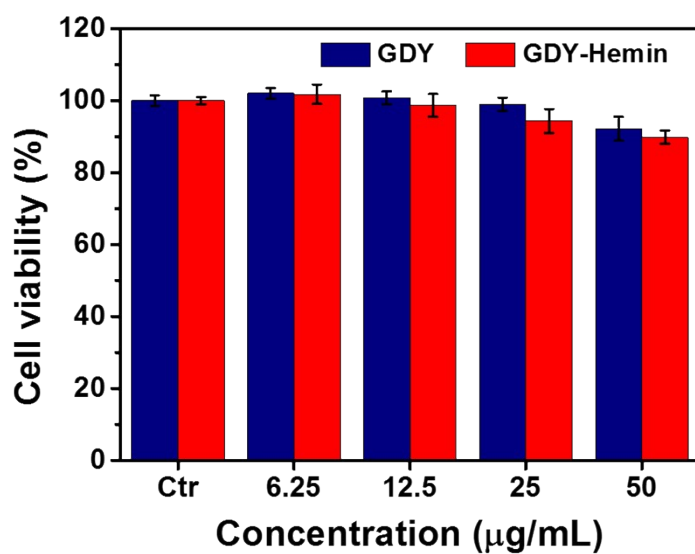
**Fig. S7** Time-dependent catalytic activity of GDY and GDY-Hemin with absorbance changes at 652 nm under different conditions. (a-b) Time dependent absorption changes at 652nm at different concentrations of GDY (a) and GDY-Hemin (b). The experiments were carried out under 40 mM  $\text{H}_2\text{O}_2$  with TMB as oxidizing substrate in sodium acetate buffer (50 mM, pH 4.0). (c) Time dependent absorption changes of GDY-Hemin (25  $\mu\text{g/mL}$ ) at 652nm under different pH conditions. The experiments were performed under 40 mM  $\text{H}_2\text{O}_2$  with TMB as oxidizing substrate in sodium acetate buffer (50 mM, pH 4.0).



**Fig. S8** Initial in vitro antibacterial performance of GDY and GDY-Hemin in the absence of  $\text{H}_2\text{O}_2$ .

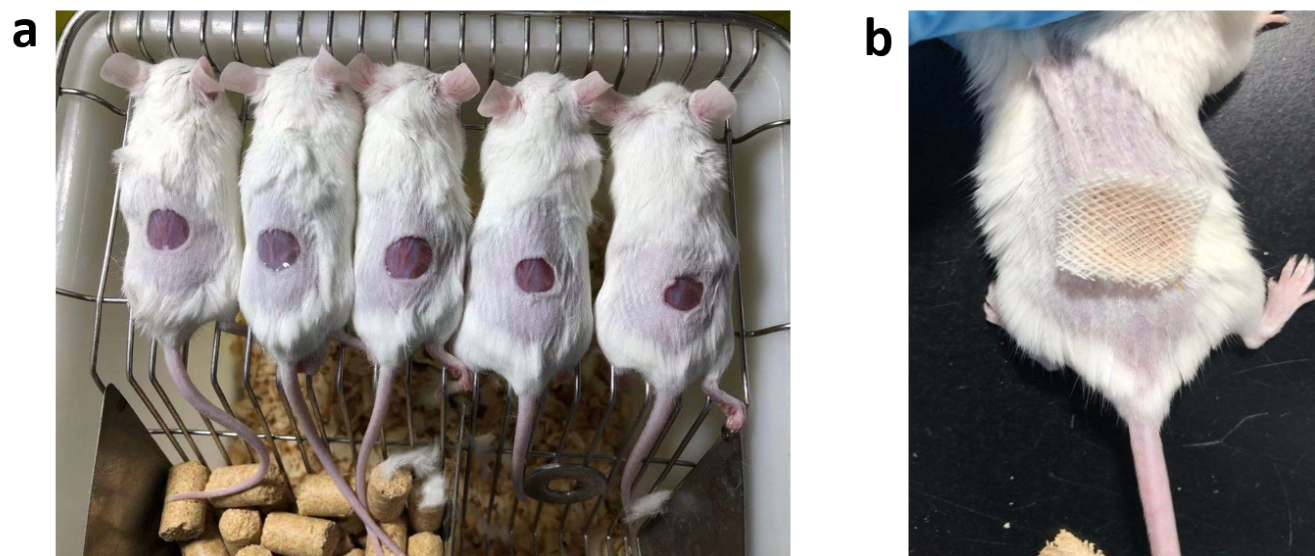


**Fig. S9** TEM micrographs of *E. coli* and *S. aureus* after upon different treatments.

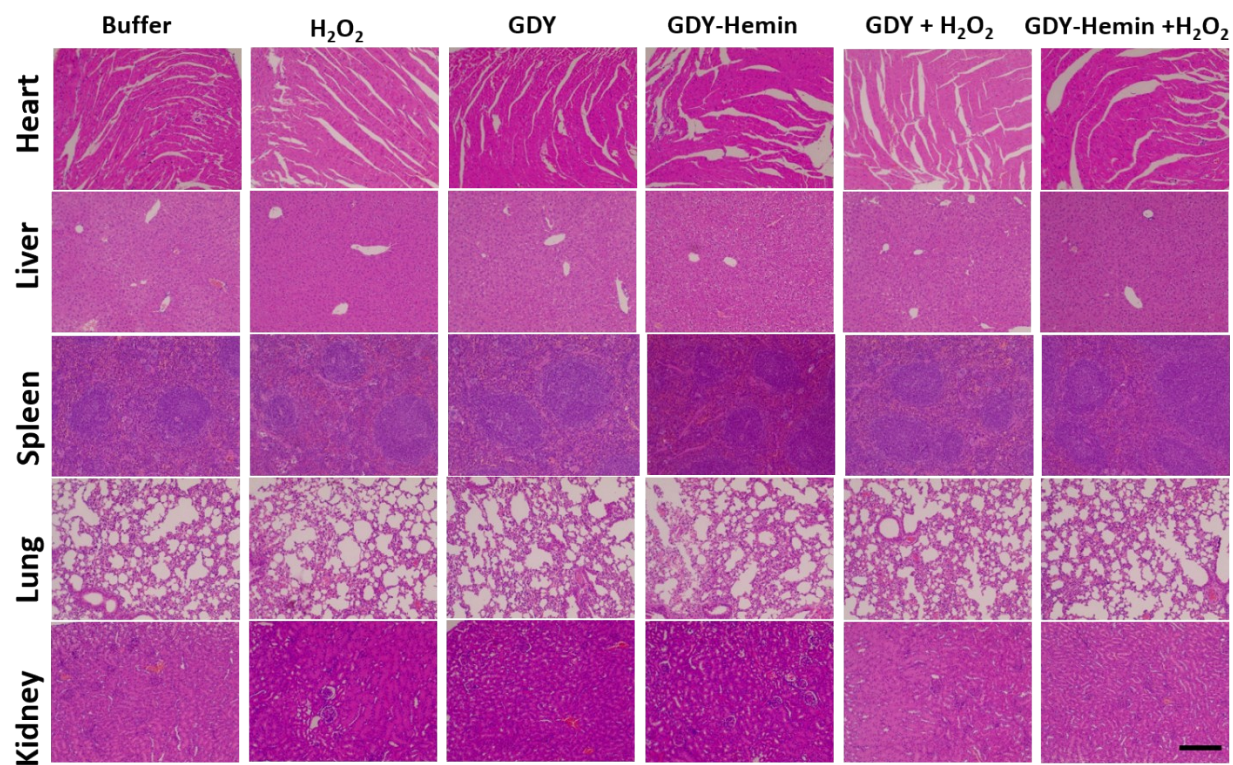


**Fig. S10** In vitro biocompatibility of GDY and GDY-Hemin. Cell viability of HUVEC cells after incubation with GDY or GDY-Hemin at different concentrations (6.25 to 100 μg/mL) for 48 hours. Data are presented as values of viable cells mean ± sd (n=3).





**Fig. S11** Photographs of mice (a) after wound incision and bacterial inoculation or (b) after treating and covering with gauze piece.



**Fig. S12** H&E staining images of major organs (heart, liver, spleen, kidney and lungs) of mice after complete treatment with topical application of different treatment formulations.