

Supporting Information

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

Arbab Ali, ^{‡^{ab}} Jiaming Liu, ^{‡^b} Huige Zhou, ^b Tao Liu, ^b Muhammad Ovais, ^b Huibiao Liu, ^c Yukui Rui, ^{*a} and Chunying Chen^{*b}

^a Beijing Key Laboratory of Farmland Soil Pollution Prevention and Remediation, College of Resources and Environmental Sciences, China Agricultural University, Beijing 100193, China

^b CAS Key Laboratory for Biomedical Effects of Nanomaterials and Nanosafety & CAS Center for Excellence in Nanoscience, National Center for Nanoscience and Technology of China, Beijing 100190, China. E-mail: ruiyukui@163.com; chenchy@nanoctr.cn

^c CAS Key Laboratory of Organic Solids, Beijing National Laboratory for Molecular Sciences, CAS Research/Education Center for Excellence in Molecular Sciences, Institute of Chemistry, Chinese Academy of Sciences, Beijing 100190, China

[‡]These authors contributed equally to this work.

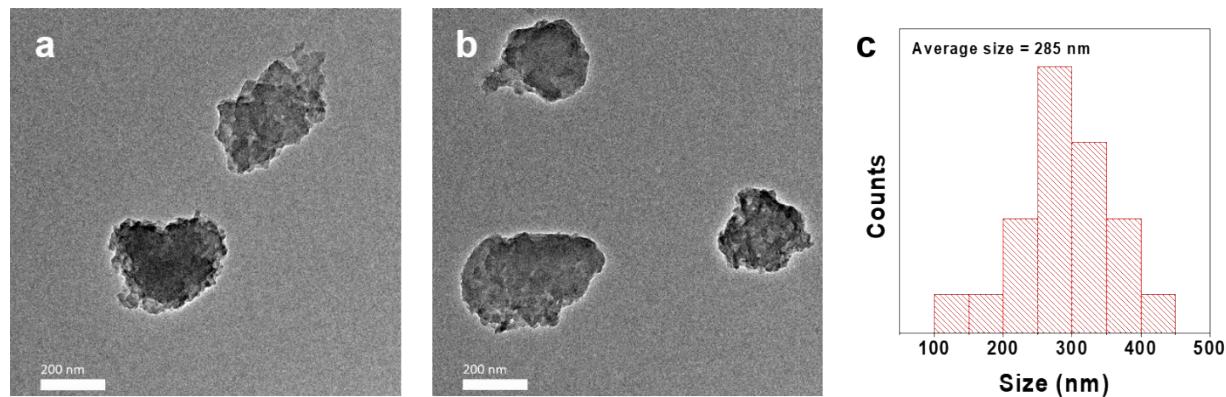


Fig. S1 (a) TEM image of GDY. (b) TEM image of GDY-Hemin and (c) Statistical size distribution of GDY-Hemin.

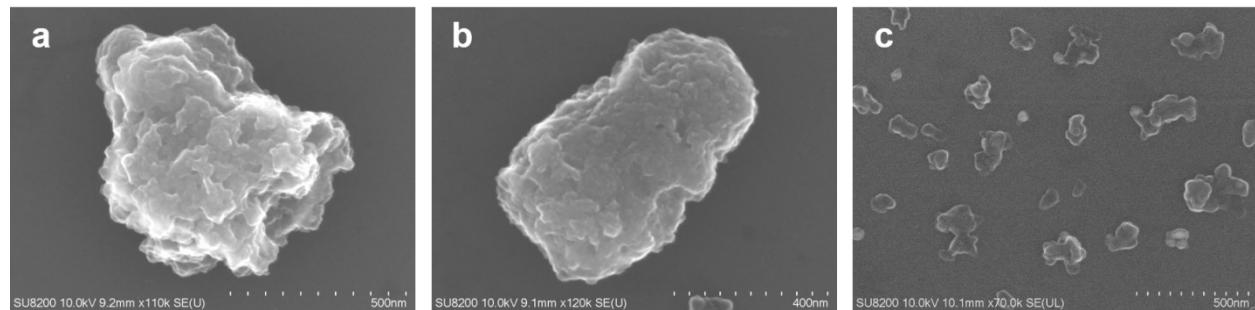


Fig. S2 SEM images of (a) GDY and (b-c) GDY-Hemin.

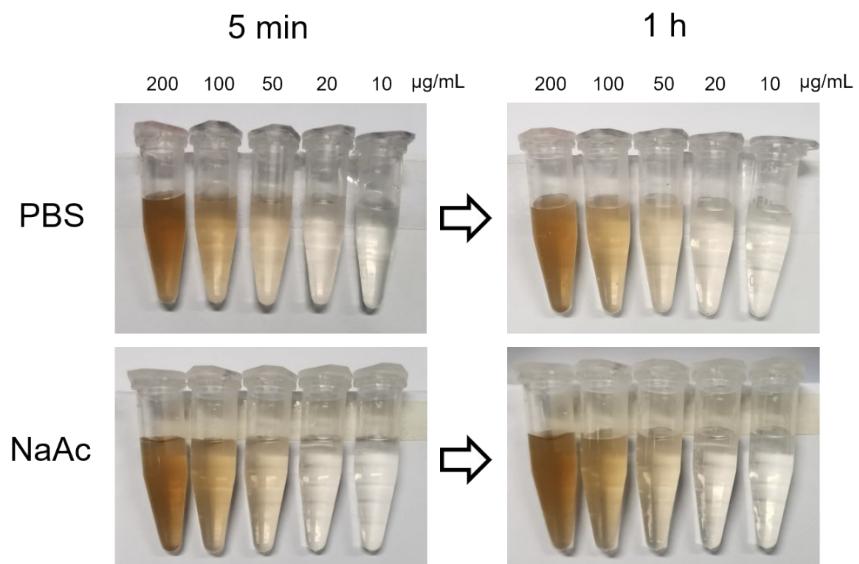


Fig. S3 Images of GDY-Hemin dispersed in different buffer solution.

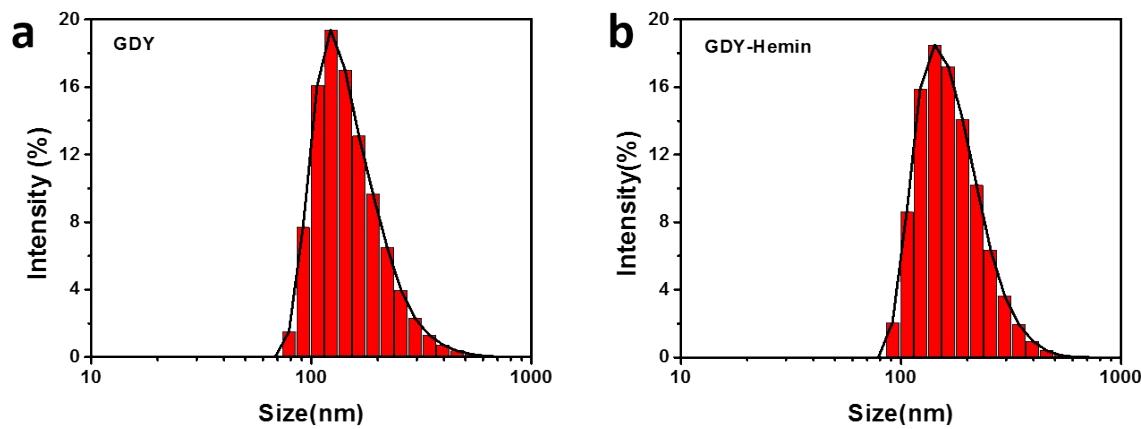


Fig. S4 Hydrodynamic size distribution of (a) GDY and (b) GDY-Hemin.

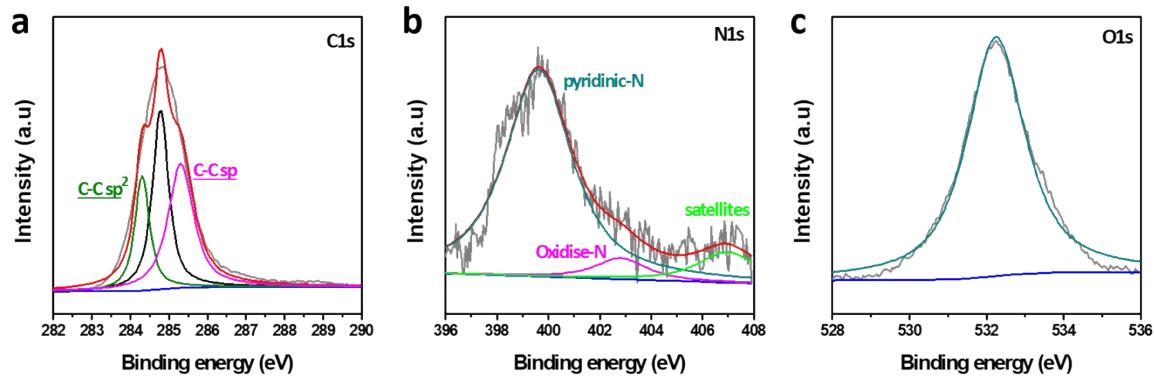


Fig. S5 High resolution (a) C1s, (b) N1s, and (c) O1s XPS spectra of GDY-Hemin.

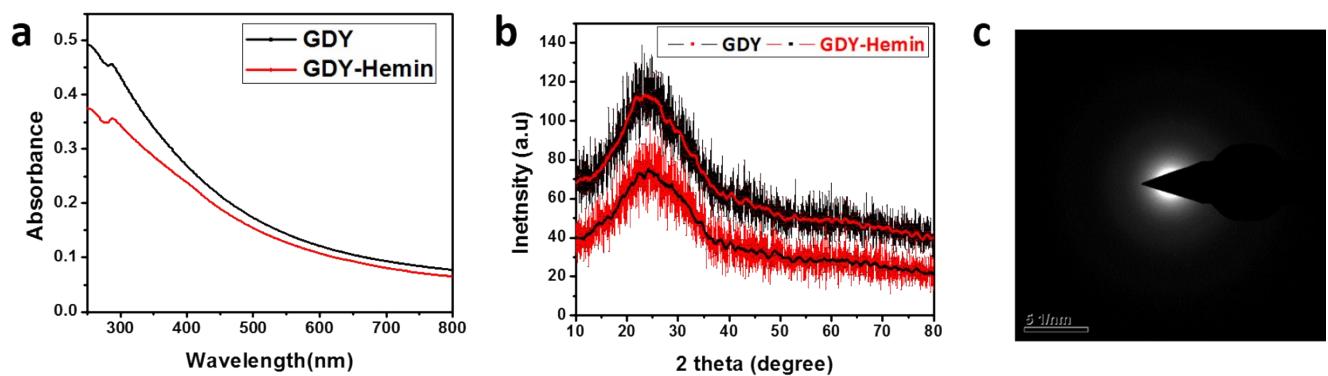


Fig. S6 Characterization of GDY and GDY-Hemin. (a) UV-Vis spectra, (b) XRD spectra, (c) SAED pattern of GDY-hemin.

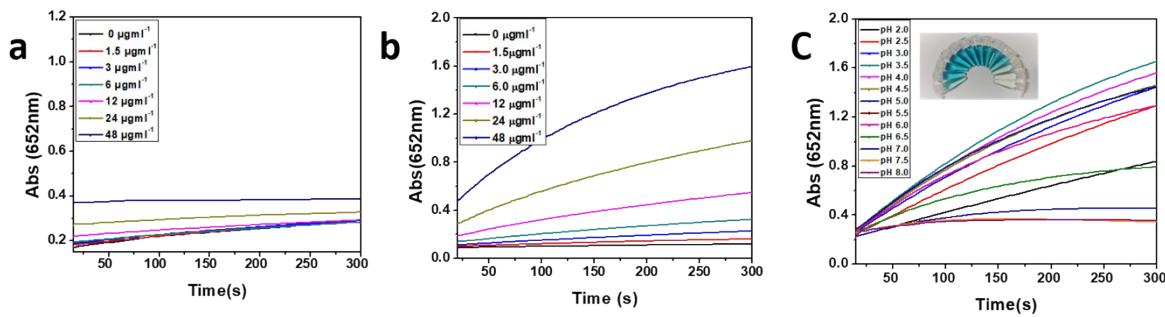


Fig. S7 Time-dependent catalytic activity of GDY and GDY-Hemin with absorbance changes at 652 nm under different conditions. (a-b) Time dependent absorption changes at 652nm at different concentrations of GDY (a) and GDY-Hemin (b). The experiments were carried out under 40 mM H₂O₂ with TMB as oxidizing substrate in sodium acetate buffer (50 mM, pH 4.0). (c) Time dependent absorption changes of GDY-Hemin (25 μ g/mL) at 652nm under different pH conditions. The experiments were performed under 40 mM H₂O₂ with TMB as oxidizing substrate in sodium acetate buffer (50 mM, pH 4.0).

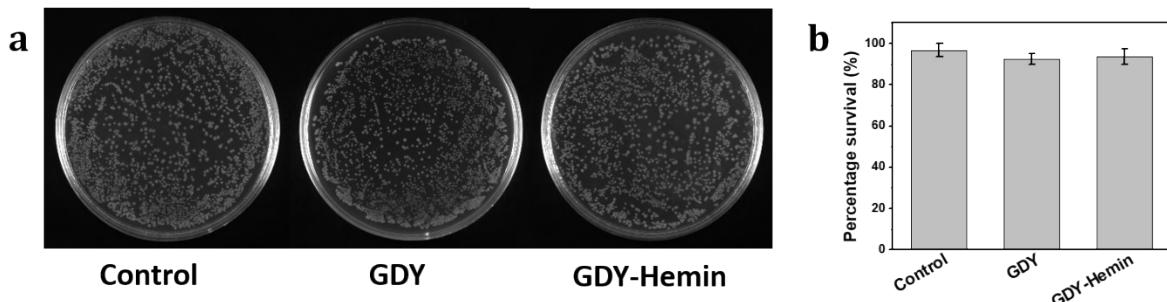


Fig. S8 Initial in vitro antibacterial performance of GDY and GDY-Hemin in the absence of H₂O₂.

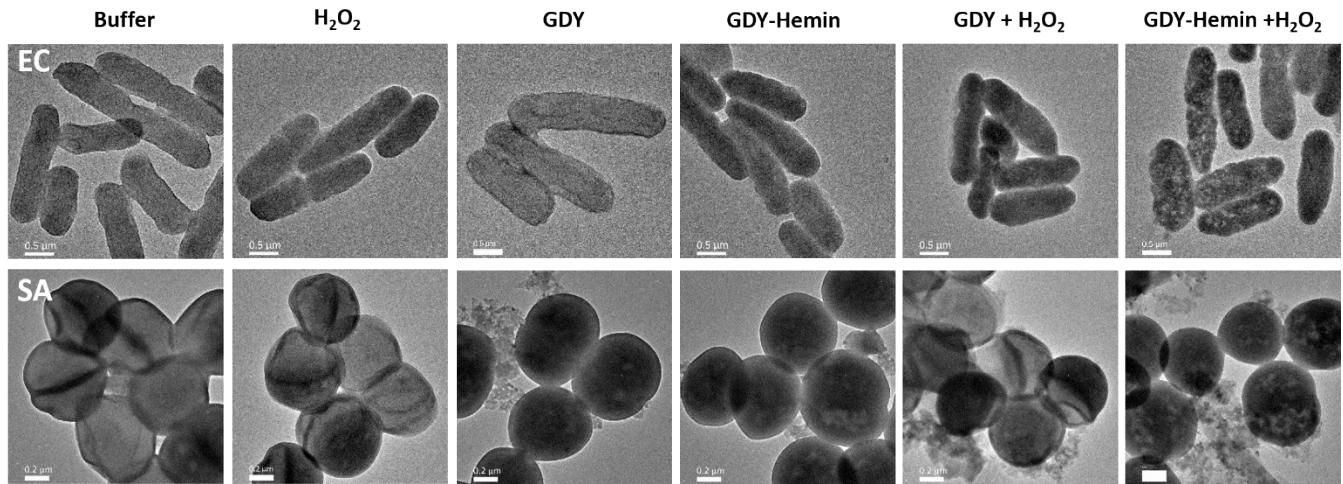


Fig. S9 TEM micrographs of *E. coli* and *S. aureus* after upon different treatments.

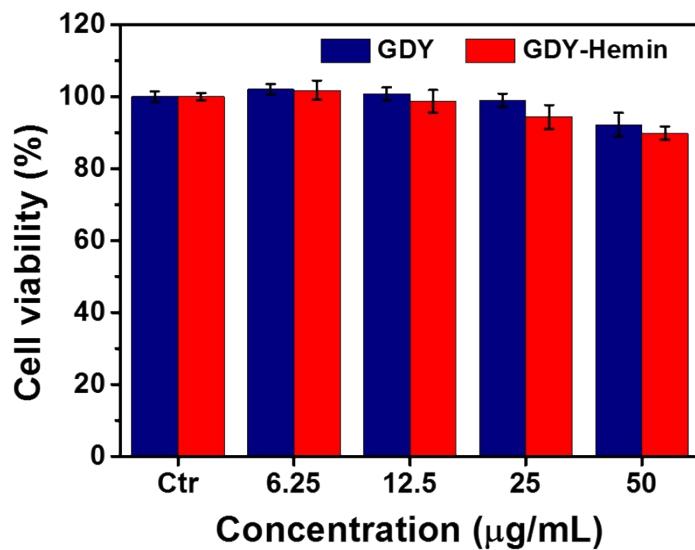


Fig. S10 In vitro biocompatibility of GDY and GDY-Hemin. Cell viability of HUVEC cells after incubation with GDY or GDY-Hemin at different concentrations (6.25 to 100 $\mu\text{g/mL}$) for 48 hours. Data are presented as values of viable cells mean \pm sd ($n=3$).

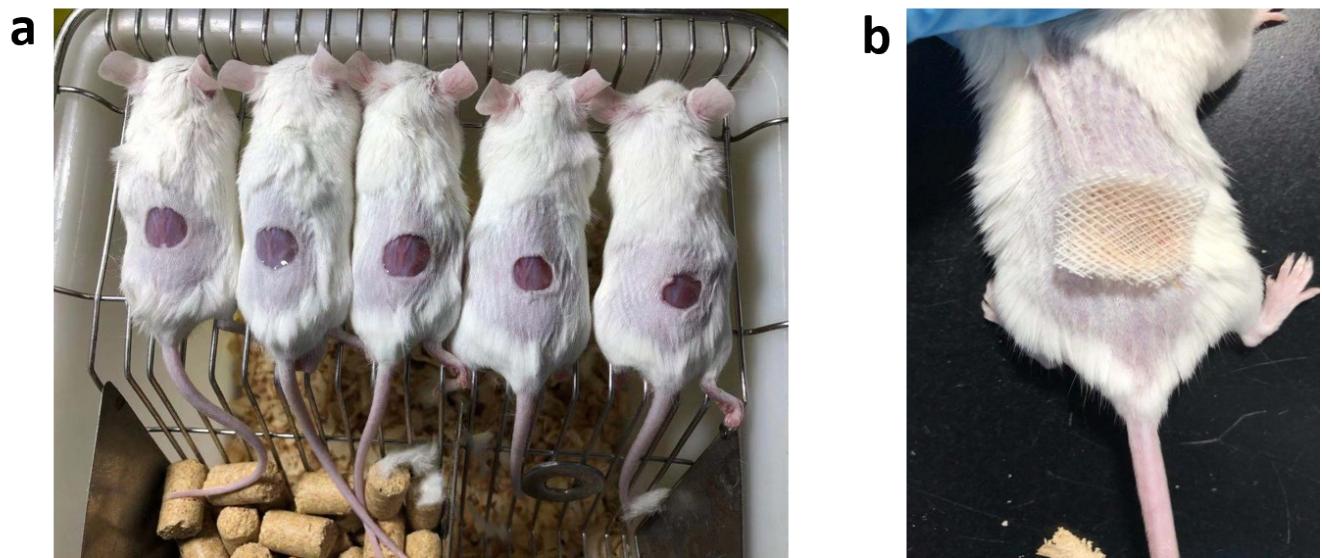


Fig. S11 Photographs of mice (a) after wound incision and bacterial inoculation or (b) after treating and covering with gauze piece.

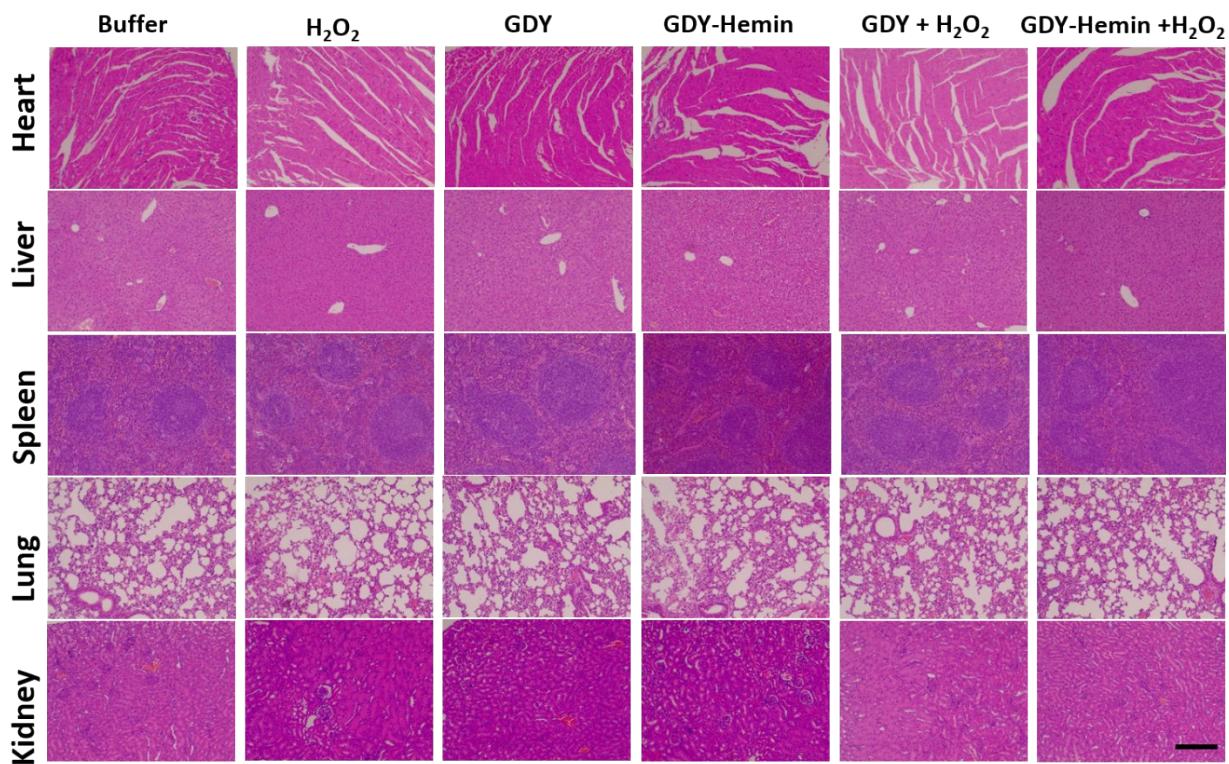


Fig. S12 H&E staining images of major organs (heart, liver, spleen, kidney and lungs) of mice after complete treatment with topical application of different treatment formulations.