Supporting Information

Bacteria responsive polyoxometalates nanocluster strategy to regulate biofilm microenvironments for enhanced synergetic antibiofilm activity and wound healing

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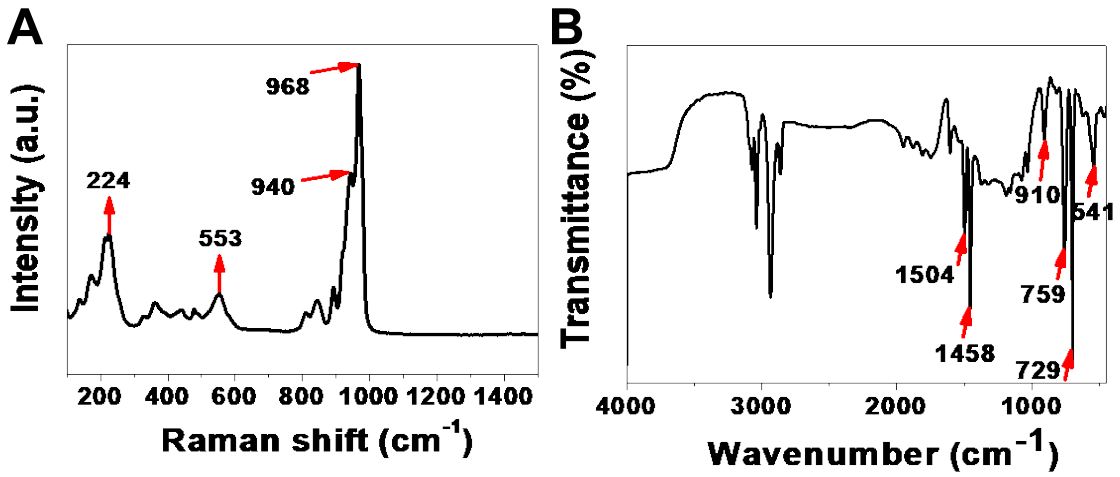

Figure S1. (A-B) Raman and FT-IR spectra of $GdW_{10}O_{36}$ NCs.

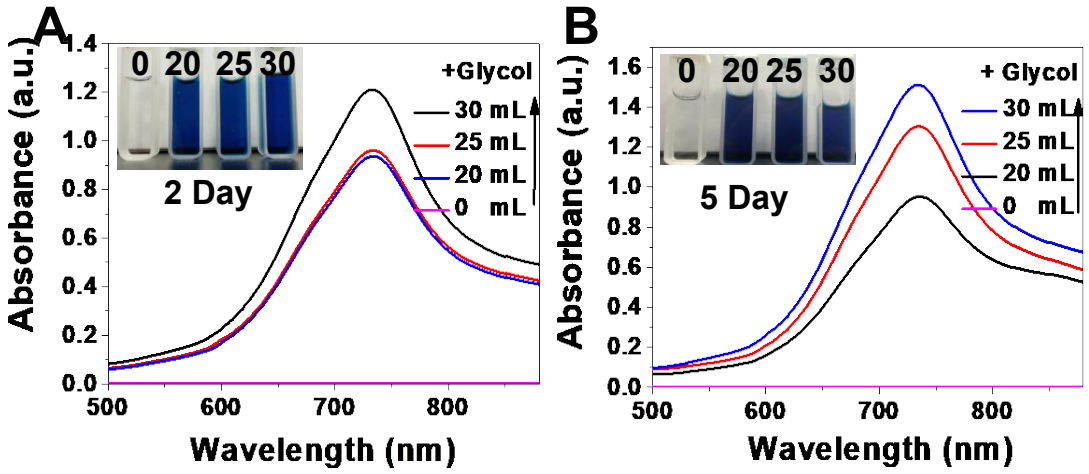

Figure S2. (A-B) The UV-vis spectra and corresponding photographs of various concentrations of ethylene glycol dispersed in deionized water before and after incubation with $GdW_{10}O_{36}$ NCs (10 mg) as a function of time, respectively.

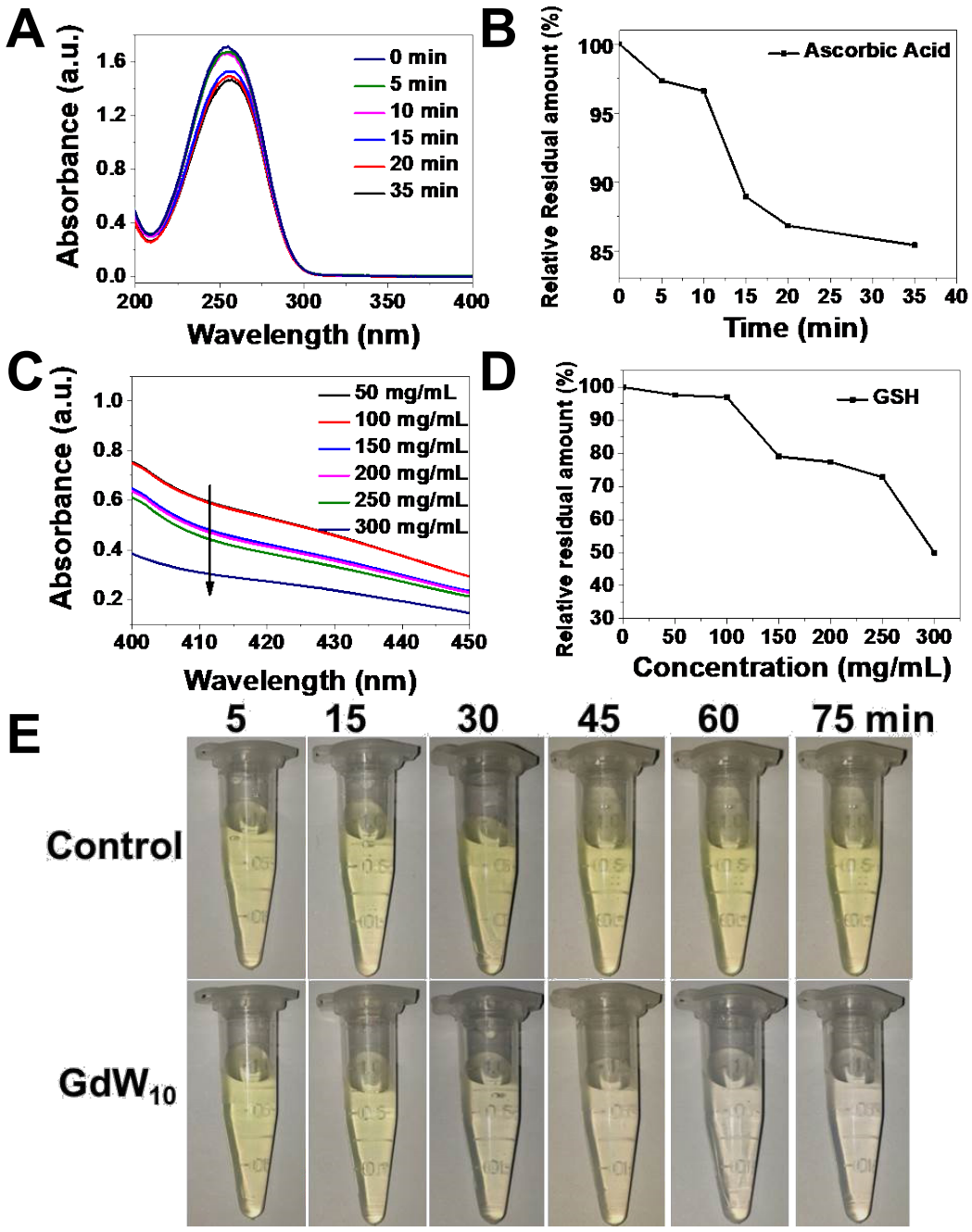

Figure S3. (A-B) The UV-vis spectra and relative residual amount of ascorbic acid before and after incubation with $GdW_{10}O_{36}$ NCs (1.5 mg/mL) as a function of time. (C-D) The UV-vis spectra and relative residual amount of glutathione after incubation with various concentrations of $GdW_{10}O_{36}$ NCs. (E) Photographs for the color change before and after treatment GSH at different time points, determined by the Ellman's assay. The concentration of $GdW_{10}O_{36}$ NCs and GSH was 100 μg/mL and 50 μM. GSH in the absence of $GdW_{10}O_{36}$ NCs was used as control.

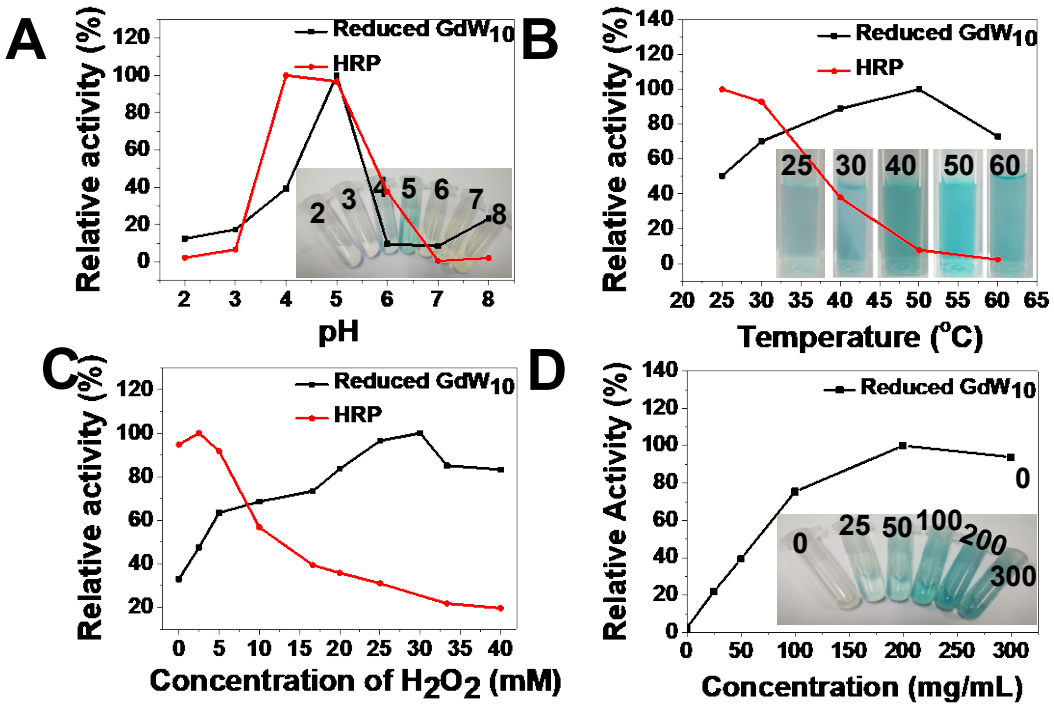

Figure S4. (A) pH-and (B) Temperature-dependent activities with TMB (1 mM), H_2O_2 (33 mM) and with reduced $GdW_{10}O_{36}$ NCs (33 μg/mL).Reduced $GdW_{10}O_{36}$ NCs and HRP show an optimal pH of 4.0–5.0 and optimal temperature around 40–50 °C. (C) H_2O_2 concentration-dependent peroxidase-like activity with reduced $GdW_{10}O_{36}$NCs (33 μg/mL) and TMB (1 mM). Reduced $GdW_{10}O_{36}$ NCs require a higher H_2O_2 concentration than HRP to reach maximal peroxidase activity. (D) Reduced $GdW_{10}O_{36}$ NCs-dependent peroxidase-like activity with TMB (1 mM) and H_2O_2 (33 mM). The maximum point in each curve (a–d) was set as 100 %. Inset shows the photographs of the reaction system.

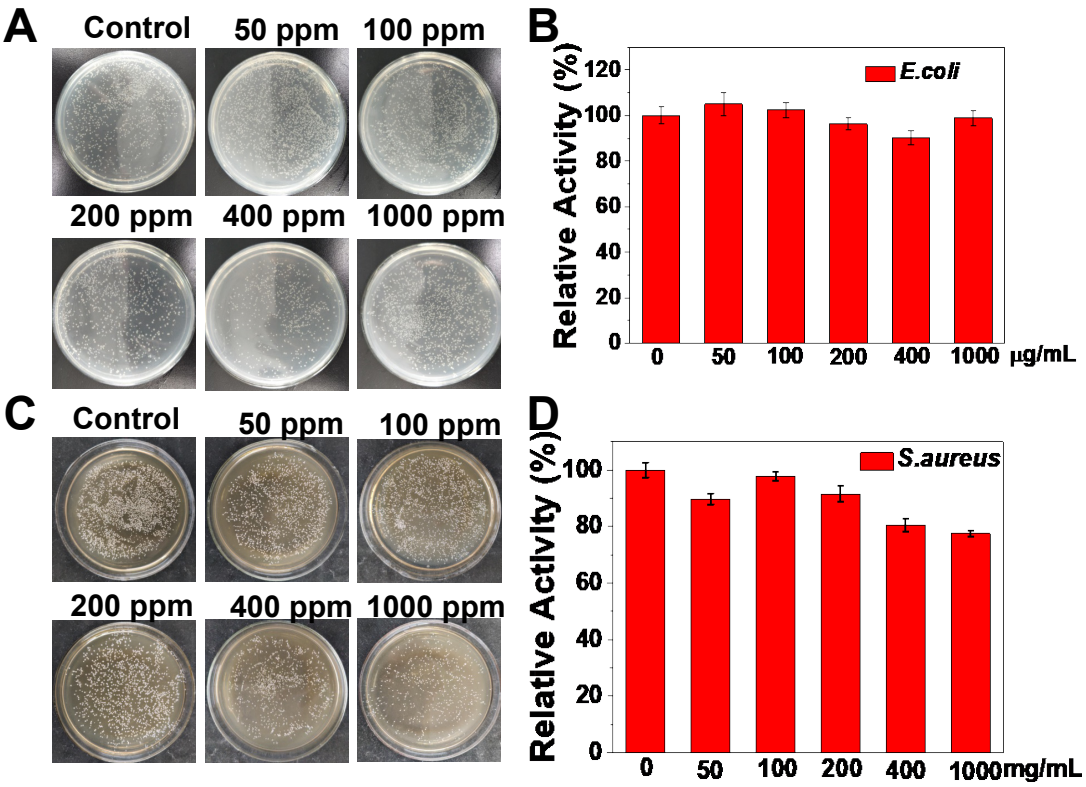

Figure S5. (A, C) Photographs and (B, D) survival rates of *E.coli* and *S.aureus* treated with various concentrations of reduced $GdW_{10}O_{36}$ NCs. The colony-forming units counting method was applied to evaluate the actual antibacterial effects of reduced $GdW_{10}O_{36}$ NCs. The data indicate the means and SD from three parallel experiments.

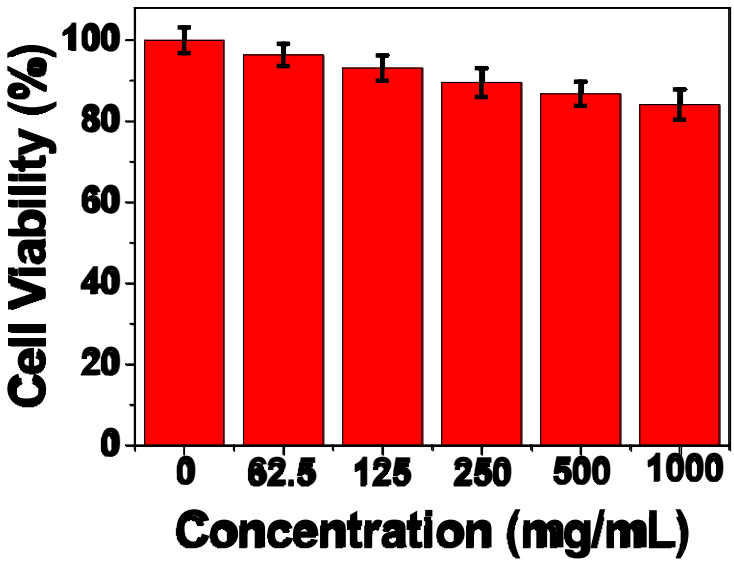

Figure S6. Cell viability assays on 4T1 cells incubated with reduced $GdW_{10}O_{36}$ NCs (0, 62.5, 125, 250, 500 and 1000 μg ml^{-1})

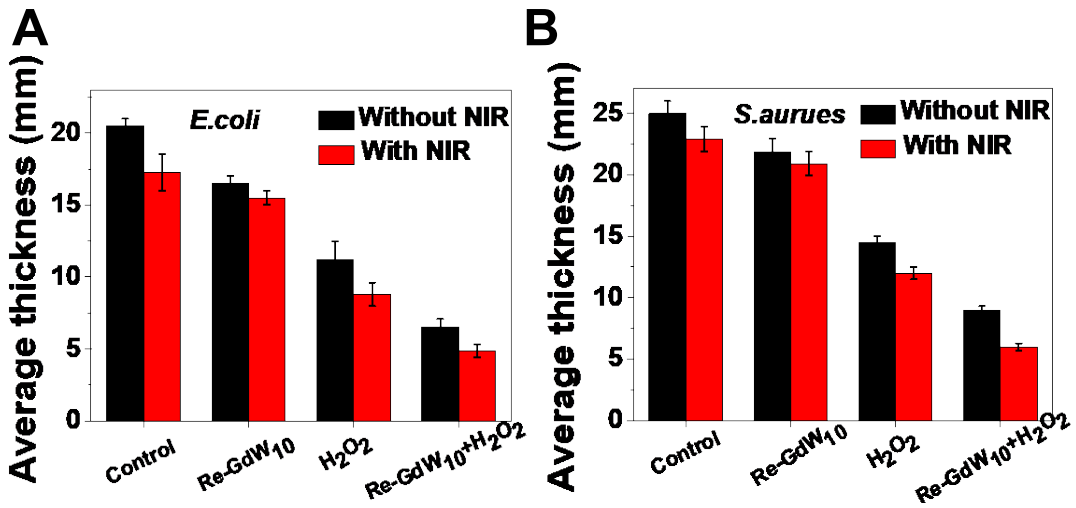

Figure S7. Average thickness of the biofilms shown in (A) *E.coli* and (B) *S.aurues* bacteria as calculated by the COMASTAT software.