

Materials. L-glutathione (GSH, reduced, 98%), N-acetyl-L-cysteine (NAC), DL-dithiothreitol (DTT), Vitamin E (VE), diphenylisobenzofuran (DPBF), 2',7'-dichlorofluorescein diacetate (DCFH-DA) and tellurium powder (99.999%, approximately 200 mesh) were obtained from Sigma-Aldrich and were used without further purification. All other reagents were of analytical grade. Ultrapure water with a conductivity of $18.2 \text{ M}\Omega \text{ cm}^{-1}$ (Millipore Simplicity) was used in all aqueous solutions. Other chemicals and reagents were purchased from Bide Pharmatech Ltd.

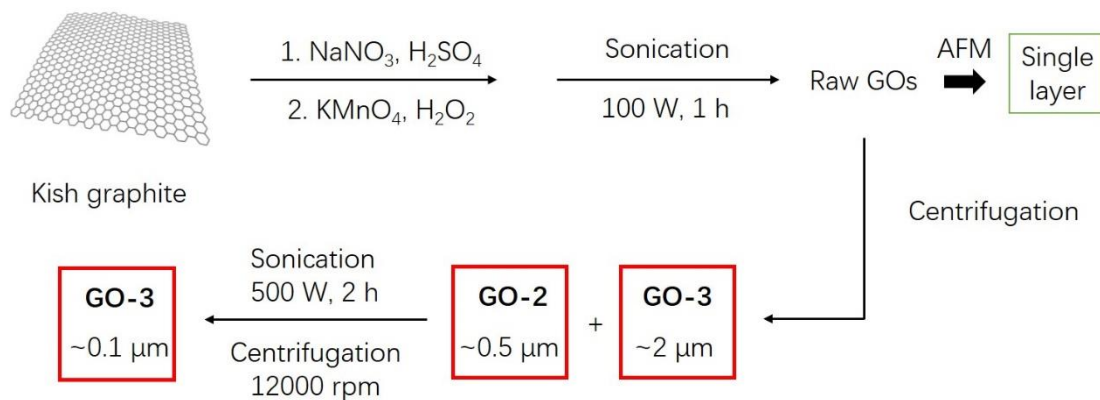


Figure S1. Scheme of the preparation procedures of GOs with different sizes.

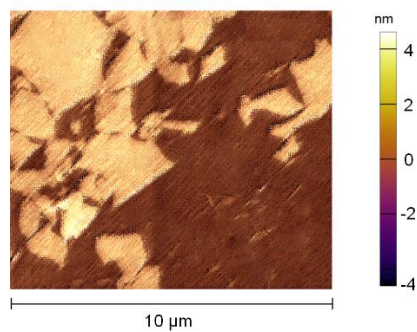


Figure S2. AFM image indicates single layer structure of the as-prepared raw GOs, as depicted in Figure S1.

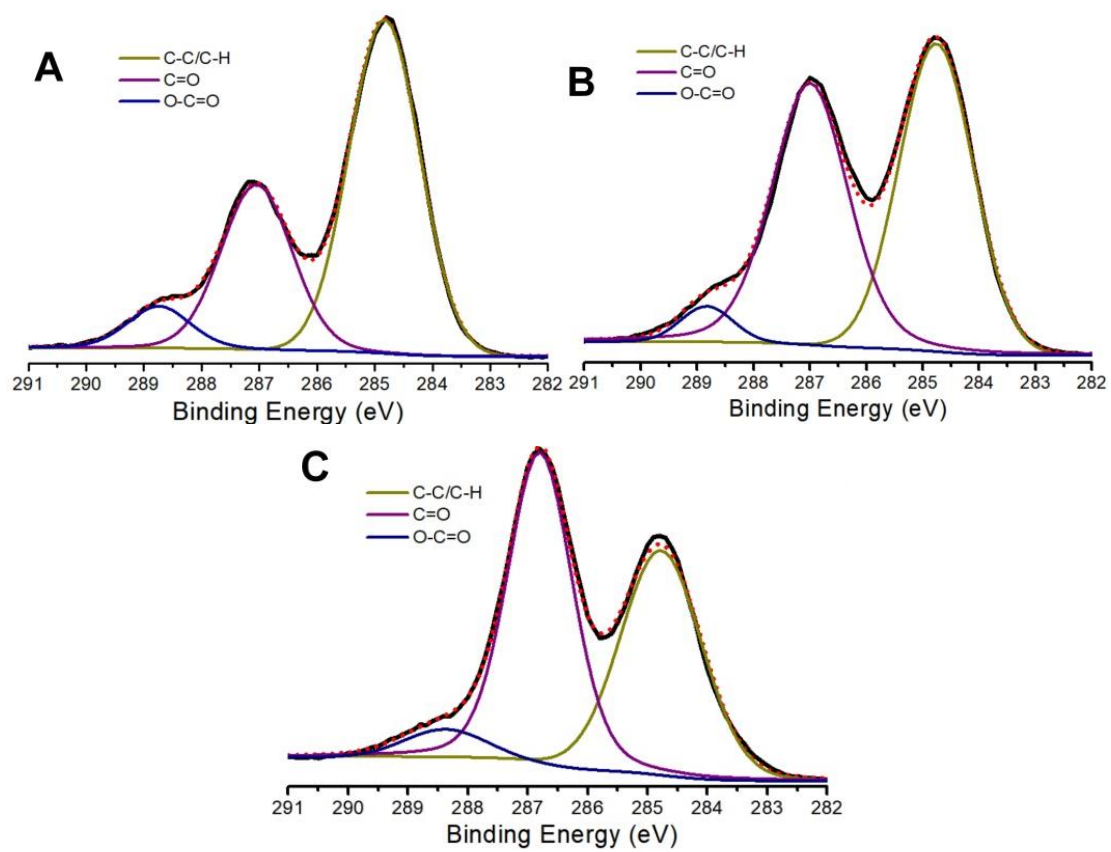


Figure S3. Peak deconvolution of C1s XPS core level of GO-1, GO-2, and GO-3.

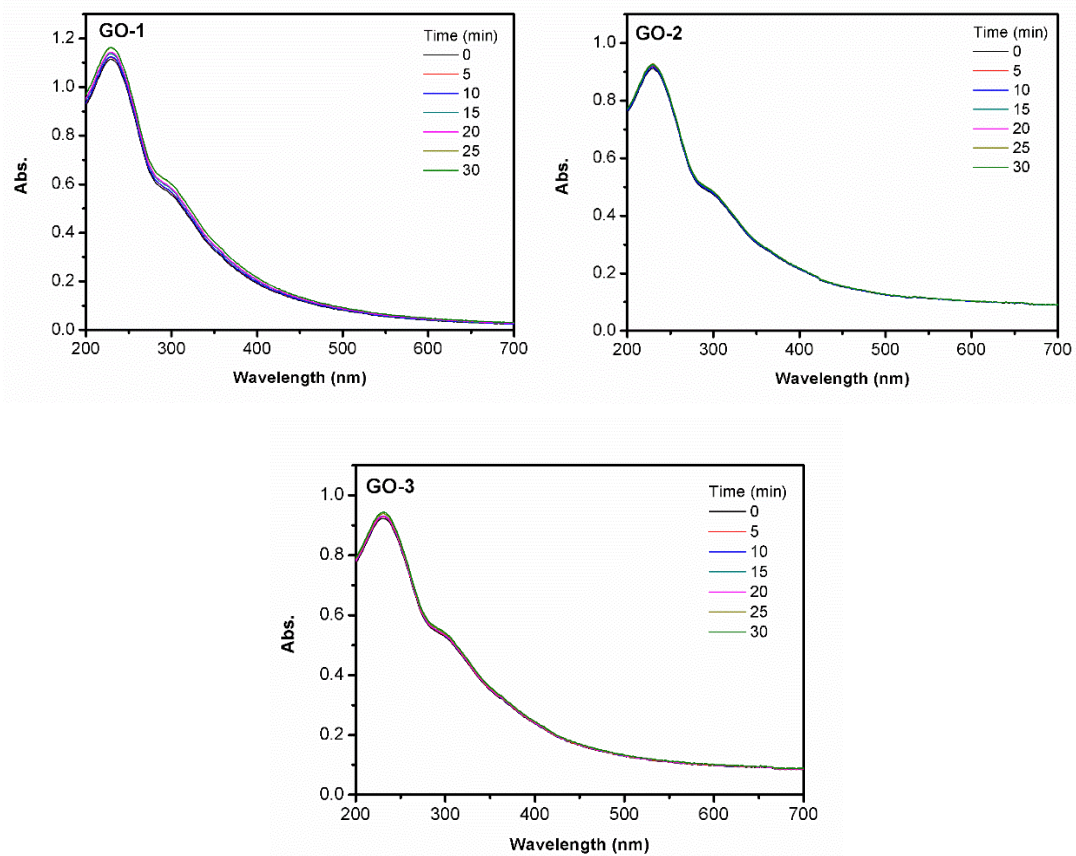


Figure S4. UV-vis spectra of GO-1, GO-2, and GO-3 under different irradiation time.

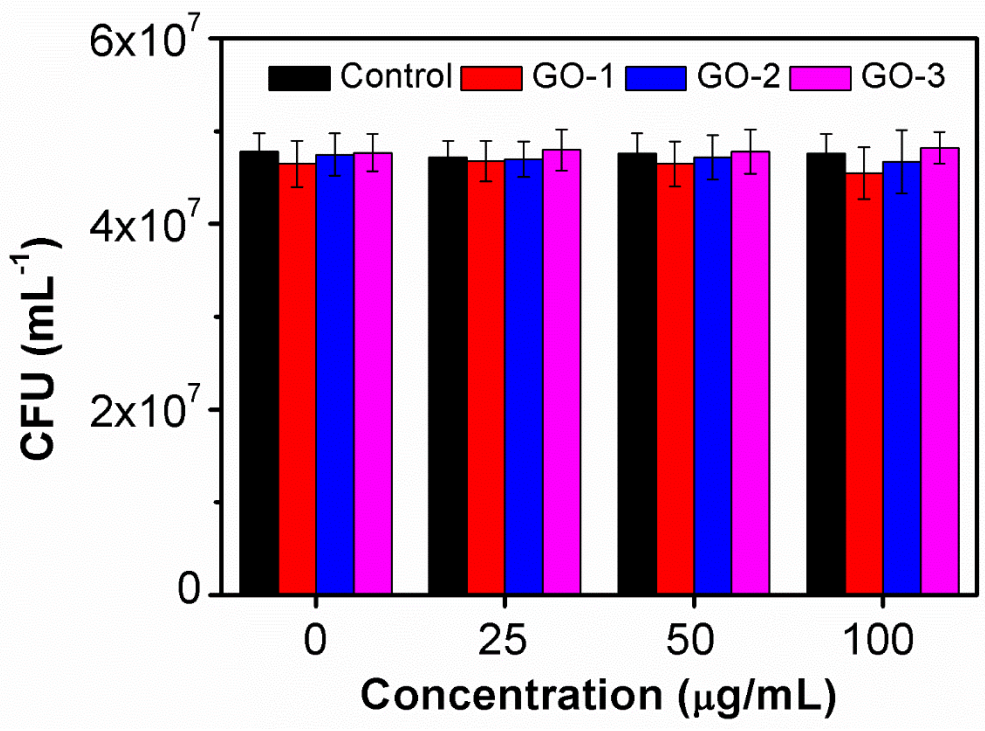


Figure S5. Measurement of colony-forming unit (CFU) of *E. coli* (λ -) suspensions with GOs after incubated for 8 hours.

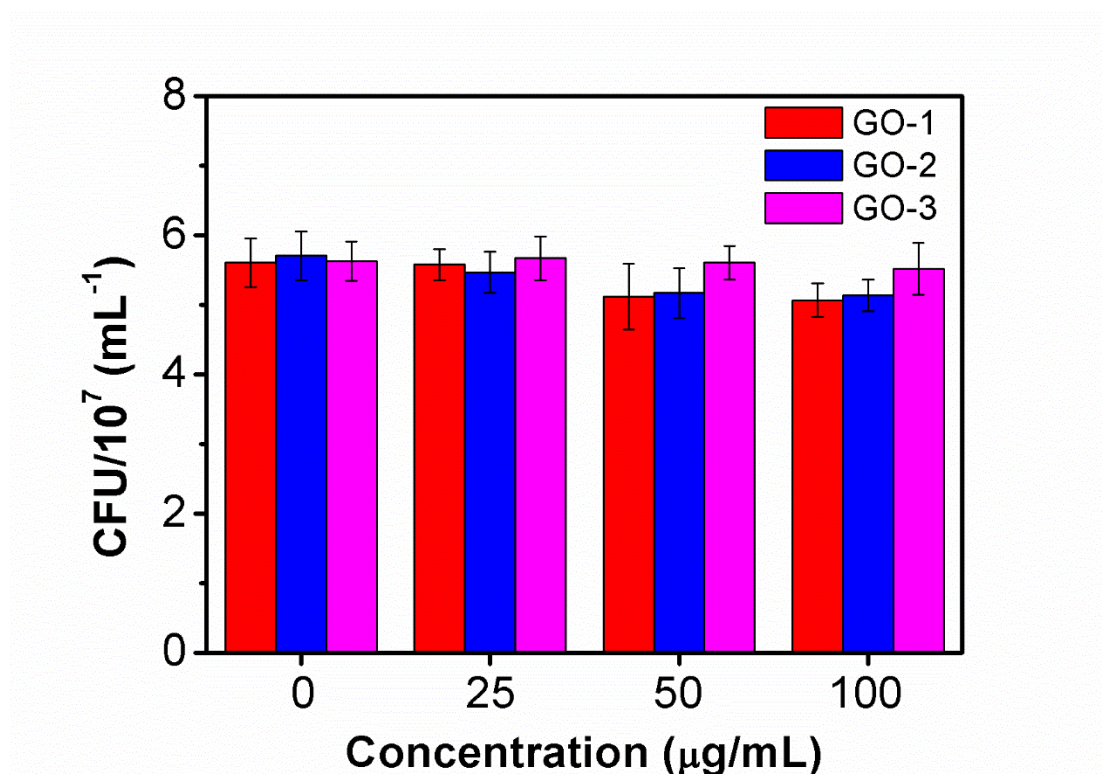


Figure S6. Measurement of colony-forming unit (CFU) of *E. coli* (λ -) suspensions with GOs and 20 min white light irradiation after incubated for 8 hours.

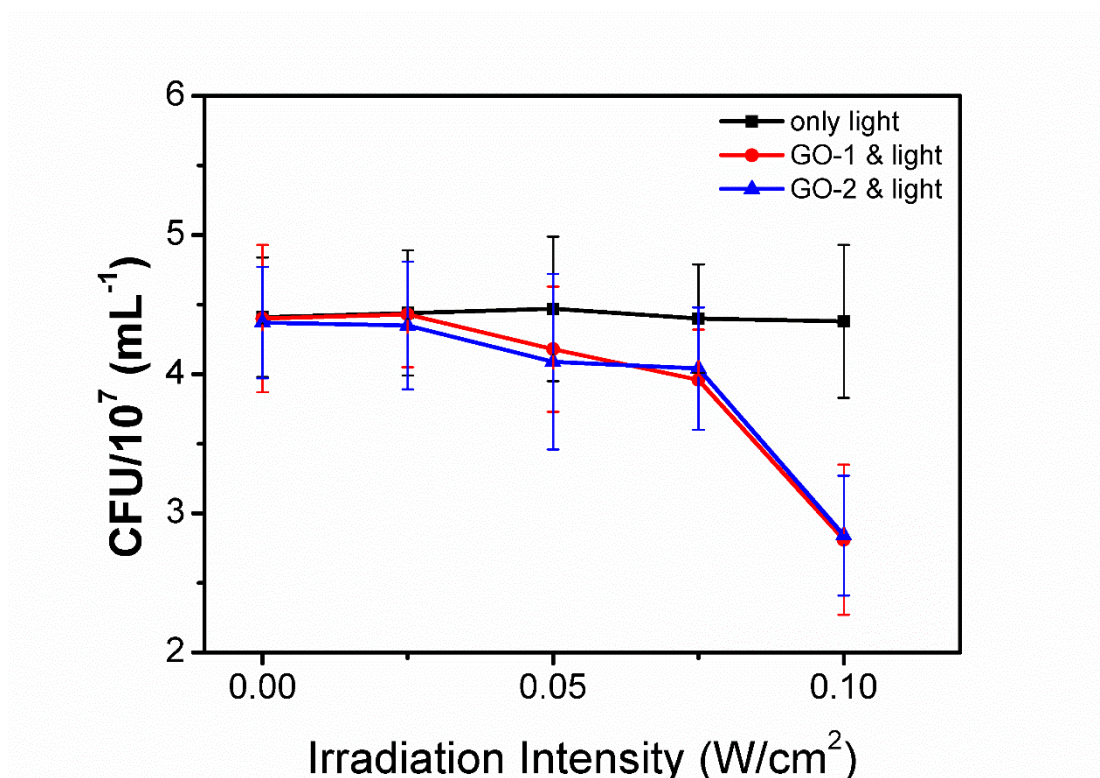


Figure S7. Determination of critical irradiation intensity for lysogenic activation. Colony-forming unit (CFU) of *E. coli* (λ^+) suspensions were calculated after treated with GOs and white light irradiation (30 min).

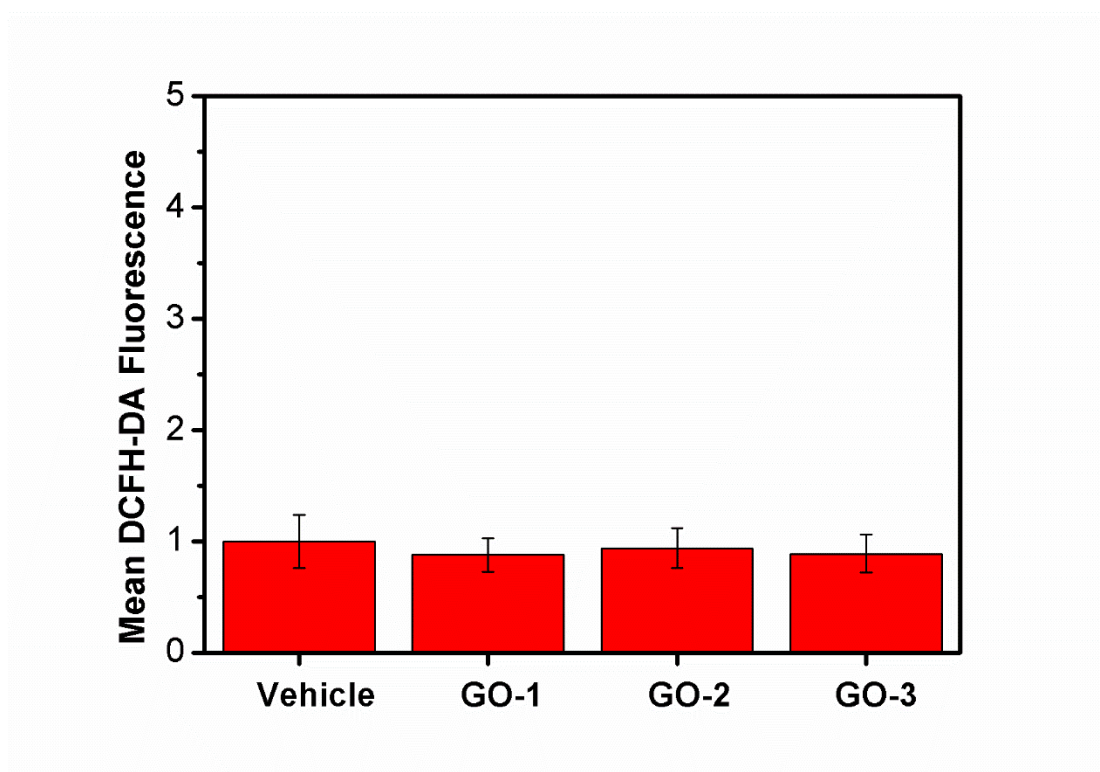


Figure S8. Intracellular ROS level of *E. coli* (λ^+) treated with GOs. ROS level were determined by fluorescence of DCFH-DA.

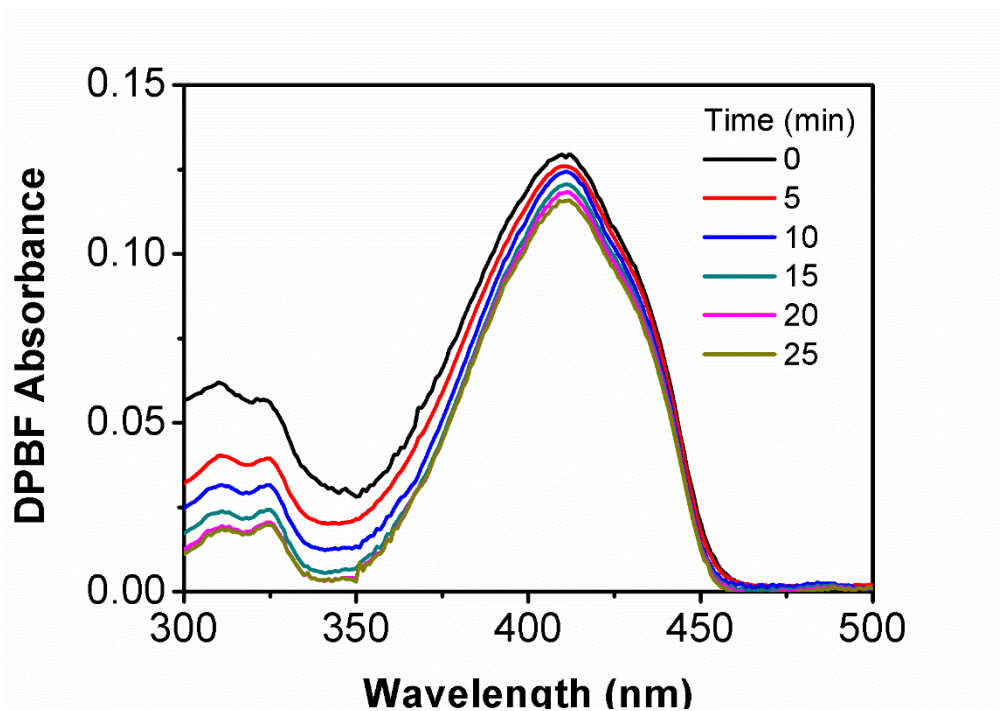


Figure S9. Measurements of photogenerated $^1\text{O}_2$ by GO-1-PEG via decomposition of DPBF. $c(\text{GO-1-PEG}) = 1.0 \mu\text{g/mL}$, $c(\text{DPBF}) = 50 \mu\text{M}$.

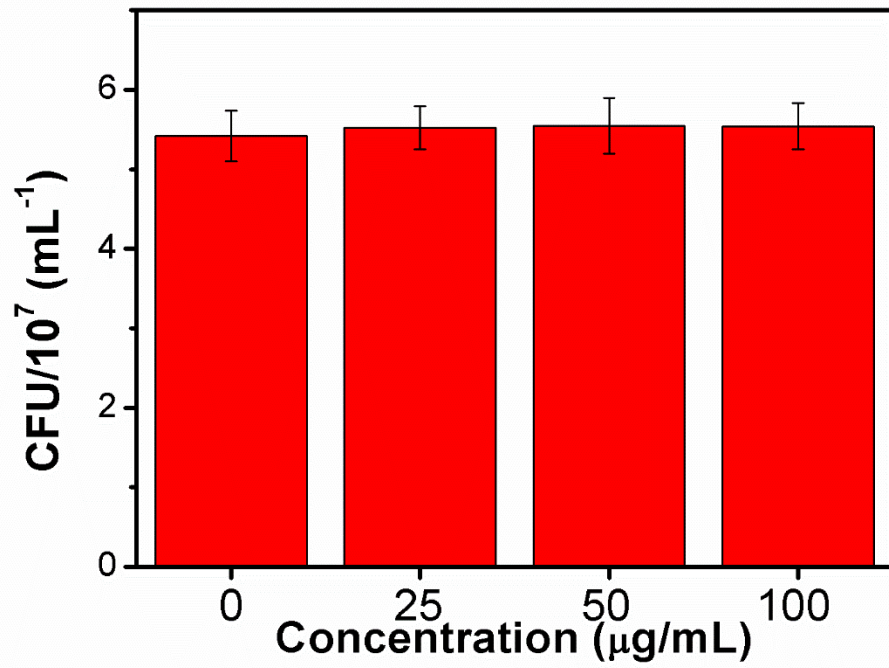


Figure S10. Measurement of colony-forming unit (CFU) of *E. coli* (λ +) suspensions with GO-1-PEG in dark for 8 hours.

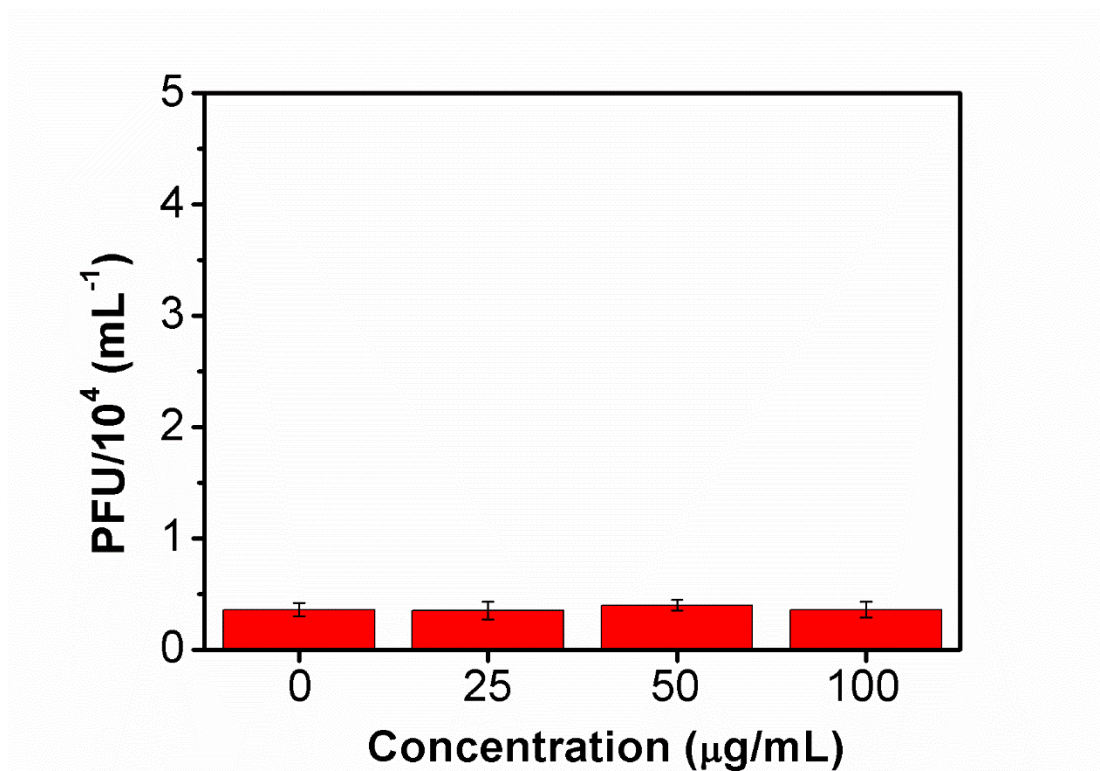


Figure S11. Measurement of PFU of *E. coli* (λ^+) suspensions with GO-1-PEG in dark after incubated for 8 hours.

Table S1. Zeta-potential of GOs stored in bacterial medium at room temperature for 3 days.

	0 days		3 days	
	Zeta-potential (mV)	Hydrodynamic (nm)	Zeta-potential(mV)	Hydrodynamic (nm)
GO-1	-31.5 ± 1.1	134 ± 18	-31.0 ± 1.4	139 ± 15
GO-2	-30.8 ± 1.4	858 ± 78	-31.4 ± 1.7	836 ± 65
GO-3	-30.8 ± 1.2	2180 ± 220	-30.3 ± 1.4	2250 ± 240