

Supporting Information

Visible-light-driven photocatalytic bacterial inactivation and mechanism of zinc oxysulfide under LED light irradiation

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Experimental Section

H₂O₂ measurement

The amount of H₂O₂ produced by ZnO_{0.6}S_{0.4} during the photocatalytic inactivation process was measured by a highly sensitive fluorometric method. Briefly, 0.4 mL of the samples, 0.1 mL of coumarin (0.5 mM), and 0.1 mL of FeSO₄ (0.25 mM) were added into 0.4 mL of acitrate buffer (pH 3) with further standing at room temperature for 10 min. Then the mixture was measured at an emission wavelength of 456 nm with an excitation wavelength of 346 nm with an Infinite® M200 microplate reader (Tecan, Mannedorf, Switzerland). The concentration of produced H₂O₂ was calculated based on the standard as the same procedure using pure H₂O₂ as a reference.

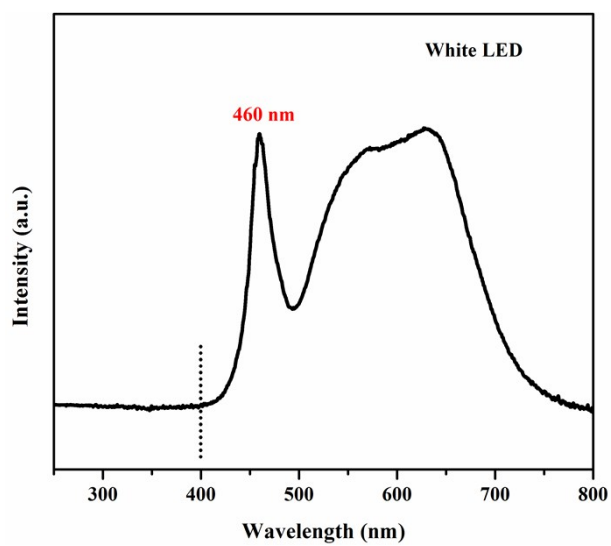


Fig. S1. Light spectrum of white LED lamp.

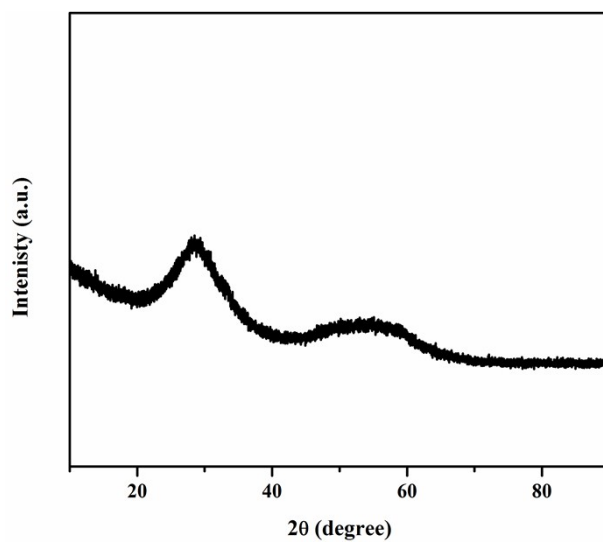


Fig. S2. XRD pattern of $\text{ZnO}_{0.6}\text{S}_{0.4}$ precursor before calcination.

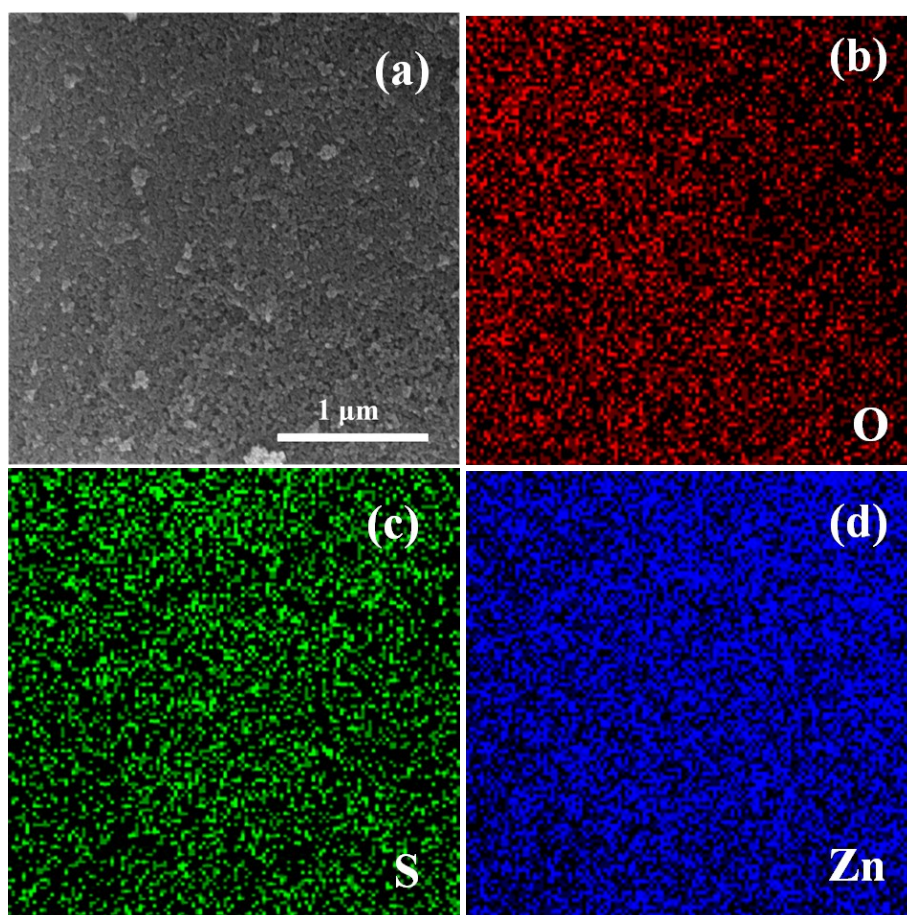


Fig. S3.(a) SEM image and corresponding EDX element mapping of (b) O, (c) S and (d) Zn of $\text{ZnO}_{0.6}\text{S}_{0.4}$ nanoparticles.

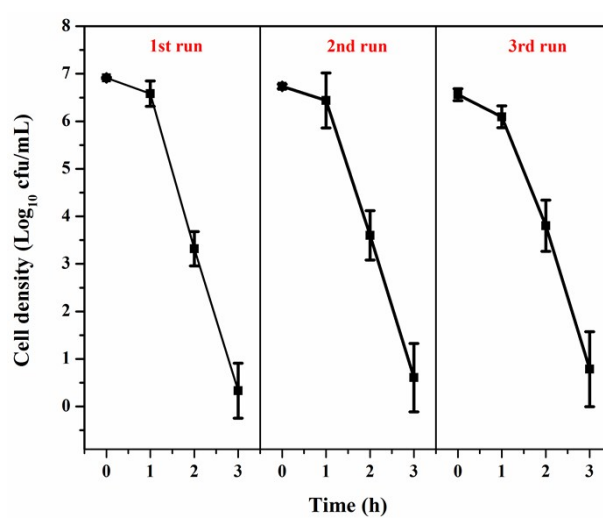


Fig. S4. Recycling test of photocatalytic bacterial inactivation for $\text{ZnO}_{0.6}\text{S}_{0.4}$ nanoparticles.

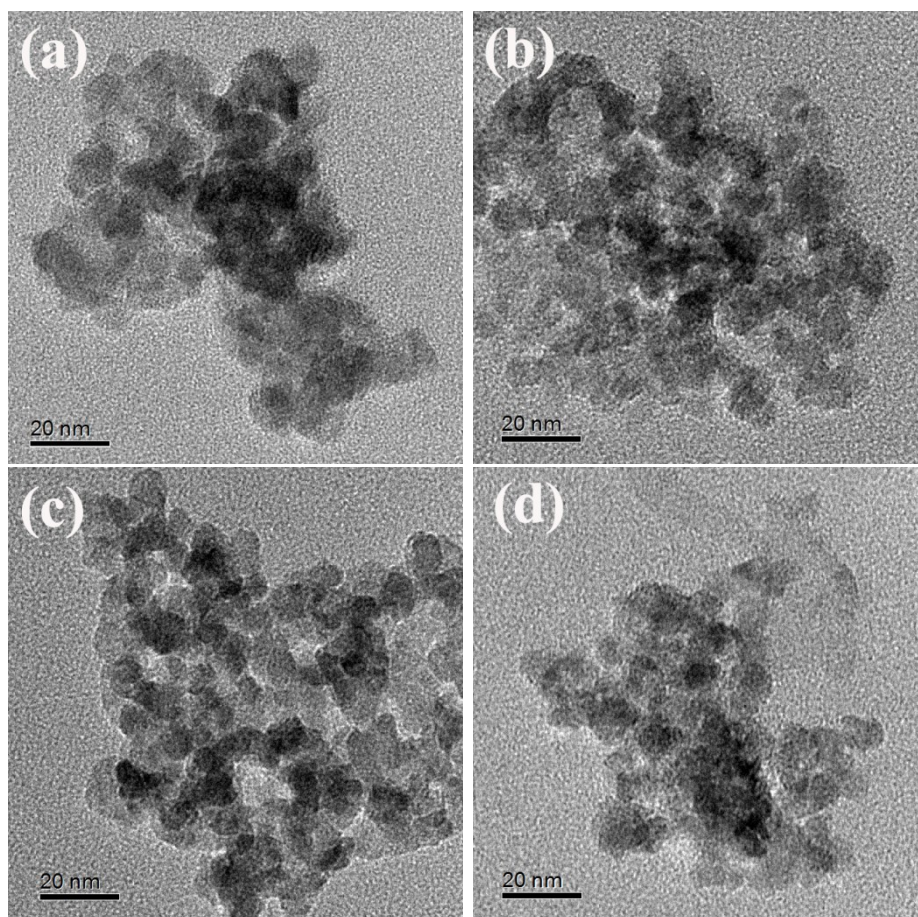


Fig. S5. TEM images of the $\text{ZnO}_{0.6}\text{S}_{0.4}$ nanoparticles after photocatalytic recycling test for (a) 0, (b) 1st (c) 2nd and (d) 3rd run.

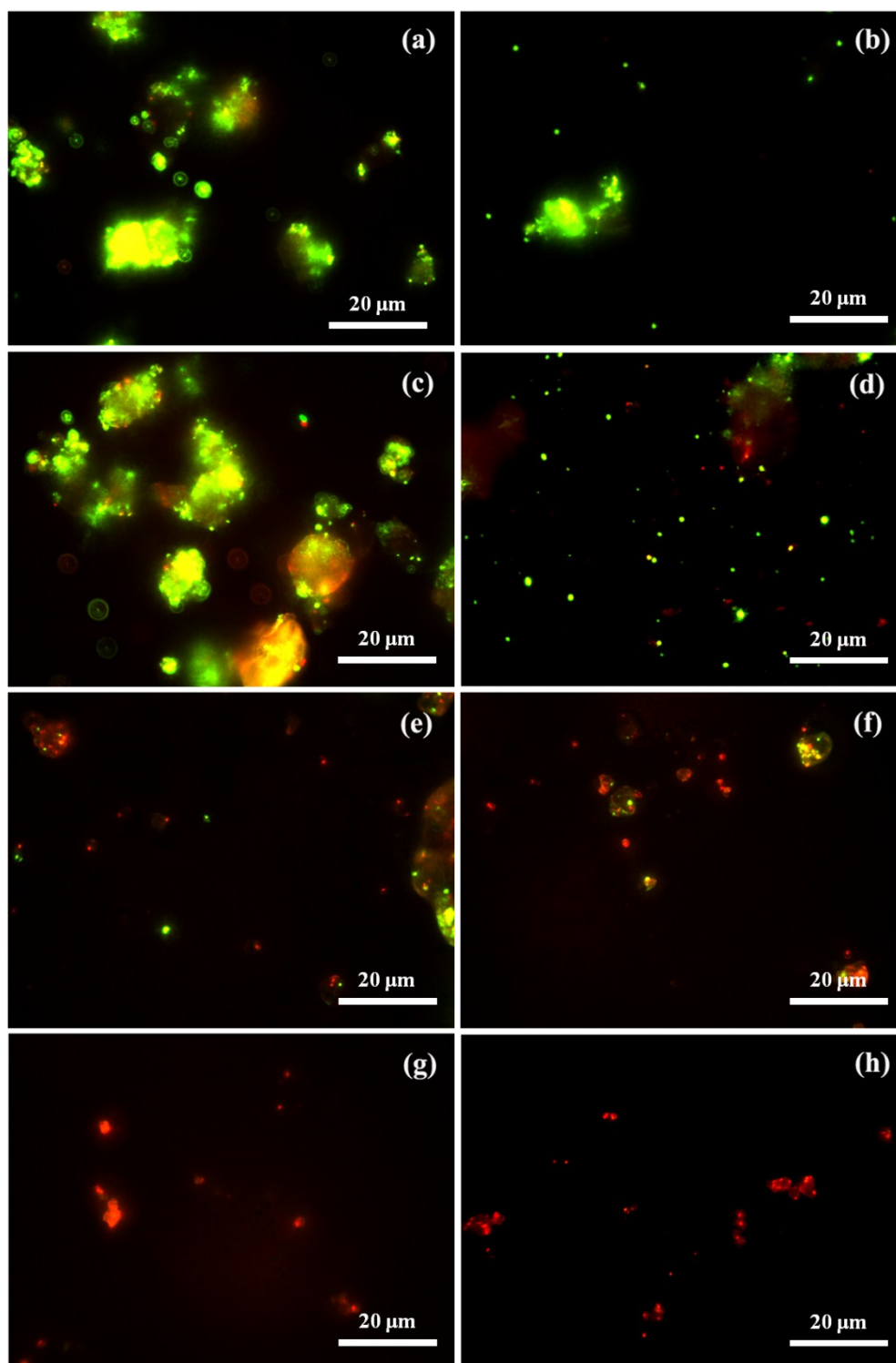


Fig. S6 Fluorescence microscopic images of *E. coli* K-12 photocatalytically treated by $\text{ZnO}_{0.6}\text{S}_{0.4}$ nanoparticles under visible LED irradiation for (a) and (b) 0, (c) and (d) 1, (e) and (f) 2, and (g) and (h) 3 h.

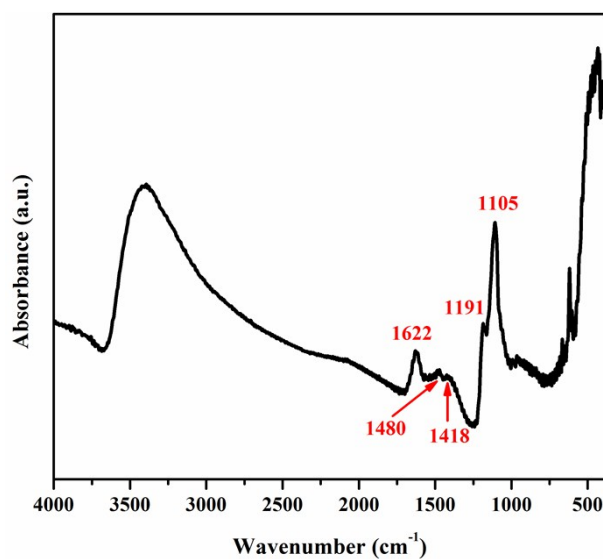


Fig. S7. FTIR spectrum of ZnO_{0.6}S_{0.4} nanoparticles.

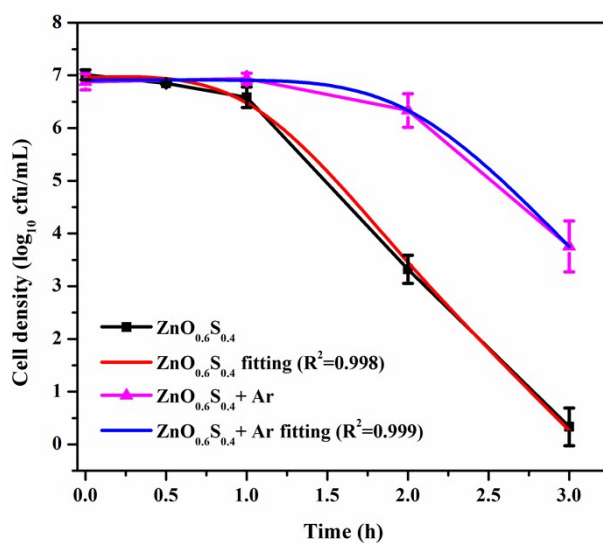


Fig. S8. Photocatalytic bacterial inactivation efficiency of ZnO_{0.6}S_{0.4} nanoparticles fitted with the “shoulder + log-linear” model.

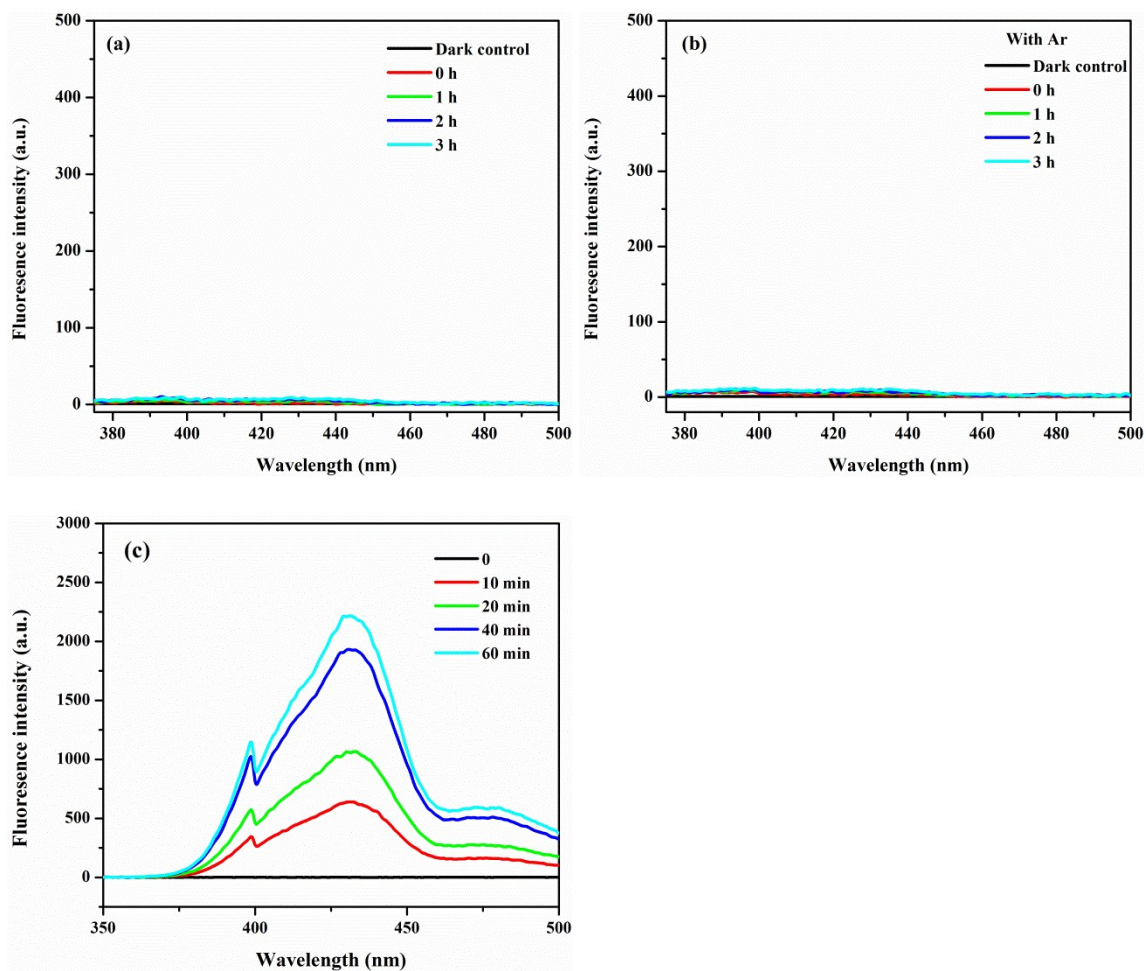


Fig. S9. Fluorescence spectra of terephthalic acid during the photocatalytic treatment of $\text{ZnO}_{0.6}\text{S}_{0.4}$ nanoparticles under visible LED irradiation (a) without and (b) with Ar purging; and for (c) TiO_2 -P25 under UV irradiation for a reference.