Electronic Supplementary Information

Ag@CuO nanohybrids synthesis and their photo-enhanced bactericidal effect through concerted Ag ion release and reactive oxygen species generation

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Fig. S1 (a) Color photographs of colloidal solution of Ag seeds nanoparticles and Ag@CuO hybrid nanostructures. (b) The corresponding UV-vis absorption spectra of the Ag seeds and Ag@CuO hybrid colloidal solutions.

Fig. S2 (a-b) TEM images of Ag@CuO hybrid nanoparticles at different magnifications, and (c) the selected area electron diffraction pattern.

Fig. S3 TEM images of Ag@CuO hybrid nanostructures prepared in the presence of 0.11 M of PVP with different molecular weights: (a) PVP-10 (10 kg mol⁻¹) and (b) PVP-1300 (1300 kg mol⁻¹).
**Fig. S4** UV-vis spectra of Ag@CuO nanohybrids with different PVP molecular weights.

**Fig. S5** TEM images of Ag@CuO hybrid nanoparticles prepared in the presence of different concentrations of PVP-40 at (a) 8 mM and (b) 0.44 M PVP-40. (c) TEM image of CuO NPs. Scale bar: 100 nm.

**Fig. S6** UV-vis spectra of Ag@CuO hybrid nanoparticle with different PVP-40 concentrations.
**Fig. S7** Photoluminescence spectra of DCF after different period of AM 1.5G light exposure in the presence of (a) Ag and (b) CuO NPs.

**Fig. S8** Antibacterial activities of CuO NPs at different concentrations against *E. Coli*, evaluated by measuring suspension optical density at 595 nm.
Fig. S9 The percentage of release of ions in Ag NPs under dark and light conditions.

Fig. S10 (a) Photographs of *E. coli* bacterial colonies formed on LB agar plates with various NPs (Ag and ZnO concentration at 1.3 and 6.1 mg L$^{-1}$, respectively) performed in the dark or under light exposure for 10 min. (b) Photographs of *S. aureus* bacterial colonies formed on LB agar plates with various NPs (Ag and ZnO concentration at 2.6 and 12.2 mg L$^{-1}$, respectively) performed in the dark or under light exposure for 10 min.