Supplementary data

Mechanism for sulfidation of silver nanoparticle by copper sulfide in water under aerobic conditions

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Table S1. The basic characterization of NPs used in this study.

NPs	Concentration (mg/L)	DLS (nm)	PdI	ξ potential (mV)
Ag-NP	5.0	36.2 ± 2.7	0.353	-9.7 ± 5.3
n-CuS-NP	17.8	525.9 ± 57.3	0.642	-39.7 ± 6.1
p-CuS-NP	17.8	278.2 ± 31.9	0.577	23.5 ± 7.3

Table S2. Pseudo-first-order rate constants (min^{-1}) for CuS-NPs reacted with Ag-NP under oxic conditions.

NPs	Molar ratio of Ag to S			
	4	1	0.5	0.25
n-CuS-NP	0.165 (R^2=0.808)	0.360 (R^2=0.859)	0.395 (R^2=0.849)	0.631 (R^2=0.792)
p-CuS-NP	0.015 (R^2=0.893)	0.077 (R^2=0.799)	0.279 (R^2=0.886)	0.342 (R^2=0.733)

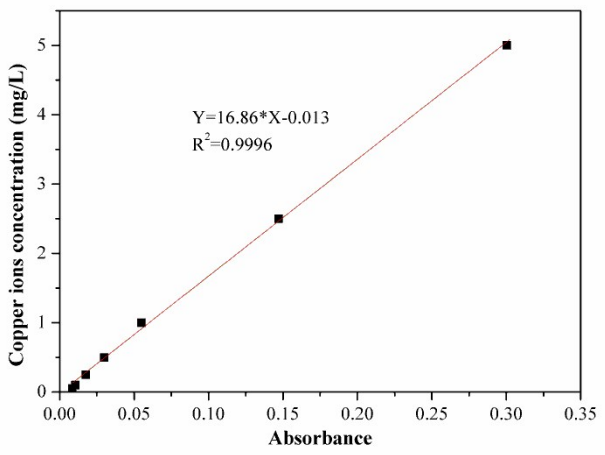

Figure S1. Calibration of dissolved copper for UV-vis spectrometry analysis.

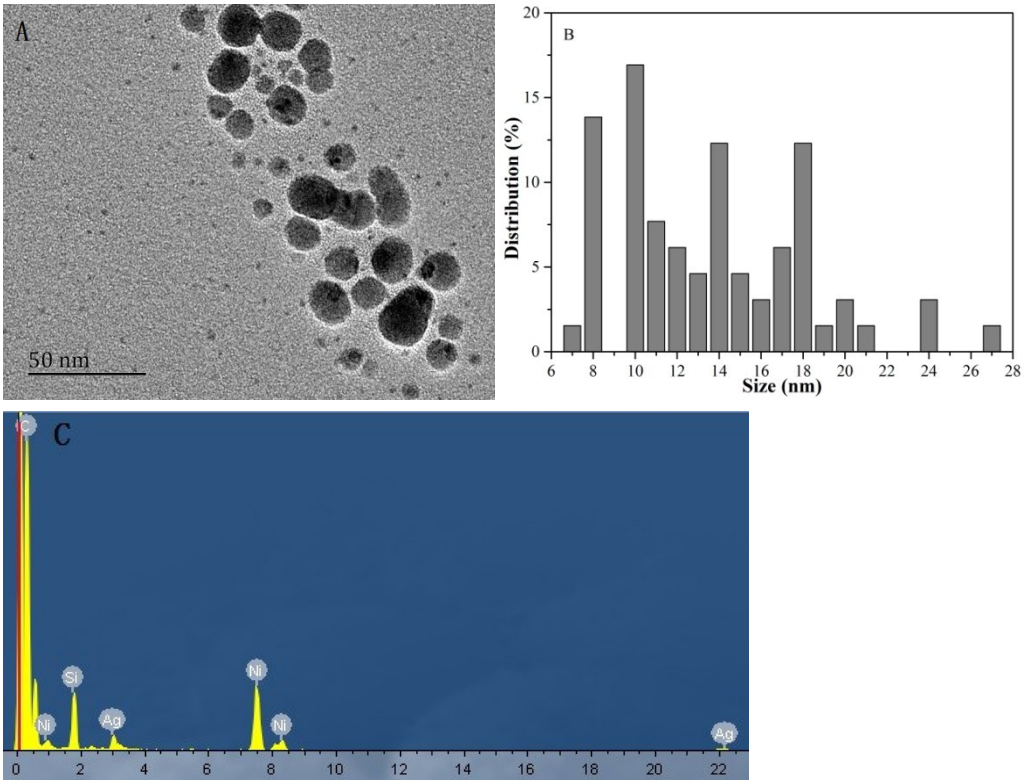

Figure S2. Morphological characterization of Ag-NP used in this study. (A) TEM image. (B) Size distribution on the basis of 189 particles. (C) EDS image, and the occurrence of Ni, Si and C was ascribed to the background of the grid for preparing TEM sample.

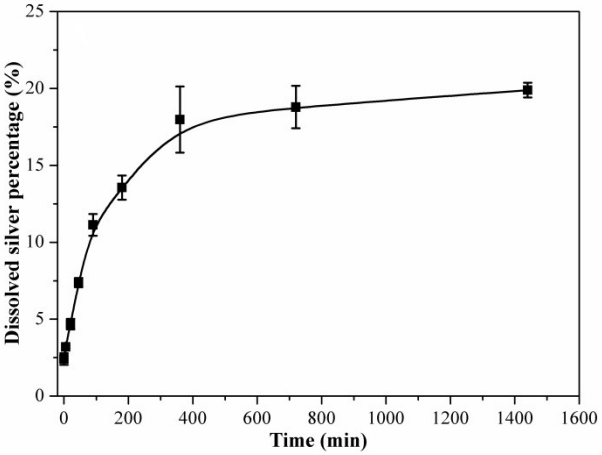

Figure S3. Dissolution kinetics of Ag-NP (5.0 mg/L) under aerobic conditions.

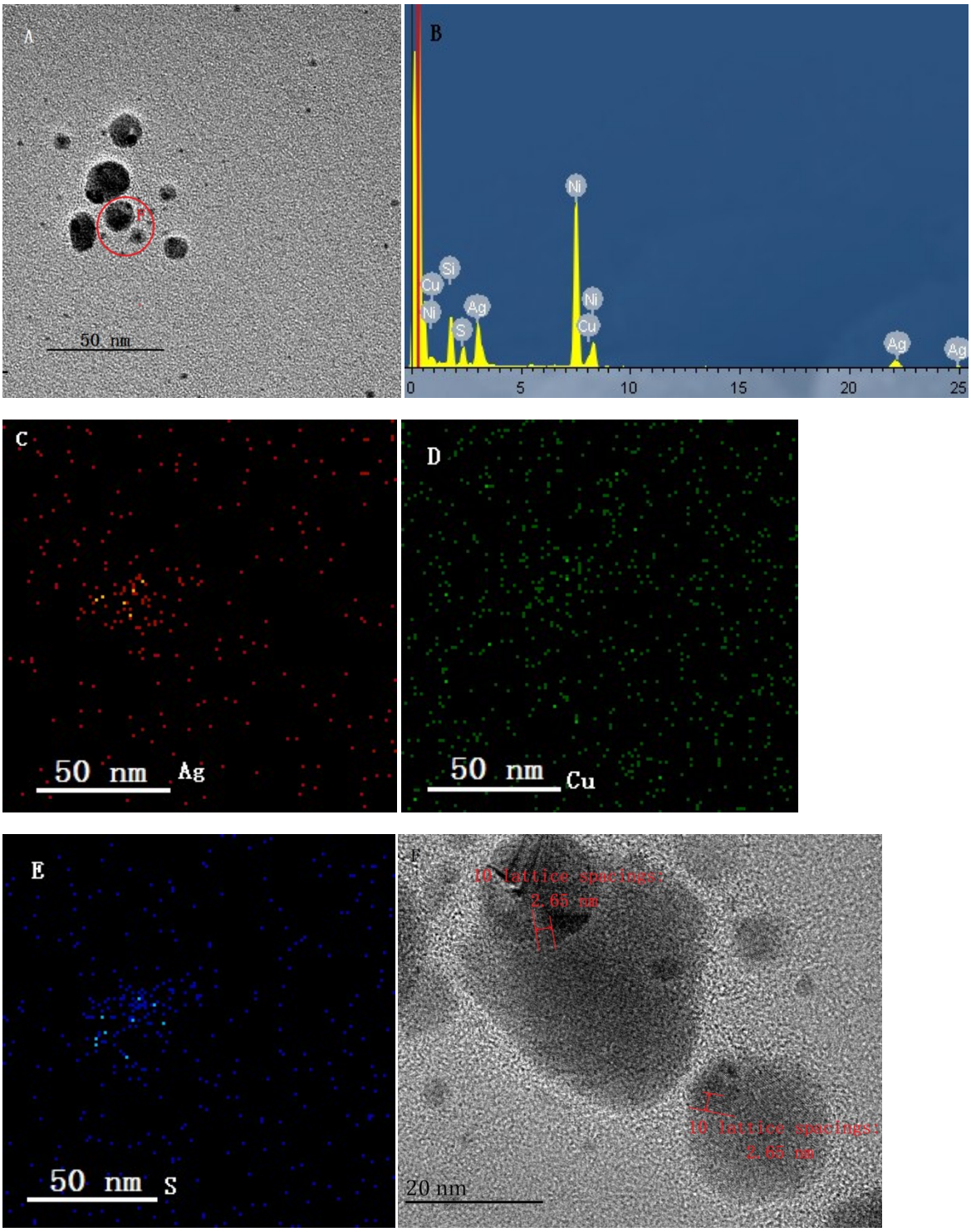

Figure S4. Identification of NPs after Ag-NP (5.0 mg/L) sulfidation caused by p-CuS-NP (4.4 mg/L) under aerobic conditions. (A) TEM image. (B) EDS analysis. (C-E) EDS elemental mappings of the NPs shown in Figure S4A. (F) HRTEM image of NPs named F in Figure S4A, showing a lattice spacing of 2.65 Å.

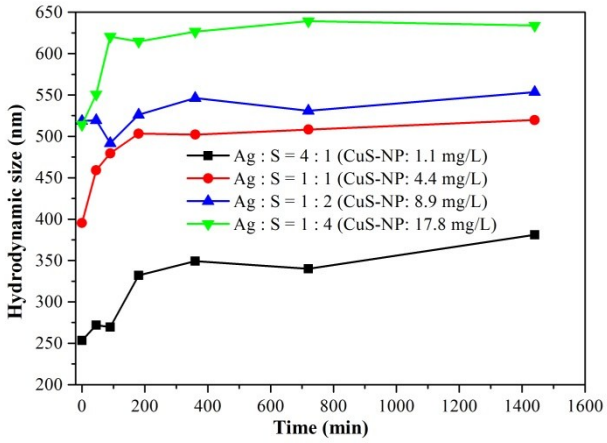

Figure S5. Hydrodynamic sizes of the Ag-NP (5.0 mg/L) dispersion with p-CuS-NP as a function of time under aerobic conditions.

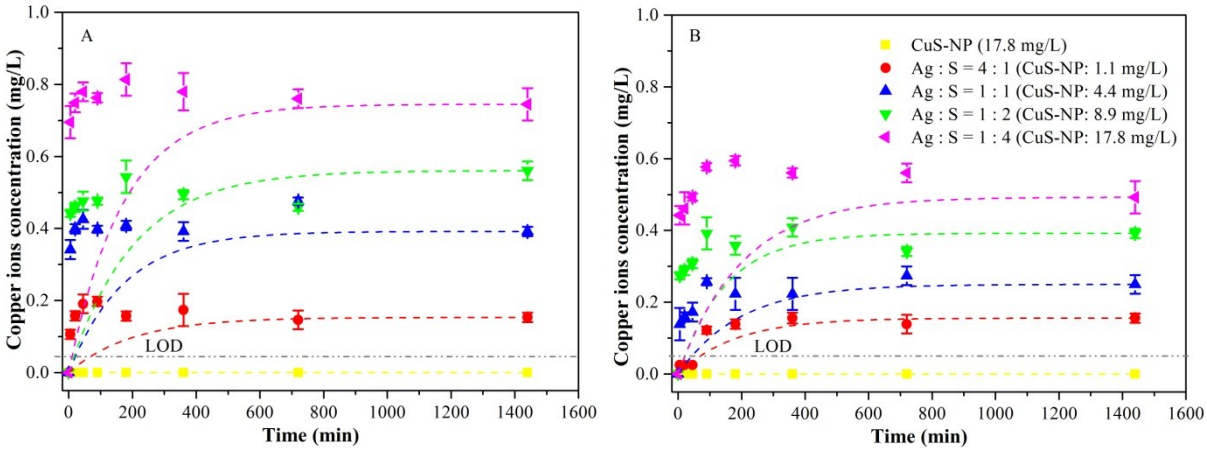

Figure S6. Effect of molar Ag/S ratios on the concentrations of dissolved copper in Ag-NP dispersion (5.0 mg/L) with coexisting CuS-NP under aerobic conditions. The dashed lines represented the general trends of each group dots with same color. (A) n-CuS-NP. (B) p-CuS-NP.

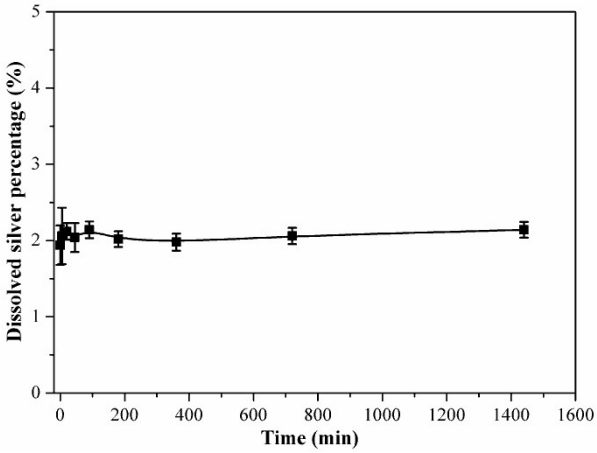

Figure S7. Dissolution kinetics of Ag-NP (5.0 mg/L) under deoxygenated conditions.