Supporting Information

for

Transformation Kinetics of Silver Nanoparticles and Silver Ions in Aquatic Environments Revealed by Double Stable Isotope Labeling

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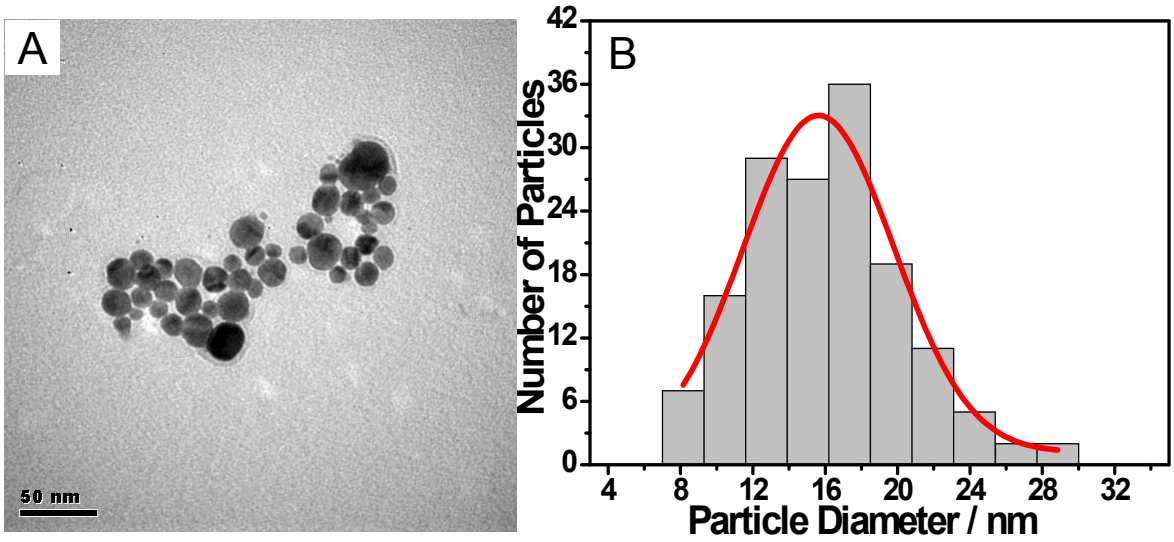

Figure S1. TEM image (A) and the size distribution (B) of the synthesized ^{107}AgNPs.

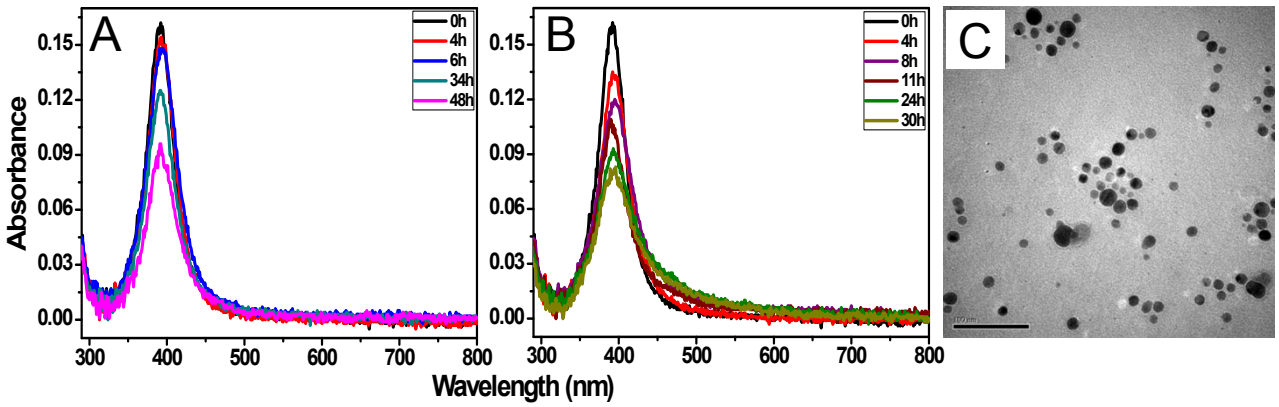

Figure S2. UV−vis absorption spectra of AgNPs in the dark (A) and light (B), and TEM image of AgNPs (C) after solar irradiation for 4 h. A mixture of 1 mg/L ^{107}AgNPs and 1 mg/L $^{109}Ag^{+}$ in pure water was treated at pH 7.4 and 30 ºC.

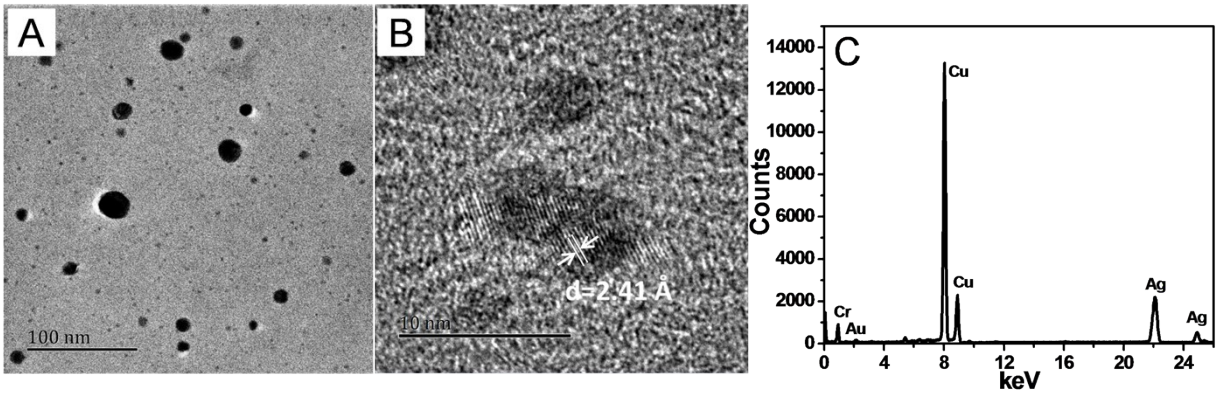

Figure S3. TEM image of AgNPs in the dark after 24 h (A), and HRTEM image (B) and EDS analysis (C) of the newly formed AgNPs in the presence of SRHA. A mixture of 1 mg/L ^{107}AgNPs, 1 mg/L $^{109}Ag^{+}$ and 5 mg C/L SRHA was treated at pH 7.4 and 30 ºC.

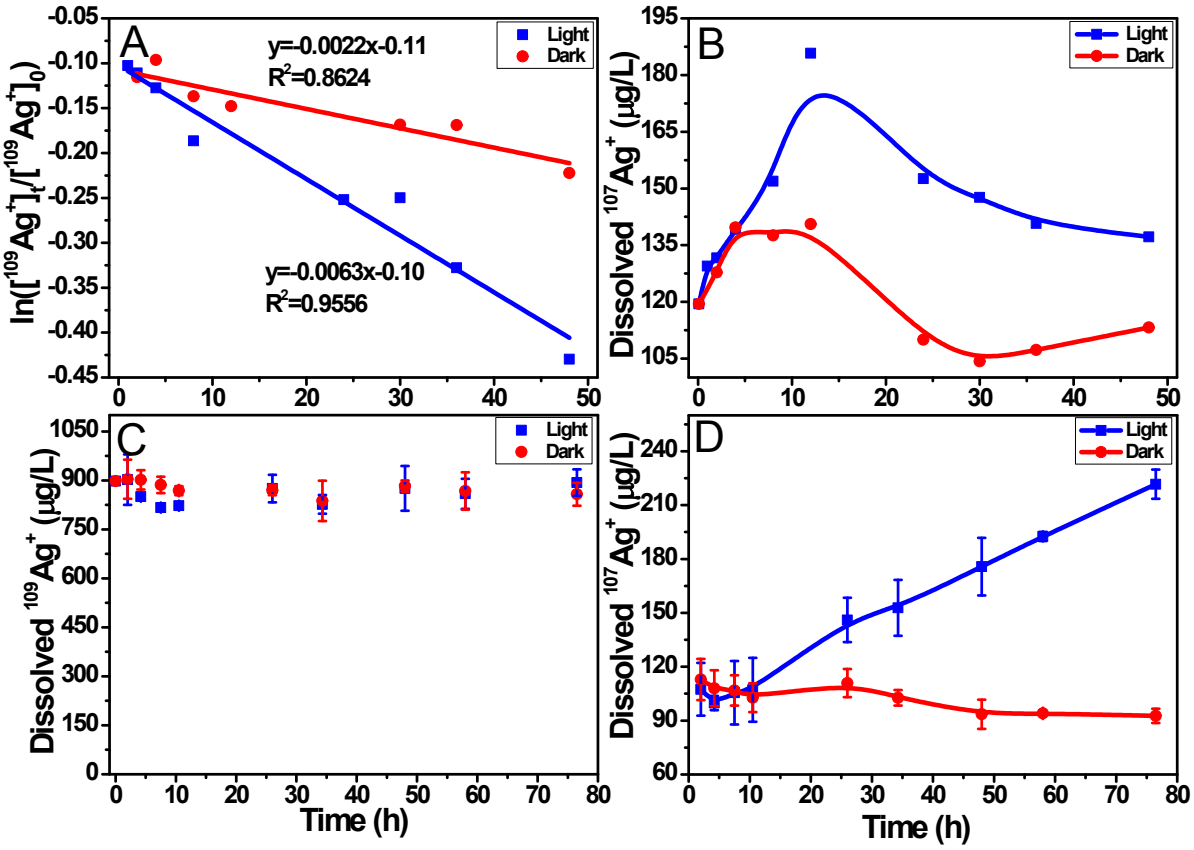

Figure S4. Fraction of dissolved $^{109}Ag^{+}$ and ion release kinetics of ^{107}AgNPs over time at different temperatures. Fraction of dissolved $^{109}Ag^{+}$ *verse* time at 50 ºC (A), ion release kinetics of ^{107}AgNPs at 50 ºC (B), concentration change of dissolved $^{109}Ag^{+}$ at 6 ºC (C), ion release kinetics of ^{107}AgNPs at 6 ºC (D). A mixture of 1 mg/L ^{107}AgNPs, 1 mg/L $^{109}Ag^{+}$ and 5 mg C/L SRHA was treated at pH 7.4. Error bars in Figure C and D represent the standard deviation for three independent measurements.

Table S1 Comparison of the reduction rate constant k of $^{109}Ag^{+}$ under different conditions

Reaction condition	k/h^{-1} (Light)	k/h^{-1} (Dark)
without SRHA, pH 7.4, 30 °C	-	-
5 mg C/L SRHA, pH 5.6, 30 °C	0.0025	0.0015
5 mg C/L SRHA, pH 7.4, 30 °C	0.0051	0.0017
5 mg C/L SRHA, pH 8.5, 30 °C	0.0098	0.0051
5 mg C/L SRHA, pH 7.4, 50 °C	0.0063	0.0022
5 mg C/L SRHA, pH 7.4, 6 °C	-	-
5 mg C/L SRHA, pH 7.4, 30 °C, with Ca^{2+} and Mg^{2+}	0.0048	0.0017

-: The reduction of $^{109}Ag^{+}$ was not obvious.

Table S2 Comparison of the oxidation rate constant k of ^{107}AgNPs

Reaction condition	k/h^{-1} (Light)	k/h^{-1} (Dark)
without SRHA, pH 7.4, 30 °C	0.0366 (the first 12 h) 0.0081(after 12 h)	0.0078