Electronic Supplementary Material (ESI) for Environmental Science: Nano.

Supporting information

Effect of natural organic matter on dissolution and toxicity of sulfidized silver nanoparticles to *Caenorhabditis elegans*.

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Supplemental characterization particle methods

We performed powder X-ray diffraction (XRD) on dried samples using a PANalytical X'pert powder X-ray diffractometer (Almelo, The Netherlands). The instrument is equipped with a Cu anode X-ray source. Data were collected from 5 to 70° 2theta with 0.02° steps. Ultraviolet-visible spectroscopy was performed using a Carey Bio 50 spectrophotometer over the range of 300-600 nm in steps of 1 nm.

Table SI1 - Characterization of the fulvic acids, data from International Humic Substances Society (IHSS) and C(%) and S(%) measured in the stock solution.

Reference		Data given by IHSS in %(w/w)								Measured data* in %(w/w)	
		H_2O	Ash	C	H	O	N	S	P	C	S
Suwannee River I fulvic acid	1S101F	8.8	0.46	52.4	4.31	42.2	0.72	0.44	<0.01	50.4	0.48
Pahokee Peat II fulvic acid	2S103F	9.3	0.9	51.3	3.53	43.3	2.34	0.76	<0.01	44.9	0.63
Pony Lake fulvic acid	1R109F	4.32	1.25	52.5	5.39	31.4	6.51	3.03	0.55	44.7	2.6

* data measured in H_2O after a 0.2µm filtration

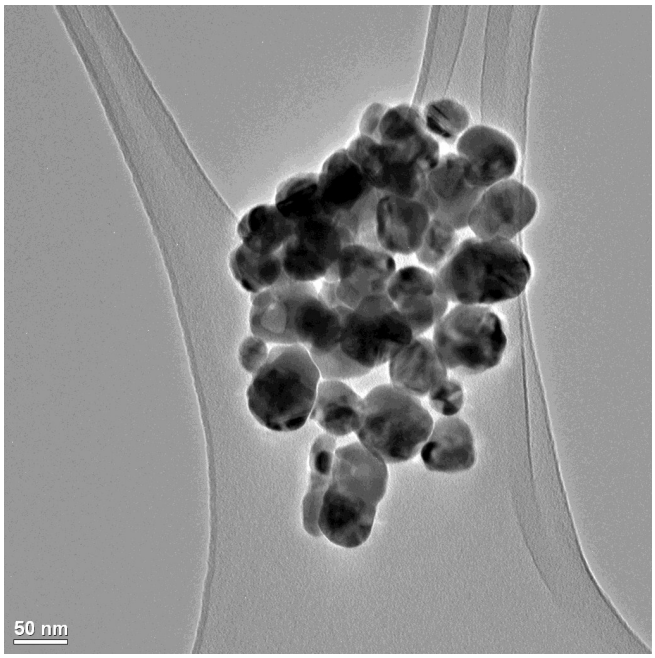


Figure SI1- Example of transmission electron micrographs of sulfidized AgNPs

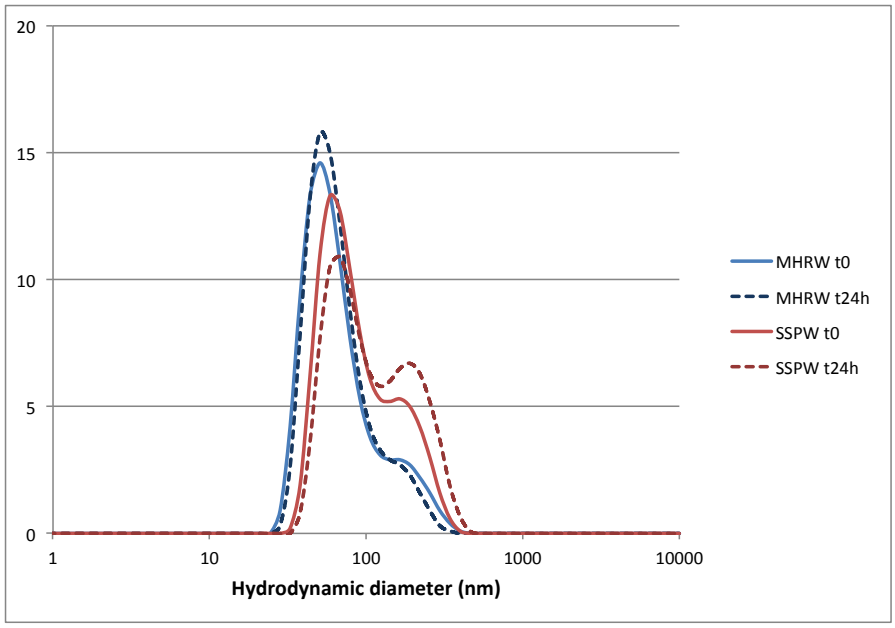


Figure SI2. Volume-weighted distribution of the hydrodynamic diameters of sulfidized AgNPs in two media: moderately hard reconstituted water (MHRW) and simulated soil pore water (SSPW)

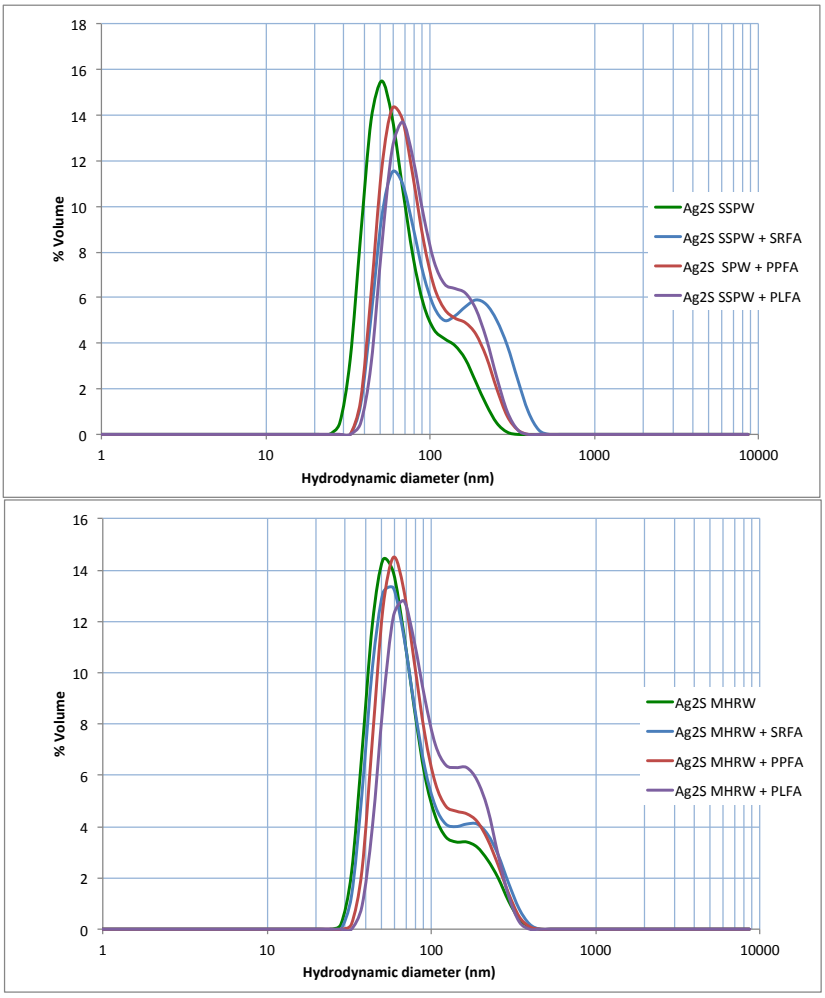


Figure SI 3 - Volume-weighted distribution of the hydrodynamic diameters of 15 mg Ag L-1 Ag2S in simulated soil pore water (SSPW) and moderately hard reconstituted water (MHRW) with 0 and 40 mg C L^{-1} of Suwannee river fulvic acid (SRFA), Pahokee peat fulvic acid (PPFA) and pony lake fulvic acid (PLFA)

Table SI 2 Greenhouse-Geisser test for the effect of time on Ag dissolution

Greenhouse-Geisser	Type III Sum of Squares	df	Mean Square	*F*	*p*	pη
MHRW	211	1.003	211	1.4	0.356	0.414
MHRW + SRFA	369	1	368	165.1	0.006	0.988
MHRW + PPFA	351	1.217	289	142.1	0.003	0.986
MHRW + PLFA	25708	1.013	25390	75.8	0.012	0.974
SSPW	51	1.151	44	1.5	0.347	0.423
SSPW + SRFA	344	1.012	340	358.6	0.003	0.994
SSPW + PPFA	258	1.097	235	740.3	0.001	0.997
SSPW + PLFA	29398	1.044	28163	416.5	0.002	0.995

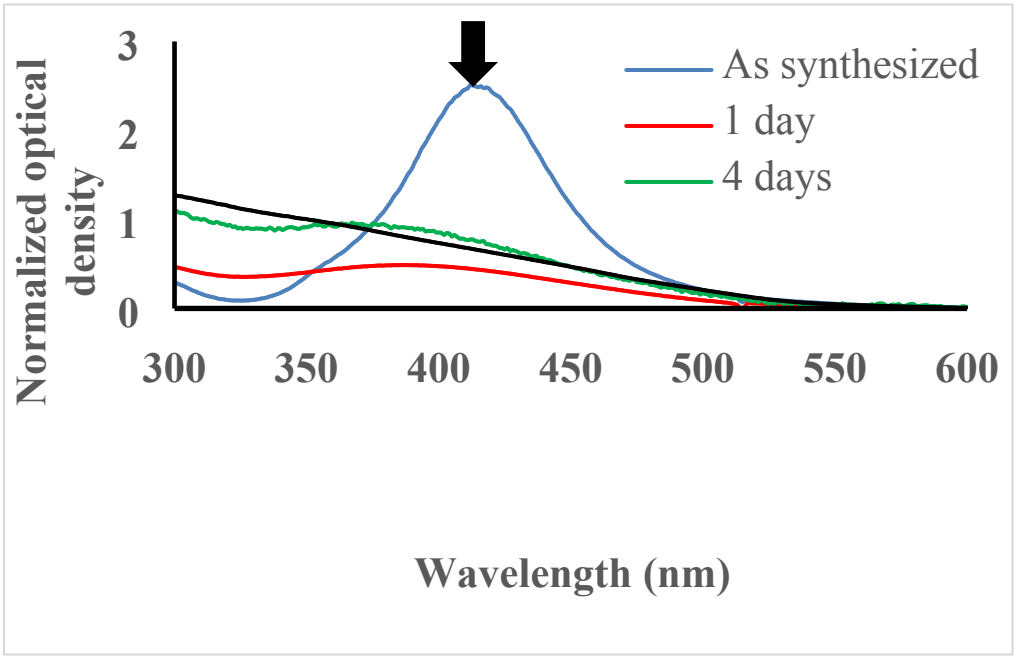
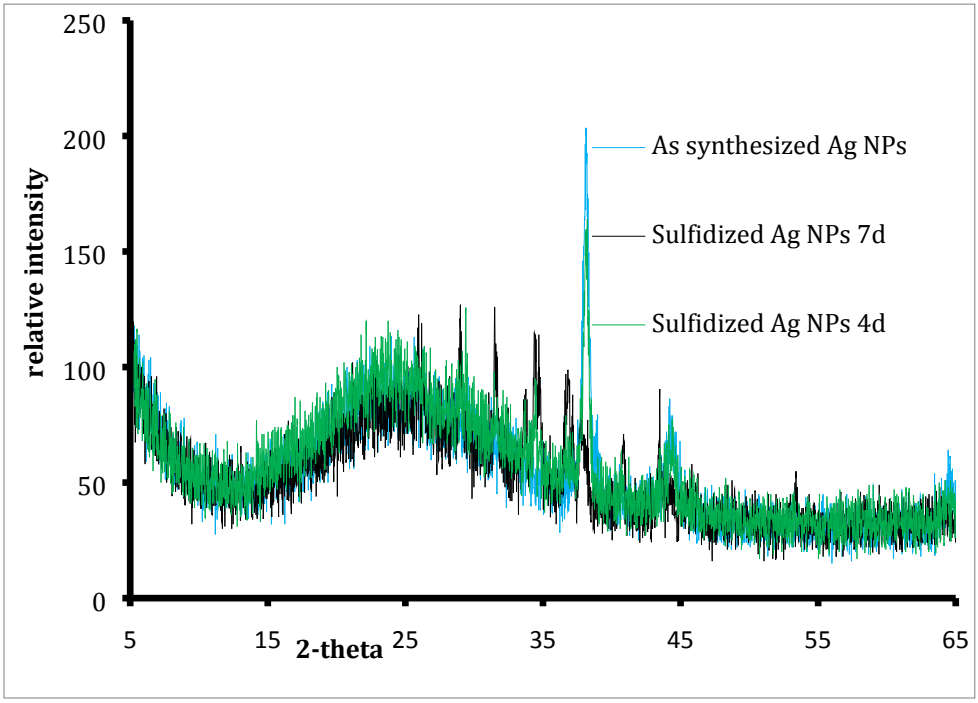


Figure SI4. Ultraviolet-visible spectra of as-synthesized silver nanoparticles (Ag NPs), and Ag NPs incubated in a solution containing 1:2 molar ratio of Ag to Na_2S for either 1, 4 or 7 days. The black arrow indicates the position of the initial surface plasmon peak.



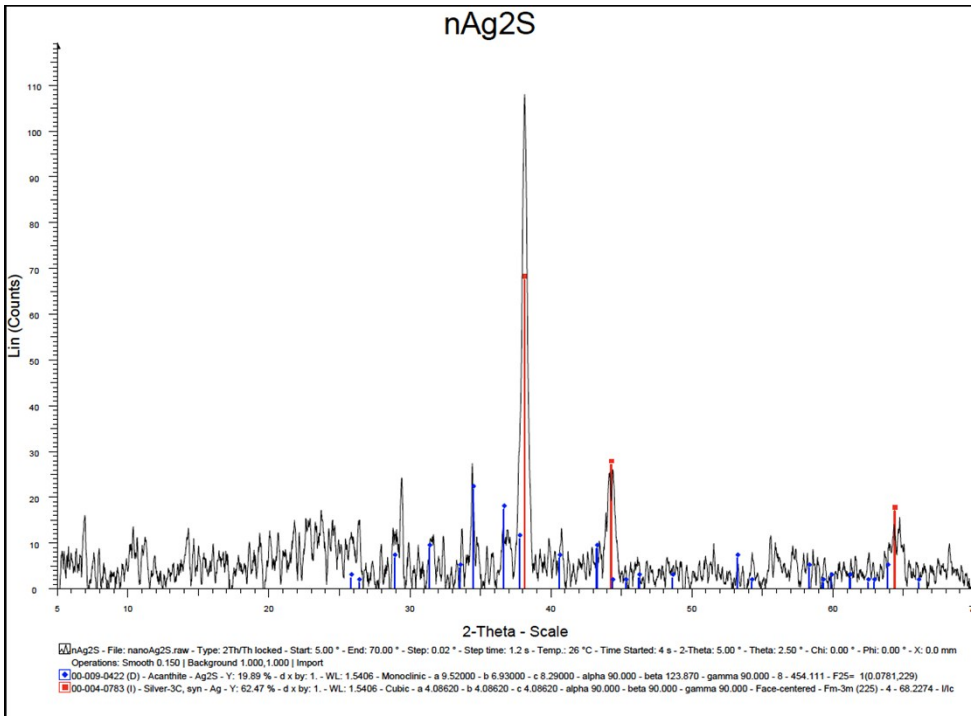


Figure SI5. Powder X-ray diffractograms for as-synthesized silver nanoparticles (Ag NPs) and Ag NPs incubated in a solution containing 1:2 molar ratio of Ag to Na_2S for either 4 or 7 days (top) and background subtracted diffractogram of Ag NPs incubated for 4 days with positions of Ag(0) (cubic; red) and Ag_2S (acanthite; blue) indicated.