Role of humic acid in the stability of Ag nanoparticles in sub-oxic conditions

SUPPORTING INFORMATION

Christopher J Milne^a, Dan J Lapworth^b, Daren C Gooddy^b, Christine N Elgy^c Éugenia Valsami-Jones^c*

^a British Geological Survey, Keyworth, Nottingham, NG12 5GG

^b British Geological Survey, Wallingford, Oxon, OX10 8BB, UK

^c Facility for Environmental Nanoparticle Analysis & Characterisation (FENAC), University of Birmingham, Edgbaston, B15 2TT

CONTENTS

3 pages, 1 figure

Details of preparation of citrate- and PVP-stabilized AGNP	S2
Energy-dispersive X-ray spectroscopy (EDX) data	S2

DETAILS OF PREPARATION OF CITRATE- AND PVP-STABILIZED AGNP

Preparation of silver nanoparticles.

Citrate stabilised

Clean glassware is essential for this method to work.

- 1. Weigh 0.0200g sodium citrate tribasic dehydrate and dissolved in 250ml H_2O .
- 2. Weighed 0.0106g silver nitrate and diossolved in 250ml H_2O .
- 3. Weighed 0.0318g sodium borohydride and dissolved in 100ml H₂O.
- 4. Stirred together 100ml sodium citrate soln, and 100ml silver nitrate solution.
- 5. Added 6 ml of sodium borohydride solution and stirred for 10 minutes.
- 6. Bring to the boil and simmer for 3 hours.
- 7. Cool and store in a cupboard for 16 hours
- 8. Reduce volume to 50% by ultrafiltration, top up to original volume with sodium citrate solution at half the concentration in step 1, to clean particles

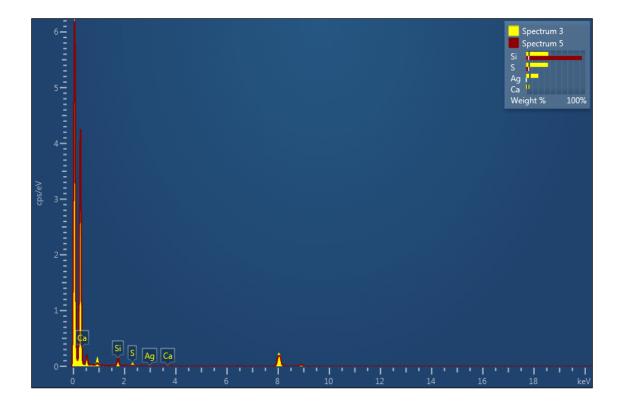
Repeat step 8 twice more.

PVP stablilised

- 1. Take 300ml citrate stabilised silver nanoparticle suspension,
- 2. Add 12 ml 3% PVP solution, with stirring
- 3. Reduce volume to 150ml by ultrafiltration.
- 4. Add 3 ml 3%PVP solution and 150 ml H₂O, with stirring
- 5. Reduce volume to 150ml.
- 6. Repeat 4 and 5 again.
- 7. Store in refrigerator in the dark.

ENERGY-DISPERSIVE X-RAY SPECTROSCOPY (EDX) DATA

Figure S1. Energy-dispersive X-ray spectroscopy (EDX) of TEM samples for experiment C2, cit-AgNP with 0.01 M (320 mg/L) sulfide ions, in CaCl₂ matrix. No HA present. Comparing elemental composition of analysis of imaged nanoparticle with analysis of background and showing clear concentration of the S associated with the Ag. Contributions from Cu, C and O have been eliminated from integrations to remove influence of Cu-based TEM support grid.



Element	Silver nanoparticle	Background
	Atomic %	Atomic %
Si	47.2	91.9
S	40.7	4.70
Cl	0.63	0.84
Са	4.79	2.57
Ag	6.67	0.00
Total	100.0	100.0