Low temperature thermal dissociation of Ag quantum clusters in solution and formation of monodisperse Ag$_2$S nanoparticles

Remya K. P, Udya Bhaskara Rao Tumu and Thalappil Pradeep*

DST Unit on Nanoscience (DST-UNS), Department of Chemistry and Sophisticated Analytical Instrument Facility, Indian Institute of Technology Madras, Chennai 600 036, India

*E-mail: pradeep@iitm.ac.in

S1. Supporting information 1

Preliminary confirmation of cluster formation through UV/Vis profile and a TEM image
**Figure S1.** UV/Vis spectrum of freshly prepared Ag$_{25}$SG$_{18}$ quantum clusters in aqueous solution showing the characteristic absorption peaks. Inset shows the TEM image of the cluster.

**S2. Supporting Information 2**

Optical absorption spectrum of the freeze dried control cluster solution.

**Figure S2.** Shows the optical absorption spectrum of cluster after freeze drying (before subjecting to heating).
S3. Supporting Information 3

Time dependent UV/Vis spectra of Ag$_{25}$SG$_{18}$ quantum cluster.

![Absorbance vs Wavelength](image)

**Figure S3.** Time dependent UV/Vis spectra of freshly prepared Ag$_{25}$SG$_{18}$ clusters from 0 min-60 min at room temperature.
S4. Supporting Information 4

Kinetics of decomposition

**Figure S4.** A) Expanded view of time-dependent variation of the 480 nm peak in the UV/Vis spectrum of clusters. B) Graph showing the decrease in the intensity of 480 nm peak with time, indicating a first order kinetics.
S5. Supporting Information 5

X-ray diffraction pattern of Ag$_{25}$SG$_{18}$ cluster which shows only broad peak at 36º (2θ)

Figure S5. X-ray diffraction pattern of freshly prepared Ag$_{25}$SG$_{18}$ cluster.
S6. Supporting Information 6

Mass spectrum of glutathione taken in the negative mode showing fragments. The peak positions are comparable with what we obtained for the supernatant solution of the decomposed sample.

**Figure S6.** A portion of negative ion ESI MS of glutathione.