

Electronic Supplementary Information

**Shape-controlled synthesis of silver sulfide nanocrystals
through the understanding of the origin of the mixed-shape evolution**

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Experimental Section

TEM and HRTEM images were recorded with a JEOL 2100F unit operated at 200 kV. The samples for TEM study were prepared by drop casting nanomaterials dispersed in hexane on carbon-coated copper grids. The TEM studies were performed on as-prepared samples without employing size-selection process. EDS was performed on a FE-SEM (JSM6700F). Powder XRD patterns were obtained on a Rigaku Max-2200 with filtered Cu_{Kα} radiation. Silver nitrate was purchased from Strem Co. Sulfur and oleylamine were purchased from Aldrich Co..

Synthesis of silver sulfide nanoparticles: Anhydrous silver nitrate (50 mg, 0.29 mmol) was dissolved in 2mL of oleylamine solution under argon at room temperature. This solution was injected to sulfur (50 mg, 1.56 mmol) solution of 7 mL oleylamine at 100°C. The solution color became rapidly black. The reaction mixture was stirred for 5 hours and cooled to room temperature. The addition of excess methanol formed black precipitates which can be retrieved by centrifugation. The powder was washed three times with excess methanol and dried under vacuum.

Synthesis of silver sulfide nanorods: Same procedure was applied except preparing the silver nitrate solution of 2 mL oleylamine by the sufficient heating.

Characterization data of new compound, [Ag(octylamine)₂] NO₃

¹HNMR (CDCl₃, 300MHz); δ 3.11(4H, brs), 2.85(4H, t, J=7.5Hz), 1.56(4H, m), 1.27(20H, m), 0.88(6H, m) Elementary Analysis: AgC₁₆N₃O₃H₃₈ Calculated C: 44.86, H: 8.94, N: 9.81, Observed C: 44.8908, H: 8.9990, N: 9.8376

Figure S1. Magnified XRPD patterns in figure 5c.

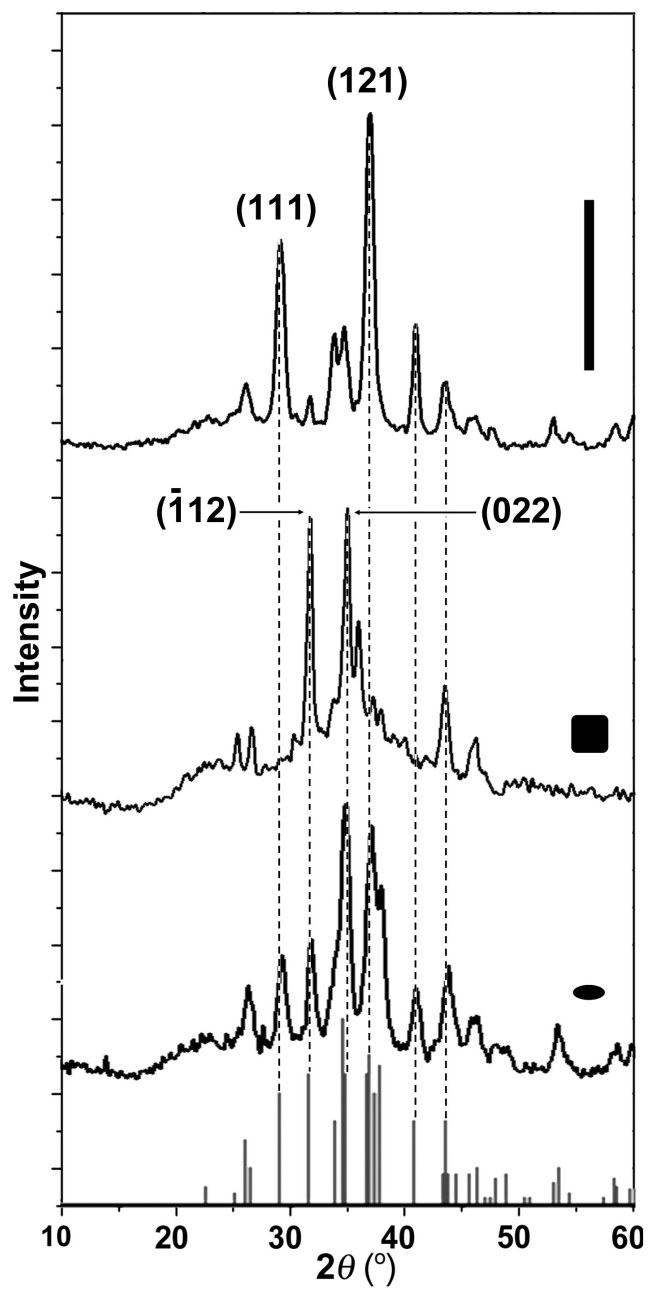


Figure S2. ^1H NMR spectrum of the isolated $[\text{Ag}(\text{octylamine})_2]^+ \text{NO}_3^-$ complex

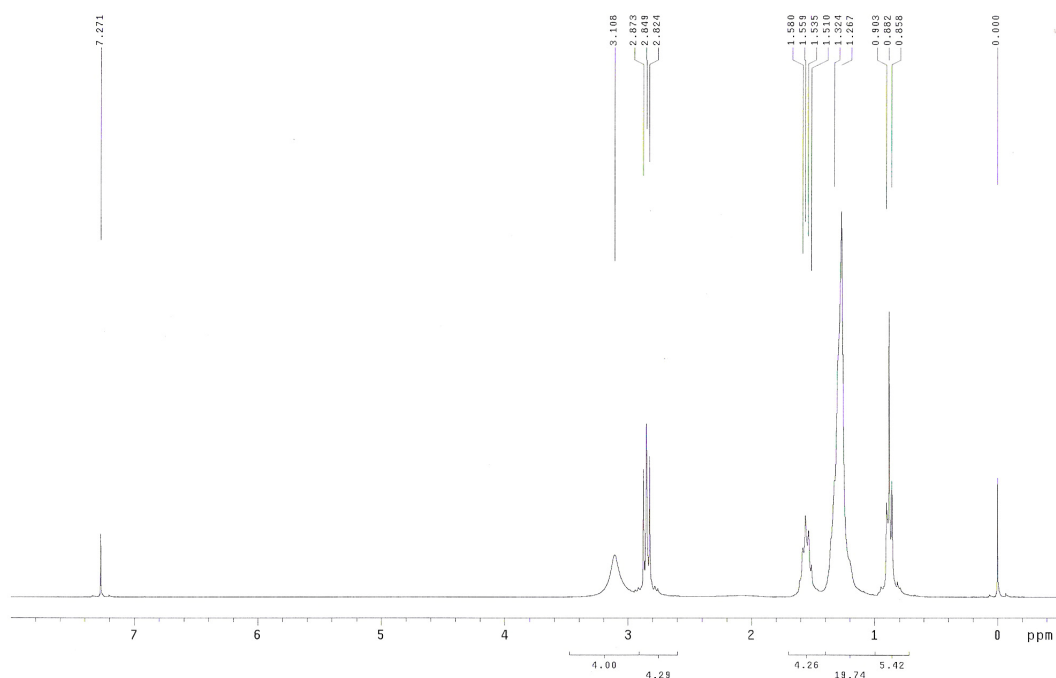


Figure S3. XRPD pattern of Ag precipitates (JCPDS 04-0783)

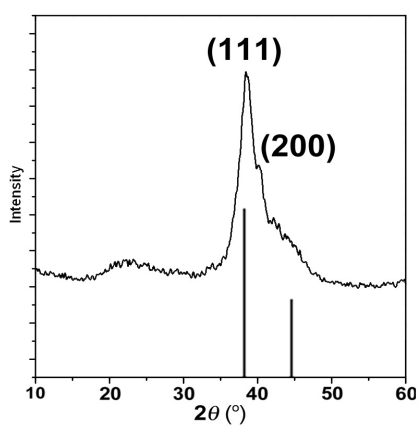


Figure S4. EDS spectra of silver sulfide nanoparticles in figure 4a and nanorods in figure 4d.

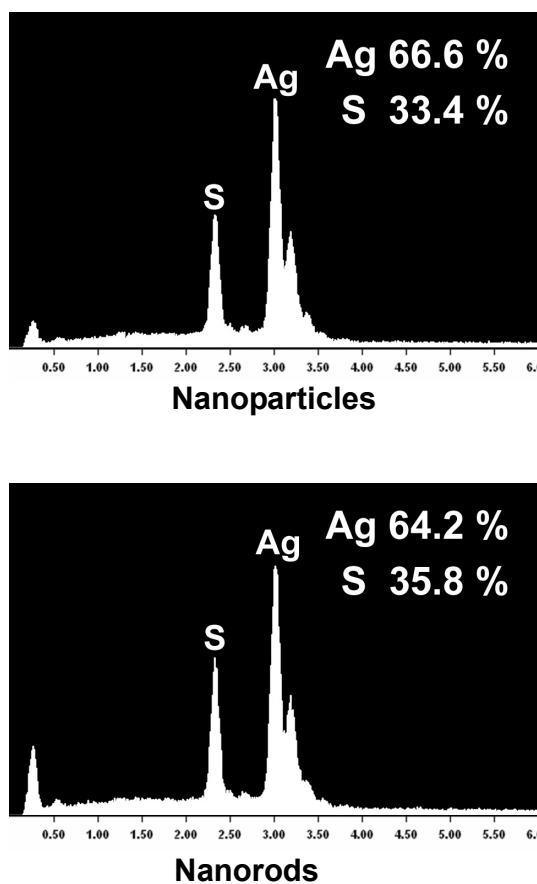


Figure S5. Additional TEM images of nanorods in figure 5b

