Electronic Supplementary Material (ESI) for ChemComm.

Supporting Information for

Longitudinal Shape Evolution of Ag_2S Nanoparticles from Nanospheres, Rhombic Dodecahedrons, Nanorods, to Nanocubes

*Hyunmi Doh, ‡ Wonseok Lee, ‡ Yunmo Sung, and Sungjee Kim**

Department of Chemistry, Pohang University of Science and Technology, Cheongam-ro 77, Nam-Gu, Pohang, South Korea, 37673.

*sungjee@postech.ac.kr

Experimental details

Materials and instrumentation

Silver nitrate (ACS reagent, ≥99.0%), octylamine (99%), sulfur powder (99.98% trace metals basis), and toluene (ACS reagents, >99.5%) were purchased from Sigma Aldrich and used without further purification. TEM images and energy dispersive X-ray spectroscopy (EDX) data were recorded using JEOL JEM-2100. X-ray diffraction (XRD) was measured by D/MAX-2500/PC.

Synthesis methods

Silver precursor solution was prepared by mixing silver nitrate (0.0112 g, 66.0 μmol) in 6.7 mL of toluene with excess octylamine (3.3 mL, 20.0 mmol). Separately, sulfur precursor solution was prepared by dissolving sulfur powder (0.02 g, 0.66 mmol) in 10 mL of toluene. The molar ratio of silver precursor and sulfur precursor was set at 1:10, to ensure excess of sulfur. After dissolving the two precursors for an hour, two solutions were mixed and stirred at 60 °C. Aliquots were taken at 2 h, 6 h, 12 h, 24 h, 30 h and 72 h of the reaction. For purification, an equal volume of methanol was added to the sample, then it was centrifuged at 3000 rpm for 30 s.

Table S1. Relative molar composition of Ag_2S nanospheres determined by EDS.

Ag [%]	S [%]	Ag/S
65.3	34.7	1.88

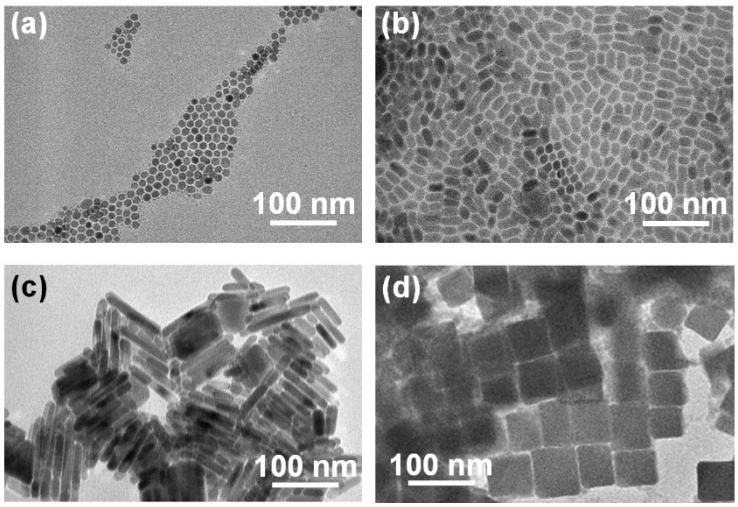

Figure S1. Low-magnification TEM images of (a) Ag_2S nanospheres, (b) fused DHNCs, (c) NRs, and (d) nanocubes.

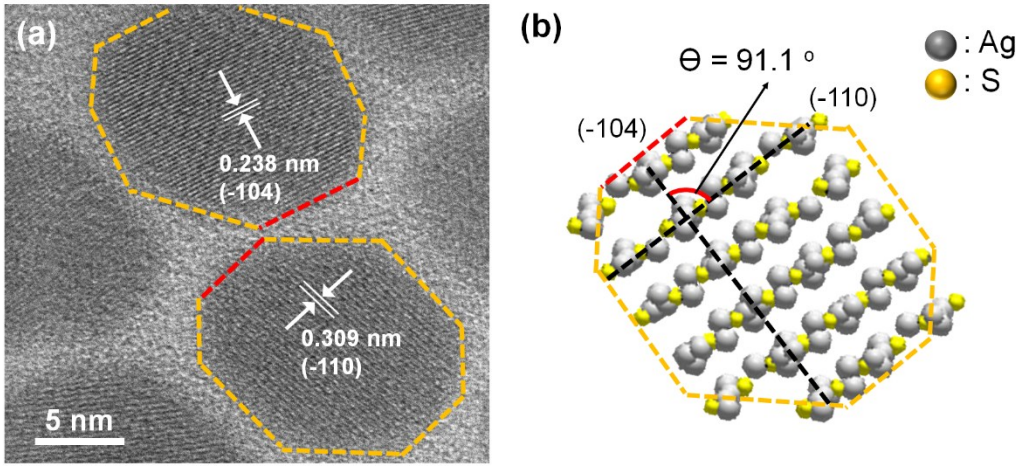

Figure S2. (a) HR-TEM image of Ag_2S DHNCs obtained at 6 h revealing (-104) and (-110) lattice fringes. The contour of the NCs is highlighted by yellow lines. (b) The arrangement of Ag and S ions in Ag_2S DHNC (not in scale). The angle between (-104) and (-110) planes coincides with obtained TEM image.

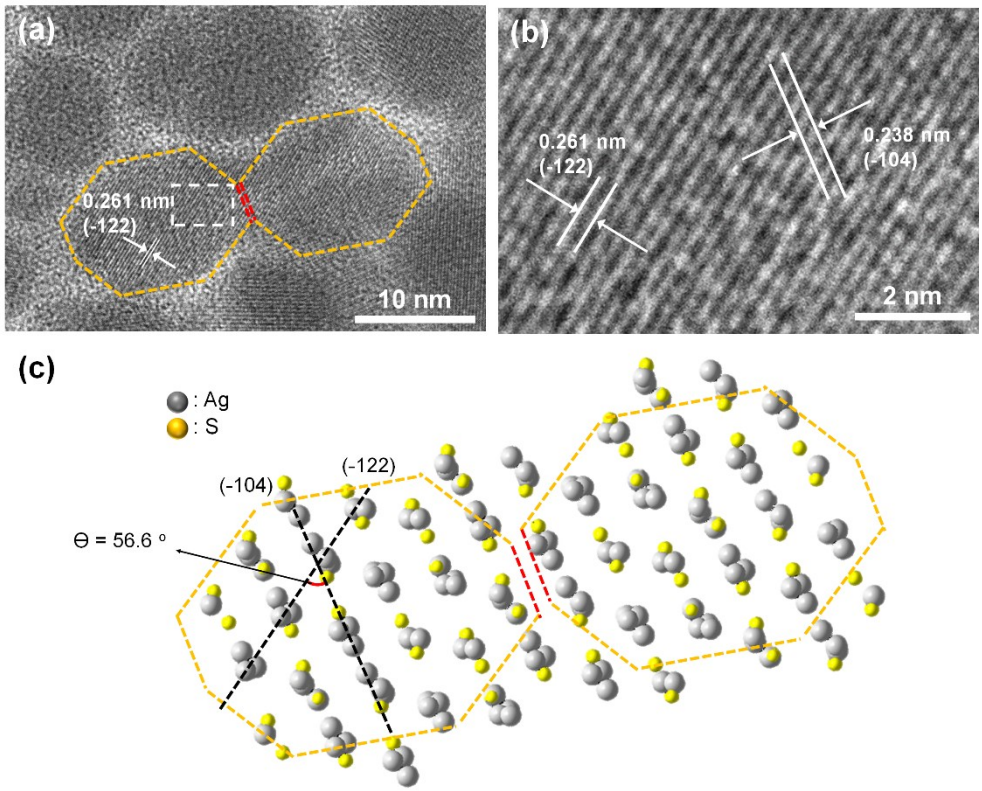

Figure S3. (a) TEM image of the Ag_2S nanodumbbells obtained at 12 h. Two DHNCs were merged at (-104) faces. (b) HR-TEM image of the dotted box region in (a). This shows d-spacing of (-104) and (-122) crystal facets and the conjunction between two DHNCs are parallel to (-104) planes. (c) The arrangement of Ag and S ions in Ag_2S nanodumbbell (not in scale). The angle between (-104) and (-122) planes coincides with obtained TEM image.

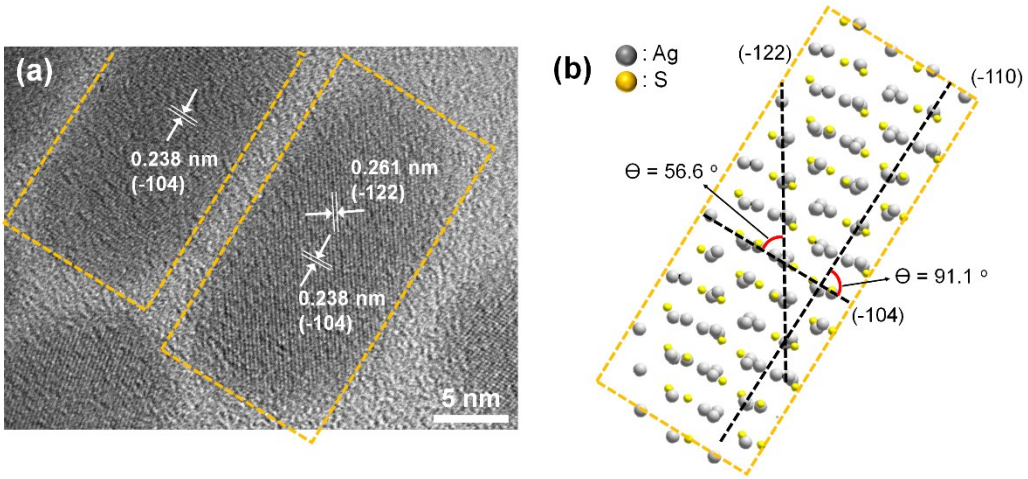

Figure S4. (a) HR-TEM image of the fused Ag_2S DHNCs obtained at 24 h. It shows d-spacing of (-104) and (-122) crystal facets. (b) The arrangement of Ag and S ions in fused Ag_2S DHNCs (not in scale). The angle between (-104) and (-122) planes coincides with obtained TEM image.

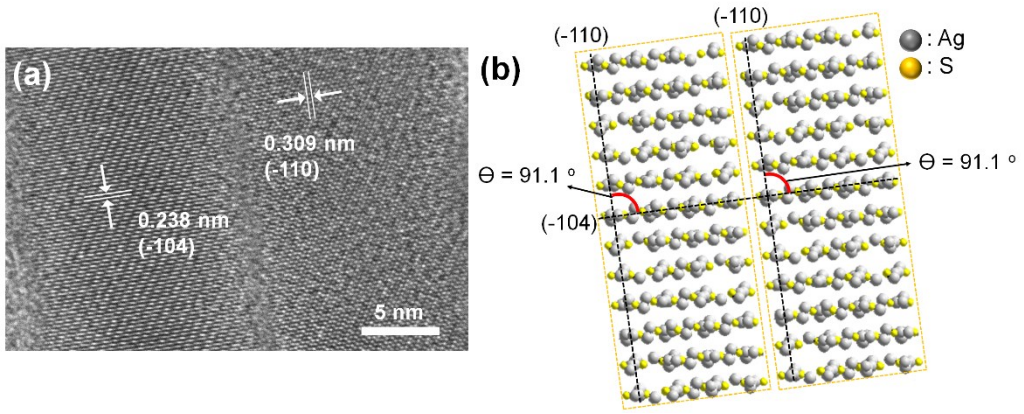

Figure S5. (a) HR-TEM image of the Ag_2S NRs obtained at 30 h. It shows d-spacing of (-104) and (-110) crystal facets. The lateral (-110) planes of two NRs face each other. (b) The arrangement of Ag and S ions in Ag_2S NRs (not in scale). The angle between (-104) and (-110) planes coincides with obtained TEM image.

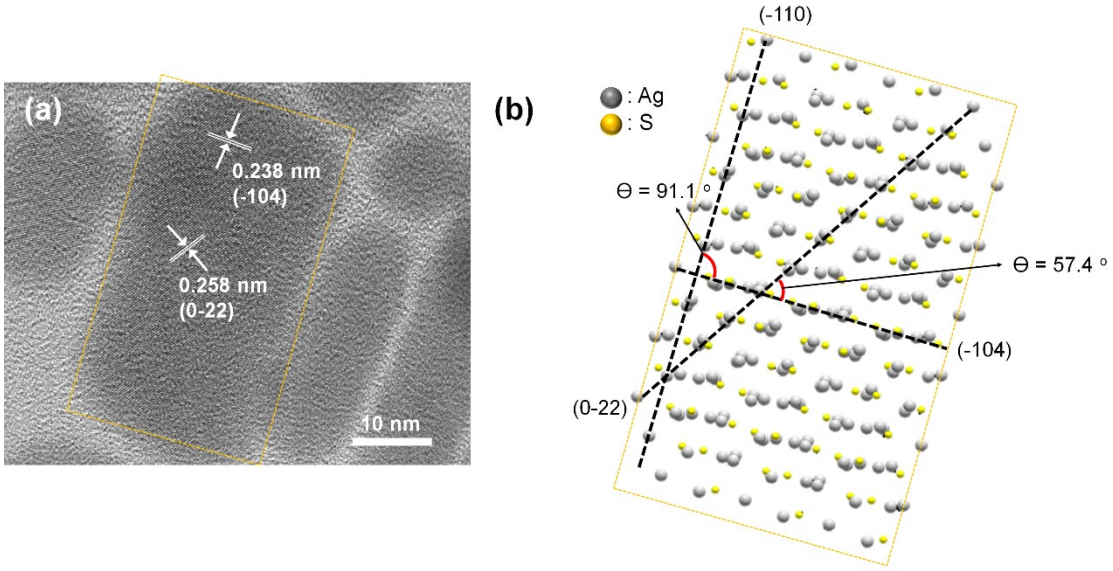

Figure S6. (a) HR-TEM image of the laterally fused Ag_2S NRs obtained at 48 h. (b) The arrangement of Ag and S ions in fused Ag_2S NRs (not in scale). The angle between (-104) and (0-22) planes coincides with obtained TEM image.