Electronic Supplementary Information

Catalyst-assisted growth of $CsPbBr_3$ perovskite nanowires

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Bulk XRD patterns and FFT analysis diffraction cards from Crystallography Open Database

Cubic $CsPbBr_3$: card No. 96-153-3064.

Cubic Ag_2S: card No. 96-150-9710.

Monoclinic Ag_2S: card No. 96-154-4686.

Orthorhombic Ag_2Se: card No. 96-900-0253.

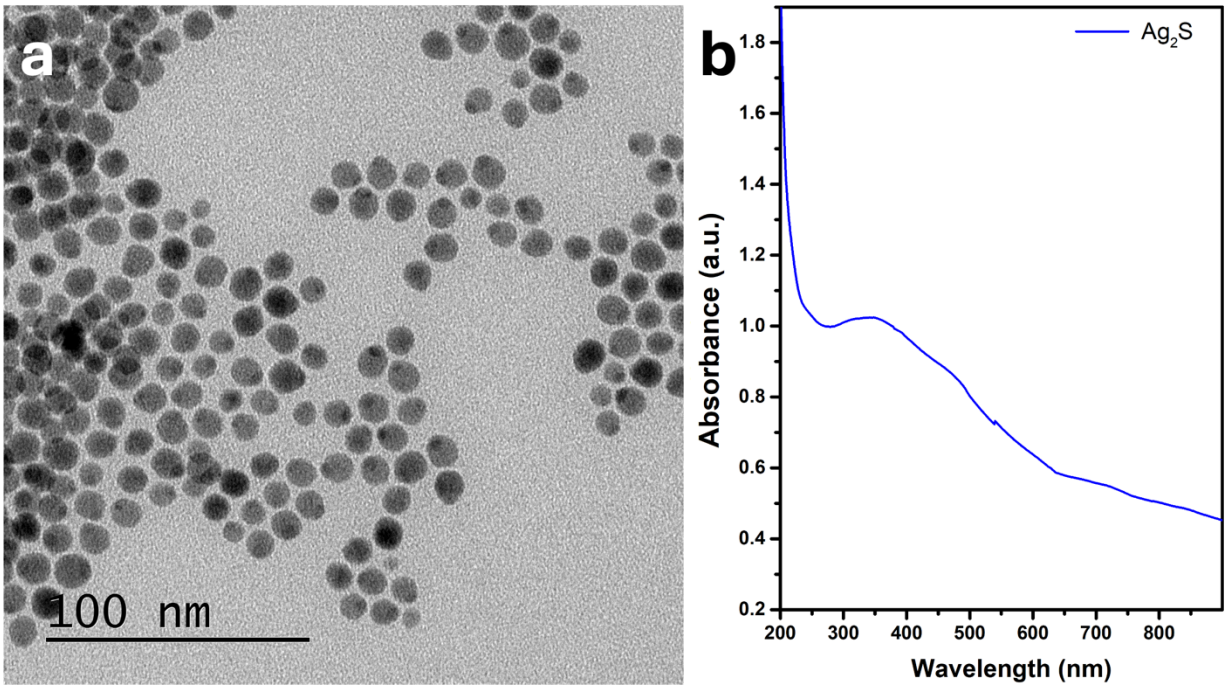

Fig. S1. (a) TEM image and (b) UV–vis absorbance spectrum of Ag_2S particles (in hexane).

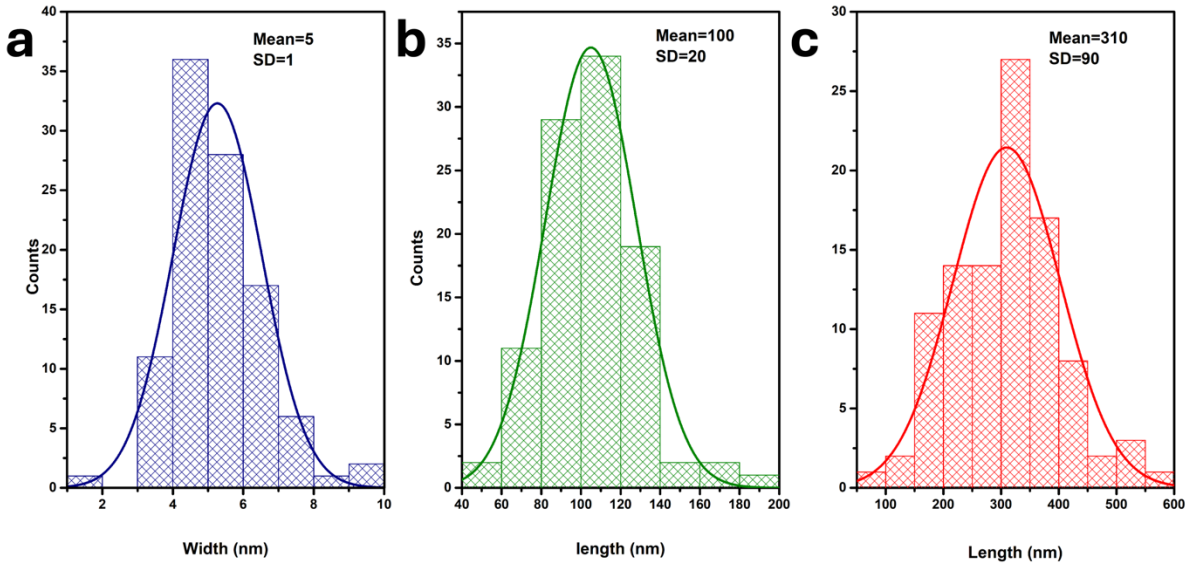

Fig. S2. Size distribution histograms of: (a) $CsPbBr_3$ NWs width, (b) length of $CsPbBr_3$ NWs after immediate quenching, and (c) length of $CsPbBr_3$ NWs, which were quenched after 5 s. For each sample, 100 individual NWs were measured. The mean represents the calculated average diameter, and SD is the standard deviation.

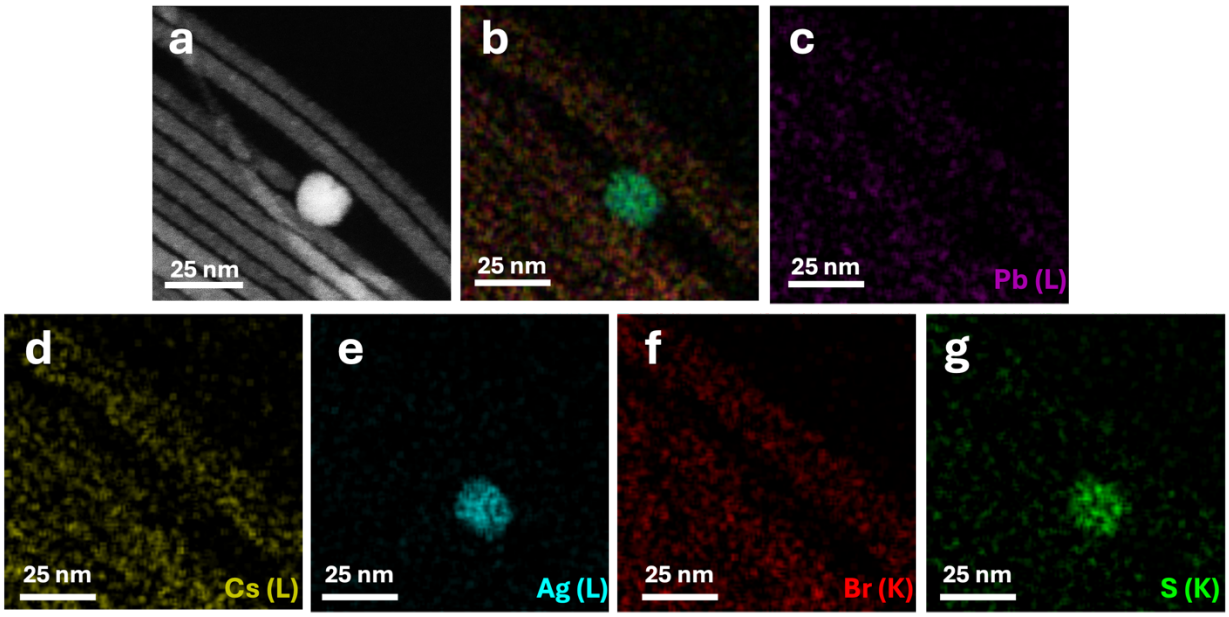

Fig. S3. Elemental mapping of Ag_2S-catalyzed $CsPbBr_3$ NWs. (a) Darkfield STEM image. Qualitative EDS elemental distribution maps: (b) All elements—silver in light blue, sulfur in green, cesium in yellow, lead in violet, and bromine in red, (c) Pb, (d) Cs, (e) Ag, (f) Br, and (g) S.

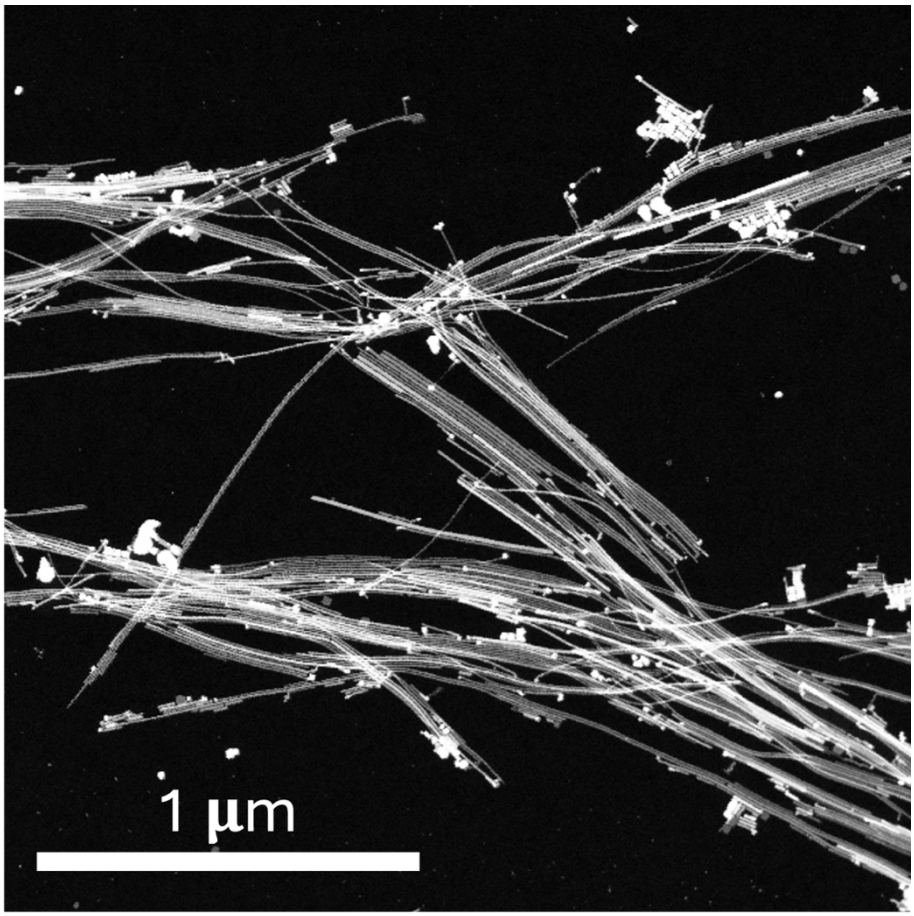

Fig. S4. Low magnification HAADF image of Ag_2S-catalyzed $CsPbBr_3$ NWs.

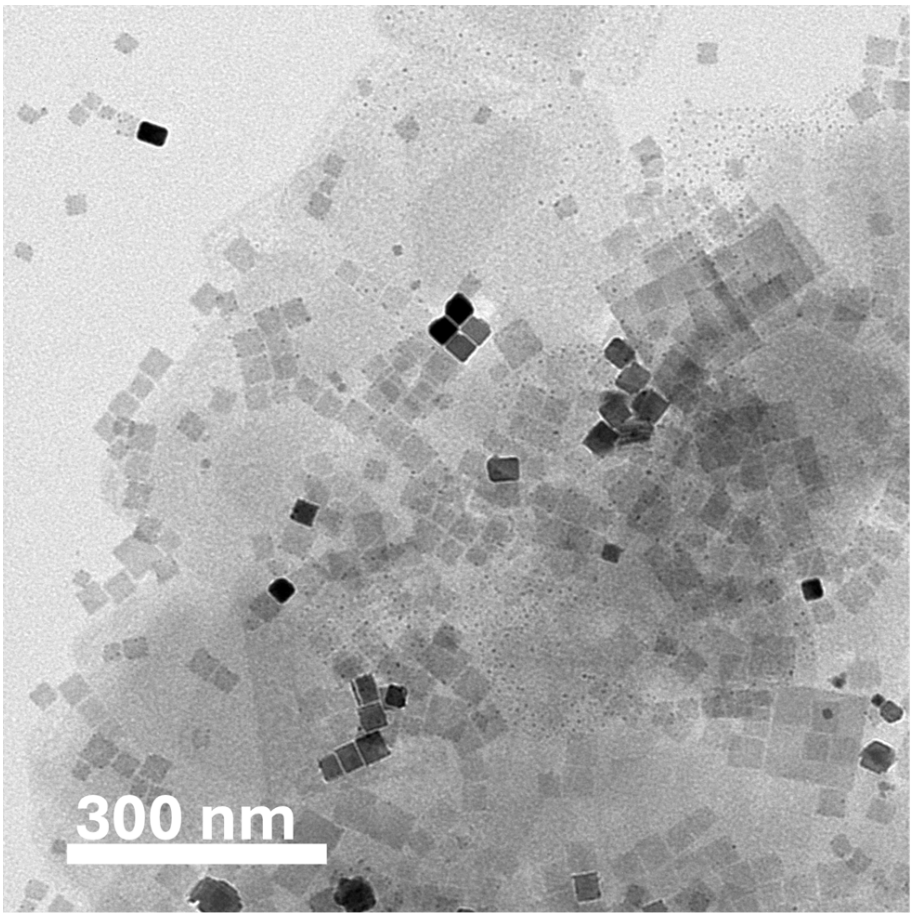

Fig. S5. TEM image of $CsPbBr_3$ nanoparticles synthesized without adding the Ag_2S NPs (i.e., without an SSS catalyst).

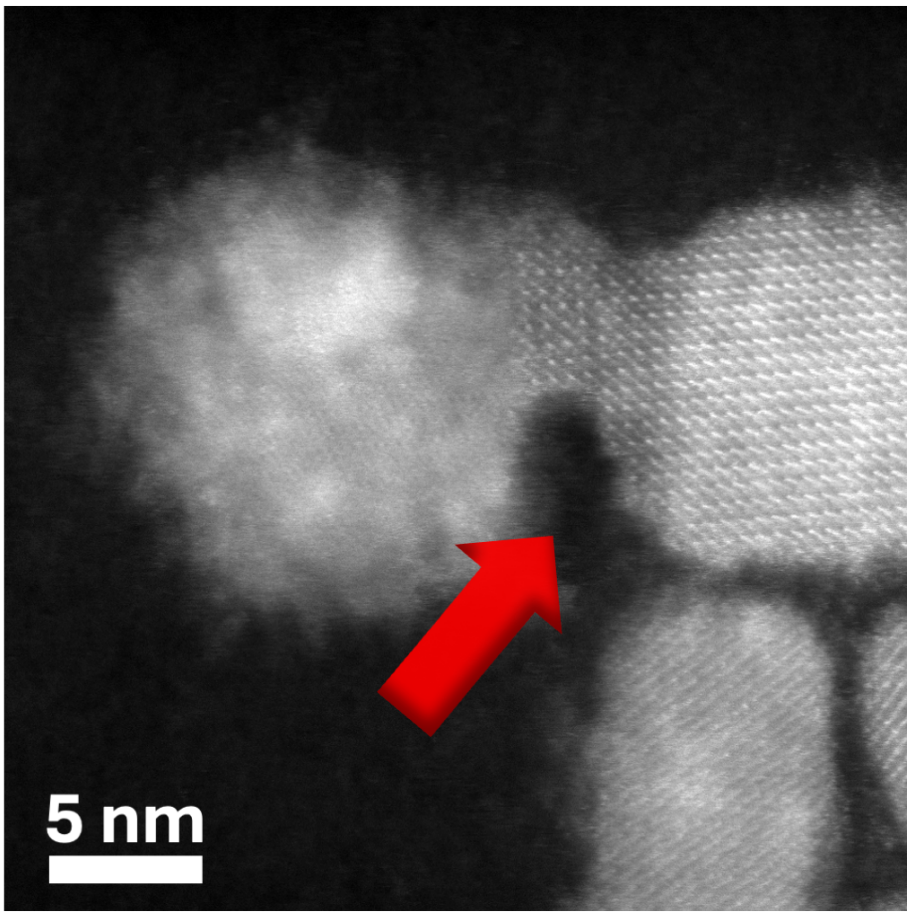

Fig. S6. HRSTEM image of Ag_2S–$CsPbBr_3$, the arrow points to the electron beam damage at the interface.

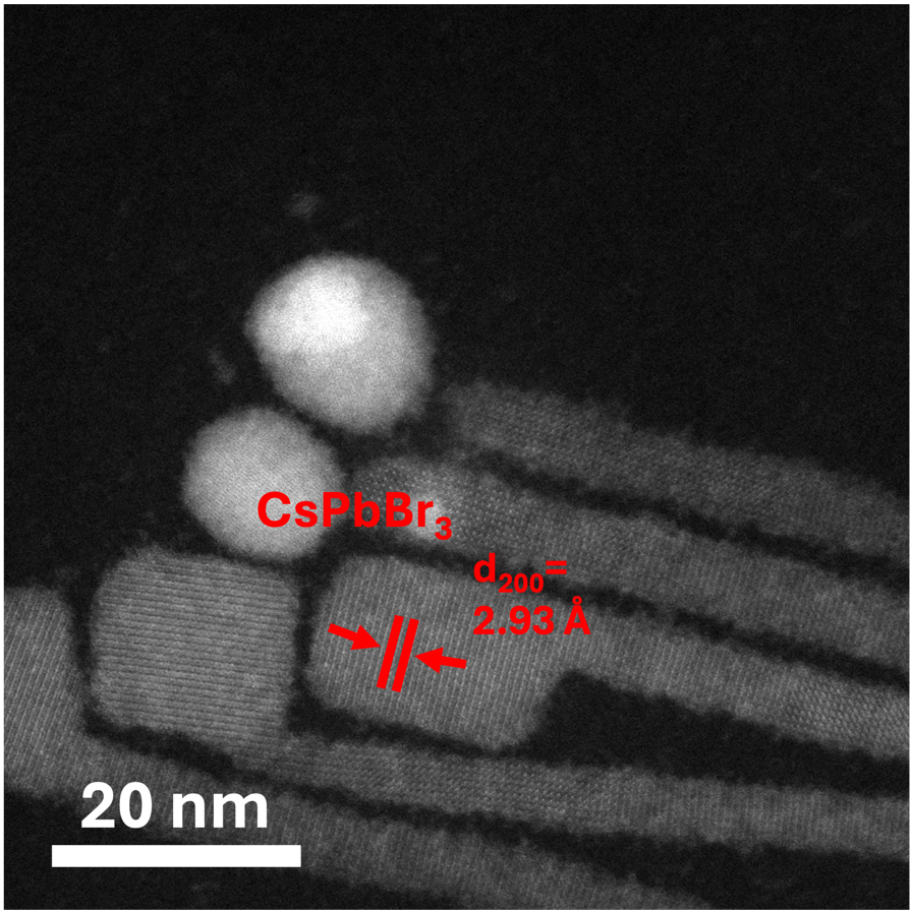

Fig. S7. HRSTEM image showing the two edges of Ag_2S-catalyzed $CsPbBr_3$ NWs.

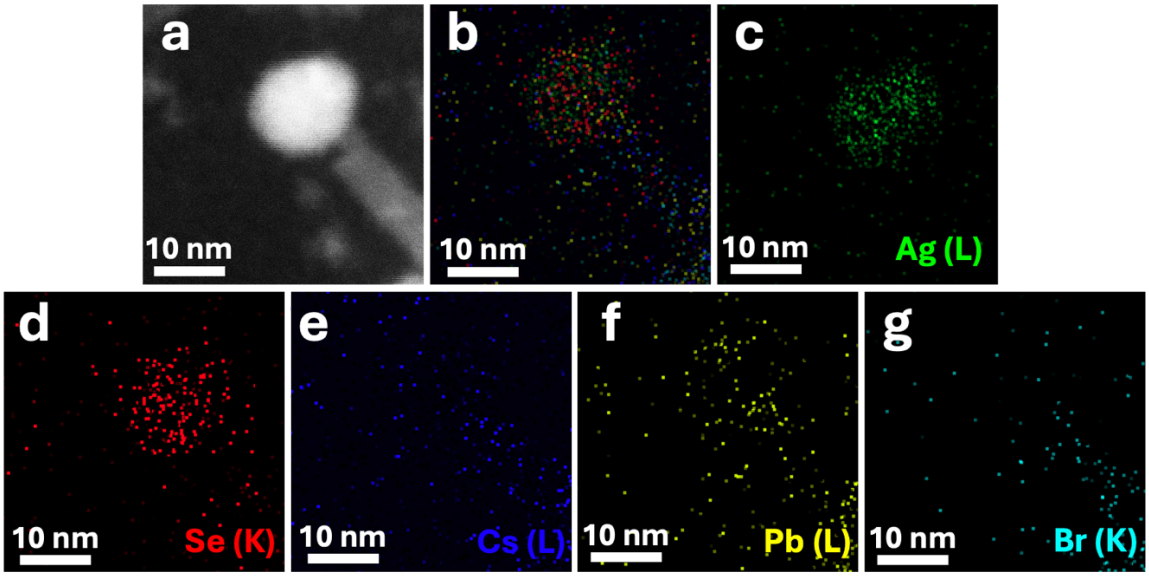

Fig. S8. Elemental mapping of Ag_2Se-catalyzed $CsPbBr_3$ NWs. (a) Darkfield STEM image. Qualitative EDS elemental distribution maps: (b) All elements—silver in green, selenium in red, cesium in blue, lead in yellow, and bromine in cyan, (c) Ag, (d) Se, (e) Cs, (f) Pb, and (g) Br.

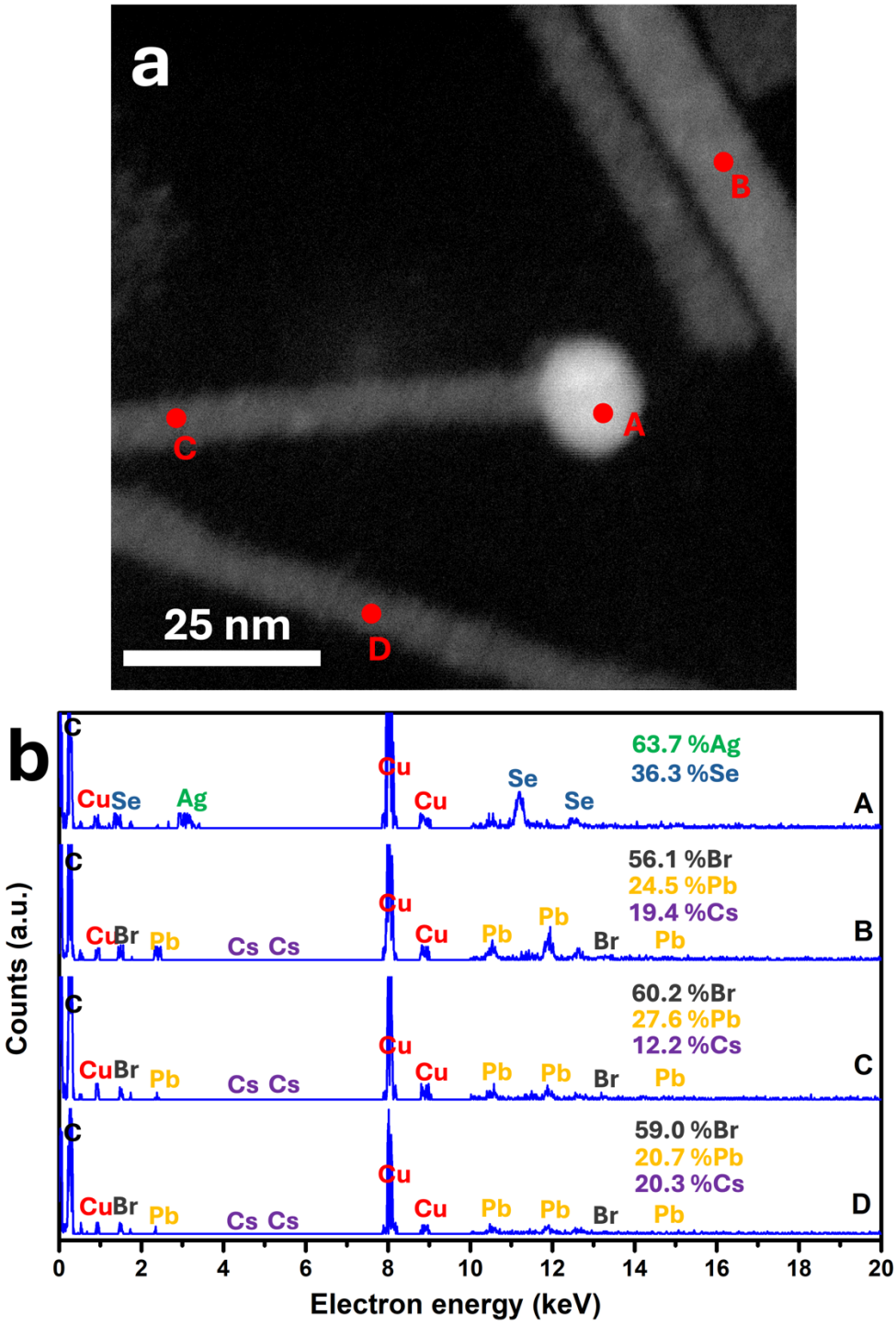

Fig. S9. (a) Dark field STEM image of a representative Ag_2Se-catalyzed $CsPbBr_3$ NW and its tip, (b) EDS spectra with an atomic ratio quantification for each of the points (A–D) marked on the STEM image in (a).

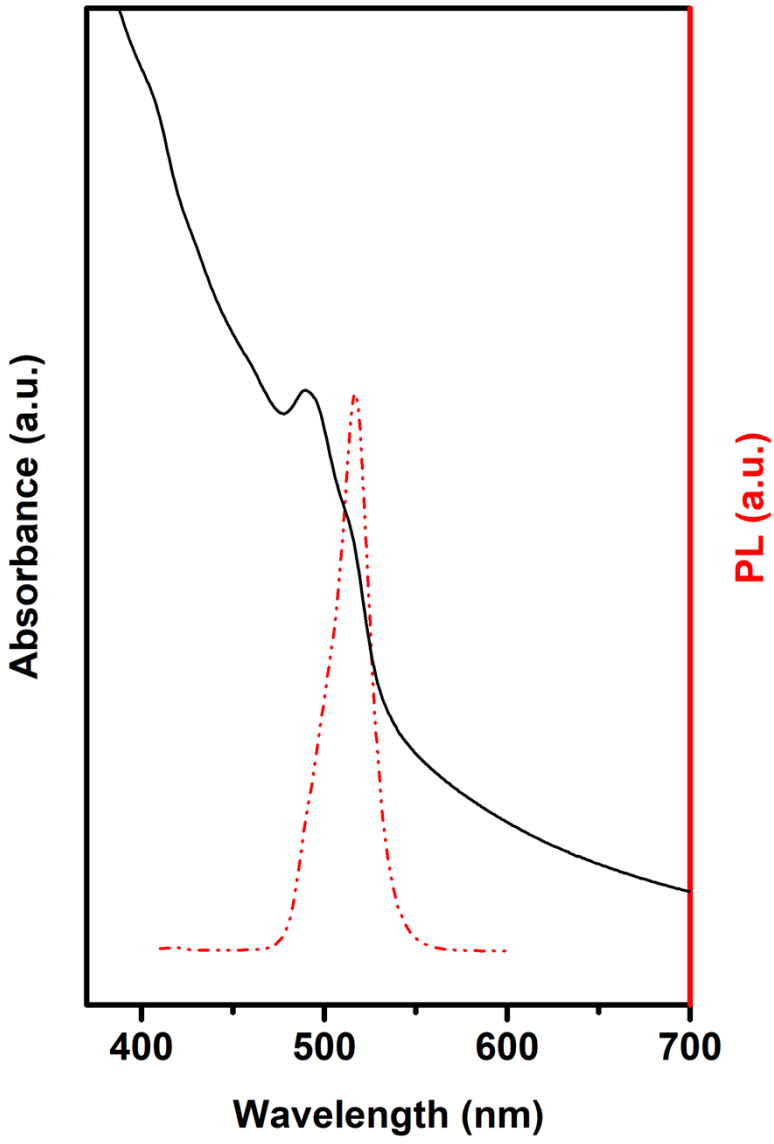

Fig. S10. Optical properties of Ag_2Se-catalyzed $CsPbBr_3$ NWs: UV–vis absorbance spectrum (left-side *y*-axis) using a black line and steady-state emission photoluminescence (PL) (right-side *y*-axis) using a dashed red line, λ_{exc} = 410 nm.

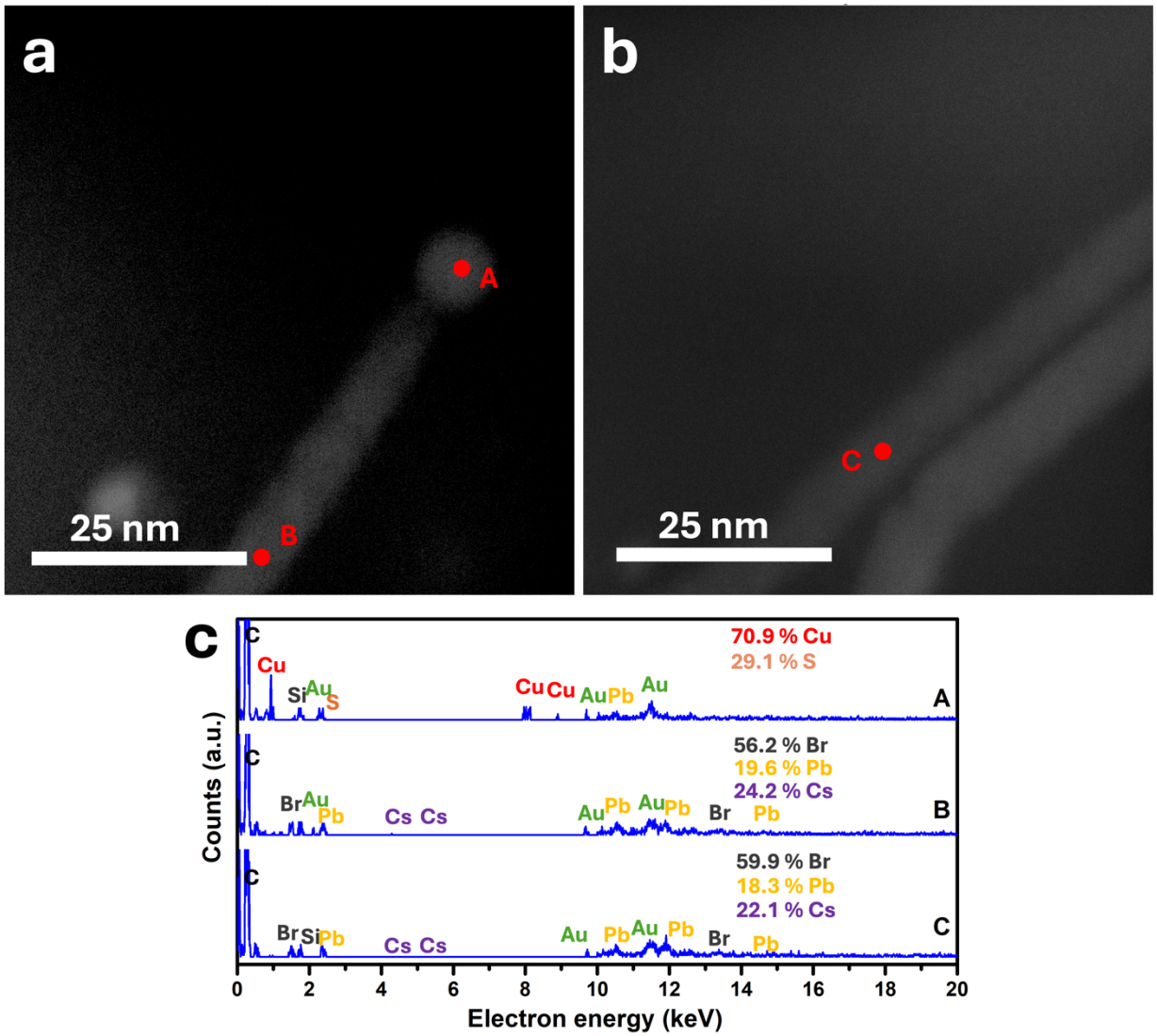

Fig. S11. Dark field STEM image of (a) a representative Cu_2S-catalyzed $CsPbBr_3$ NW tip with (b) the body of the same NW, and (c) EDS spectra with an atomic ratio quantification for each point (A–C) marked on the two STEM images in (a, b).

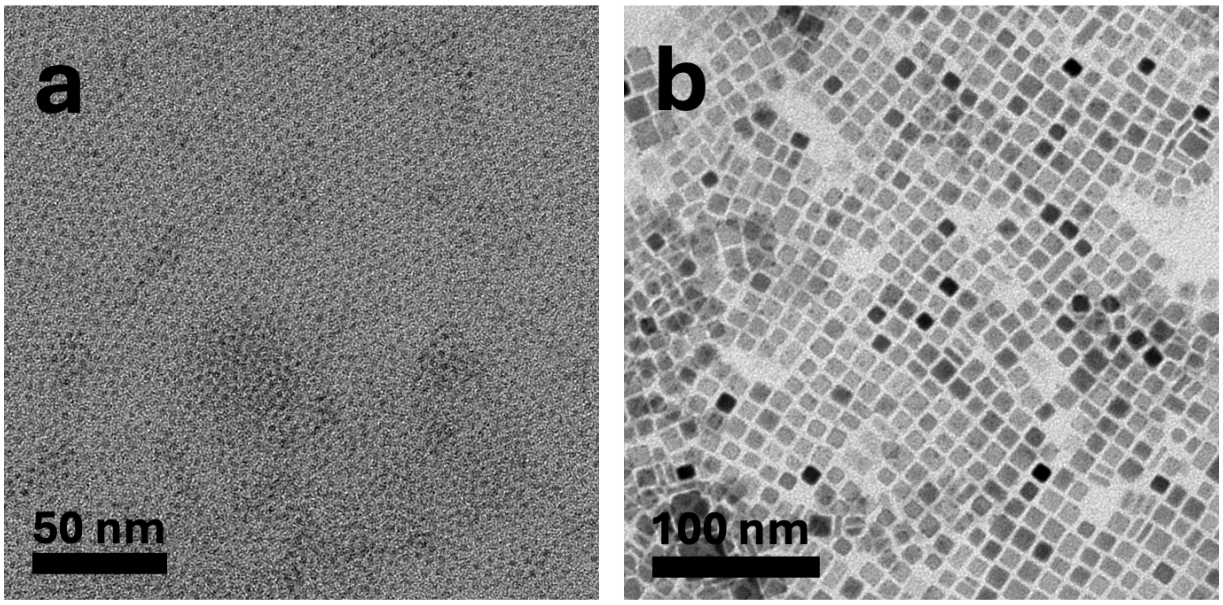

Fig. S12. TEM images of the (a) CdS NPs and (b) product of the catalyst-assisted NWs growth procedure when using the CdS NPs as the catalysts (no NWs form, only $CsPbBr_3$ cubes).