Supporting Information

Phase-Selective Synthesis and Self-Assembly of Monodisperse Copper Sulfide Nanocrystals

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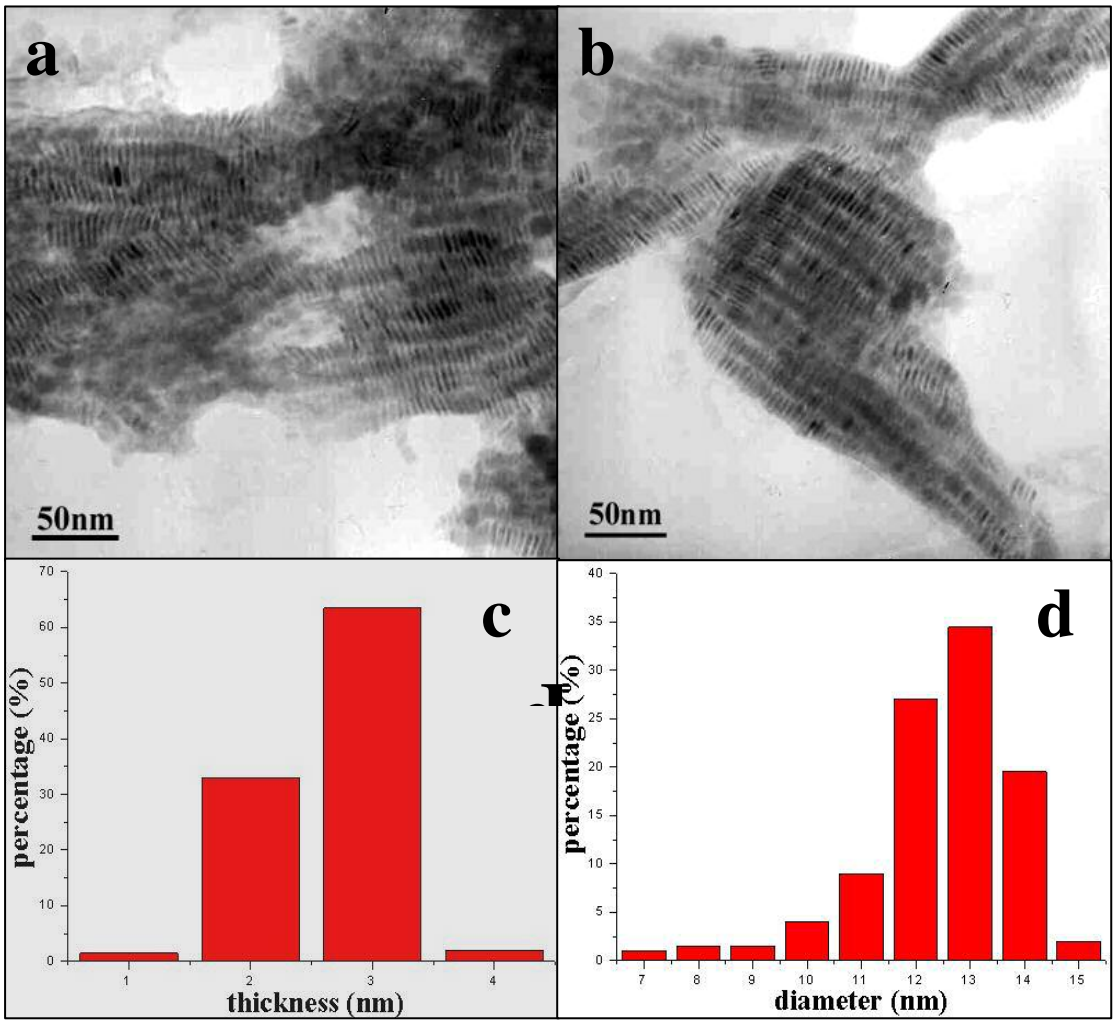

Figure S1 TEM images (a) and (b) of CuS nanoribbons, size distributions (c) and (d) for thickness and diameter of CuS nanoribbons, respectively. 200 particles are measured to obtain the size distribution.

Comparing identical areas at each tilting position (□15.0°, 0.0°, and □15.0°), the outlined regions of these nanocrystals are unchanged along the vertical direction of nanoribbons, but obviously changed along the parallel direction of nanoribbons due to the overlap of nanocrystals, especially at □15.0° tilting position, as shown in Figure S2. Based on this evidence, the possibility is ruled out that these nanoribbons are made up of nanorods.

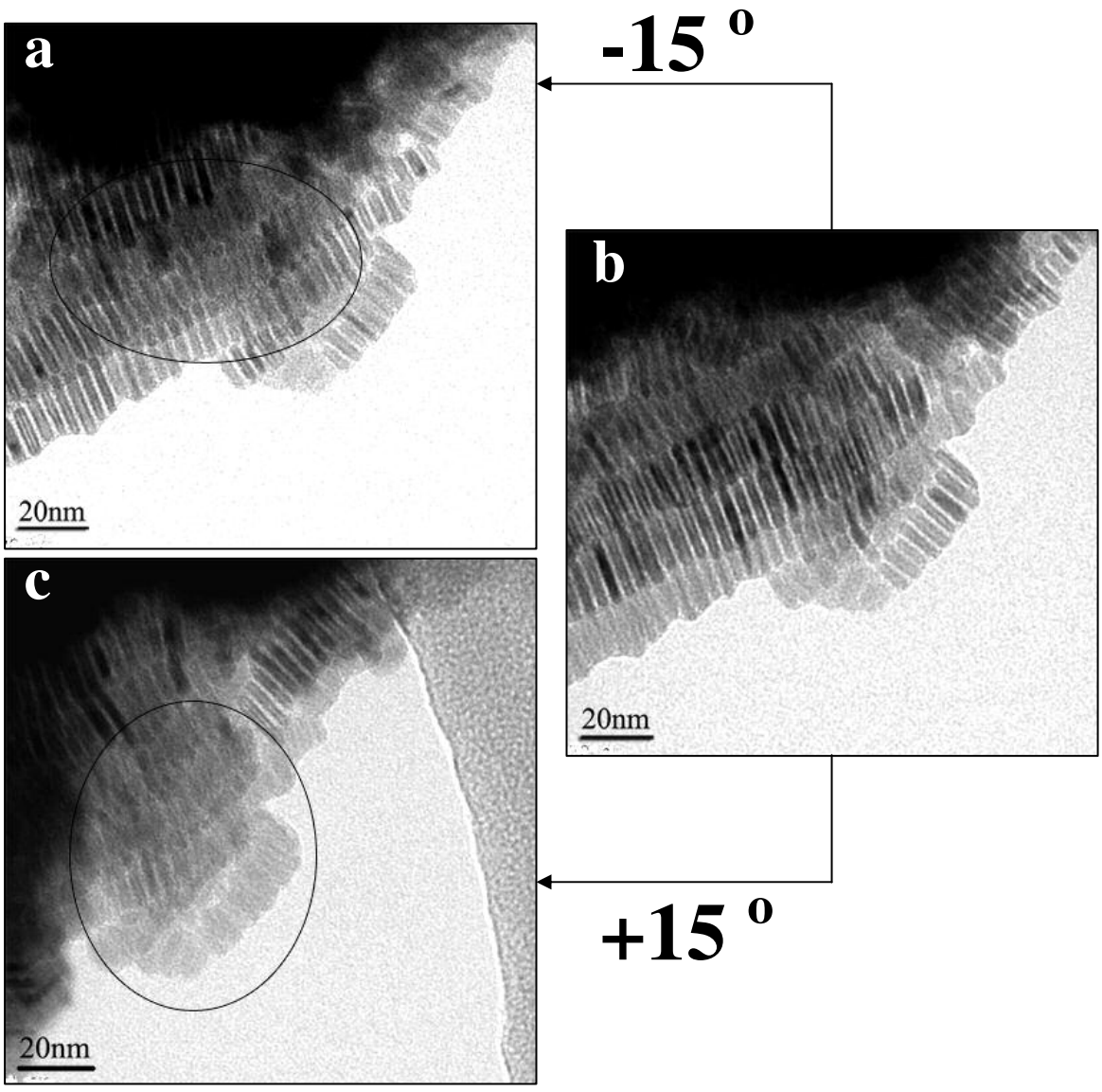

Figure S2 TEM images of CuS nanoribbons tilted at (a) □15 °; (b) 0 °; (c) □15 °.

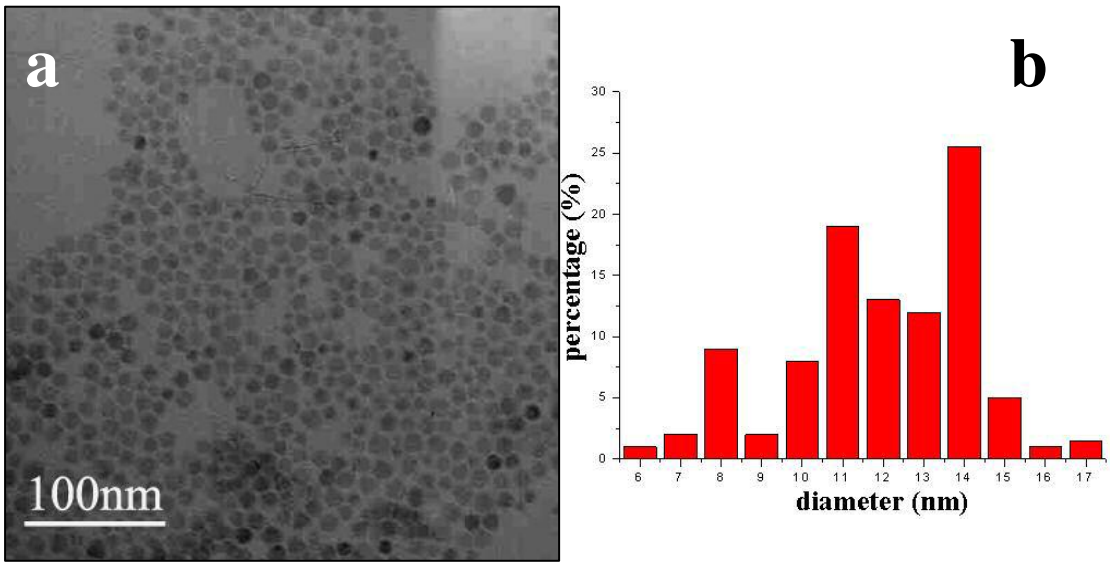

Figure S3 TEM image (a), and diameter (b) distributions for CuS nanodisks. 200 particles are measured to obtain the size distribution.

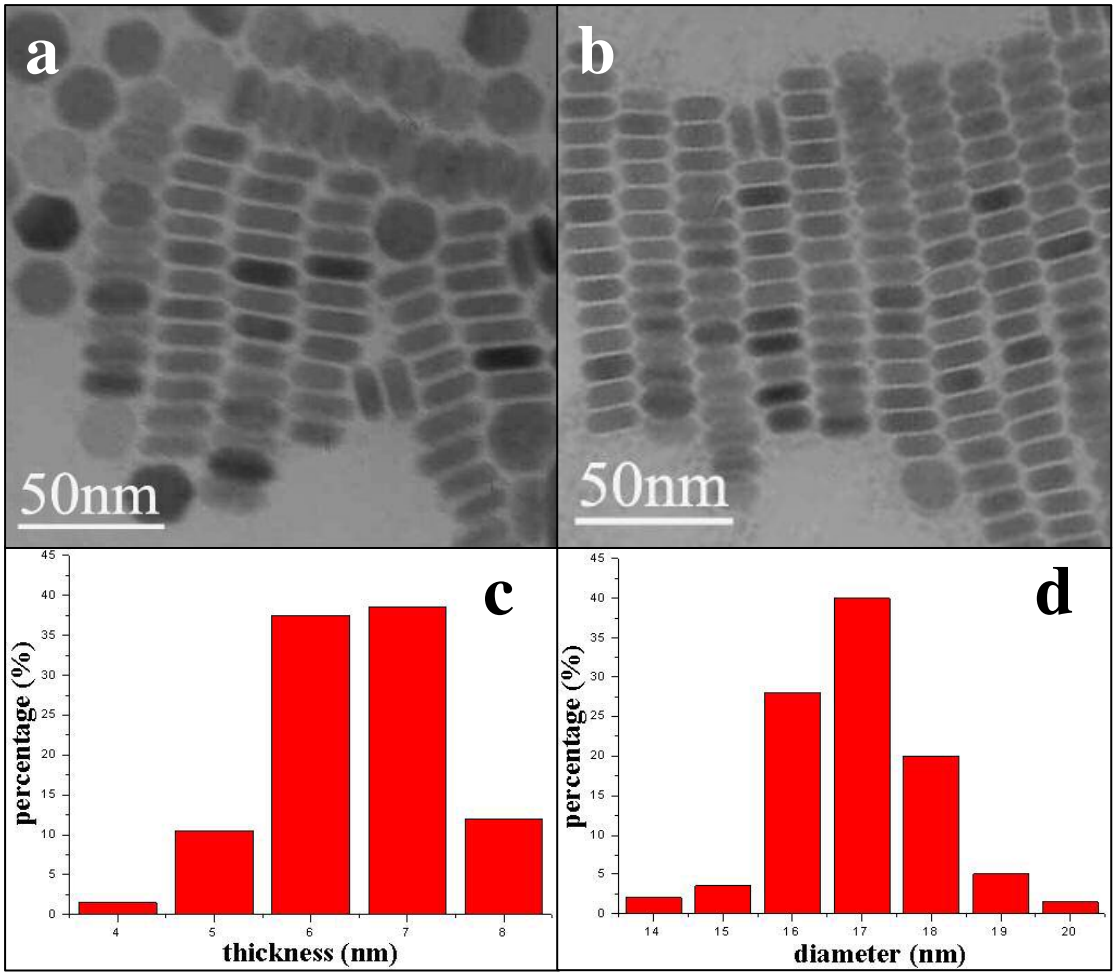

Fig. S4 TEM images (a) and (b) of $Cu_{1.75}S$ nanoribbons; size distributions (c) and (d) for thickness and diameter of $Cu_{1.75}S$ nanodisks, respectively. 200 particles are measured to obtain the size distribution.

Comparing identical areas at each tilting position (□15.0°, 0.0°, and □15.0°), the outlined regions of these nanocrystals are unchanged along the vertical direction of nanoribbons, but obviously changed along the parallel direction of nanoribbons due to the overlap of nanocrystals, especially at -15.0° tilting position, as shown in Figure S5. Based on this evidence, the possibility is ruled out that these nanoribbons are made up of nanorods.

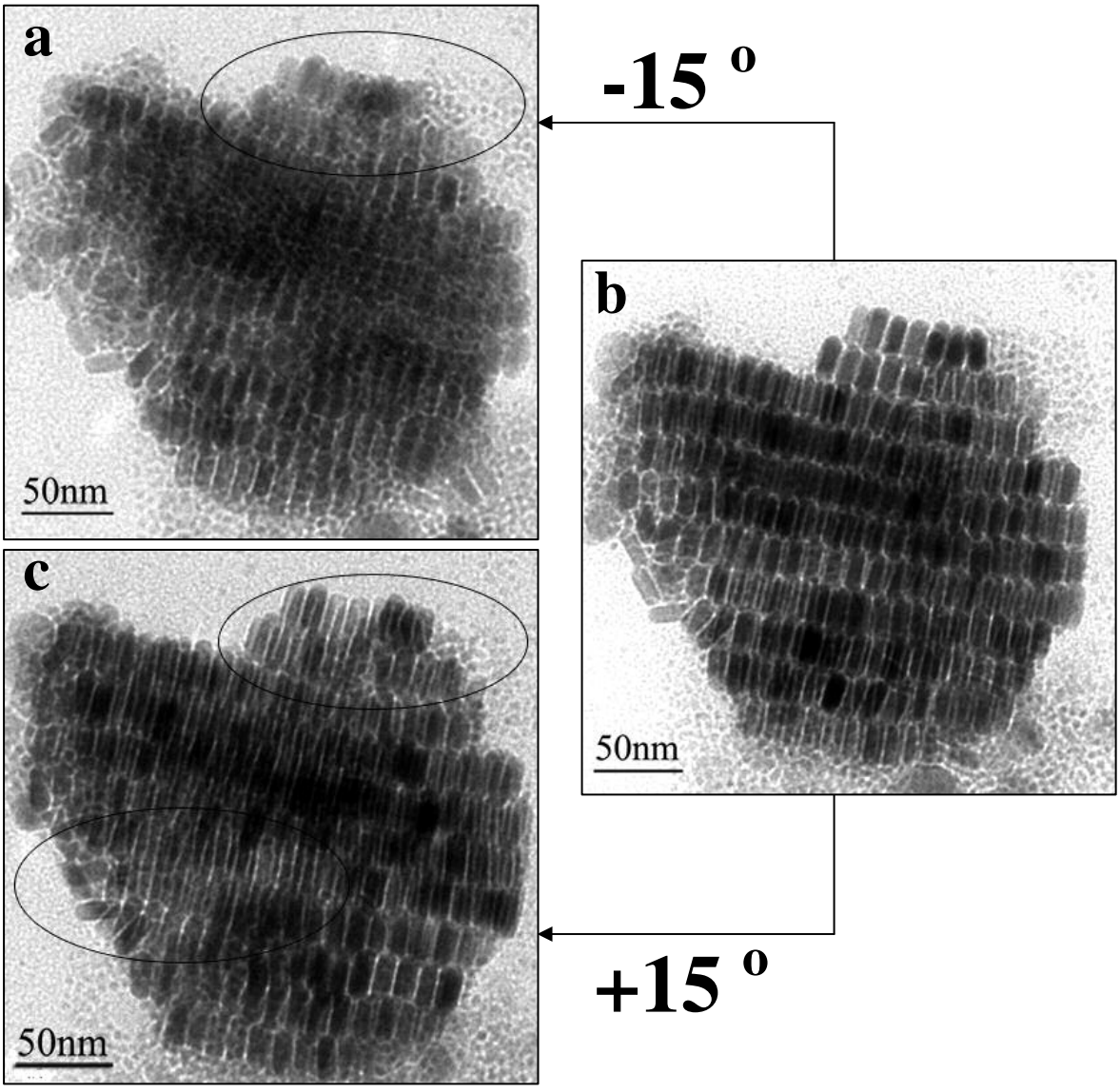

Fig. S5 TEM images of $Cu_{1.75}S$ nanoribbons tilted at (a) □15 °; (b) 0 °; (c) □15 °.

Figure S6 shows the FTIR spectra of CuS nanodisks and nanoribbons. The characteristic vibration modes of NH_2 and C-N indicate that OLA encapsulates copper sulfide nanocrystals. Meanwhile, the peaks of OLA in the samples are similar to that of free OLA.

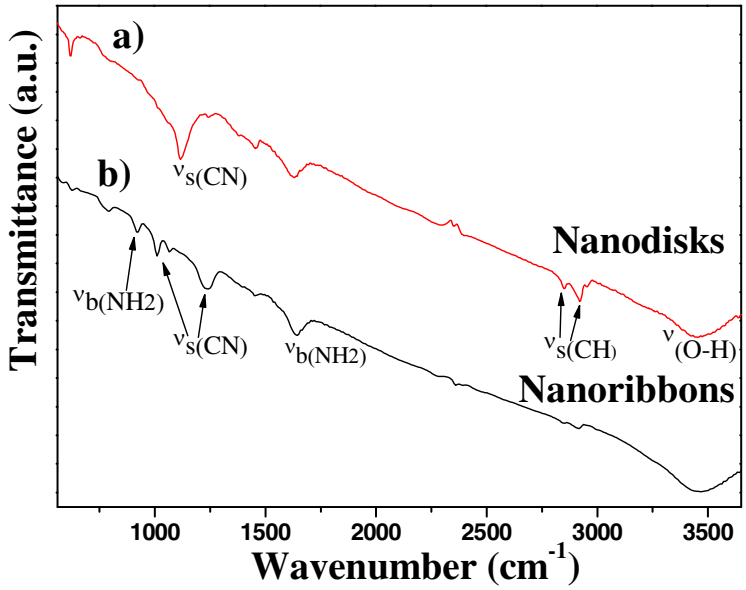

Figure S6 FTIR spectra of CuS nanodisks (a) and CuS nanoribbons (b).

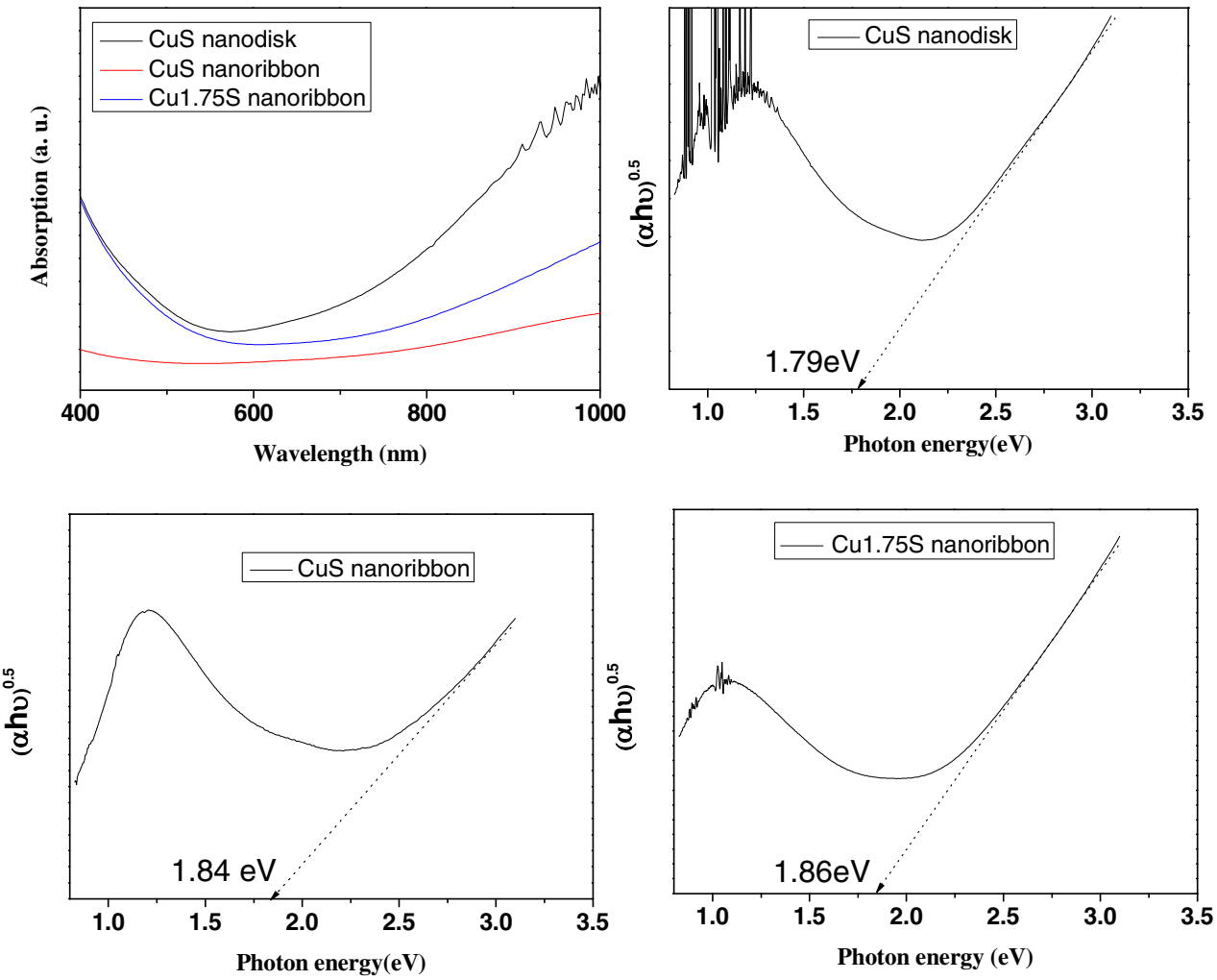

Figure S7 (a)UV-vis spectra of CuS nanodisk, CuS nanoribbon and $Cu_{1.75}S$ nanoribbon; (b), (c), (d) their corresponding Tauc's plots

Figure S7a shows the UV-vis spectra of CuS nanodisk, CuS nanoribbon and $Cu_{1.75}S$ nanoribbon. These spectra exhibited the strong absorption in the UV-blue region and the characteristic absorption peaks in a near IR-region. The near IR-region absorptions can be attributed to intraband-transitions, which was consistent with the previous report [1]. Their corresponding Tauc's plots indicated that the bandgap of the CuS nanodisk, CuS nanoribbon and $Cu_{1.75}S$ nanoribbon were 1.79, 1.84, 1.86 eV,

respectively, which were similar to the previous results [2]. No obvious quantum effect can be observed because their sizes are large than Bohr radii of copper sulfide.

1. Kuzuya, T.; Itoh, K.; Sumiyama, K., *J. Colloid Interface Sci.* **2008**, *319*, 565.

2. Koch, D. F. A.; McIntyre, R., *J. Electroanal. Chem.* **1976**, *71*, 285.

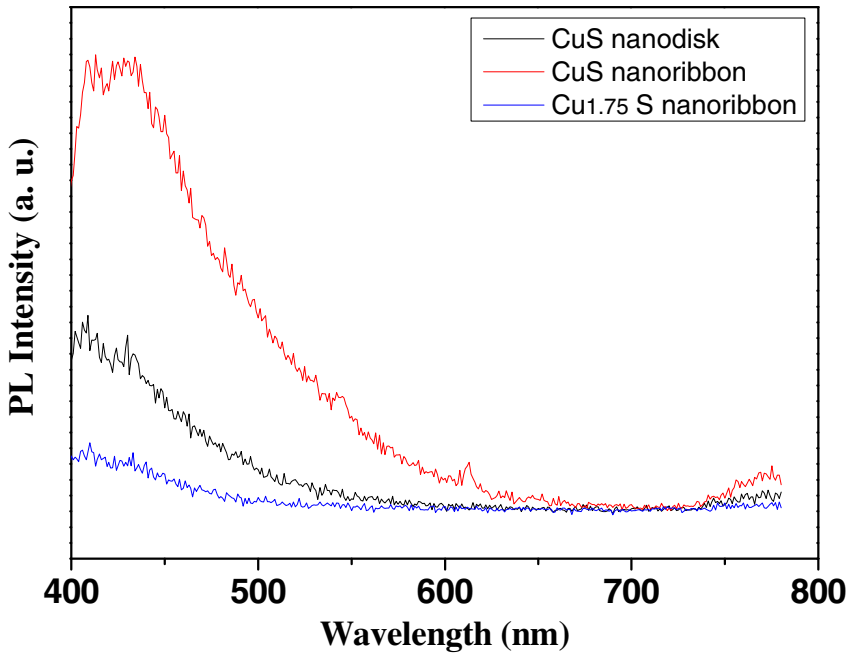

Figure S8 PL spectra of CuS nanodisk, CuS nanoribbon and $Cu_{1.75}S$ nanoribbon

Figure S8 shows the PL spectra of CuS nanodisk, CuS nanoribbon and $Cu_{1.75}S$ nanoribbon. As can be seen, there is no obvious PL emission due to their indirect bandgap.