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Electronic Supplementary Information

Self-regulated Route to Ternary Hybrid Nanocrystals Ag-Ag_2S-CdS with Near-Infrared Photoluminescence and Enhanced Photothermal Conversion

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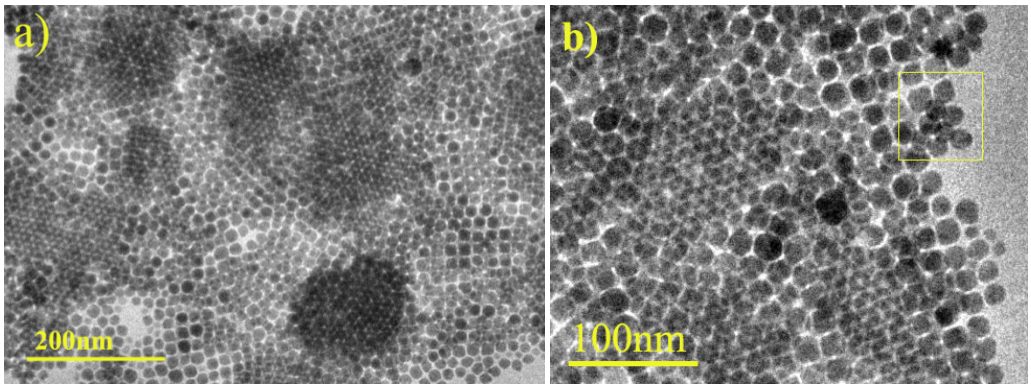

Figure SI-1 The self-assembly of the as-prepared Ag-Ag_2S-CdS hybrid nanocrystals forming highly ordered microstructure, the noted area of b) showing the multilayer assembly with ABAB mode.

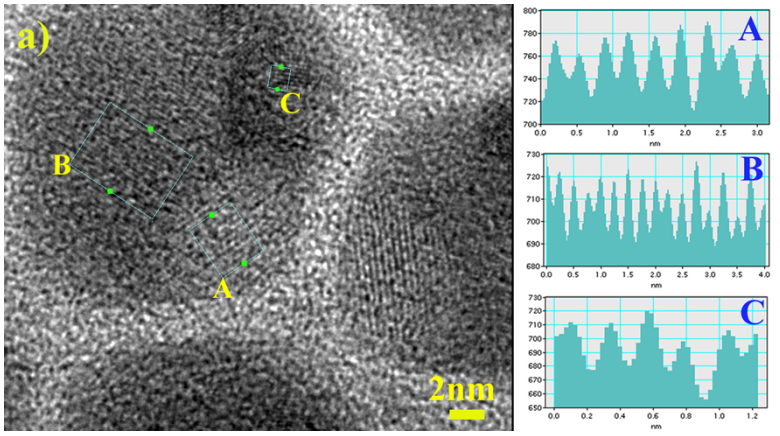

Figure SI-2 a) Lattice spacing measure in the HR-TEM image and b, c) more HRTEM images for the as-prepared hybrid nanocrystals.

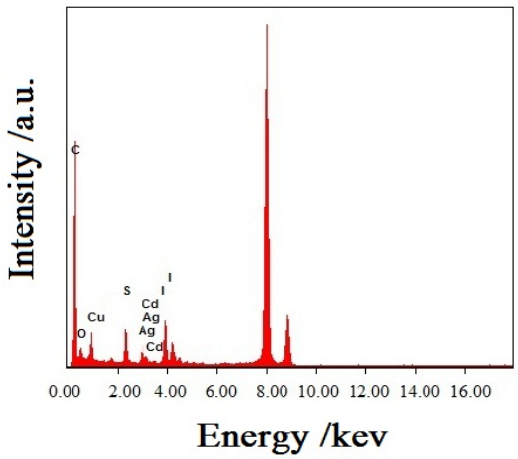

Figure SI-3 EDS pattern of the product when the reaction temperature is increased to 80 ^{o}C.

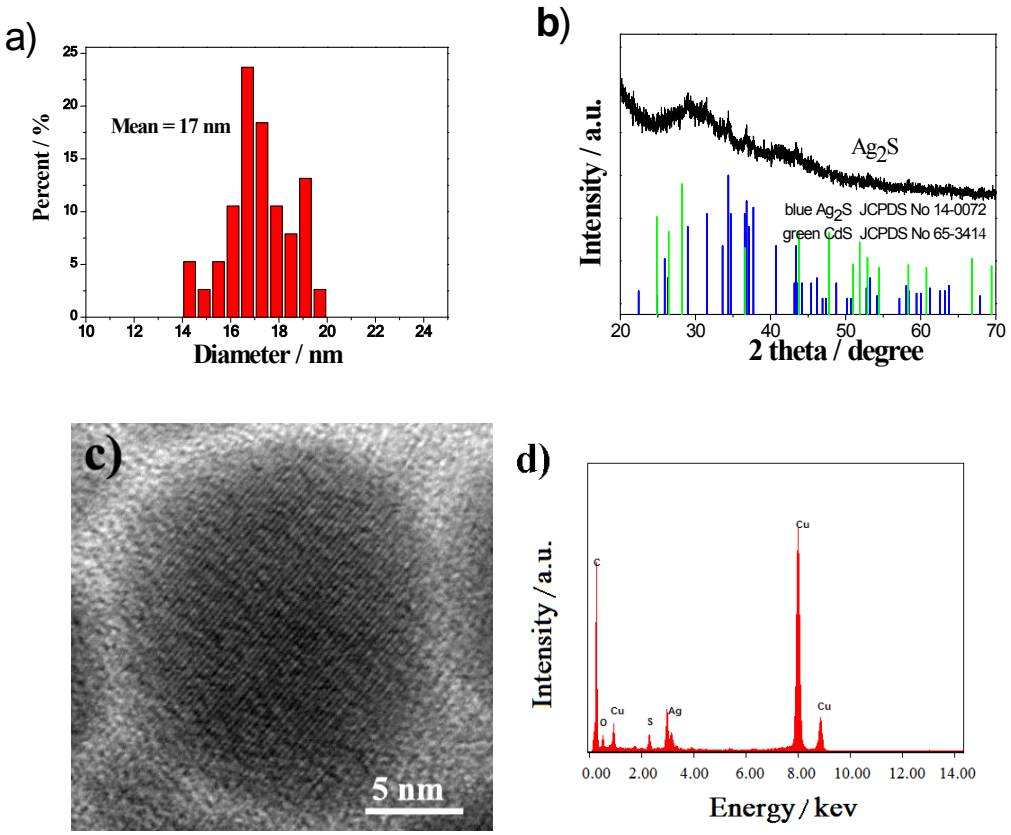

Figure SI-4 a) Size distribution, b) XRD, c) HRTEM, and d) EDS pattern of the product collected when the reaction system kept at 150 ^{o}C for 5 min. The results show pure phase Ag_2S is obtained at this stage.

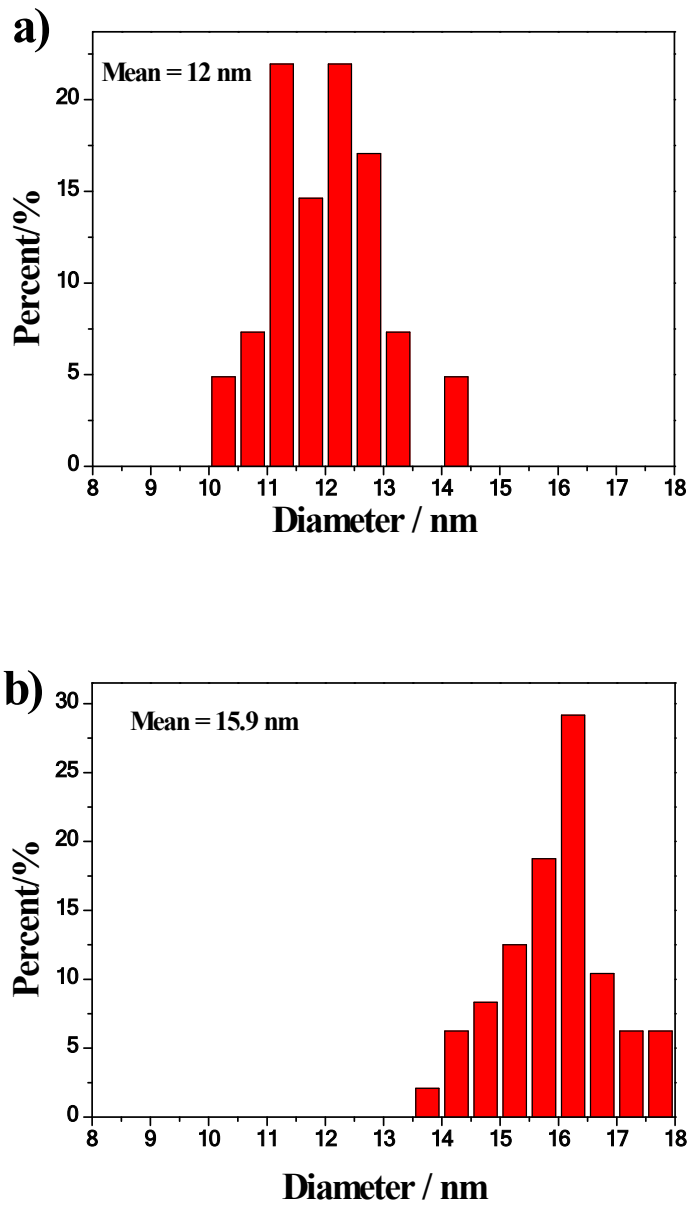

Figure SI-5 Size distribution of the reaction system kept at 150 °C for a) 7 min and b) 15 min.

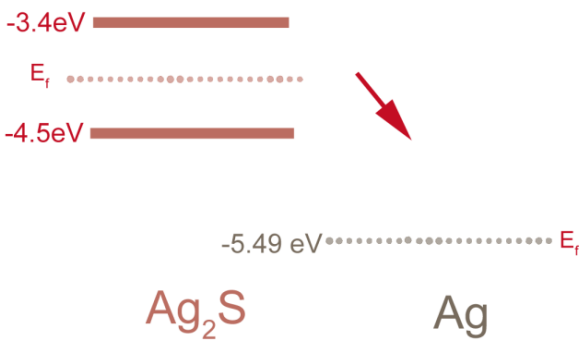

Figure SI-6 The scheme for the electron transfer from Ag_2S to Ag driven by equilibration of the Fermi energy.

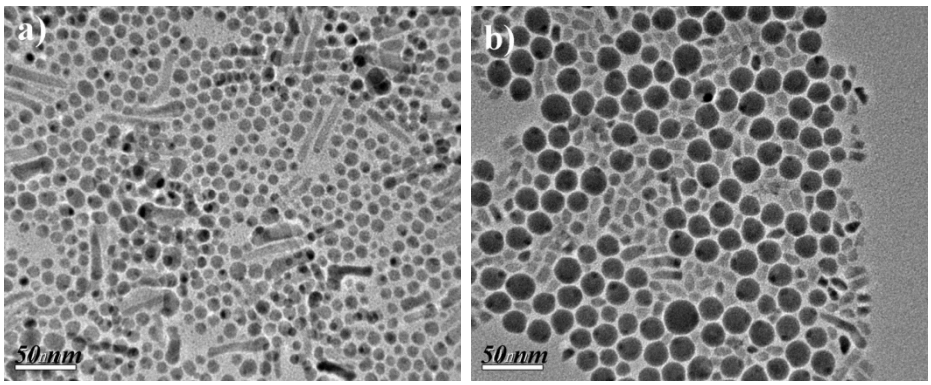

Figure SI-7 TEM images of the products obtained with different precursors: (a) $AgNO_3$ and $Cd(ddtc)_2$, (b) AgCl and $Cd(ddtc)_2$.

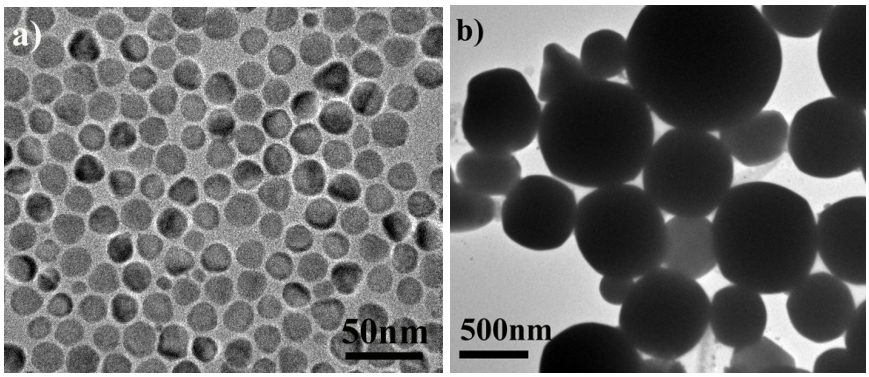

Figure SI-8 TEM images of the products obtained with a) heating rate of 3 ^oC/min and b) reation temperature of 180 ^oC.

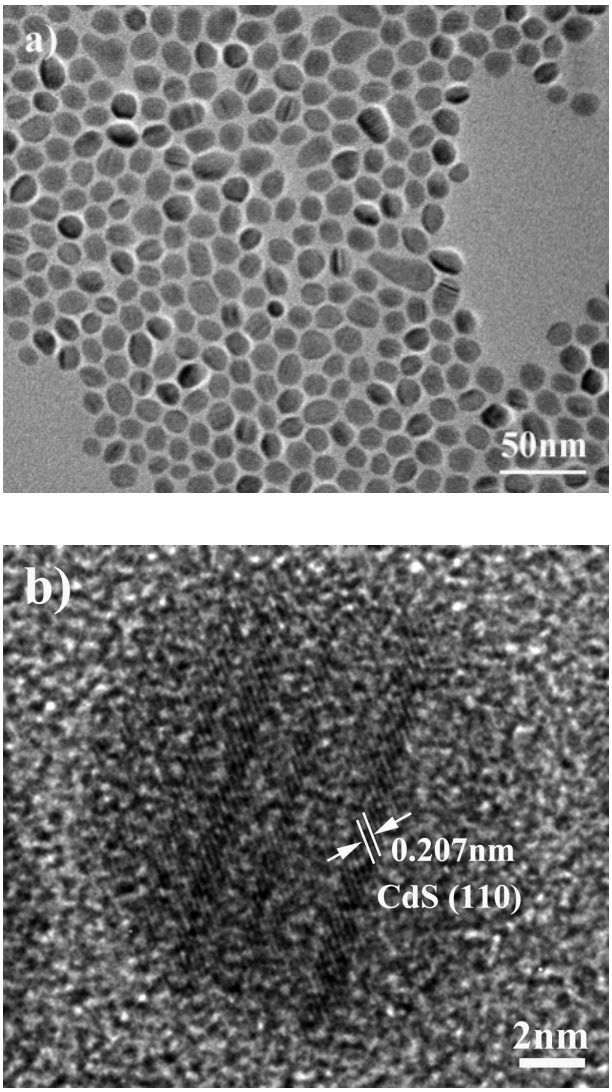

Figure SI-9 a) TEM and b) HRTEM images of the Ag_2S-CdS hybrid nanocrystals prepared with molar ratio of AgI/$Cd(ddtc)_2$ of 1:0.92.

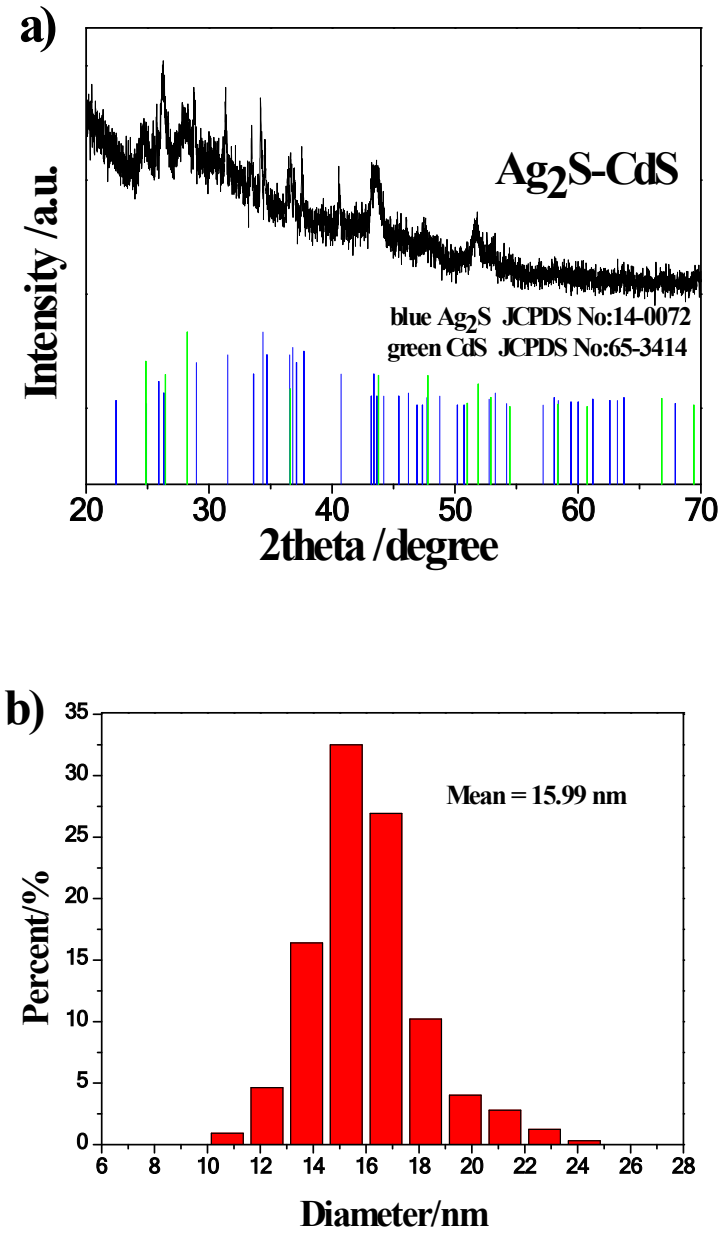

Figure SI-10 a) XRD pattern and b) size distribution of the the Ag_2S-CdS hybrid nanocrystals prepared with molar ratio of AgI/$Cd(ddtc)_2$ of 1:0.92.

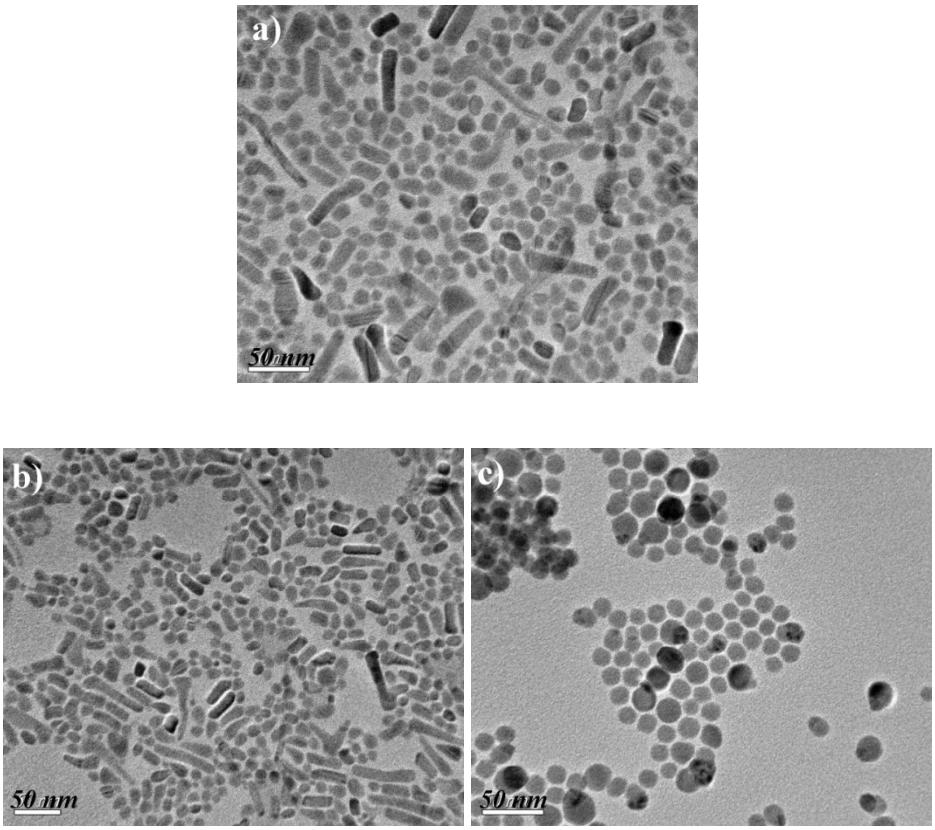

Figure SI-11 TEM images of the samples prepared by using different molar ratio of Ag/Cd: (a) 1:1.37; (b) 1:1.84; (c) 1:0.42.

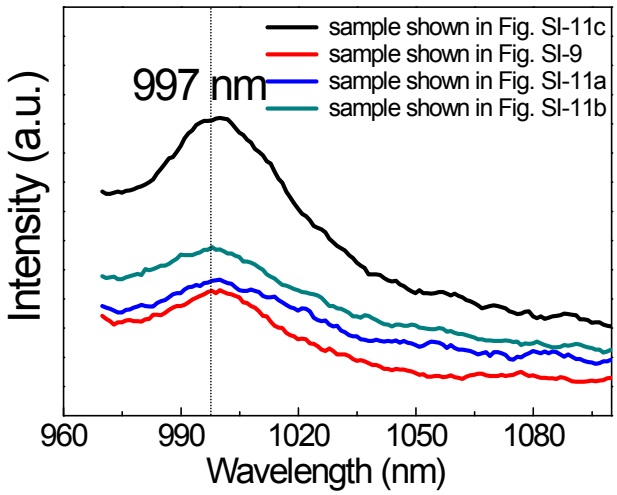

Figure SI-12 Fluorescent spectra of the nanocrystals with different structures and compositions, demonstrating the weak influence of the hybrid structure on the emission.

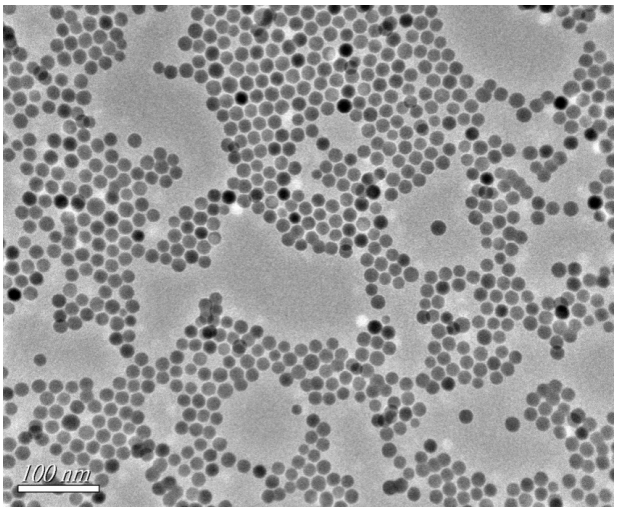

Figure SI-13 TEM image of Ag_2S nanoparticles used for comparison. The size is about 16.5 nm.

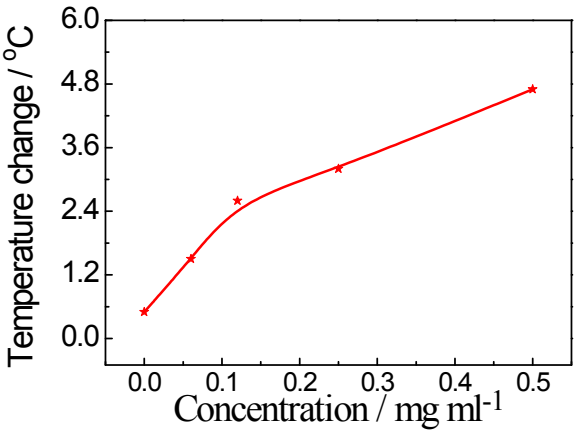

Figure SI-14 Plot of temperature change (ΔT) over a period of 5 min versus the concentration of Ag-Ag_2S-CdS hybrid nanocrystals.