Supplementary Information

$Cu_{1.94}S$-MnS Dimeric Nanoheterostructures with Bifunctions: Localized Surface Plasmon Resonance and Magnetism

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1. Experimental section：

Chemical reagents: Cyclohexane, ethanol, distilled water are used as received. Copper(II) acetate ($Cu(CH_3COO)_2 \cdot H_2O$, 99%), Manganese(II) acetate ($Mn(CH_3COO)_2 \cdot 4H_2O$, 98%), dodecanethiol ($CH_3(CH_2)_{11}SH$, 98%), and oleylamine ($CH_3(CH_2)_7CH=CH(CH_2)_8NH_2$, 90%) are all purchased from Sinopharm Chemical Reagent Company.

Synthesis of $Cu_{1.94}S$ nanoplates: In a typical synthesis, 0.0571 g $Cu(CH_3COO)_2$ are dissolved in **10** ml oleylamine and 5 ml dodecanethiol at room temperature. Then the resulting mixture is heated at 140℃ for 30 min under argon flow to get rid of oxygen and water, and heated at 220℃ for another 15 min under argon flow to proceed the reaction. After the solution is cooled to room temperature, ethanol is added to precipitate the deep brown product, which is then separated by centrifuging.

Synthesis of $Cu_{1.94}S$-MnS nanoheterostuctures: In a typical synthesis, 0.0571 g $Cu(CH_3COO)_2$ are dissolved in 10 ml oleylamine and 5 ml dodecanethiol at room temperature. Then the resulting mixture is heated at 140℃ for 30 min under argon flow to get rid of oxygen and water, then heated at 220℃ for another 15 min under argon flow to proceed the reaction. After that, 0.1211 g $Mn(CH_3COO)_2$ dissolved in 5 ml oleylamine was injected into the mixture when temperature is further increased to 220℃. The solution is then kept at 220℃ for various duration (10 min, 15 min, 20 min). After the solution is cooled to room temperature, ethanol is added to precipitate the deep brown product, which is then separated by centrifuging.

Characterizations: XRD analyses are carried out with a powder diffractometer (DMAX 2500 RIGAKU) using $Cu_{K\alpha}$ radiation (λ = 0.154 nm). TEM observations are performed by a transmission electron microscope (JEM-2010). The absorbance spectra are detected by a lambda 900 UV-vis-IR spectrometer. The magnetic properties were measured on a superconducting quantum interference device (SQUID) magnetometer (MPMS-7, Quantum Design) at RT.

2、Figure S1-S2

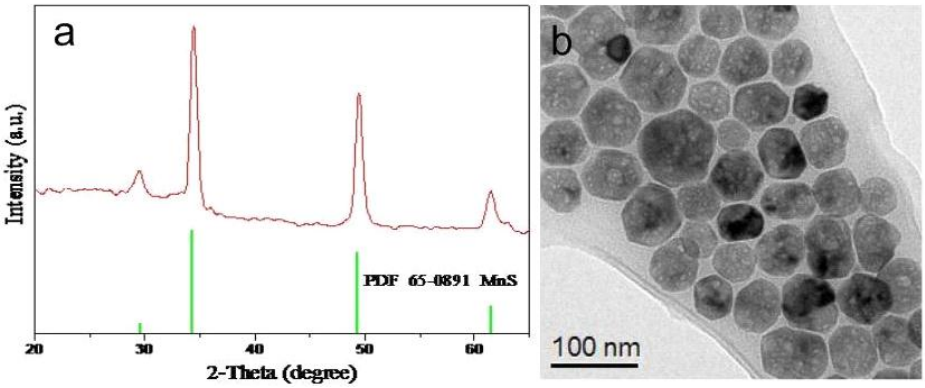

Fig. S1 (a) XRD pattern, and (b) TEM micrograph of the synthesized cubic phase MnS nanocrystals.

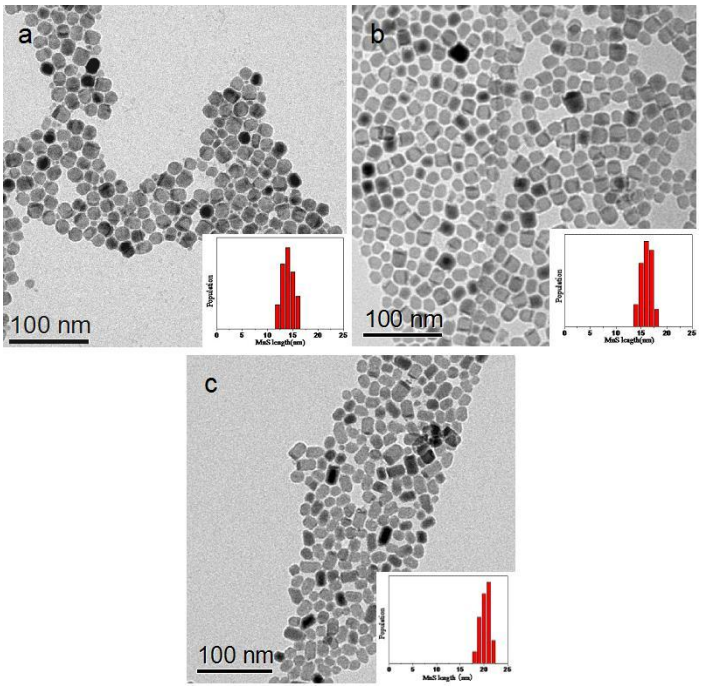

Fig. S2 $Cu_{1.94}S$-MnS nanoheterostructures having reacted for (a)10 min, (b) 15 min, and (c) 20 min respectively; insets of (a), (b) and (c) are the corresponding histograms by measuring 100 nanoheterostructures lying horizontally, showing MnS length distributions.