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Supporting Information for Synthesis of Metal Sulfide Nanomaterials via Thermal Decomposition of Single-Source Molecular Precursors

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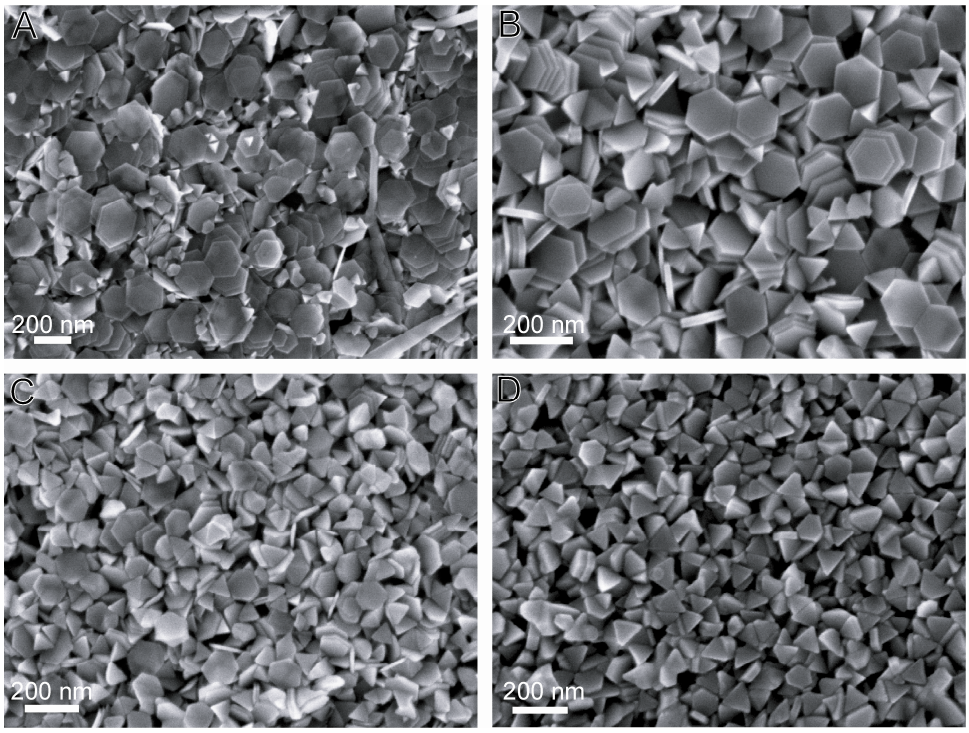

Figure S1. Cuprous sulfide (Cu_2S) hexagonal plates formed from $Cu(II)[S_2CNC_4H_{10}]_2$ in trioctylphosphine. Thermal decomposition reactions were performed in solution under standard air-free Schlenk technique. a) $Cu(II)[S_2CNC_4H_{10}]_2$ is 0.055M in trioctylphosphine. b) 0.11M c) 0.22M d) 0.33M As the initial concentration increases, the yield of triangular plates to hexagonal plates increases. All structures are the low-chalcocite monoclinic crystal phase.

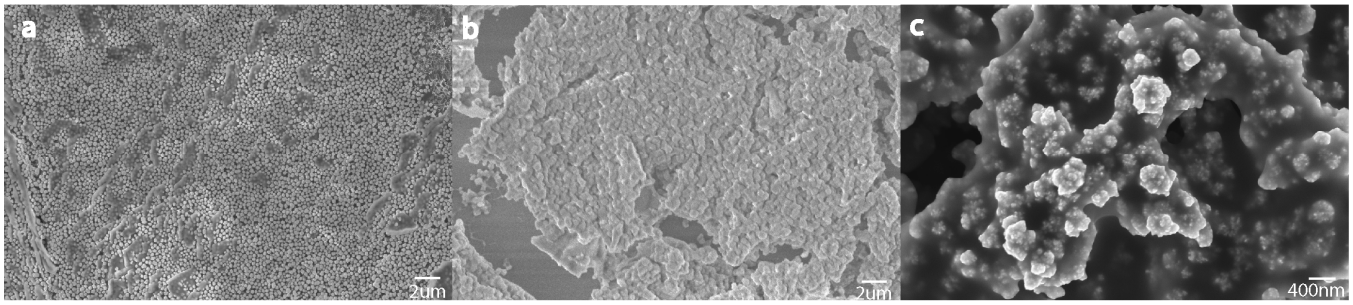

Figure S2. Thermal decomposition products of other metal sulfide single-source molecular precursors from trioctylphosphine on substrates. a) CdS nanoparticles. b) ZnS c) Ni_3S_2

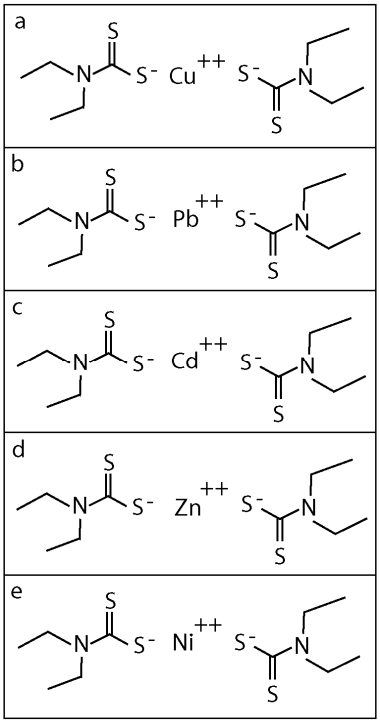

Figure S3. Single-source molecular precursors used. a-e) Copper, lead, cadmium, zinc, and nickel bis(diethyldithiocarbamate). All synthesized from the metal chloride salt dissolved in deionized water mixed with sodium diethyldithiocarbamate. The product is vacuum filtered, dried, and recrystallized from hot chloroform.

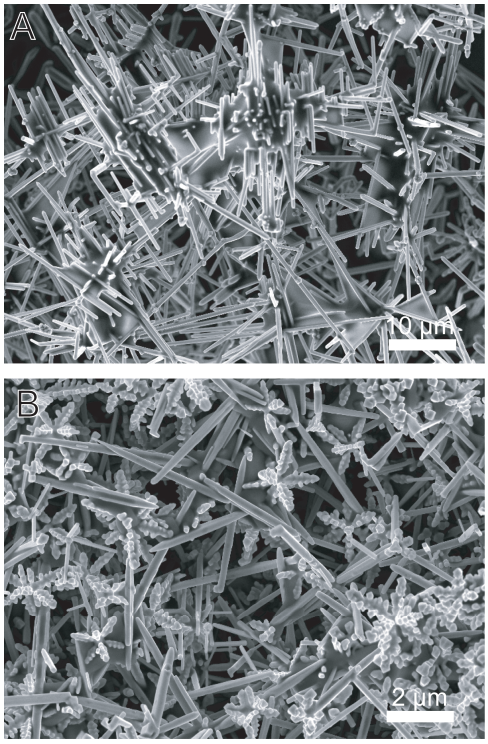

Figure S4. Lower magnification SEM images the Cu_2S and PbS nanowire substrates. Cuprous sulfide nanowires show highly branched structures.

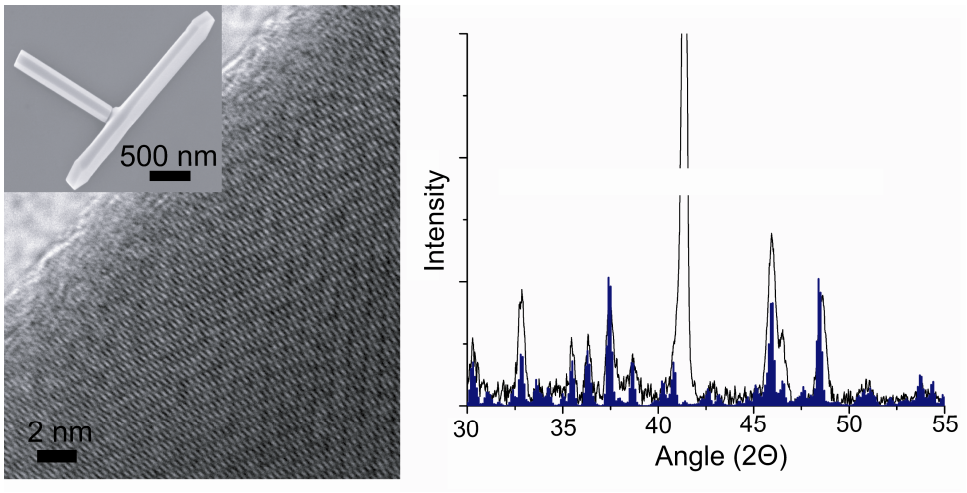

Figure S5. A) High-resolution TEM with inset SEM of Cu_2S an individual nanowire in combination with B) X-ray diffraction confirms the crystal structure of the Cu_2S nanowires to be the same as those of the nanocrystals, monoclinic.