Electronic Supplementary Information

Well-Controlled Synthesis of Wurtzite-Type Cu_2ZnSnS_4 Nanoparticles Using Multiple Sulfur Sources via a Two-Step Heating Process

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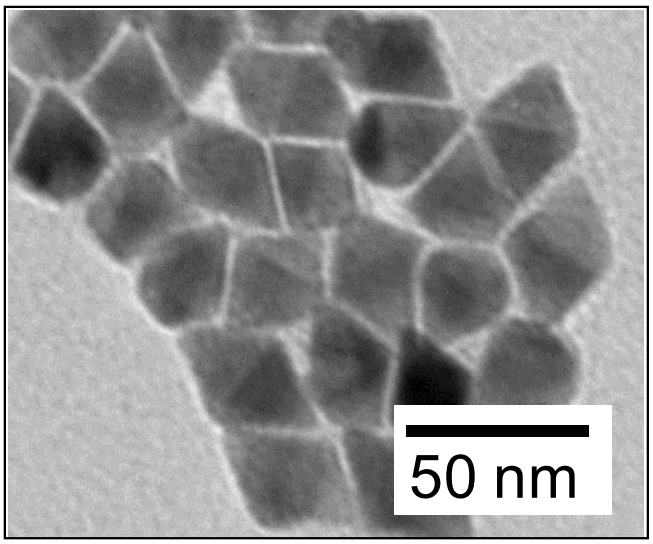

Fig. S1 A TEM image of nanoparticles obtained by heating the metal acetates in DDT at 240 $^{\circ}$ C for 60 min.

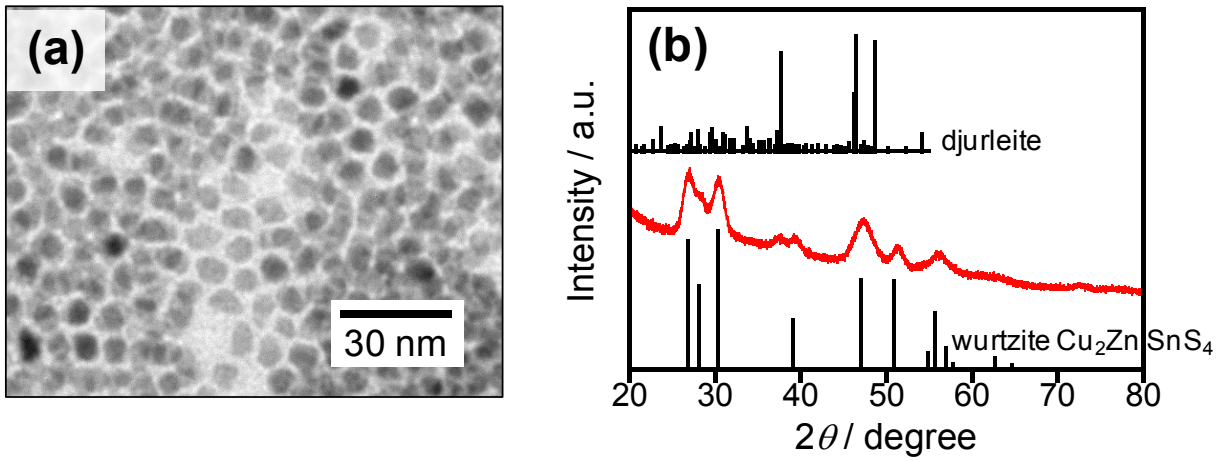

Fig. S2 TEM image (a) and XRD pattern (b) of nanoparticles obtained by addition of S and DBTU (50 : 50) into the precursor solution at 200 ° C for 180 min. Reference pattern of djurleite (PDF card: #00-034-0660) and simulated pattern of wurtzite-type Cu_2ZnSnS_4 shown in ref. 17 are also shown. The chemical composition of the particles was determined to be Cu : Zn : Sn = 0.79 : 0.10 : 0.11.

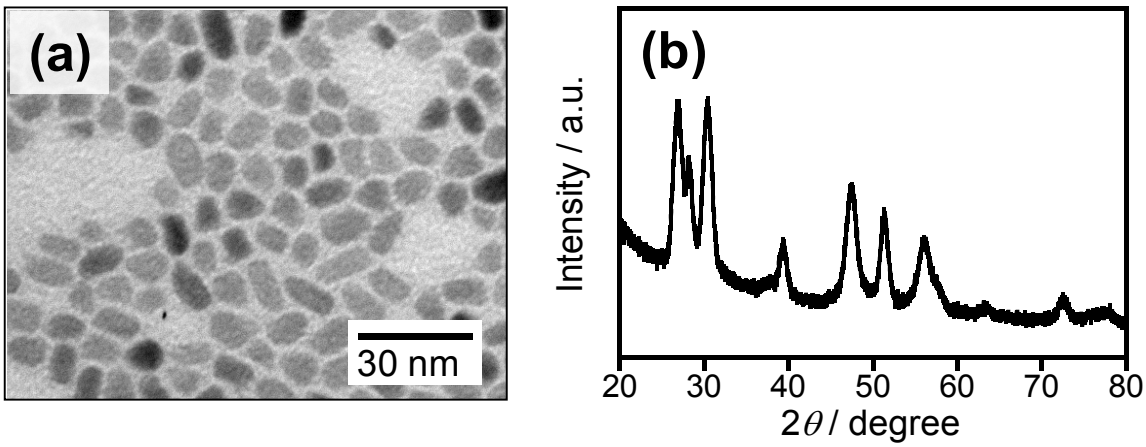

Fig. S3 TEM image (a) and XRD pattern (b) of Cu_2ZnSnS_4 nanoparticles prepared through the nucleation at 150 ºC for 30 min followed by the crystal growth process at 240 ºC for 30 min.

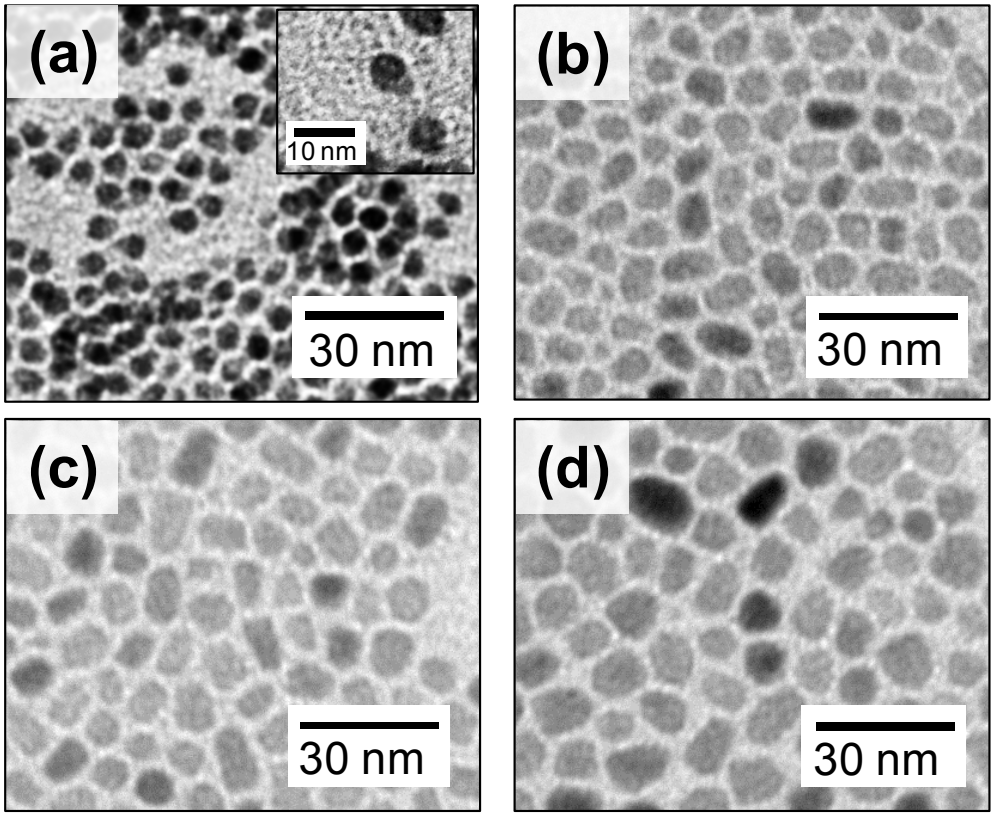

Fig. S4 TEM images of nanoparticles obtained after the crystal growth process for 0 (a), 15 (b), 60 (c), and 180 min (d). The panel a is the same as Fig. 1a.