

Supplementary Figure

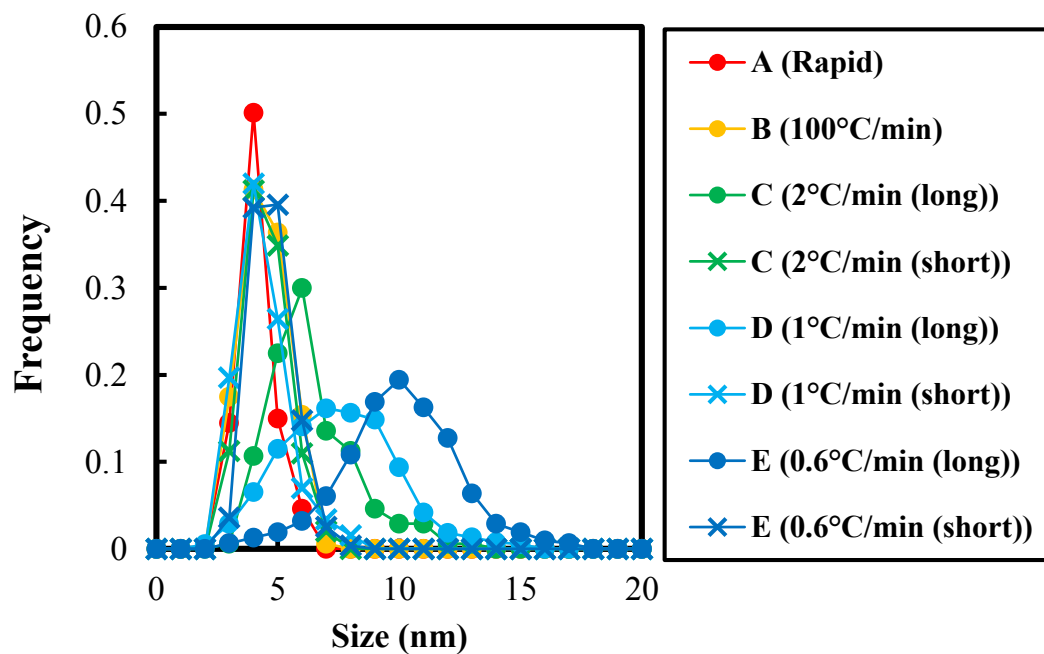


Fig. S1 Histogram of size of products by variable heating rates. The frequencies of all products were estimated from 500 particles or more in STEM images. Solid circle marks and cross marks mean the size frequencies of long and short axis, respectively.

Supplementary Figure

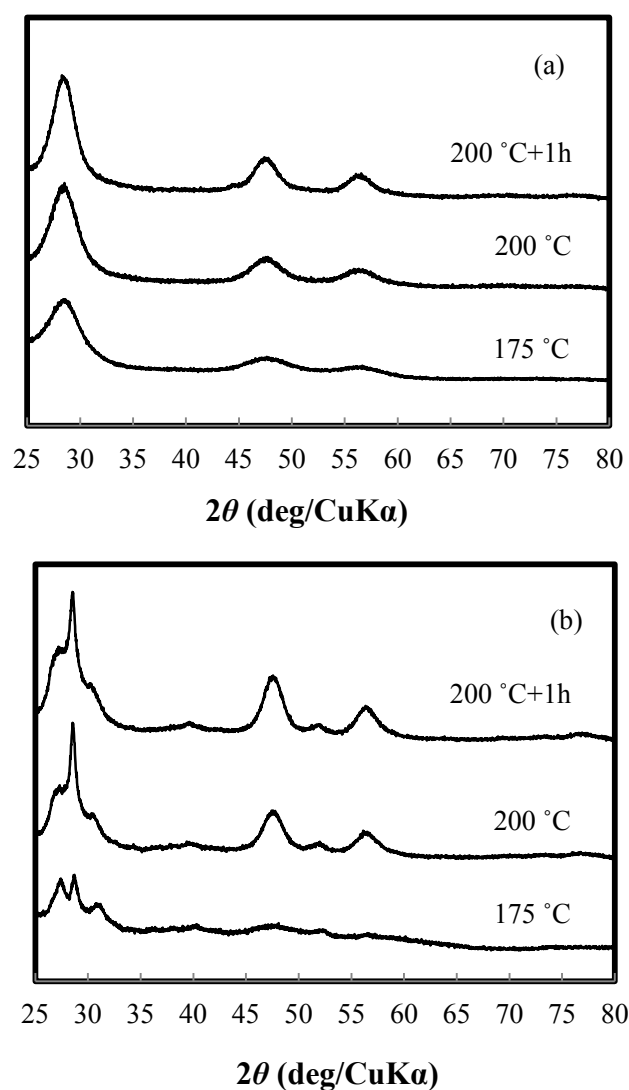


Fig. S2 XRD patterns of samples synthesized by 0.6 °C/min heating rate using two solutions. (a) volume ratio of oleylamine to 1-octadecene : 1/3 and (b) 1/0. In the low amount of oleylamine (ratio = 1/3), the crystalline phase was ZB even at 175 °C. In the solution without 1-octadecene (only oleylamine), the crystalline phase was WZ even after 200 °C holding. The transformation was not occurred both two cases.

Supplementary Figure

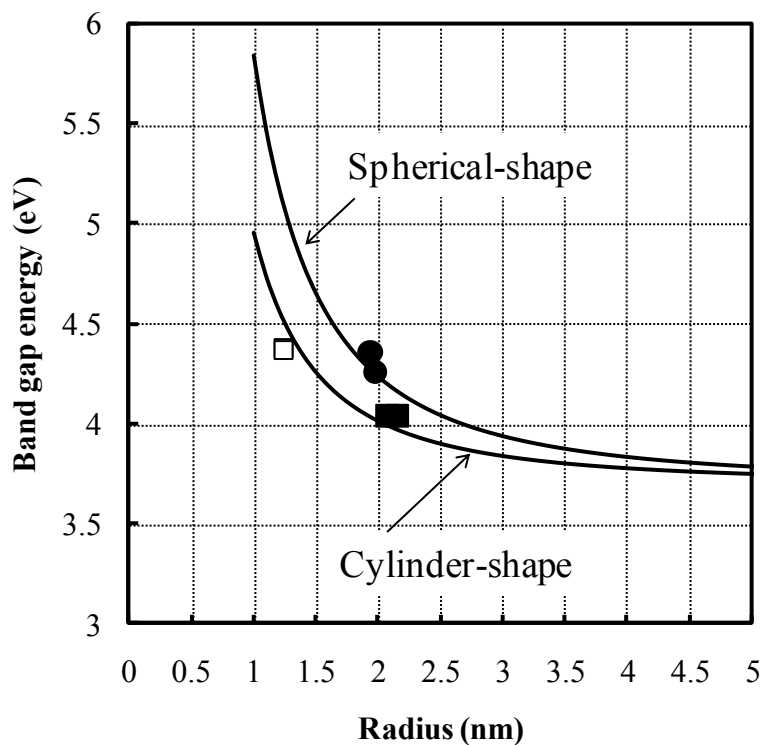


Fig. S3 Relationship between the particle size and band gap energy of products. Solid circle and square marks show the values of samples after 200 °C heating. Open square marks represent those of below 175 °C heating (indicated in Fig.5 and 6). Two solid curves were estimated by effective mass approximation.

The effective mass approximation is based on the following equation,

$$E_g = E_{g, \text{bulk}} + (\hbar^2 \zeta^2 / 2R^2)(1/m_e^* + 1/m_h^*) - 1.8 e^2 / \epsilon R$$

where, $E_{g, \text{bulk}}$ stands for band gap energy of bulk material (3.7 eV)⁹, \hbar represents Plank constant, R denoted radius of spherical particle or cylinder-shape particle, m_e^* signifies the effective mass of electron, m_h^* is the effective mass of hole, and ϵ is the dielectric constant. We used $m_e^*=0.25$, $m_h^*=0.59$ and $\epsilon/\epsilon_0=8.3$ (ϵ_0 is the vacuum dielectric constant) as the values of effective mass in ZnS.²⁹ For spherical shape, $\zeta = \pi$; whereas for cylindrical shape, $\zeta = 2.4048$.²⁸