

Synthesis of Ultra-small PbS Nanocrystal Quantum Dots for Energy Applications

최혜경¹, 정소희²

¹한국기계연구원, ²충북대학교

We present a new synthetic route and characterization for ultra small sized PbS quantum dots in extreme quantum confinement with 1.5 to 2.9 nm in diameter. We obtained a series of nanocrystals with first absorption wavelength ranging from 580 to 820 nm (2.1-1.5 eV). To get this result, PbS quantum dots size is finely controlled by adjusting the growth temperature in the range of 70-95°C. We demonstrate that photoluminescence (PL) shows a red shift with respect to the first absorption peak that increases with decreasing PbS quantum dots size and ranges from about 500 to 125 meV as the mean PbS quantum dots diameter increases from 1.5 to 2.9 nm. We further created the assembled PbS quantum dot solids and investigated the transport properties for energy applications.

Keywords: Quantum dot, PbS nanocrystal, Ultrasmall size