

Synthesis and Characterization Of PbS Nanoparticles For Bulk Hetero-junction Solar Cell Performance

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The semiconducting lead sulfide (PbS) nanoparticles (NPs) were prepared and the morphological, structural and optoelectronic properties of PbS NPs were investigated by using High-resolution transmission electron microscopy (HR-TEM), X-ray diffraction (XRD) and Ultraviolet visible (UV-vis), systematically. The shape of NPs was controlled, shows as HR-TEM images which is showed the shapes of PbS NPs are spherical, nano-tubes, nano-sheets and rectangles. The structure of PbS nanocrystals was confirmed by using XRD. Resulting, the structure of NCs is cubic phase with structure planes of (111), (200), (220), (311), (222), (400), (331), (420) and (422). Optical property is measured by UV-vis, which is showed the absorption peak at 936nm and band gap energy is about 1.3eV. Bulk hetero-junction solar cells will be fabricated by using PCPDTBT as the electron donor and PbS nanoparticle as the acceptor in the following device structure: Glass/ITO/PEDOT:PSS/(PbS+ PCPDTBT)/Al. Power conversion efficiency of device is measured by using a solar simulator (Keithley 69911) under AM 1.5 illumination.