



材料合成及性能

ZnSe : Cu/CdS核壳量子点的合成及光学性能研究

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摘要：以CdS为壳层材料对核水溶性ZnSe:Cu量子点进行包覆,得到ZnSe:Cu/CdS核壳结构的量子点。研究了壳层厚度对ZnSe:Cu量子点光学性能的影响,采用TEM、XRD、PL和UV-Vis手段对所得样品进行表征。实验结果表明:量子点为立方闪锌矿结构,分散性好,形状为球形,经壳层修饰后量子点的粒径由2.7 nm增大到4.0 nm。随着包覆CdS壳层数的增加,量子点的发射和紫外吸收谱红移,说明量子点在长大,证明CdS壳层生长在ZnSe:Cu量子点的表面,形成了核壳结构的ZnSe:Cu/CdS量子点。包覆CdS壳层后ZnSe:Cu量子点的发光强度减弱,但稳定性得到了提高。

关键词：量子点 ZnSe : Cu ZnSe : Cu/CdS 核壳结构

Synthesis and Photoluminescent Properties of ZnSe : Cu/CdS Core/Shell Quantum Dots

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Abstract: Water-soluble ZnSe:Cu quantum dots were synthesised in aqueous solution, ZnSe:Cu/CdS core/shell quantum dots(QDs)with different shell thickness were obtained in this paper. The influence of shell thickness on the optical properties of ZnSe:Cu QDs was studied. The samples were characterized by TEM, XRD, PL and UV-Vis. The results showed that ZnSe:Cu/CdS core/shell QDs have a cubic zinc-blende structure and are spherical with good dispersibility. The average grain size increased from 2.7 to 4.0 nm after the shell modification. The redshift of core/shell QDs compared with the core QDs was observed in both the UV-Vis and the PL spectra, which suggested that the size of core/shell QDs increased. The results proved that CdS shell were coated on the surface of ZnSe:Cu QDs and formed the ZnSe:Cu/CdS core/shell structure QDs. The PL intensity of the ZnSe:Cu QDs decreased with higher stability after being coated by CdS shell.

Keywords: quantum dots(QDs) ZnSe : Cu ZnSe : Cu/CdS core/shell structure

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