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论文

PAMAM树形分子模板法原位制备CdS-ZnS核-壳结构量子点

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摘要:

以4、5代PAMAM树形分子(64个酯端基)为模板, 在树形分子空腔内原位合成了CdS-ZnS核-壳结构量子点, 并对其形貌和光学性能进行了表征. HRTEM观察发现量子点分散良好, 尺寸均匀, 平均粒径约为2.3 nm. UV-Vis光谱证明ZnS外延生长在CdS核外, EDS能谱也证明了核壳结构的生成. 适当厚度的ZnS壳层可使光致发光效率提高至31%. PAMAM树形分子包在CdS-ZnS核-壳结构量子点外, 构成一层有机壳, 有效地限制了粒子聚集, 钝化了CdS量子点表面, 提高了发光效率. 另外， PAMAM树形分子良好的溶解性也赋予了量子点在不同极性溶剂中良好的溶解性, 提高了其稳定性.

关键词： PAMAM树形分子; 模板法; CdS-ZnS核　壳量子点; 表面钝化; 荧光效率

In-situ Synthesis of CdS-ZnS Core-shell Structure Quantum Dots Inside PAMAM Dendrimer Templates

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Abstract:

CdS-ZnS core-shell structure quantum dots(QDs) were in-situ synthesized inside PAMAM dendrimer templates of generation 4、5(containing 64 ester end groups). The size distribution of the well-dispersed QDs was narrow and the average diameter was about 2　3 nm as shown in HRTEM images. The red shift of the absorption spectra suggested the formation of the core　shell structure. Also the EDS confirmed that the QDs were comprised of CdS and ZnS. ZnS shell of appropriate thickness effectively eliminated the noradiactive centers and the PL efficiency was improved to 31%. An organic shell covering the CdS-ZnS core-shell QDs formed via the PAMAM dendrimers, which prevented the conglomeration of QDs, passivated the hanging bonds and improved the PL efficiency. Furthermore, the excellent solubility of PAMAM dendrimers in solvents with different polarities endowed the QDs good solubility and made the QDs more stable.

Keywords: PAMAM dendrimer; Template method; CdS-ZnS core-shell QDs; Surface passivation; Photoluminescence efficiency

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