



材料合成及性能

水溶性CdTe量子点荧光探针的制备表征及应用

周华健, 曹立新, 高荣杰, 苏革, 柳伟, 赵艳玲, 王磊

中国海洋大学材料科学与工程研究院, 山东 青岛 266100

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摘要：采用水相合成法,在氮气气氛下,以3-巯基丙酸(MPA)为稳定剂制备了水溶性的CdTe量子点,并通过荧光(PL)光谱、紫外可见(UV-Vis)光谱、透射电子显微镜(TEM)和X射线粉末衍射(XRD)对样品进行了表征。XRD结果表明量子点为立方闪锌矿结构,TEM结果表明量子点分散性较好,形状为球形,平均粒径为2.0 nm。进一步考察了回流时间、反应温度和体系pH值对量子点性能的影响,结果表明:回流时间、反应温度和体系pH值对量子点的粒径大小、粒径分布及生长速度均有影响。基于量子点对金属离子具有荧光响应的特性,以CdTe量子点为荧光探针实现了对水溶液中Ni²⁺的检测。

关键词：CdTe 量子点 荧光探针

Preparation, Characterization and Application of Water-soluble CdTe Luminescent Probes

ZHOU Hua-jian, CAO Li-xin, GAO Rong-jie, SU Ge, LIU Wei, ZHAO Yan-ling, WANG Lei

Institute of Materials Science and Engineering, Ocean University of China, Qingdao 266100, China

Abstract: 3-Mercaptopropionic acid capped CdTe quantum dots (QDs) were synthesized in aqueous solution under nitrogen protection. The samples were characterized by photoluminescence (PL) spectroscopy, Ultraviolet-Visible (UV-Vis) spectroscopy, transmission electron microscopy (TEM) and X-ray diffraction (XRD), respectively. The XRD result show that CdTe QDs have a cubic zinc-blende structure, and the TEM result show that CdTe QDs are spherical with good dispersibility. The effects of reflux time, reflux temperature and pH on the property of QDs were studied. Experimental results show that reflux time, reflux temperature and pH can influence the particle size, size distribution and the rate of growth. The obtained CdTe QDs are water-soluble and have fluorescence sensitivity to Ni²⁺ ions, thus CdTe QDs can be used as the fluorescent probe to investigate Ni²⁺ ion in water.

Keywords: CdTe QDs fluorescent probe

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通讯作者: 曹立新

作者简介: 周华健(1988-), 女, 山东德州人, 主要从事发光材料的研究。 E-mail: zhou_huajian@163.com

作者Email: caolixin@ouc.edu.cn

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