

研究论文

PAMAM树形分子与Cd²⁺的配位作用研究及CdS/PAMAM纳米复合材料的制备与表征

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收稿日期 2004-7-16 修回日期 2004-11-15 网络版发布日期 接受日期

摘要 CdS半导体纳米簇具有独特的光、电性能, 如何制备均匀分散的、能够稳定存在的CdS纳米簇是目前的研究热点之一. 以聚酰胺-胺(PAMAM)树形分子为模板, 原位合成了CdS纳米簇. 首先用UV-Vis分光光度法研究了与树形分子的配位机理, 得出G4.5和G5.0的平均饱和配位数分别为16和34, 并发现在G4.5PAMAM树形分子中Cd²⁺主要与最外层叔胺基配位, 在G5.0PAMAM树形分子中Cd²⁺主要与最外层伯胺基配位. 酯端基的G4.5的模板作用要明显优于胺端基的G5.0. 通过改变Cd²⁺与G4.5树形分子的摩尔比可以得到不同粒径的CdS纳米簇. 溶液的pH值对CdS纳米簇影响很大, pH在7.0左右制备的CdS纳米簇粒径小而均匀, 且溶液稳定性高. 用UV-Vis分光光度计和TEM对CdS纳米簇的大小和形貌进行了表征. 结果表明TEM观测CdS纳米簇的粒径要大于用Brus公式的估算值.

关键词 [硫化镉纳米簇](#) [PAMAM树形分子](#) [模板](#) [树形分子纳米复合材料](#)

分类号

Study on the Complexes between PAMAM Dendrimer and Cd²⁺ and the Preparation of CdS/PAMAM Dendrimer Nanocomposite

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Abstract The complexation between PAMAM dendrimers and Cd²⁺ was studied by titrating PAMAM dendrimers with dilute cadmium acetate methanol solution under the monitoring of UV-Vis spectrophotometry. The results showed that the average number of Cd²⁺ complexed with a PAMAM dendrimer is 34 for a primary amine-terminated G5.0 dendrimer and 16 for an ester-terminated G4.5 dendrimer. A series of CdS/PAMAM dendrimer nanocomposites of different diameters were prepared by leading H₂S into the methanol solution of Cd²⁺/PAMAM complexes with different Cd²⁺/PAMAM ratio. The gained CdS/PAMAM dendrimer nanocomposites were characterized by UV-Vis spectrophotometry and TEM. The study implied that G4.5 PAMAM dendrimers were better templates. The stability, diameter and dispersion of the CdS clusters were affected remarkably by the changes of the ratio of Cd²⁺ to G4.5 PAMAM dendrimer and pH of the solution. The results showed that in neutral solution the stability and the dispersion of CdS/PAMAM dendrimer nanocomposites were better and the diameters were smaller.

Key words [CdS cluster](#) [PAMAM dendrimer](#) [template](#) [dendrimer nanocomposite](#)

DOI:

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