

研究论文

金纳米粒子表面自组装巯基十一烷醇单分子层体系的制备及其光散射特性研究

尹洪宗^{1,2}, 刘辉¹, 李园园¹, 何锡文*¹, 陈朗星¹, 李文友*¹

(¹南开大学化学系 天津300071)

(²山东农业大学化学与材料科学学院 泰安271018)

收稿日期 2004-5-28 修回日期 2005-3-6 网络版发布日期 接受日期

摘要 采用柠檬酸钠还原法制备了水相金纳米粒子, 通过巯基的自组装, 成功获得了巯基十一烷醇(MUN)单分子层保护的金纳米粒子. 用紫外可见光谱、透射电子显微镜、激光散射粒度分析、同步散射光谱和发射光谱等手段对组装前后的金纳米粒子的性质进行了研究. 结果表明:

制备的金纳米粒子最大吸收波长518 nm, 形状规则, 粒度均匀, 平均粒径为14.6 nm, 每个粒子含有约 9.64×10^4 原子; 组装之后的金纳米粒子表面等离子体共振吸收峰红移17.0 nm, 平均粒径增大为20.2 nm, 组装层的平均厚度2.8 nm, 与MUN分子长度相当, 结合量实验证明每一个金纳米粒子可以结合约 7.52×10^3 个MUN, 表面覆盖率为83.6%, 粒子分散均匀, 稳定性增强可长期保存; 同步散射光谱变化和发射光谱中分频、差频和倍频峰的存在证明, 金纳米粒子组装前后均具有非线性光学特性.

关键词 [制备](#) [金纳米粒子](#) [自组装单分子层](#) [同步光散射光谱](#) [巯基十一烷醇](#)

分类号

Preparation and Light-scattering Characterization of Gold Nanoparticle Self-assembled by Mercaptoundecanol Monolayer

YIN Hong-Zong^{1,2}, LIU Hui¹, LI Yuan-Yuan¹, HE Xi-Wen*¹, CHEN Lang-Xing¹, LI Wen-You*¹

(¹Department of Chemistry, Nankai University, Tianjin 300071)

(²College of Chemistry and Material Science, Shandong Agricultural University, Tai'an 271018)

Abstract A water-soluble gold nanoparticle was prepared with trisodium citrate and hydrogen tetrachloroaurate by reduction method. Using mercaptoundecanol as a self-assembled molecule, self-assembled monolayer-protected gold nanoparticle was obtained. Various techniques, such as UV-Vis spectrophotometry, transmission electron microscopy, laser scattering size analysis, synchronous light-scattering spectrum, emission spectrum, were used to characterize nanoparticles. The diameter of monolayer-protected gold nanoparticle was about 20.2 nm, bigger than that of gold nanoparticle of 14.6 nm. There were about 9.65×10^4 gold atoms in a gold nanoparticle and 7.52×10^3 mercaptoundecanol molecules binding to it. The monolayer-protected gold nanoparticle was global and compact. Compared with gold nanoparticle (518 nm), its UV-Vis absorption peak has been red-shifted to 535 nm. Both gold nanoparticles and monolayer-protected gold nanoparticles had a nonlinear light-scattering characteristic.

Key words [preparation](#) [gold nanoparticle](#) [self-assembled monolayer](#) [synchronous light-scattering spectrum](#) [mercaptoundecanol](#)

DOI:

通讯作者 何锡文 xiwenhe@nankai.edu.cn

扩展功能

本文信息

▶ [Supporting info](#)

▶ [PDF\(371KB\)](#)

▶ [\[HTML全文\]\(0KB\)](#)

▶ [参考文献](#)

服务与反馈

▶ [把本文推荐给朋友](#)

▶ [加入我的书架](#)

▶ [加入引用管理器](#)

▶ [复制索引](#)

▶ [Email Alert](#)

▶ [文章反馈](#)

▶ [浏览反馈信息](#)

相关信息

▶ [本刊中 包含“制备”的 相关文章](#)

▶ 本文作者相关文章

- [尹洪宗](#)
- [刘辉](#)
- [李园园](#)
- [何锡文](#)
- [陈朗星](#)
- [李文友](#)