

研究论文

银纳米粒子自组装结构的光谱性质研究

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摘要 采用自组装方法在玻璃基底表面上构筑了银纳米粒子二维亚单层结构, 进而以对巯基苯胺为耦联分子进行银粒子的二次组装, 构成具有分子尺寸间隙的银粒子簇. 银粒子表面等离子体共振依赖于粒子间距、表面吸附分子和粒子组装方式. 同层内的银粒子相互间电磁耦合可导致银粒子偶极子等离子体共振蓝移; 对巯基苯胺的吸附则使得表面等离子体共振红移. 表面增强拉曼光谱结果表明, 具有分子尺寸间隙的银粒子簇对耦联于粒子间的对巯基苯胺分子的拉曼散射具有极大的增强效应, 同时也使耦联的对巯基苯胺与银粒子间产生更大程度的电荷转移.

关键词 [银纳米粒子](#) [对巯基苯胺](#) [自组装](#) [表面增强拉曼光谱](#) [表面等离子体共振](#)

分类号

Spectroscopic Study of Self-assembly Structure of Silver Nanoparticles

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Abstract Two-dimensional submonolayer of silver nanoparticles was prepared on glass surface by self-assembly method. Double assembly structure of silver nanoparticles was also constructed with 4-aminothiophenol as the linker, forming particle cluster with molecular gap between the particles. Surface plasmon resonance (SPR) of the assembled silver nanoparticles depended on the distance between the particles, the adsorption of molecules, and the assembly structure. The electromagnetic coupling among the particles in the particle monolayer resulted in a blue shift of the SPR band. The adsorption of 4-aminothiophenol, on the other hand, caused a red shift of the SPR band. Surface-enhanced Raman spectroscopic results demonstrated that the silver nanoparticle cluster with molecular gap between the particles led to a great enhancement of the Raman scattering of the linker 4-aminothiophenol molecules, and larger extent of charge transfer between the 4-aminothiophenol molecules and silver nanoparticles.

Key words [silver nanoparticle](#) [4-aminothiophenol](#) [self-assembly](#) [surface-enhanced Raman spectroscopy](#) [surface plasmon resonance](#)

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