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技术及应用

玻璃基底上三角纳米银的原位生长与光谱特性研究

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摘要 以经硅烷化后的玻璃片为基底，吸附三角形银纳米种子，采用柠檬酸钠为还原剂，在室温下还原硝酸银，制备出基底表面具有三角形银纳米粒子聚集结构的材料。应用透射电镜、扫描电镜、X射线衍射仪、吸收和荧光光谱对产物的结构和性质进行表征。结果表明：随着生长液体积的增加，基片上三角形银纳米盘的平均粒径长大约为300 nm，且基底上出现了双层粒子堆叠；基底上纳米粒子的吸收光谱中出现了由银粒子的表面等离子体激元偶极子耦合引发的强烈吸收峰，耦合峰在600～800 nm波段内移动；在215 nm紫外光的激发下，基底上纳米粒子的荧光光谱在400 nm处出现发射峰，荧光光谱的发光强度随着基底上粒子平均尺度增加而减弱。

关键词 三角形银纳米盘 种子法 玻璃基底 表面等离子体共振 荧光

分类号

In-situ Growth of Triangular Silver Nanoplate Structure on Glass Substrates and Their Spectral Properties

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Abstract Triangular silver nanoplates on the surface of glass substrate were synthesized by small triangular silver nanoplate seeds with the assistance of trisodium citrate dihydrare. The substrates were characterized by transmission electron microscopy, scanning electron microscopy, X-ray diffraction, absorption and fluorescence spectroscopy, respectively. The results show that the triangular silver nanoplate of the substrates finally grows up to 300 nm with the volume increasing of growth solution, and some of nanoparticles stack forms bilayer. A new broad band appears in the absorption spectra of the substrates due to the interparticle dipole-dipole coupling of surface plasmon resonance response of the triangular silver nanoplate particles, which red shifts in 600-800 nm as the particles grow up, indicating the intensification of the coupling. The substrates have an emission band centered at 400 nm in their fluorescence spectra under excitation at 215 nm, the fluorescence intensity shrunk as the average size of the triangular silver nanoplate particles increases.

Key words triangular silver nanoplate seed-mediated method glass substrate surface plasmon resonance fluorescence

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