

研究论文

## 金纳米粒子的阳光光化学合成和晶种媒介生长

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**摘要** 在柠檬酸盐-HAuCl<sub>4</sub>溶液体系中, 于高原太阳紫外线辐射下光化学合成了分散良好、尺寸分布窄的胶体金纳米粒子. 研究了溶液的酸度和太阳辐射条件对Au(III)离子光化学还原反应速率和形成金纳米粒子尺寸的影响; 采用晶种媒介生长技术, 通过改变Au(0)/Au(III)比合成了平均直径为4.9~9.7 nm的球形金粒子. 根据紫外-可见吸收光谱和透射电子显微镜的表征和分析, 讨论了光化学反应中自由基反应、金纳米粒子成核和生长机理.

**关键词** [太阳紫外线辐射](#) [光化学还原](#) [金纳米粒子](#) [晶种法](#) [机理](#)

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## Photochemical Synthesis and the Seeding-mediated Growth of Gold Nanoparticles Under the Sunlight Radiation

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**Abstract** In the aqueous citrate-chloroauric acid solution, well-dispersed gold nanoparticles were synthesized by the photochemical reduction under the UV solar radiation on plateau. The influences of the pH of the mixture solution and the UV solar radiation conditions on the photochemical reaction rate and the size of gold nanoparticles were investigated. By means of seeding-mediated growth approach, monodispersed spherical gold nanoparticles with an average diameter from 4.9 nm to 9.7 nm and with a narrow size distribution were obtained by varying the ratio of Au(0) seed to Au(III) ion under suitable conditions. Based on the characterization by UV-Vis adsorption spectrum and transmission electron microscope(TEM), the mechanisms of the freedom radical reaction, the nucleation and growth during the formation process of the gold particles were discussed.

**Key words** [UV solar radiation](#) [Photochemical reduction](#) [Gold nanoparticles](#) [Seed approach](#) [Mechanism](#)

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