

# Synthesis and optical properties of colloidal gold nanoparticles

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**Abstract:** Colloidal gold nanoparticles (spheres) have been prepared from  $\text{HAuCl}_4$  containing aqueous solution by using X-ray irradiation and by chemical reduction method. Gold nanorods were synthesized according to the seed-mediated growth method. The colloidal gold nanoparticles were characterized by using transmission electron microscopy, X-ray diffraction, and UV-VIS absorption spectroscopy. It was found that the concentration of the precursors affects the size of the nanoparticles. In the chemical reduction approach the size of nanoparticles can be controlled by varying amount of trisodium citrate, but in the photochemical method the size of nanoparticles can be controlled by varying the ratio of  $\text{HAuCl}_4$  to TX-100 and X-ray irradiation duration. Gold nanorods have been synthesized according to the seed-mediated growth method with two steps. The effect of silver acetate and CTAB on formation of gold nanorods has been studied. © 2009 IOP Publishing Ltd.

**Author Keywords:** Chemical reduction method; Gold nanoparticles; Metallic nanoparticles; Photochemical method

Year: 2009

Source title: Journal of Physics: Conference Series

Volume: 187

Art. No.: 12026

Cited by: 1

Link: [Scopus Link](#)

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ISSN: 17426588

DOI: 10.1088/1742-6596/187/1/012026

Language of Original Document: English

Abbreviated Source Title: Journal of Physics: Conference Series

Document Type: Article

Source: Scopus

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