

## First View

## Seed-mediated synthesis and PEG coating of gold nanoparticles for controlling morphology and sizes

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## Abstract

A significant area of research is biomedical applications of nanoparticles which involves efforts to control the physicochemical properties through simple and scalable processes. Gold nanoparticles have received considerable attention due to their unique properties that they exhibit based on their morphology. Gold nanospheres (AuNSs) and nanorods (AuNRs) were prepared with a seed-mediated method followed of polyethylene glycol (PEG)-coating. The seeds were prepared with 0.1 M cetyltrimethyl-ammonium bromide (CTAB), 0.005 M chloroauric acid (HAuCl<sub>4</sub>), and 0.01 M sodium borohydride (NaBH<sub>4</sub>) solution. Gold nanoparticles with spherical morphology was achieved by growth by aggregation at room temperature, while to achieve the rod morphology 0.1 M silver nitrate (AgNO<sub>3</sub>) and 0.1 M ascorbic acid solution were added. The gold nanoparticles obtained by the seed-mediated synthesis have spherical or rod shapes, depending on the experimental conditions, and a uniform particle size. Surface functionalization was developed using polyethylene glycol. Morphology, and size distribution of AuNPs were evaluated by Field Emission Scanning Electron Microscopy. The average size of AuNSs, and AuNRs was 7.85nm and 7.96 x 31.47nm respectively. Fourier transform infrared spectrometry was performed to corroborate the presence of PEG in the AuNPs surface. Additionally, suspensions of AuNSs and AuNRs were evaluated by UV-Vis spectroscopy. Gold nanoparticles were stored for several days at room temperature and it was observed that the colloidal stability increased once gold nanoparticles were coated with PEG due to the shield formed in the surface of the NPs and the increase in size which were 9.65±1.90 nm of diameter for AuNSs and for AuNRs were 29.03±5.88 and 8.39±1.02 nm for length and transverse axis, respectively.

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