

## Abstract

Metallic nanoparticles exhibit localized surface plasmon resonances resulting from the coherent oscillation of free electrons in response to electric field from incident electromagnetic radiation. In this work, the dependence of peak surface plasmon resonance of gold nanoparticles on the particle size using UV–Vis spectra is shown. Small-sized gold nanoparticles (10–15 nm) were prepared through citrate reduction method. From theoretical modelling based on their resonance peaks and full wave at half maximum, the gold nanoparticles were found to have a narrow size distribution of  $\sim 12$  nm optimized over 1.0–1.10 mL of the citrate. A comparison of the experimental data and data from multiple scattering theory revealed that the plasmon resonances were centered at wavelengths between 520 and 518 nm for all samples under citrate volume range from 0.85 to 1.15 mL. Further analysis indicated that, small sized AuNPs exhibited multiple resonances, which could be attributed to the radiative interband recombination between the sp- and d-bands.