

# **A Novel Method to Monitor Sequential Displacement of Capped Ligands in Gold Nanoparticles**

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## **Abstract**

Nanochemistry of ligand displacement reactions has attracted much attention in recent years for the development of myriad of new gold nanomaterials. Gold nanoparticles have shown applications ranging from tumor imaging agent in nanomedicine to single electron devices in information technology. New gold materials are synthesized by exchange of neutral or anionic ligands with thiolated molecules. Completion of ligand substitution reactions in gold nanoparticles are monitored by using UV-Vis spectrometry. However, there are no methods available to monitor the sequence of the ligand substitution reactions. Monitoring and predicting the sequence of ligand substitutions would provide a convenient handle for the design and development of hybrid nanomaterials containing two or more ligands. In this context, we have developed a novel technique utilizing disc centrifuge systems to monitor the sequential displacement of ligands in various gold nanoconstructs. In our studies, we have used gold nanoparticles stabilized with both anionic and neutral ligands. Gold nanoparticles of various different substitutions have been identified and characterized by disc centrifuge systems. Details of substitution reactions and mechanism on monitoring the sequential displacement using strong ligands will be presented.