# Self-Assembled Chiral Gold Nanoclusters for Enantiospecific Recognition of Carntine

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**Abstract**

Stereospecific recognitions of chiral molecules are ubiquitously present in chemical and biological systems leads to strong demand for development of enantiomeric drugs, enantioselective sensors, and asymmetric catalysts. In this study, we demonstrated the optical properties as well as structures of self-assembled supramolecular Cys-Au(I) prepared through a simple reaction of tetrachloroaurate(III) with chiral cysteine (Cys) was highly depended the ratio of d-Cys and l-Cys. The irregular shaped -[d-Cys-Au(I)]$n$- or -[l-Cys-Au(I)]$n$- supramolecules with the size larger 500 nm possess strong absorption at near UV region and chiroptical characteristics were obtained from reaction of Au(III) and d-Cys or l-Cys. The well confined Au(I)...Au(I) aurophilic interactions coupled with stacked hydrogen bonding and zwitterionic interactions between d/l-Cys ligands in the -[d/l-Cys-Au(I)]$n$- lead it to form an exceptional spindle-shaped supramolecules. The NaBH4-mediated reduction leads the formation of photoluminescent gold nanoclusters (Au NCs) embedded in the chiral -[d-Cys-Au(I)]$n$- or -[l-Cys-Au(I)]$n$- supramolecules with the quantum yield of 10%. The as-formed An NCs/-[d-Cys-Au(I)]$n$- and An NCs/-[l-Cys-Au(I)]$n$- could be a enantiospecific substrate to trap d-carntine and l-carntine, respectively, and as nanomatrix for surface-assisted laser desorption/ionization mass spectrometry (LDI-MS). The high laser absorption efficiency, analyte-binding capacity and homogeneity endow the An NCs/-[d-Cys-Au(I)]$n$- and An NCs/-[l-Cys-Au(I)]$n$- for the detection of enantiomeric carnitine down to nanomolar regime with high reproducibility. The superior efficiency of An NCs/-[d -Cys-Au(I)]$n$- substrate thereby enabling LDI-based measurements to a consistent quantification of l-carntine ions in real samples.

**Keywords:** Photoluminescent, Gold nanoclusters, Chiral molecules, Self Assembled

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