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Green Synthesis of Red-Fluorescent Gold Nanoclusters: Characterization and Application for Breast Cancer Detection

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Abstract : The use of biocompatible precursors for the synthesis and stabilization of fluorescent gold nanoclusters (NCs) with strong red photoluminescence creates an important link between natural sciences and nanotechnology. Herein, we report the cost-effective synthesis of Au nanoclusters by templating and reduction of chloroauric acid with the cheap amino acid food supplements. This synthesis under the optimized conditions leads to the formation of biocompatible Au NCs having good stability and intense red photoluminescence, peaked at 680 to 705 nm, with a quantum yield (QY) of ≈7% and the average lifetime of up to several μs. The composition and luminescent properties of the obtained NCs were compared with ones formed via well-known bovine serum albumin reduction approach. Our findings implied that synthesized Au NCs tend to accumulate in more tumorigenic breast cancer cells (line MDA-MB-213) and after dialysis can be prospective for bio imagining.

Keywords : gold nanoclusters, proteins, materials chemistry, red-photoluminescence, bioimaging
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