# INVESTIGATION OF PROTEIN-STABILIZED GOLD NANOCLUSTERS WITH APPLICABILITY IN CELLULAR IMAGING

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## Abstract

With the development of confocal microscopy techniques, fluorescence imaging has been proven as a powerful tool in early detection and diagnosis of diseases [1]. Photoluminescent metal nanoclusters have attracted extensive research interest due to numerous advantages such as high photostability, small dimensions and large Stokes shift [2]. Herein, we developed bovine serum albumin stabilized gold nanoclusters (BSA-AuNCs) with an intrinsic photoluminescence in the first biological window. The formation of nanoclusters was proved via transmission electron microscopy (TEM) and their strong red emission. Afterwards, the photostable BSA-AuNCs were functionalized with folic acid (FA-BSA-AuNCs) for the specific binding with the overexpressed folate receptor α in human ovarian adenocarcinoma cells (NIH:OVCAR-3). The superior biocompatibility and internalization of FA-BSA-AuNCs compared to the BSA-AuNCs inside ovarian cancer cells was assessed by proliferation assays and steady-state fluorescence microscopy, respectively. Although the OVCAR-3 cells present a low autofluorescence, the intrinsic photoluminescence of FA-BSA-AuNCs surrounding the nucleus highlights the cellular cytoplasm, acting as efficient fluorescent contrast agents. The localization of FA-BSA-AuNCs inside cancer cells using fluorescence lifetime imaging microscopy (FLIM) is currently under investigation. Considering their valuable fluorescent properties, the synthesized FA-BSA-AuNCs hold great promise for direct application in cellular imaging towards early cancer diagnosis.

**Keywords**: gold nanoclusters, photoluminescence, fluorescence imaging

**Domain**: physics

**Section**: Elaboration of the doctoral thesis

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