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# Polydopamine-Based Functional Composite particles for Tumor Cell

## Targeting and Dual-Mode Cellular Imaging

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### Abstract

Particles which bear tumor cell targeting and multimode imaging capabilities are promising in tumor diagnosis and cancer therapy. A simple and versatile method to fabricate gold/polydopamine-Methylene Blue@Bovine Serum Albumin–glutaraldehyde–Transferrin composite particles (Au/PDA-MB@BSA-GA-Tf NPs) for tumor cell targeting and fluorescence (FL) / surface-enhanced Raman scattering (SERS) dual-modal imaging were reported in this work. Polydopamine (PDA) spheres played an important role in gold ion reduction, gold nanoparticle (Au NPs) binding and methylene blue (MB) adsorption, MB were employed as both fluorescence label and Raman reporter. In addition, glutaraldehyde (GA) crosslinked bovine serum albumin (BSA) in the outer layer of Au/PDA-MB nanoparticles can prevent MB from dissociation and leakage. The composite nanoparticles were further conjugated with transferrin (Tf) to target transferrin receptor (TfR)-overexpressed cancer cells. The targeting ability as well as the intracellular location of the probe was investigated through SERS mapping and fluorescence imaging. Their excellent biocompatibility was demonstrated by low cytotoxicity against breast cancer cell (4T1 cell).

**Keywords:** Au/PDA-MB@BSA-GA-Tf NPs, tumor cell targeting, fluorescence, SERS, imaging, biocompatibility

### 1. Introduction

Imaging technology, one of the most intuitive ways for pathological changes research in lesions, is an essential part of cancer clinical protocols, which could furnish morphological, structural, metabolic and

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