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Silver ions enhanced AuNCs fluorescence as a turn-off nanoprobe for ultrasensitive detection of iodide

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Abstract: Fluorescence nanoprobe are frequently employed to construct sensitive biosensors via turn-on and turn-off strategy. In this paper, a novel strategy for ultrasensitive detection of iodide was firstly constructed based on Ag⁺ regulated photoluminescence enhancement of gold nanoclusters (AuNCs) as a turn-off nanoplatform. In the presence of Ag⁺, the fluorescence (FL) intensity of AuNCs can be enhanced obviously. When adding iodide ions (I⁻) in the Ag⁺-AuNCs, Ag⁺ can be pulled down from AuNCs and results in quenching of the fluorescent effectively owing to the combination between Ag⁺ and I⁻. Compared with that of I⁻ directly reaction with AuNCs, the introducing of Ag⁺ shows improved quenching efficiency from 32% to 66% since I⁻ can react with Ag⁺ as well as AuNCs. Therefore, the platform could be applied to assay of Ag⁺ and I⁻, on the basis of the FL enhancement and the further FL quenching. The detection ranges and detection limits were 0.2-12 μM and 0.06 μM for Ag⁺, 0.001-6 μM and 0.3 nM for I⁻, respectively. The new sensing method based on ion regulation to enhance the detection sensitivity can extend to the appliance of other fluorescent materials in biosensing and biomedical field.

Keywords:

GSH-AuNCs, Ag⁺, I⁻, fluorescence enhancement, turn-off nanoprobe, ultrasensitive detection.

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