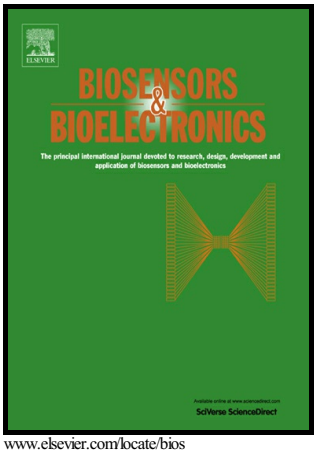

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Dual-channel Probe of Carbon Dots Cooperating with Gold Nanoclusters Employed for Assaying Multiple Targets

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Abstract

Herein, carbon dots (CD@Papain) from papain have been originally synthesized in aqueous solution along with a quantum yield of 6.2%, and showed cyan fluorescence at 435 nm. Meanwhile, papain-templated Au nanoclusters (AuNCs@Papain) were prepared with the same precursor. On the basis of the two types of nanomaterials, CD@Papain and AuNCs@Papain have been designed to assemble as one nanosensor (termed as CD-AuNCs@Papain) through a typical cross-linking reaction. Significantly, it not only emitted the dual-emission fluorescent signals with the same excitation, but also can assay multiple targets through exhibiting cyan, yellow, and red emission respectively. Thereby, H_2O_2, doxycycline and I^- can be detected by CD-AuNCs@Papain. The mechanism of the fluorescence variations of CD-AuNCs@Papain: Au(0) of CD-AuNCs@Papain oxidized as Au(I) by H_2O_2, the formation of hydrogen bonds between the CD-AuNCs@Papain and I^-, the inner filter effect (IFE) occurring caused by tetracyclines. Meanwhile, the detection limits of H_2O_2, doxycycline and I^- were obtained as 0.3 nM, 0.2 nM, and 0.6 nM at a signal-to-ratio of 3, respectively. These results suggested that the nanoprobe here has provided the possibility for rapidly assaying multiple targets with the acceptable selectivity.

Key words: Carbon dots; Au nanoclusters; Papain; Dual-channel; Multiple targets