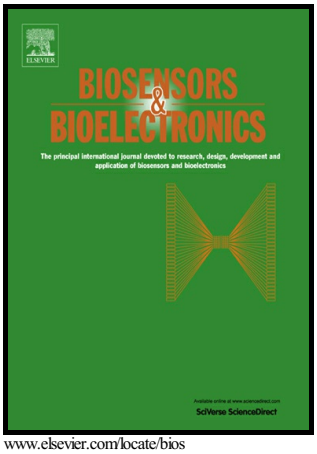

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A novel sensitive colorimetric sensor for Cu^{2+} based on in situ formation of fluorescent quantum dots with photocatalytic activity

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ABSTRACT

This work demonstrates the use of quantum dots (QDs) with photocatalytic activity as a sensitive, inexpensive and rapid colorimetric platform for Cu^{2+} sensing. Based on the simple thiol compound mediated QDs growing method, CdS QDs can be quickly formed in situ, which possess excellent photocatalytic ability for the oxidation of 3,3',5,5'-tetramethylbenzidine (TMB) to produce a colored product under light irradiation. Cu^{2+} can catalyze the oxidation of sulfhydryl groups in glutathione (GSH) which act as a stabilizer for CdS QDs. In the presence of Cu^{2+}, GSH is oxidized and loss the stabilization ability for the growth of CdS QDs, thus resulting in the decrease of the absorbance. Under optimum conditions, as low as 5.3 nM Cu^{2+} can be detected. This sensing system is simple, reliable and holds great potential to provide a new general platform for ultrasensitive monitoring of a variety of analytes.

Keywords: Colorimetric sensor, copper ions, quantum dots, photocatalytic activity

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