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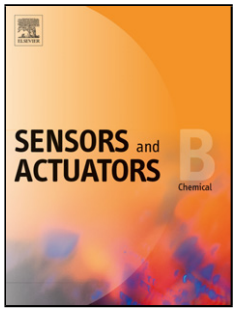

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A ratiometric fluorescence visual test paper for an anthrax biomarker based on functionalized manganese-doped carbon dots

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Highlights

1. Functionalized fluorescent manganese-doped carbon dots (FMn-CDs) were synthesized.
2. The FMn-CDs showed excellent water-solubility and biocompatibility.
3. A ratiometric fluorescence sensing approach for an anthrax biomarker was developed.
4. FMn-CDs test paper was produced for visual detection of DPA with a smartphone.

Abstract: Functionalized manganese-doped carbon dots (FMn-CDs) were prepared by integration of pyrolysis-derived Mn-CDs with ethylene diamine, ethylenediamine tetraacetic acid and Eu(III) ions. The FMn-CDs emitted intense blue fluorescence with high photostability, excellent water-solubility and favorable biocompatibility. 2, 6-dipicolinic acid (DPA) is an important biomarker of *Bacillus anthracis spore*. It serves as an antenna suction light group and can sensitize the Eu(III) combined on the FMn-CDs to produce bright red fluorescence. Benefitting from the absorbance energy transfer emission effect from DPA to the sensitized Eu(III), a ratiometric biosensor towards DPA detection was developed. The approach exhibited a linearity range from 0.1 to 750 nM and a detection limit of 0.1 nM. Moreover, visual FMn-CDs test paper was produced for the DPA detection using a smartphone under a portable UV lamp, with a lowest detection limit of 1 μM. This work revealed the potential of a convenient smart phone diagnostics for DPA detection using visual FMn-CDs test paper.

Keywords: FMn-CDs; Ratiometric fluorescence biosensor; Dipicolinic acid; Visual

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