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www.elsevier.com/locate/bios

PII: S0956-5663(16)30650-9
DOI: <http://dx.doi.org/10.1016/j.bios.2016.07.021>
Reference: BIOS8902

To appear in: *Biosensors and Bioelectronic*

Received date: 16 June 2016
Revised date: 5 July 2016
Accepted date: 7 July 2016

Cite this article as: Xiaoyan Huang, Yujie Zhou, Cui Liu, Ruilong Zhang, Liying Zhang, Shuhu Du, Bianhua Liu, Ming-Yong Han and Zhongping Zhang, A Single Dual-Emissive Nanofluorophore Test Paper for Highly Sensitive Colorimetry-Based Quantification of Blood Glucose, *Biosensors and Bioelectronic*, <http://dx.doi.org/10.1016/j.bios.2016.07.021>

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A Single Dual-Emissive Nanofluorophore Test Paper for Highly Sensitive Colorimetry-Based Quantification of Blood Glucose

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ABSTRACT

Fluorescent test papers are promising for the wide applications in the assays of diagnosis, environments and foods, but unlike classical dye-absorption-based pH test paper, they are usually limited in the qualitative yes/no type of detection by fluorescent brightness, and the colorimetry-based quantification remains a challenging task. Here, we report a single dual-emissive nanofluorophore probe to achieve the consecutive color variations from blue to red for the quantification of blood glucose on its as-prepared test papers. Red quantum dots were embedded into silica nanoparticles as a stable internal standard emission, and blue carbon dots (CDs) were further covalently linked onto the surface of silica, in which the ratiometric fluorescence intensity of blue to red is controlled at 5:1. While the oxidation of glucose induced the formation of Fe^{3+} ions, the blue emission of CDs was thus quenched by the electron transfer from CDs to Fe^{3+} , displaying a serial of consecutive color variations from blue to red with the dosage of glucose. The high-quality test papers printed by the probe ink exhibited a

¹ These authors contributed equally to this work.

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