

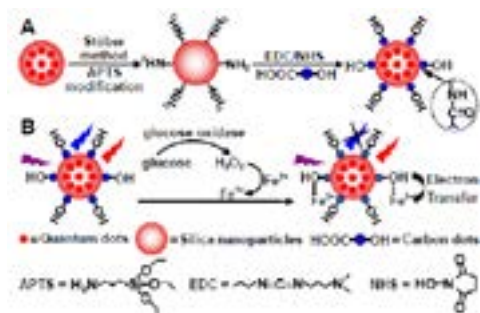
June 04-05, 2018
London, UKShuhu Du, Polym Sci 2018, Volume 4
DOI: 10.4172/2471-9935-C2-012

A SINGLE DUAL EMISSIVE NANOPROBE FOR QUANTIFICATION OF SPONTANEOUS GLUCOSE IN HUMAN SERUM

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In this work, we report a strategy of a single dual-emissive ratiometric fluorescent nanoprobe (QDs@SiO₂-CDs) with the controllable ratio of emissive intensities to realize the consecutive color variations from blue to red for the quantification of blood glucose. The red quantum dots (rQDs) were embedded into silica nanoparticles (SiO₂ NPs) as an stable internal standard emission, and blue carbon dots (bCDs) were further covalently linked onto the surface of SiO₂ NPs, in which the ratiometric fluorescence intensity of blue to red is controlled at 5: 1 (from QDs@SiO₂-CDs) was thus quenched by the electron transfer from CDs to Fe³⁺. Meanwhile, the fluorescent intensity (at 630 nm) of rQDs (from QDs@SiO₂-CDs) keeps almost unchanged. It has been demonstrated that the fluorescence intensity ratio I₄₄₅/I₆₃₀ is linearly related to the glucose concentration in the range of 0–75 μ M ($R^2 = 0.989$). The calculated detection limit is about 3 μ M in terms of the 3 σ rule. Consecutive color variations from blue to red with the dosage of glucose can be seen under a 365 nm UV lamp. That is to say, the ratiometric fluorescent probe can be used for the detection of glucose in human serum. The test result show that the spontaneous blood glucose determined by the probe was almost in accordance with that measured by a standard glucometer. The method reported here opens a window to the wide applications of the ratiometric fluorescent probe in biological assays.



Scheme 1. Schematic illustration of (A) the synthesis of the dual-emission ratiometric fluorescent probe QDs@SiO₂-CDs nanoparticles and (B) the visual detection of glucose.

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Biography

Shuhu Du is working as a professor at Nanjing Medical University, China. On July, 1987–November, 2004, He was doing as research fellow in Anhui Academy of Medical Sciences. His work was for the Drug development research.

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