Multifunctional ratiometric fluorescence probe: Intracellular Fe^{3+} sensing in living cells and portable paper-based pH sensor

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Ferric ions play key roles in the human body and any overload or anaemic disorders can cause significant dysfunction. Thus, engineering a selective and sensitive sensor to detect such ions is a high priority. Furthermore, developing an inexpensive portable, accurate probe for pH monitoring is a matter of great importance. We developed a novel ratiometric probe with high sensitivity toward Fe^{3+} metal ions and pH values. First, the carbon dots (CDs) synthesized using hydrothermal method which followed by comprehensive optical properties optimization due to the particle size effect on absorption, excitation, and emission of CDs. Second, we conjugated the CDs with FITC and the sensing ability of the probe toward variation of pH, and Fe^{3+} ions were examined in aqueous solution. Third, we used the probe to develop a paper-based sensor for efficient on-site visual determination of pH. Finally, the probe was used for exogenous and endogenous Fe^{3+} sensing in living cells.