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ABSTRACT: Immunochromatographic strips (ICSs) are inexpensive, simple, portable, and robust, and therefore have many uses in the medicinal, agricultural, and environmental industries. For detection of small molecules, current ICSs are competitive format (competitive ICSs, CICSs), which only offer a turn-off readout mode, and therefore lead to low sensitivity when evaluating results by the naked eye. To overcome this problem, we report a turn-on CICSs that relies on the ability of gold nano-stars (AuNSs) quenching the signal of quantum dots (QDs). This turn-on CICSs device was applied to detect cadmium ions (Cd^{2+}). The linear detection range (LDR) of the turn-on CICSs was 0.25 ng/mL-8 ng/mL, and the detection of limit (LOD) was 0.18 ng/mL. Compared with traditional turn-off CICSs, the sensitivity of the turn-on CICSs was enhanced by 32 times. The turn-on CICSs also has a high specificity and high recovery for the detection of Cd^{2+} in Pearl River (95%-112%) and tap water samples (103.5%-116.67%). Therefore, we believe the turn-on CICSs offers great potential for the detection of other small molecules in clinical diagnostics, food safety investigations, and environment pollution monitoring.

Key Words: Turn-on Competitive Immunochromatographic Strip; Quantum Dots; Gold Nano-Stars; Cadmium Ion

1 Introduction