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Supplementary Information

A label-free dual-modal aptasensor for colorimetric and fluorometric detection of sulfadiazine

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Sample preparation

Food samples included egg, beef, and pork, which were purchased from local supermarkets and processed according to reported methods with a slight modification.[1, 2] The samples were processed as follows: 5 g of the sample was added to 25 mL of acetonitrile, then the mixture was placed on a vortex shaker for 10 min, followed by sonication for 10 min and finally centrifugation at 6000 rpm for 10 min, the acetonitrile layer was collected. Subsequently, 30 mL of acetonitrile-saturated n-hexane was added to the collected acetonitrile solution and shaken for 10 min to remove the fat in the sample, and then centrifuged at 6000 rpm for 10 min to collect the bottom acetonitrile solution, evaporated to dryness in a water bath at 80 °C. After that, the obtained residue was dissolved in PBS buffer, diluted 10 times, and filtered through a 0.22 μM filter membrane for use.

Environmental samples, such as river water, lake water and soil, were also collected and processed briefly.[3] The river water was taken from the Jiangjin section of the Yangtze River in Chongqing, and the lake water and soil were taken from the vicinity of a livestock farm. These water samples were filtered with a 0.22 μM filter membrane. The soil was treated as follows: The soil samples were dried and ground. Subsequently, 10 mL of PBS buffer solution was added to 5 g of soil, vortexed for 10 min and left to stand overnight. Finally, take the supernatant and filter it with a 0.22 μM membrane filter. All processed samples were stored at 4°C.

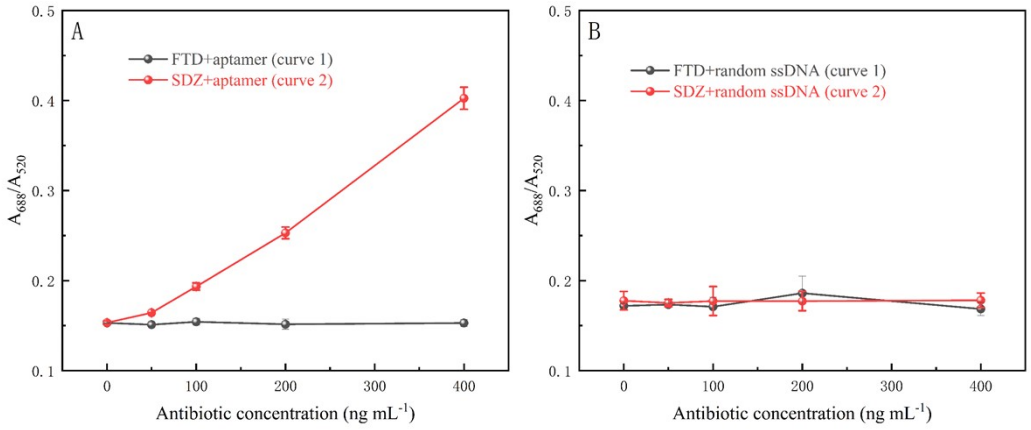

Fig. S1 The absorbance ratio of the aptasensor as a function of SDZ and FTD concentrations using (A) the aptamer of SDZ and (B) random ssDNA. AuNPs, 300 μL; aptamer (or random ssDNA), 40 nM; NaCl, 28 mM.

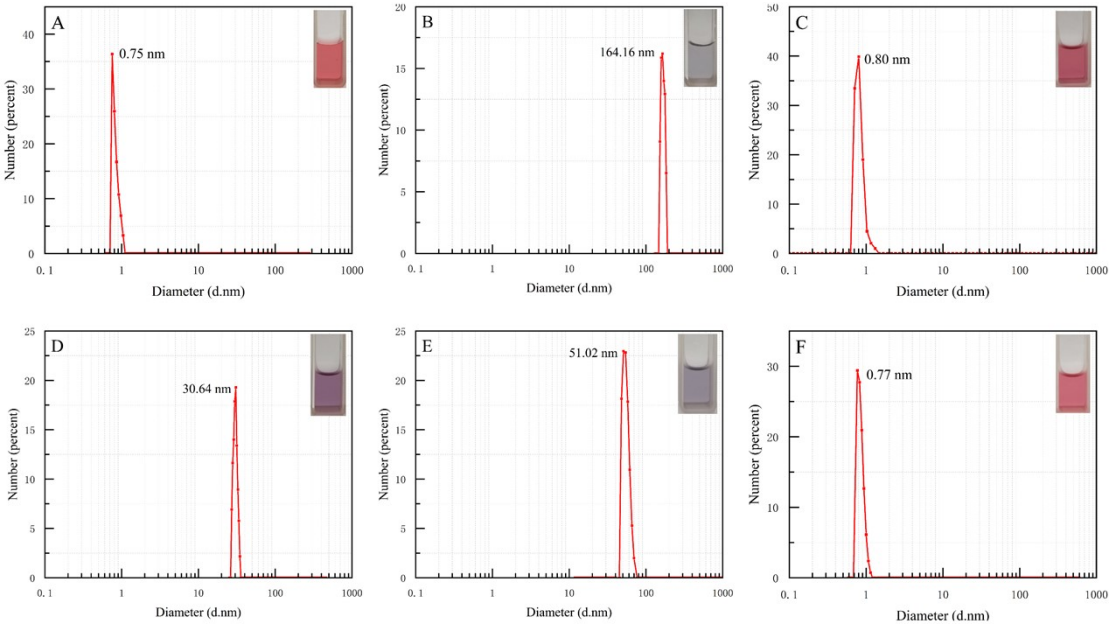

Fig. S2 Dynamic Light Scattering (DLS) of solutions containing different components. (A): AuNPs; (B): AuNPs + NaCl; (C): Aptamer + AuNPs + NaCl; (D): Aptamer + 0.5 μg mL^{-1} SDZ + AuNPs + NaCl; (E): Aptamer + 1 μg mL^{-1} SDZ + AuNPs + NaCl; (F): 1 μg mL^{-1} SDZ +AuNPs. AuNPs, 300 μL; NaCl, 28 mM; aptamer, 40 nM.

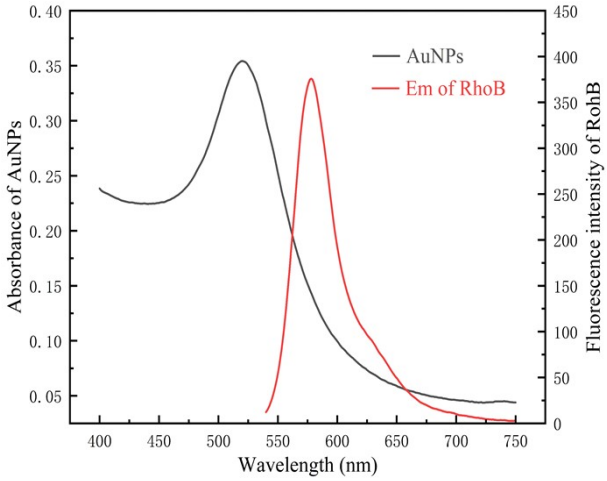

Fig. S3 UV-Vis absorption spectra of AuNPs and fluorescence emission spectra of RhoB. AuNPs, 300 μL; RhoB, 6 μM.

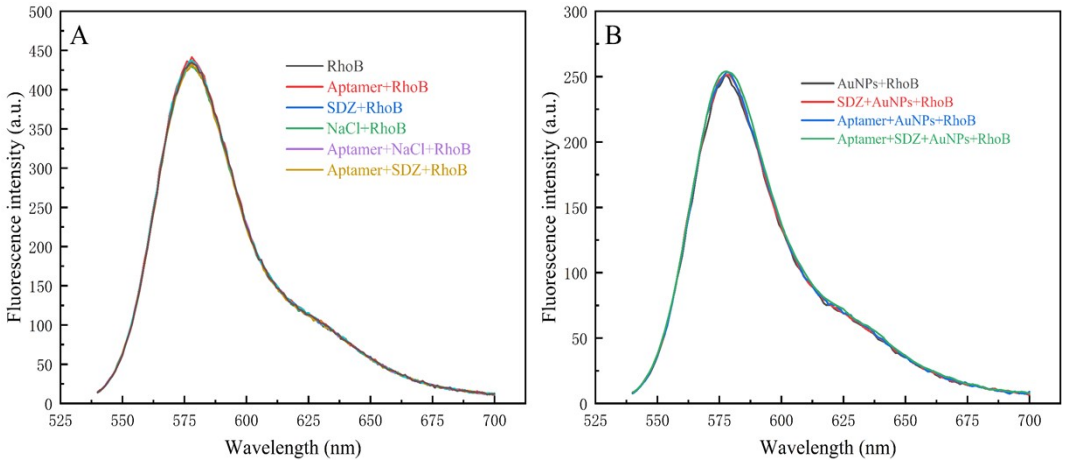

Fig. S4 Fluorescence spectra of RhoB in different sample solutions. AuNPs, 300 μL; NaCl, 28 mM; aptamer, 40 nM; RhoB, 6 μM; SDZ, 1 μg mL^{-1}.

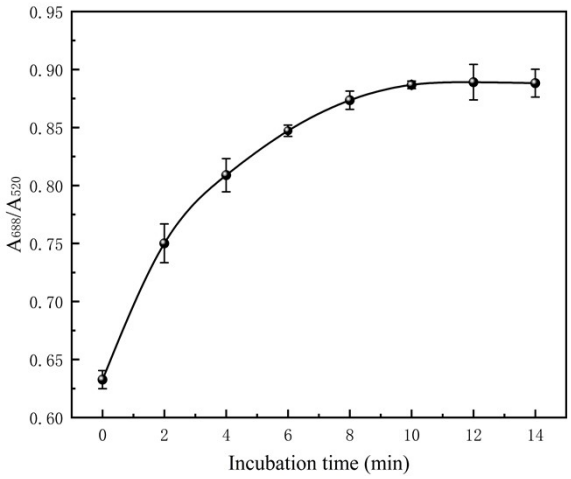

Fig. S5 Effects of reaction time of AuNPs with NaCl on A_{688}/A_{520}. AuNPs, 300 μL; NaCl, 28 mM.

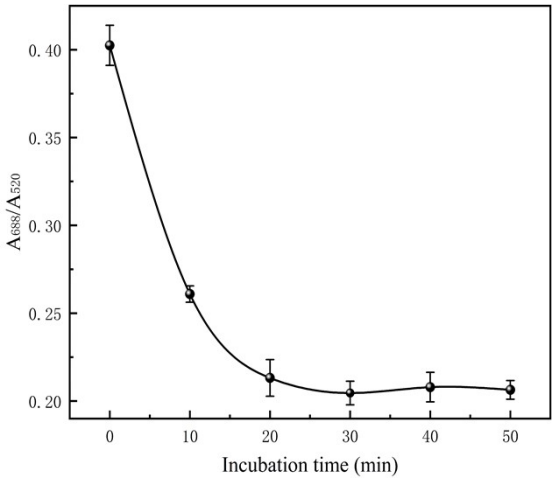

Fig. S6 Effects of reaction time of AuNPs with aptamer on A_{688}/A_{520}. AuNPs, 300 μL; NaCl, 28 mM; aptamer, 40 nM.

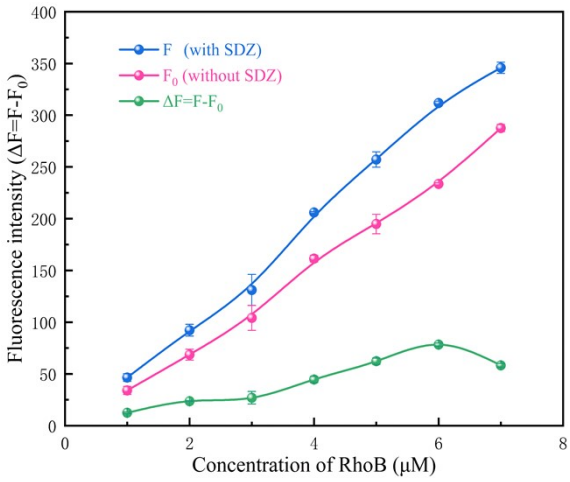

Fig. S7 The effect of RhoB concentration on the fluorescence intensity in the aptasensor. AuNPs, 300 μL; NaCl, 28 mM; aptamer, 40 nM; SDZ, 1 μg mL^{-1}; RhoB, 1-7 μM.

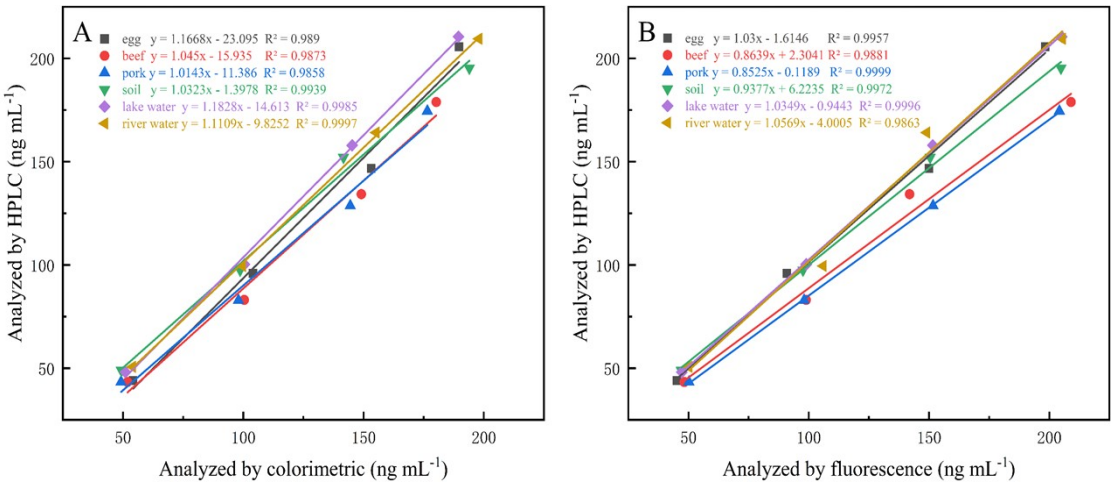

Fig. S8 Correlation of detection results between the dual-modal aptasensor and the HPLC in spiked samples. (A): Correlation of colorimetric analysis with HPLC; (B) Correlation of fluorescence analysis with HPLC.

References

1 X. Yan, Y. Wang, Q. Kou, Q. Sun, J. Tang, L. Yang, X. Chen, W. Xu and T. Le, *Sensors and Actuators B: Chemical*, 2022, **353**.

2 Y. Tang, Y. Hu, P. Zhou, C. Wang, H. Tao and Y. Wu, *J Agric Food Chem*, 2021, **69**, 2884-2893.

3 Y. R. Wang, X. L. Yan, Q. M. Kou, Q. Sun, Y. X. Wang, P. Wu, L. L. Yang, J. M. Tang and T. Le, *Int J Nanomedicine*, 2021, **16**, 2751-2759.