Supporting Information for

A multicolor aptasensor based on DNA-induced Au-Ag nanorods for simultaneous and visual detection of inorganic and organic mercury

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1. Reagents and apparatus used in the experiment

All DNA aptamers used in the experiment were synthesized by Sangon Biological Technology & Services Co., Ltd. (Shanghai, China), and their detailed sequences were shown in Table S1. The DNA concentrations were accurately quantified by the optical density at the wavelength of 260 nm (OD_{260}), which based on their individual absorption coefficients. $AgNO_3$ (99.99%), trisodium citrate ($C_6H_5O_7Na_3 \cdot 2H_2O$), cetyl-trimethyl ammonium bromide (CTAB) (≥ 99%) and Tris-(hydroxymethyl)-aminomethane (Tris) were provided by Sigma-Aldrich company (China). Methyl-mercuric chloride (CH_3HgCl) and ethylmercuric chloride (C_2H_5HgCl) standards were purchased from Dr. Ehrenstorfer GmbH (Germany). Hg^{2+} standard (1 mg/mL Hg in 2~5% HNO_3) and $HAuCl_4 \cdot 3H_2O$ (49% Au) were received from J&K Scientific company (China). NaBH4 (≥ 98%, AR) and Ascorbic acid (AA) (≥ 99.7 %, AR) were obtained from Sinopharm Chemical Reagent Co., Ltd. (China). The UV-visible absorption spectra were obtained with Tecan's Infinite M200 PRO (Switzerland) multifunctional microplate reader. Transmission electron microscope (TEM) images were characterized by Tecnai G2 F20 U-TWIN transmission electron microscope (FEI, USA).

Table S1: All DNA sequences we used in the experiment

DNA name	DNA sequence
H_R	5’-HS-CTGCTGCTGCAAAAAGCAGCAGCAG-3’
H_{T5}	5’-HS-CTTTGTTAAAAATTCTTTG-3’
H_{T7}	5’-HS-GTTCTTTGTTAAAAATTCTTTGTTC-3’
H_{T9}	5’-HS-TTGTTCTTTGTTAAAAATTCTTTGTTCTT-3’

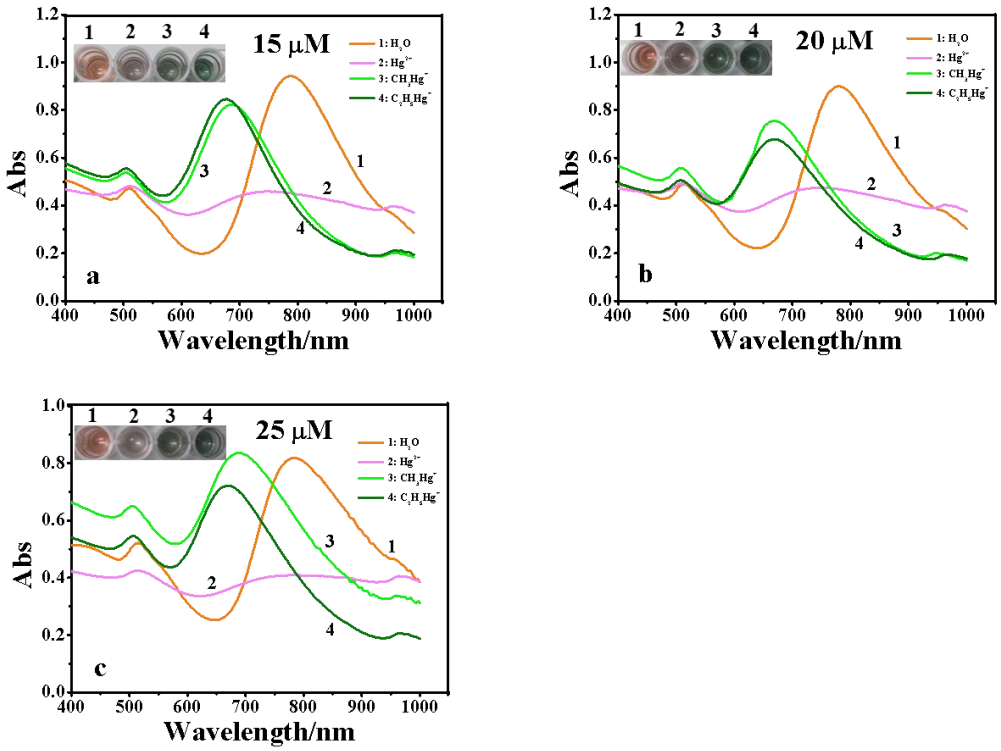

Figure S1: Optimization of the H_{T7} DNA concentration for specifically detecting mercury species. (a): 15 μM; (b): 20 μM; (c): 25 μM. The photograph is (1) Blank; (2) Hg^{2+}; (3) CH_3Hg^+; (4) $C_2H_5Hg^+$.

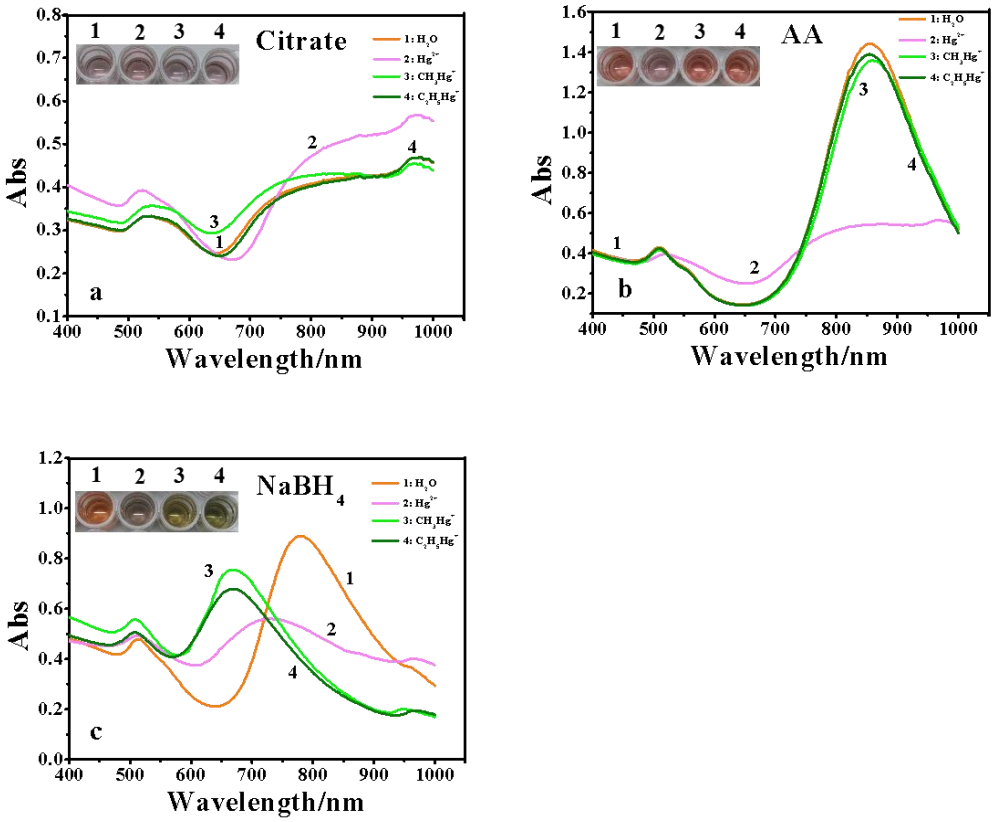

Figure S2: The effect of reducing agent on the specifically detection of mercury species. Data was obtained under the optimal conditions except reducing agent. (a): Citrate; (b): AA; (c): $NaBH_4$. The photograph is (1) Blank; (2) Hg^{2+}; (3) CH_3Hg^+; (4) $C_2H_5Hg^+$.

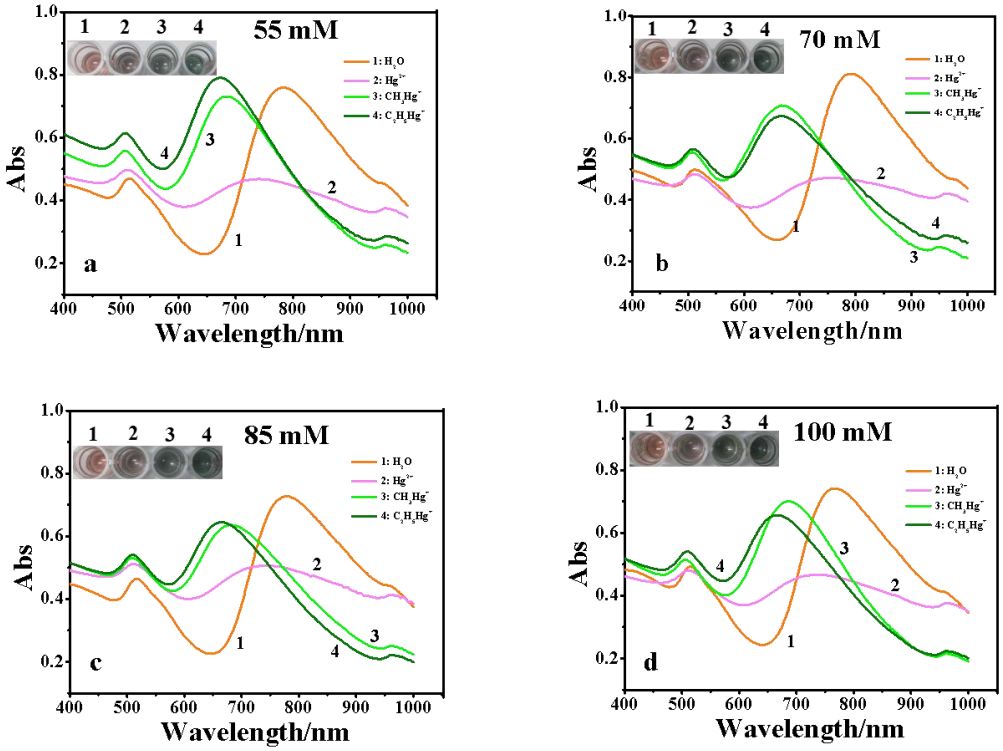

Figure S3: Optimization of the $NaBH_4$ concentration for specifically detecting mercury species. Data was obtained under the optimal conditions except $NaBH_4$ concentration. (a): 55 mM; (b): 70 mM; (c): 85 mM; (d) 100 mM. The photograph is (1) Blank; (2) Hg^{2+}; (3) CH_3Hg^+; (4) $C_2H_5Hg^+$.

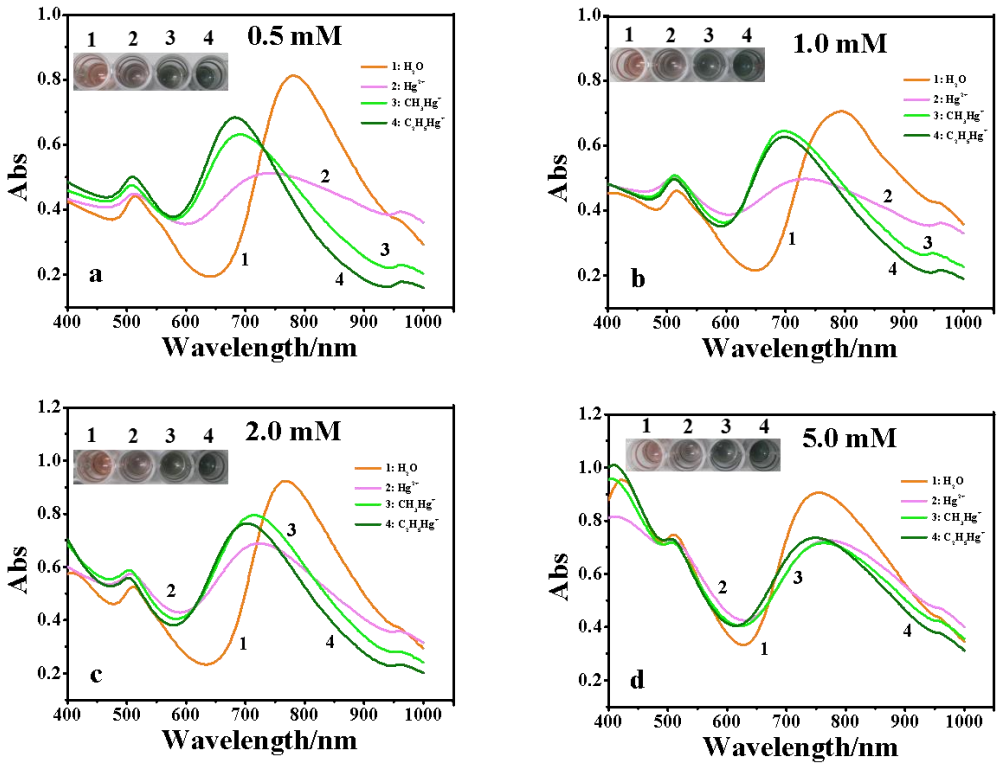

Figure S4: Optimization of the Ag^+ concentration for specifically detecting mercury species. Data was obtained under the optimal conditions except Ag^+ concentration. (a): 0.5 mM; (b): 1.0 mM; (c): 2.0 mM; (d) 5.0 mM. The photograph is (1) Blank; (2) Hg^{2+}; (3) CH_3Hg^+; (4) $C_2H_5Hg^+$.

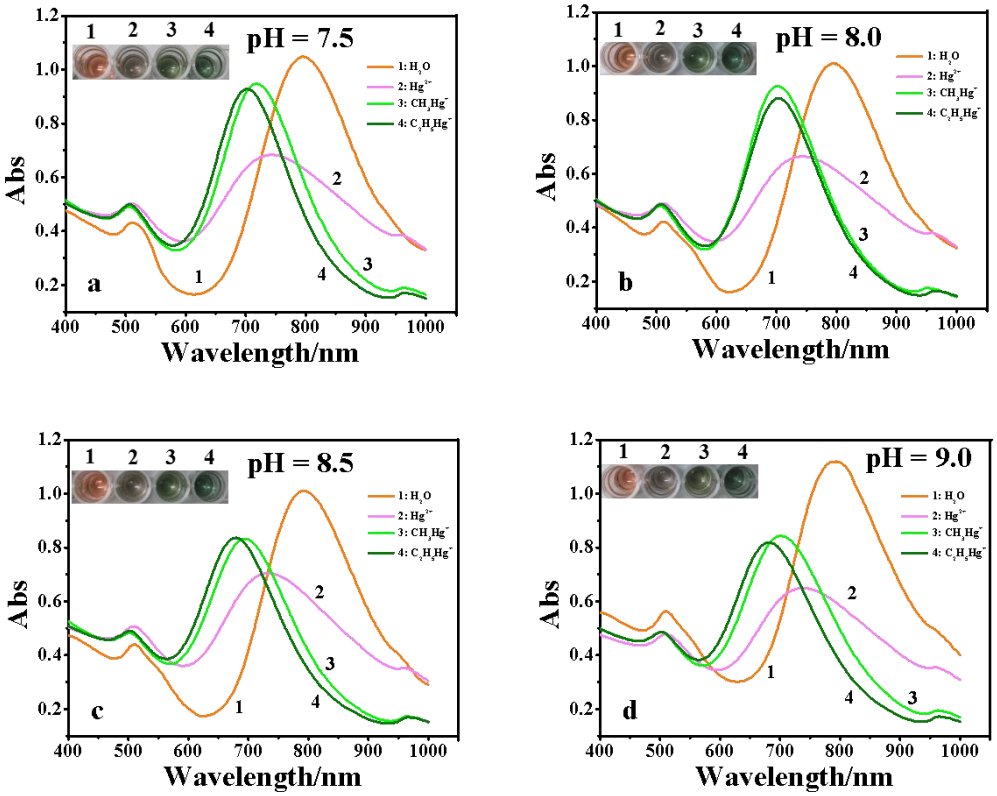

Figure S5: Optimization of the pH value of Tris-HNO_3 buffer solution for specifically detecting mercury species. Data was obtained under the optimal conditions except pH of Tris-HNO_3. (a): pH 7.5; (b): pH 8.0; (c): pH 8.5; (d) pH 9.0. The photograph is (1) Blank; (2) Hg^{2+}; (3) CH_3Hg^+; (4) $C_2H_5Hg^+$.

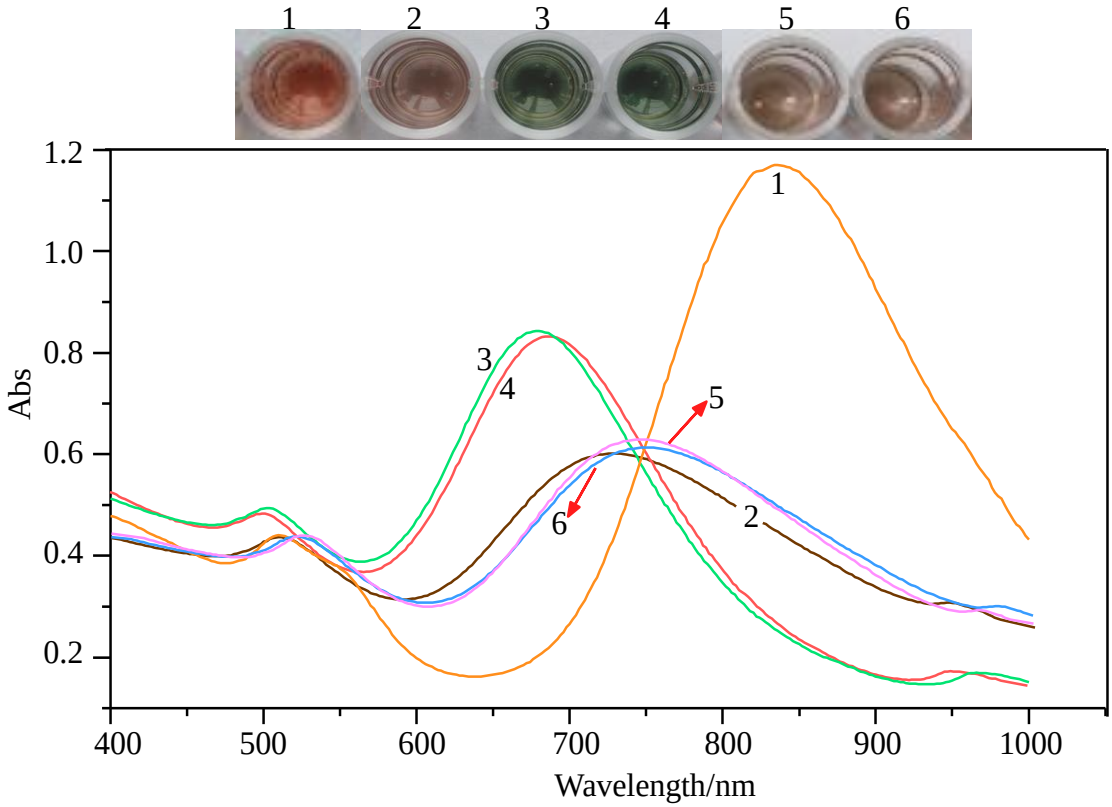

Figure S6: Photographs and absorption spectra for detecting different mercury species under optimal conditions. (1): black; (2): 40 ppm Hg^{2+} and 40 ppm CH_3Hg^+; (3): 40 ppm Hg^{2+}, 40 ppm CH_3Hg^+ and 50 mM AA; (4): 40 ppm Hg^{2+}, 40 ppm $C_2H_5Hg^+$ and 50 mM AA; (5): 12 ppm Hg^{2+}; (6) 12 ppm Hg^{2+}, 20 ppm CH_3Hg^+ and 20 ppm $C_2H_5Hg^+$.