**Nanogold sol plasmon di-scattering assay for trace carbendazim in tea coupled aptamer with Au3+-glyoxal-carbon dot nanocatalytic reaction**

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**FIGURE S1.** RRS Spectra of CDFe-GX-HCl-HAuCl4 Catalytic System at Different Time. (A) CDFe (80 min)-53.3 μg/mL HAuCl4-1.2 mmol/L HCl-3.48 mmol/L GX, a-h curves represent 0, 8, 16, 32, 40, 48, 60 and 72 μg/L CDFe. (B) CDFe (100 min)-53.3 μg/mL HAuCl4-1.2 mmol/L HCl-3.48 mmol/L GX, a-g curves represent 0, 16, 32, 40, 48, 72 and 80 μg/L CDFe. (C) CDFe (120 min)-53.3 μg/mL HAuCl4-1.2 mmol/L HCl-3.48 mmol/L GX, a-f curves represent 0, 8, 16, 32, 64 and 80 μg/L CDFe. (D) CDFe (150 min)-53.3 μg/mL HAuCl4-1.2 mmol/L HCl-3.48 mmol/L GX, a-f curves represent 0, 8, 16, 32, 60 and 72 μg/L CDFe.

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**FIGURE S2.** RRS Spectra of CDFe-GX-HCl-HAuCl4 Catalytic System at Different Temperatures. (A) CDFe (140℃)-53.3 μg/mL HAuCl4-1.2 mmol/L HCl-3.48 mmol/L GX, a-f curves represent 0, 0.8, 1.6, 2.4, 3 and 3.6 mg/L CDFe。 (B) CDFe (160℃)-53.3 μg/mL HAuCl4-1.2 mmol/L HCl-3.48 mmol/LGX, a-f curves represent 0, 0.8, 1.6, 2, 2.4 and 3.6 mg/L CDFe。(C) CDFe (180℃)-53.3 μg/mL HAuCl4-1.2 mmol/L HCl-3.48 mmol/L GX, a-f curves represent 0, 8, 16, 32, 64 and 80 μg/L CDFe。(D) CDFe (200℃)-53.3 μg/mL HAuCl4-1.2 mmol/L HCl-3.48 mmol/L GX, a-f curves represent 0, 16, 24, 32, 72 and 96 μg/L CDFe。

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**FIGURE S3.** RRS Spectra of CDFe-GX-HCl-HAuCl4 Catalytic System with Different Fer Dosages. (A)CDFe (0.012 g)-53.3 μg/mL HAuCl4-1.2 mmol/L HCl-3.48 mmol/L GX, a-f curves represent 0, 5.33, 10.67, 32, 40 and 55 μg/L CDFe. (B) CDFe (0.018 g)-53.3 μg/mL HAuCl4-1.2 mmol/L HCl-3.48 mmol/L GX, a-f curves represent 0, 8, 16, 32, 64 and 80 μg/L CDFe. (C) CDFe (0.024 g)-53.3 μg/mL HAuCl4-1.2 mmol/L HCl-3.48 mmol/L GX, a-f curves represent 0, 10.67, 42.67, 53.3, 85.3 and 106.67 μg/L CDFe. (D) CDFe (0.03 g)-53.3 μg/mL HAuCl4-1.2 mmol/L HCl-3.48 mmol/L GX, a-f curves represent 0, 26.67, 53.3, 66.67, 106.67 and 120 μg/L CDFe. (E) CDFe (0.045 g)-53.3 μg/mL HAuCl4-1.2 mmol/L HCl-3.48 mmol/L GX, a-g curves represent 0, 20, 40, 100, 120, 160 and 180 μg/L CDFe.

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**FIGURE S4.** Effect of reaction time/reaction temperature/Fer dosage on k. (A) 0.018 g Fer-x h-180℃, (B) 0.018 g Fer-2 h-x℃, (C) x g Fer-2 h-180℃.

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**FIGURE S5.** Fluorescence/RRS/Abs spectrum of CDFe/CDHM. (**A)** The fluorescence spectrum of CDFe under different excitation wavelengths, 128 mg/L CDFe. (**B)** CDFe fluorescence spectrum, the a-g curves represent 0, 16, 32, 60, 72, 96 and 128 mg/L CDFe, respectively. (**C)** CDHM fluorescence spectrum, a-g curves represent 0, 8, 16, 60, 32, 48, 64 and 96 mg/L CDHM respectively. (**D**) CDFe RRS spectrum, a-f curves represent 0, 24 40, 72, 80 and 96 mg/L CDFe respectively. (**E)** CDHM RRS spectrum, a-h curves represent 0, 8, 16, 24, 48, 64, 96 and 128 mg/L CDHM. (**F)** CDFe Abs spectrum, a-g curves represent 0, 16, 32, 48, 60, 96 and 128 mg/L CDFe. (**G)** CDHM Abs spectrum, a-g curves represent 0, 32, 48, 64, 96, 128 and 160 mg/L CDHM respectively.

**FIGURE S6.** Selection of conditions. (**A)** The influence of CDFe concentration on the ∆I. (**B)** The influence of AptCBZ on the system ∆I. (**C)** The influence of glyoxal concentration on the ∆I of the system.(**D)** The effect of HAuCl4 concentration on the ∆I of the system. (**E)** The influence of the concentration of HCl on the ∆I of the system. (**F**) The influence of temperature on the ∆I of the system.(**G)** The effect of time on the ∆I of the system.

**TABLE S1**. Influence of coexisting substances on SERS determination of CBZ

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| Interfering ion | Tolerate limit | Relative error (%) | Interfering ion | Tolerate limit | Relative error (%) |
| Mg2+ | 100 | -9.79 | Ca2+ | 100 | -6.81 |
| Cr2+ | 100 | 0.34 | Ba2+ | 100 | 0.03 |
| HCO32- | 100 | 6.96 | NH4- | 100 | 5.0 |
| Al3+ | 100 | -7.43 | Cu2+ | 50 | -7.08 |
| HPO42-- | 50 | 3.61 | P2O74- | 50 | -1.55 |
| Fe3+ | 50 | 2.83 | Zn2+ | 50 | 5.12 |
| BSA | 50 | 8.77 | HSA | 10 | 9.43 |
| CO32- | 10 | 0.66 | PF | 100 | 4.9 |
| OTC | 100 | 5.3 | triadimefon | 100 | 5.3 |
| Isocarbophos | 100 | 4.8 | Benzoic acid | 100 | 2.6 |