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# An electrochemical platform based on hemin-rGO-cMWCNTs modified aptasensor for sensitive detection of kanamycin

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## Supporting information

As shown in Fig. S1A, the background current of hemin-graphene-cMWCNTs/GCE (curve a) was increased tremendously than hemin-graphene-Au/GCE (curve b) because of the good conductivity of MWCNTs (Fig. S2A), which is consistent with EIS (Fig. S1B). The results *via* MTT, CD and electrochemistry showed hemin-graphene-cMWCNTs could play the role of an efficient electron-conducting tunnel and biocompatible spatial micro-environment.

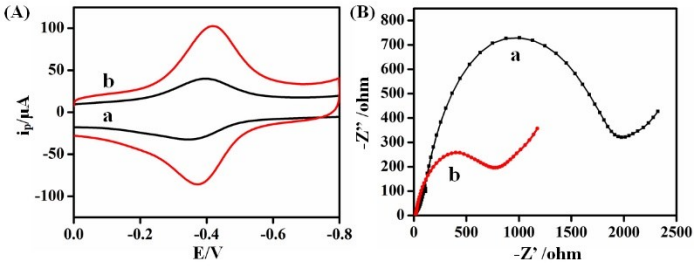


**Fig. S1.** (A) The CV of hemin-graphene-Au (curve a) and hemin-rGO-cMWCNTs (curve b). (B) Nyquist plot of Faradic impedance obtained in 0.10 M PBS (pH 6.0) for hemin-graphene-Au (curve a) and hemin-rGO-cMWCNTs (curve b)

The interaction between KANA and aptamer has been proven.[1] In this paper, fluorescence spectroscopy was used to determine the binding constant between the aptamer and KANA. Fig. S2 showed that KANA produced a maximum fluorescence emission peak at 305 nm by 250 nm excitation.

The binding constant between the aptamer-KANA interaction can be calculated by following equation.[2]

$$\lg[(F_0\text{-}F)/F] = \lg K_a + n\lg[Q]$$

Where $K_a$ is the binding constant of the aptamer-kanamycin interaction. The values of $K_a$ and n for mixture were calculated from the plot of $\lg(F_0–F)/F$ versus lg[Q] was showed in Fig. S2 and Table S1.

Fig. S2 and Table S1 showed that the binding constant of the aptamer-KANA at 288K was $2.54\times10^3$. It is showed the complex of the aptamer-KANA was stable and the affinity was high.[3] In other words, the aptamer/hemin-rGO-cMWCNTs/GCE shows high selectivity for KANA detection. Furthermore, hemin-rGO-cMWCNTs have large surface to volume ratio and good biocompatibility, which was conducive to bind with a mass of aptamer. Thus, it can meet all kinds of problems in food detection, such as a large number of samples, large test types, and the timeliness of food, with satisfactory results.

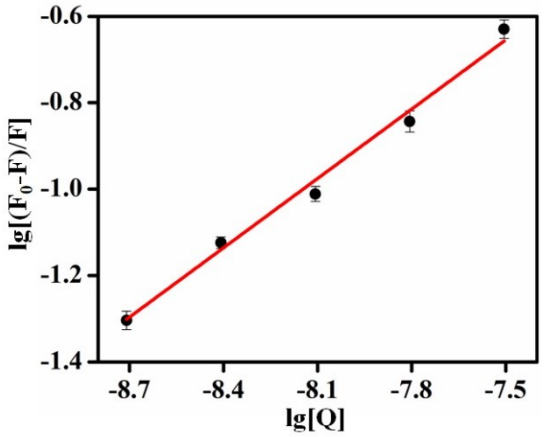


**Fig. S2.** Lineweaver-Burk curve of fluorescence quenching of the aptamer-KANA at 288 K.

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Table S1. Binding constant $K_a$ and number of binding sites of the aptamer-kanamycin at 288 K.

| T/K | Lineweaver-Burk equation | R2 | Ka/(L·mol$^{-1}$) |
|---|---|---|---|
| 288 | lg[($F_0$-F) /F]=0.54 lg[Q]+3.41 | 0.99 | 2.54×103 |

## Notes and references


1 H. Li, D. E. Sun, Y. J. Liu and Z. H. Liu, *Biosensors & Bioelectronics*, 2014, **55**, 149-156.
2 X. Wu, X. Zhao, Z. Deng, X. Liang and S. Fang, *Journal of Molecular Liquids*, 2020, 114873.
3 X. Zhou and J. F. Liang, *Journal of Photochemistry and Photobiology A: Chemistry*, 2017, **349**, 124-128.