Electronic Supplementary Material (ESI) for Analytical Methods.


# Ultrasensitive electrochemiluminescence immunosensor for detection of ochratoxin A based on gold nanoparticles hybridized mesoporous carbon

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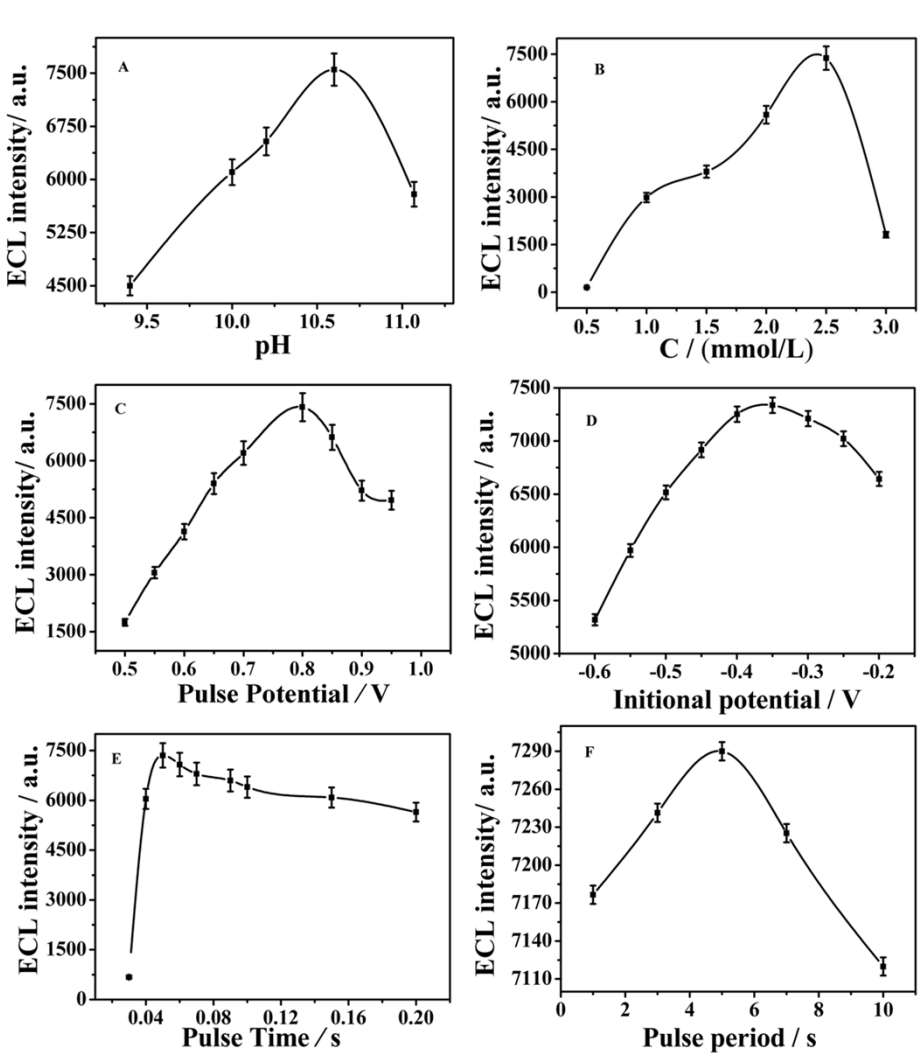


**Fig. S1** The effect of pH (A), $H_2O_2$ concentration (B), pulse potential (C), initial potential (D), pulse time (E) and pulse period (F). Error bar = RSD, n = 3.

The pH, $H_2O_2$ concentration would affect the ECL intensity of the sensor. The effect of pH on the ECL response of luminol was shown in Fig. S1A. The maximum ECL intensity was obtained at pH 10.6. Greater than or less than 10.6, the reaction between luminol and $H_2O_2$ would be inhibited. The reason may be that the pH of solution may influence the formation of the deprotonation luminol and the oxidation of luminol [1]. So CBS of pH 10.6 was selected as base solution. The effect of $H_2O_2$ concentration on the ECL intensity has been investigated. As shown in

Fig. S1B, because of the co-oxidation function of $H_2O_2$, the maximum ECL intensity occurred at 2.5 mmol/L. Lower than 2.5 mmol/L, the co-oxidation reaction of $H_2O_2$ decreased. When $H_2O_2$ concentration was greater than 2.5 mmol/L, the ion index of the base solution was increased, leading to the decrease of ECL intensity. Therefore, 2.5 mmol/L $H_2O_2$ was selected in the following experiments.

In addition, the pulse potential, initial potential, pulse time and pulse period would also influence the ECL signal. A wide range of pulse potentials were set to investigate the effect on the ECL signal (Fig. S1C). It was observed that the maximum ECL intensity appeared at 0.8 V. It was the result of the electro-oxidation of luminol. Therefore, a pulse potential of 0.8 V was adopted. The effect of the initial potential in the range -0.6 V ~ -0.2 V was also investigated (Fig. S1D). A maximal ECL intensity was achieved at -0.35 V. That is the result of diffusion controlled reaction between luminol and $H_2O_2$ on the surface of the electrode. Therefore, an initial potential of -0.35 V was adopted. The effect of the pulse time was examined (Fig. S1E). The optimal pulse time was 0.05 s. This was due to the diffusion reaction. When the pulse time was longer than 0.05 s, the diffusion layer on the surface of electrode became thicker and it was difficult to recover in the next pulse. To obtain higher ECL intensity, a pulse time of 0.05 s was adopted. In order to achieve a best detection condition, the effect of the pulse period was finally examined (Fig. S1F). It might affect the diffusion of $H_2O_2$. When the pulse period was 5 s, $H_2O_2$ had a good contact with luminol and the ECL intensity achieved a maximum value. Therefore, a pulse period of 5 s was adopted.

**Table S1**: A comparison of the proposed ECL immunosensor with reported methods for the determination of OTA.

| Method | Linear range (ng/mL) | Detection limit (ng/mL) | Reference |
|---|---|---|---|
| ECL | 0.001 - 50 | $5\times10^{-4}$ | This work |
| High-performance liquid chromatography-mass spectrometry | 10 - 200 | 0.02 | [2] |
| Chemiluminescent enzyme-linked immunosorbent assay | 0.006 - 0.245 | 0.04 | [3] |
| Electrochemical aptasensor | $10^{-4}$ - 5 | $6.5\times10^{-5}$ | [4] |
| Solid-phase microextraction-liquid chromatography-fluorescence detection | 0.03 - 2 | $5.3\times10^{-2}$ | [5] |
| Electrochemical impedimetric immunosensor | 1 - 20 | 0.5 | [6] |
| Immunosensor | 0.01 - 5 | 0.01 | [7] |

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