

Supporting Information

Application of CuS/Au Heterostructure with peroxidase-like activity in immunosensors

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3.5 Optimization of experimental condition

Incubation temperature of antigen can influence the amount of interaction and binding during specific recognition of antigen and antibody. Therefore, the incubation temperature will affect the current signal of the immunosensor. As shown in Fig. S1(A), its response value gradually increased when the incubation time was increased from 27°C to 37°C. However, the current response value decreased significantly when the incubation temperature was further increased. This may be due to the high temperature, which caused the inactivation of proteins such as antigen antibody. Therefore, considering the maximum sensitivity of the electrochemical immunosensor, the optimal incubation temperature for determining the antigen of AFP is 37 °C.

Bovine serum protein(BSA) is essential in the electrochemical immune system to reduce nonspecific binding of proteins and produce a low background signal¹. Therefore, the BSA content is particularly critical. As shown in Fig. S1 (B) , BSA levels of 1% and 0.2% showed the highest current response signal values. However, 0.2% BSA will result in less complete closure of the non-specific binding site and lead to a higher background signal. When the BSA content is greater than 1%, it can be seen that the current response gradually decreases as the BSA content gradually increases. We speculate that the increase in protein content will increase the interfacial electron transfer resistance, resulting in a decrease in its current value.

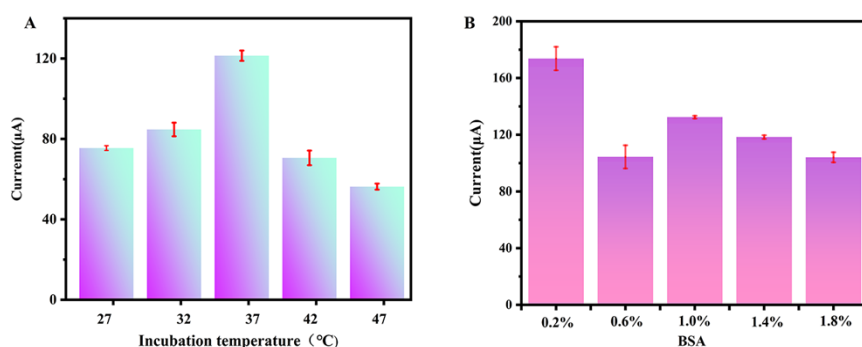


Fig. S1. (A) Optimization of antigen incubation temperature and (B)bovine serum protein mass fraction

Table S1 Comparison of analytical performance of CEA immunosensors with different nanomaterials

| analytical method | Nanomaterial | Liner range (ng/mL) | Detection limit(ng/mL) | Ref |
|---------------------------|-------------------------------------|---------------------|------------------------|-----------|
| photoelectrochemical | NaYF ₄ :Yb,Er UCNPs@CdTe | 0.1-300 | 0.032 | 2 |
| point-of-care immunoassay | platinum nanozyme | 0.5-60 | 0.167 | 3 |
| Fluorescence | CdTe / CdSe QDs | 0.05-20 | 0.0067 | 4 |
| Electrochemistry | Graphene oxide/MoS ₂ | 0.5-200 | 0.01 | 5 |
| Electrochemistry | Fe ₃ O ₄ | 0.01-80 | 0.0062 | 6 |
| Electrochemistry | HRP-Au | 0.1-200 | 0.04 | 7 |
| Electrochemistry | CuS-Au | 0.1-80 | 0.0055 | This work |

References

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