

Electronic Supplementary Material

An OFF-ON detection method for copper (II) ion using AgAu-NG nanocomposites modified electrode

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XRD analysis

The phase composition of AgAu-NG nanocomposites was identified by XRD analysis. Fig. S1. shows the XRD patterns of AgAu-NG nanocomposites and GO in the 2θ range of $5-90^\circ$. As illustrated in curve a, AgAu-NG nanocomposites exhibits five sharp diffraction peaks at 38.33° , 44.54° , 64.72° , 77.61° and 81.86° , assigned to the characteristic (111), (200), (220), (311) and (222) planes of the face centered cubic Ag and Au NPs.¹ Compared with the XRD pattern of GO (curve a), the peak at 2θ of 10.74° corresponding to the (002) plane of GO disappears. This can be ascribed to the following three possible reasons: (i) GO was reduced during the hydrothermal process;² (ii) high intensity of metal diffraction peaks covered up carbon diffraction peak, making carbon diffraction peak near the background signal;³ (iii) AgAu bimetallic NPs served as spacers to keep graphene sheets separated, leading to the increase of interlayer spacing.⁴

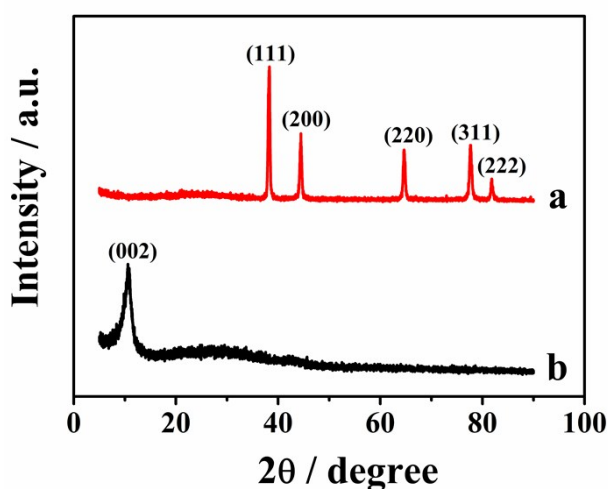


Fig. S1 XRD patterns of the AgAu-NG nanocomposites (a) and GO (b).

Optimization of experimental conditions

The detection of Cu^{2+} was based on the copper-catalyzed oxidation of Cys to regulate the oxidation peak current of Ag. So, the concentration of Cys was very important on the measurement results. As shown in Fig. S2A, the current response decreases remarkably with increasing the concentration of Cys. When the

concentration of Cys exceeds 15 μM , the current response tends to be stable. Hence, 15 μM of Cys was used for all subsequent experiments.

The reaction time for copper-catalyzed oxidation of Cys have a great influence on the current response of Ag. Fig. S2B shows the current change for different reaction time. As can be seen, the current response increases gradually and reaches a plateau after 30 min, indicating 30 min is enough for the copper-catalyzed oxidation of Cys. So, 30 min of reaction time was selected in our experiments.

The incubation time of AgAu-NG/GCE is another important factor for Cu^{2+} detection. As can be seen from Fig. S2C, the current response decreases rapidly with the increase of incubation time from 5 to 30 min, and then current response remains almost unchanged. This is because the amount of Cys reached to the surface of electrode is saturated. Therefore, the optimal incubation time of AgAu-NG/GCE was 30 min.

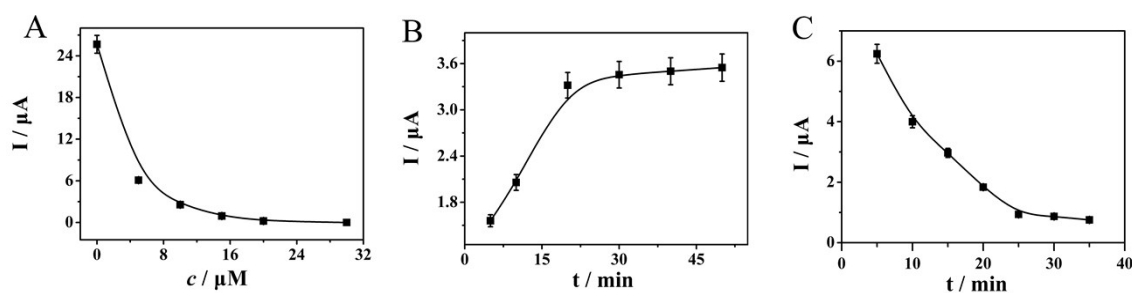


Fig. S2 Effects of the concentration of Cys (A), reaction time for the copper-catalyzed oxidation of Cys (B) and incubation time of AgAu-NG/GCE (C) on the oxidation peak current of Ag.

References

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