Supporting information

An ultrasensitive electrochemical aptasensor for thrombin based on the triplex-amplification of Hemin/G-quadruplex horseradish peroxidase-mimicking DNAzyme and horseradish peroxidase decorated FeTe nanorods

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S1. *Optimization of the concentration of H_2O_2 for thrombin detection*

As we know, both signal amplification and noise reduction are critical for sandwich-type electrochemical aptasensors. To obtain the best performance of the aptasensor, concentration of H_2O_2 was investigated as it may also influence the sensitivity of the aptasensor. After incubated with a fixed concentration of thrombin through sandwich assay, the aptasensor was tested in 0.1 M PBS (pH 7.0) containing H_2O_2 with different concentrations of 0.5, 1.0, 1.5, 2.0, 2.5 mM. It could be evidently observed that the reduction peak current of proposed aptasensor increased rapidly with increasing the concentration of H_2O_2 and the current tended to reach at a saturation value when the concentration of H_2O_2 was higher than 2.0 mM (Fig. S1). Therefore, 2.0 mM H_2O_2 was adopted in the subsequent work for signal amplification.

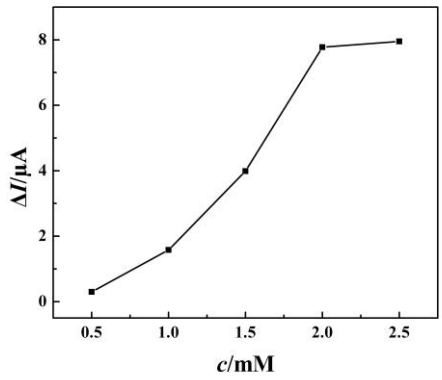

Fig. S1. Influence of the concentration of H_2O_2 on the current response of the aptasensor.

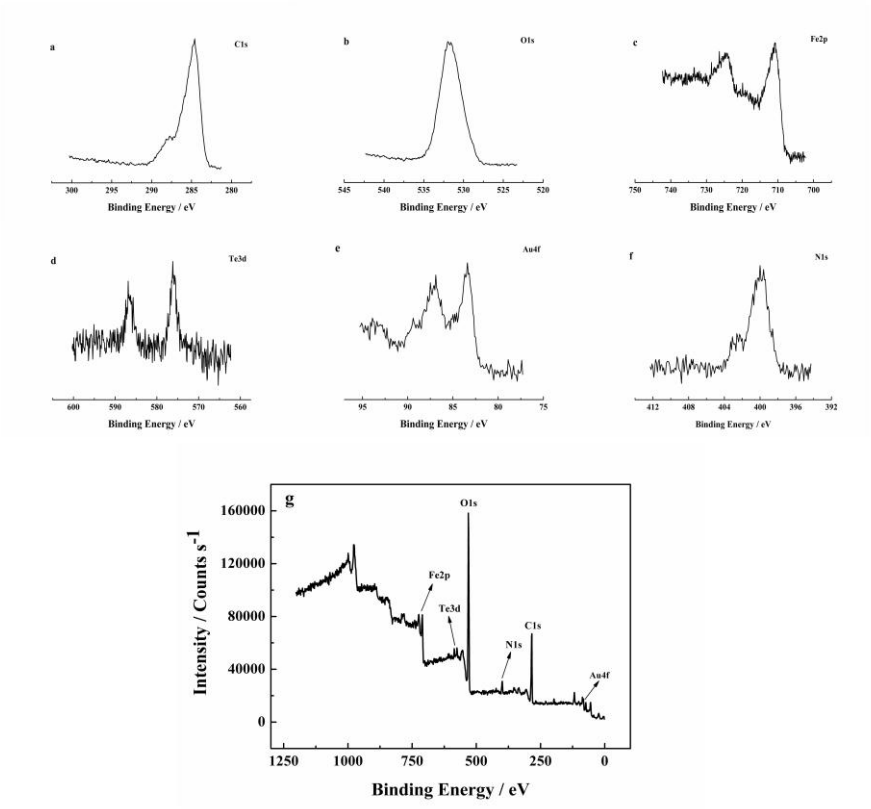

Fig. S2 XPS analysis of different nanomaterials. (a) and (b) were the C1s and O1s core level spectrum; (c), (d), (e), (f), represented the Fe2p, Te3d, Au4f, N1s core level spectrum of as-prepared Au@FeTe NRs nanocomposite respectively; (g) was the coverage of Au@FeTe NRs nanocomposites.

Table 1
Analytical application of the aptasensor

Serum samples	Added thrombin /M	Found Thrombin/M	Relative standard deviation[a] / %	Recovery / %
1	1.0×10^{-11}	1.1×10^{-11}	4.4	107.0
2	1.0×10^{-10}	1.1×10^{-10}	5.7	106.5
3	5.0×10^{-10}	4.8×10^{-10}	4.7	95.3
4	5.0×10^{-9}	4.6×10^{-9}	7.3	91.1

a. Determination of thrombin added in human blood serum ($n=3$) with the proposed aptasensor.

Table 2

Comparisons of proposed aptasensor with other sandwich-type electrochemical aptasensor for thrombin detection.

Analytical method	**Detection limit**	**Linear range**	**Ref.**
DPV	2 pM	0.01~50 nM	1
DPV	0.34 nM	0.001~50 nM	2
DPV	4.6 nM	0.007~70 nM	3
DPV	0.2 nM	0.8~15 nM	4
DPV	0.06 nM	0.1~5 nM	5
DPV	0. 5 pM	0.001~20 nM	Our work

From the Table 2 we can see that our proposed aptasensor exhibits a much higher sensitivity and wider linear range, which provides a vigorous evidence of our strategy for highly sensitive detection of thrombin.

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Electronic supplementary information (ESI): Optimization of the concentration of H_2O_2 for thrombin detection, analytical application of the aptasensor and XPS analysis of Au@FeTe NRs nanocomposite. This material is available free of charge via the Internet at http://pubs.acs.org.