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Colorimetric immunosensor constructed by 2D metal-organic frameworks nanosheets as enzyme mimics for the detection of protein biomarker

Yujing Zeng,[a] Minghui Wang,[a] Zhaowei Sun,[*b] Lingjun Sha,[c] Jie Yang[a] and Genxi Li[*ac]

[a] State Key Laboratory of Pharmaceutical Biotechnology, School of Life Sciences, Nanjing University, Nanjing 210023, P. R. China. E-mail: genxili@nju.edu.cn

[b] School of Life Sciences, Zhengzhou University, Zhengzhou, 450001, P. R. China. E-mail: szw@zzu.edu.cn

[c] Center for Molecular Recognition and Biosensing, School of Life Sciences, Shanghai University, Shanghai 200444, P. R. China

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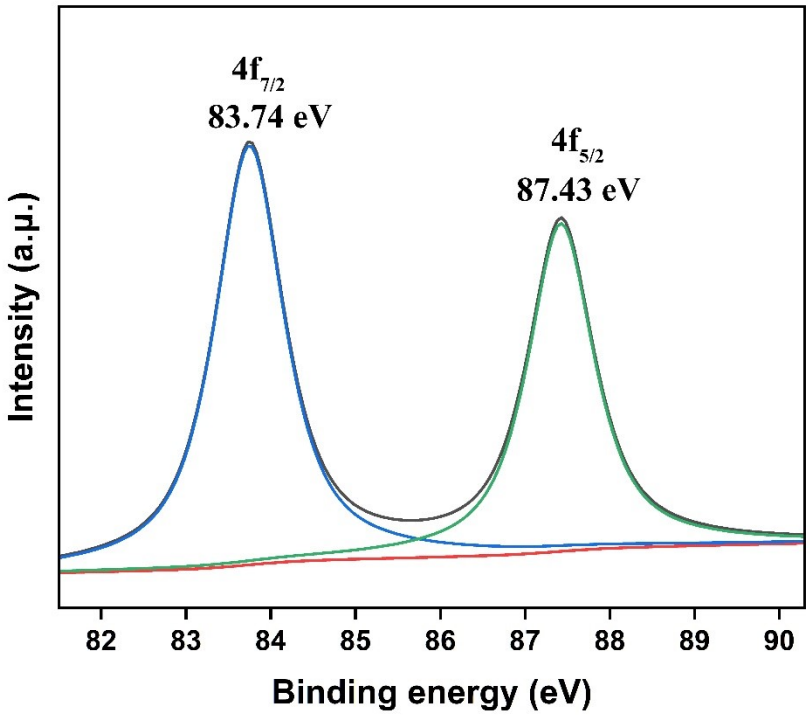

Figure S1 Au 4f XPS spectrum of Au NPs/Cu-TCPP hybrid nanosheets.

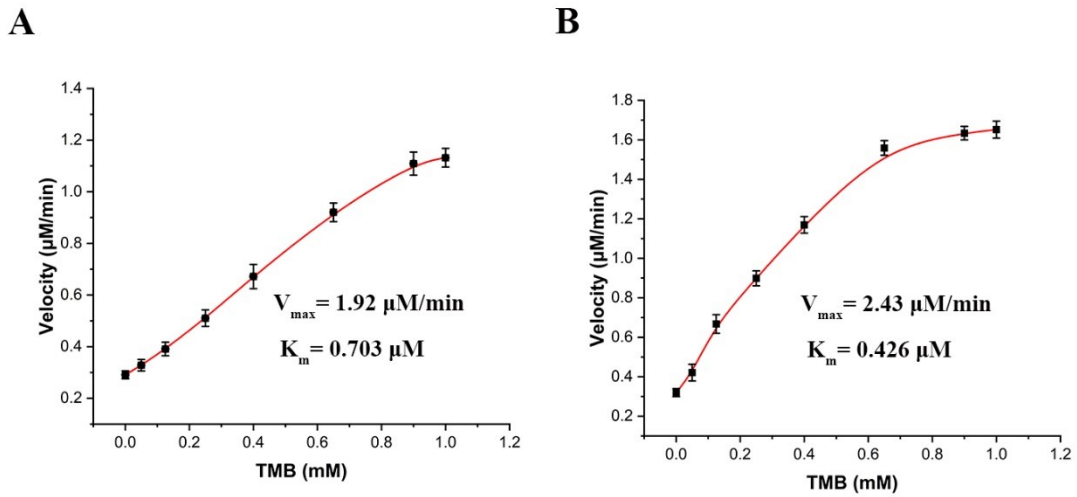

Figure S2 Variance of initial velocity of (A) Cu-TCPP nanosheets and (B) AuNP/Cu-TCPP hybrid nanosheets in response to various concentrations of TMB substrate. The material concentration is 2.5 μg/mL. Error bars represent the standard derivation of three independent experiments.

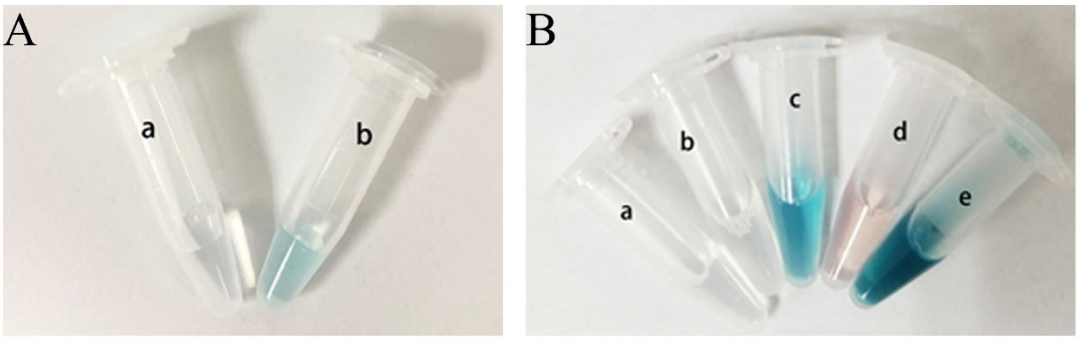

Figure S3 Photographs of colorimetric reaction in different cases. A: (a) $Cu(NO_3)_2 \cdot 3H_2O$+TMB+H_2O_2, (b) Tetrakis (4-carboxyphenyl) porphyrin (Fe)+TMB+H_2O_2; B: (a) TMB, (b) TMB+H_2O_2, (c) Cu-TCPP nanosheets+TMB+H_2O_2, (d) AuNPs+TMB+H_2O_2, and (e) AuNPs/Cu-TCPP hybrid nanomaterials+TMB+H_2O_2.

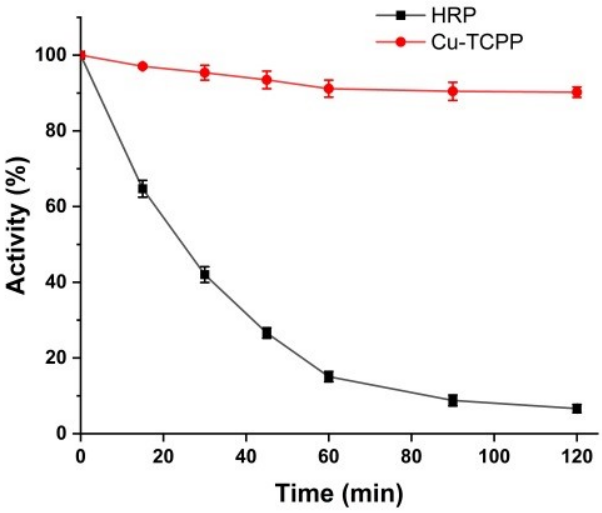

Figure S4 The enzyme activities of HRP and AuNPs/Cu-TCPP after treated at 40℃ for different time. Error bars represent the standard derivation of three independent experiments.

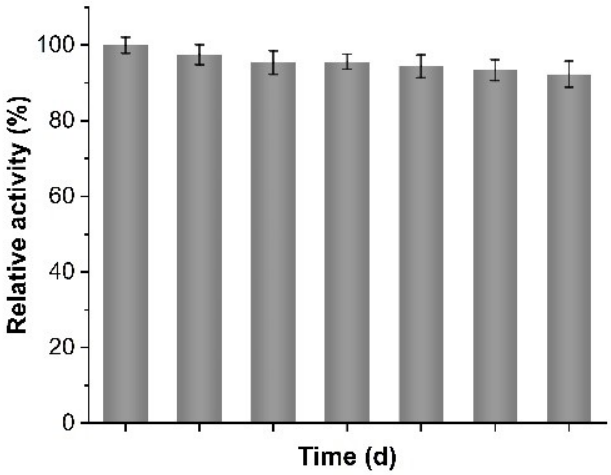

Figure S5 The stability of the AuNPs/Cu-TCPP materials. Error bars represent the standard derivation of three independent experiments.

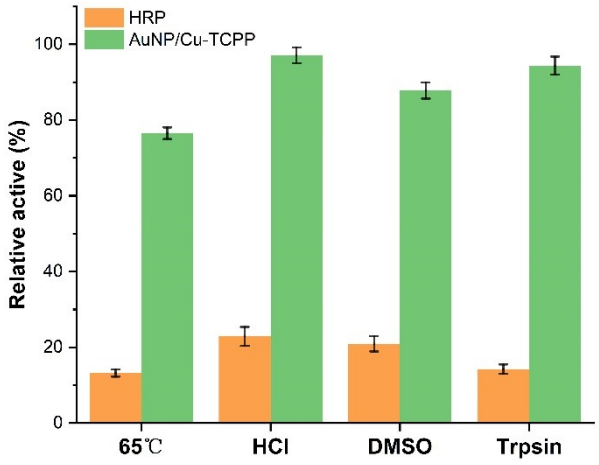

Figure S6 Activity of HRP and AuNPs/Cu-TCPP after treatment under different harsh conditions for 1h. Error bars represent the standard derivation of three independent experiments.

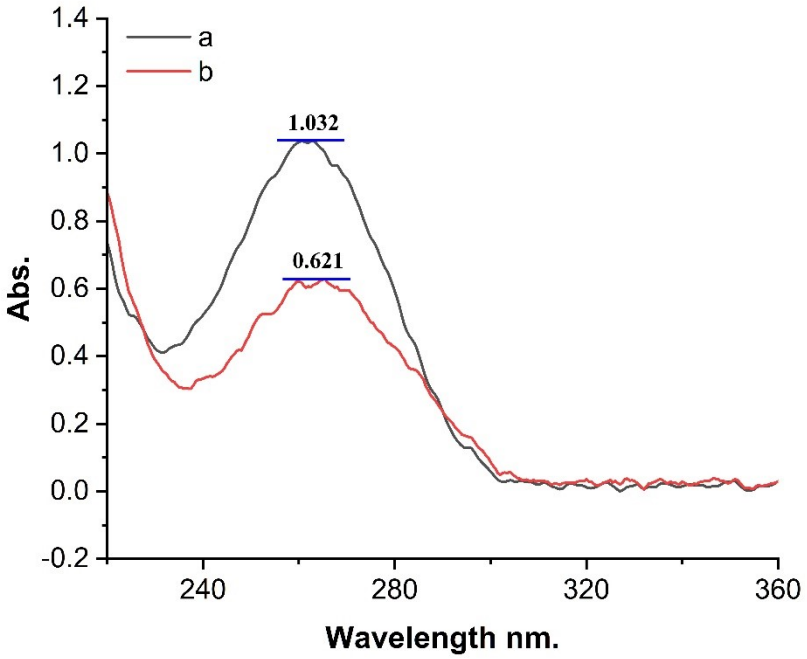

Figure S7 The supernatant of DNA is determined by UV/Vis spectroscopy after incubation without (a) and with (b) Cu-TCPP nanosheets for 1 h, the values of absorbance at the 260 nm are labeled (Cu-TCPP: 25 μL with100 μg/mL; DNA:25 μL with 10 uM).

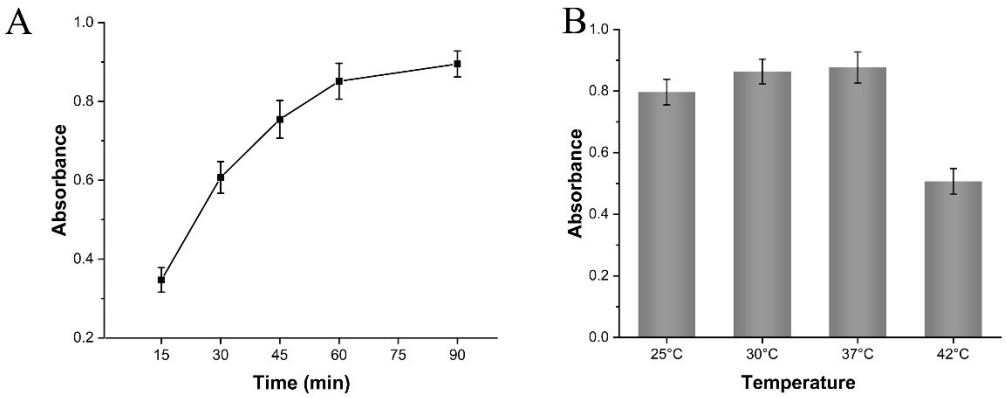

Figure S8 Optimization of (A) the incubation time of the AuNPs/Cu-TCPP materials and (B) the temperature of colorimetric reaction. Error bars represent the standard derivation of three independent experiments.

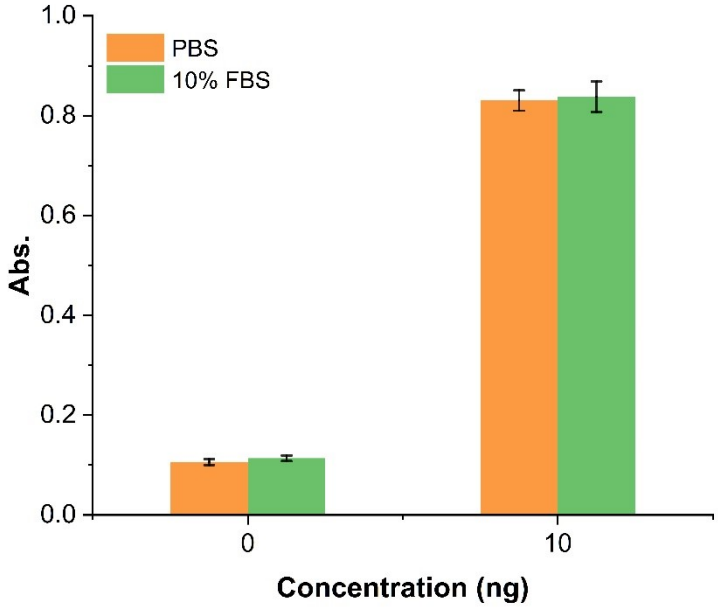

Figure S9 Peak currents obtained by UV/Vis spectroscopy response to different concentrations of CEA diluted in PBS and 10% FBS. Error bars represent the standard deviations of three independent experiments.

Table S1 Comparisons of thisimmunosensor with previous methods.

Method	Linear range (ng/mL)	LOD (pg/mL)
Electrochemical immunosensor[1]	0.0005 - 50	0.167
Colorimetric Immunoassay[2]	0.05 - 100	21.1
Nanopore-based strategy[3]	2 - 200	0.6
Fluorescence resonance energy transfer biosensor[4]	0.004 - 0.1	1.7
Microfluidic paper-based immunosensor[5]	0.05 - 500	10
This proposed method	0.001 - 1000	0.742

References

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