Supporting Information

Zirconium–Metalloporphyrin Frameworks as a Three-in-One Platform Possessing Oxygen Nanocage, Electron Media, and Bonding Site for Electrochemiluminescence Protein Kinase Activity Assay

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Figure S1 FT-IR spectra of ZnTCPP (a) and MOF-525-Zn (b).

Figure S2 (A) Effects of different buffer solutions on the ECL peak intensity of GCE/MOF-525-Zn/TOAB in the O_2-saturated condition. (B) Effect of pH on the ECL peak intensity of GCE/MOF-525-Zn/TOAB in the O_2-saturated HEPES buffer solutions.

Figure S3 ECL-time response of the biosensor at PKA concentration of 0.1 U mL^{-1} under continuous potential scan with a scan rate of 100 mV s^{-1} in the O_2-saturated pH 7.4 HEPES solution.

Figure S1

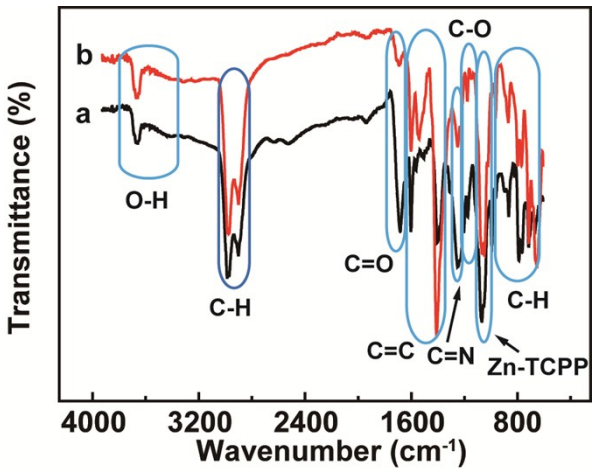
b
a
O-H
C-H
C=O
C=C
C=N
C-O
C-H
Zn-TCPP
Transmittance (%)
4000
3200
2400
1600
800
Wavenumber (cm-1)

Figure S2

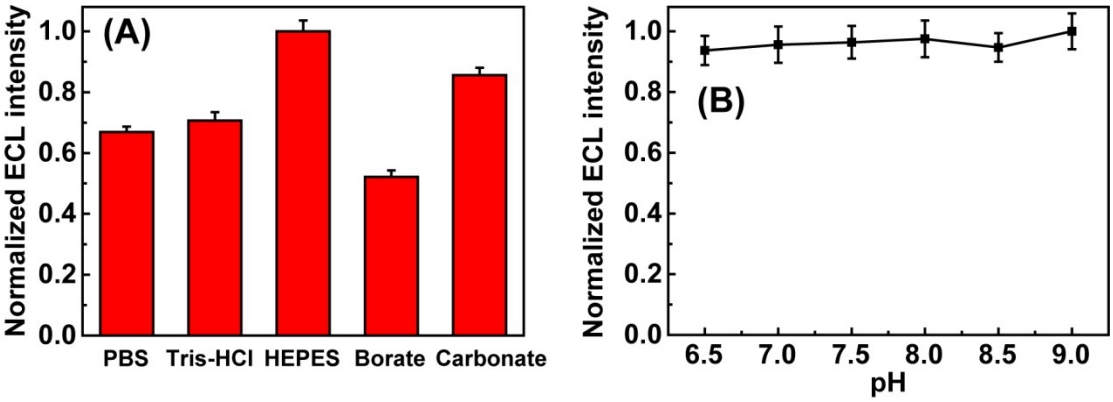
(A)
Normalized ECL intensity
1.0
0.8
0.6
0.4
0.2
0.0
PBS
Tris-HCl
HEPES
Borate
Carbonate
(B)
Normalized ECL intensity
1.0
0.8
0.6
0.4
0.2
0.0
6.5
7.0
7.5
8.0
8.5
9.0
pH

Figure S3

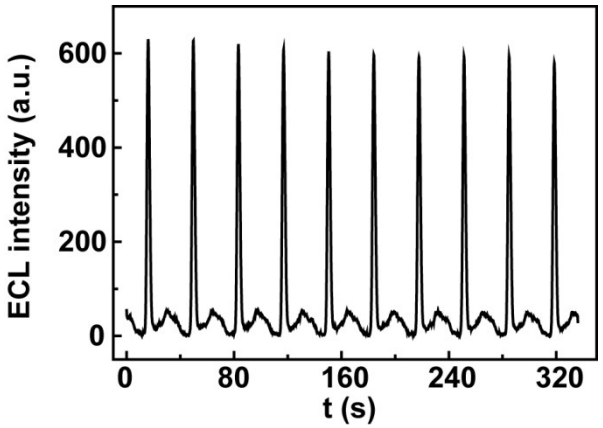

Table S1 Comparison of the performance of our proposed sensor with other published PKA sensors.

Analytical method	Linear range	Detection limit	Reference
Ag nanoclusters-based fluorescence assay	0.001−2 U μL^{-1}	0.5 mU μL^{-1}	[1]
Synthetic phosphorylated receptor probebased electrochemical assay	5−50 U mL^{-1}	0.1 U mL^{-1}	[2]
DNA-Au NPs network-based electrochemical assay	0.1−40 U mL^{-1}	0.03 U/mL	[3]
Gold nanoparticles amplification-based ECL assay	0.07−32 U mL^{-1}	0.07 U mL^{-1}	[4]
Graphite-like carbon nitride-based photoelectrochemical assay	0.05–100 U mL^{-1}	0.015 U mL^{-1}	[5]
Dual-potential ECL ratiometric strategy	0.01−10 U mL^{-1}	0.005 U mL^{-1}	[6]
Semisynthetic GFP-based fluorescent assay	2.5−125 mU μL^{-1}	0.5 mU μL^{-1}	[7]
Zirconium-(zinc)porphyrin frameworks-based ECL assay	0.01 to 20 U mL^{-1}	0.005 U mL^{-1}	This work

Table S2 PKA activity measured in human serum with the proposed ECL biosensor

Samples	Add (U mL^{-1})	Found (U mL^{-1})	Recovery (%)	RSD (%)
1	0.1	0.093	93	2.1
2	1.0	1.02	102	2.3
3	10.0	10.5	105	2.6

References

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