Supplementary Information

Singlet-oxygen generated by metal-organic framework for electrochemical biosensing

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Supporting Figures

The elemental mappings of Zn-ZnMOF

Fig. S1. Elemental mappings of C, N, O and Zn in Zn-ZnMOF.

The EDX spectrum of Zn-ZnMOF

Fig. S2. EDX spectrum of Zn-ZnMOF.
The FT-IR of TCPP(Zn) and Zn-ZnMOF

![FT-IR analysis of TCPP(Zn) and Zn-ZnMOF](image)

**Fig. S3.** FT-IR analysis of TCPP(Zn) and Zn-ZnMOF.

The XPS of Zn 2p and O 1s in Zn-ZnMOF

![XPS spectra of Zn-ZnMOF](image)

**Fig. S4.** (A) Zn 2p and O 1s peaks from the XPS spectra of Zn-ZnMOF.

![N₂ adsorption isotherm of Zn-ZnMOF](image)

**Fig. S5.** N₂ adsorption isotherm of Zn-ZnMOF.
The ABDA absorption spectra as a function of time in the presence of TCPP(Zn)

Fig. S6. (A) ABDA absorption spectra as a function of irradiation time of TCPP(Zn) in 0.1 M PBS (pH = 7.4). (B) Photo of tubes with different reaction system: TMB + 420 nm illumination (a), TCPP(Zn) + 420 nm illumination (b), TMB-TCPP(Zn) (c), and TMB-TCPP(Zn) + 420 nm illumination (d).

The Cyclic voltammograms of bare ITO electrode and Zn-ZnMOF/ITO electrode

Fig. S7. Cyclic voltammograms of bare TIO electrode (a) and Zn-ZnMOF/ITO electrode (b) in 5 mM K$_3$[Fe(CN)$_6$]/K$_4$[Fe(CN)$_6$] in 0.1 M PBS (pH 7.4) containing 0.1 M KCl at scan rate of 50 mV s$^{-1}$. 
The EIS of bare ITO electrode and Zn-ZnMOF/ITO electrode

Fig. S8. EIS of Zn-ZnMOF/ITO electrode (inset: bare TIO electrode) in 5 mM K$_3$[Fe(CN)$_6$]/K$_4$[Fe(CN)$_6$] in 0.1 M PBS (pH 7.4) containing 0.1 M KCl.

The effect of potential for potoelectrochemical bosensor

Fig. S9. Effects of potential on current response in the presence of 40 µM HQ in 0.1 M pH 7.4 PBS with 420 light illumination.
Fig. S10. Amperometry measurements at Zn-ZnMOF/ITO electrode in pure buffer and in the presence of 40 μM amoxicillin, 40 μM ampicillin, 40 μM benzylpenicillin and 40 μM 6-aminopenicillanic acid at -0.4 V in 0.1 M pH 7.4 PBS with 420 nm light illumination.
**Fig. S11.** The structure of 2-aminophenol, 3-aminophenol, 4-aminophenol, 2-nitrophenol, 3-nitrophenol, 4-nitrophenol, and bisphenol A and amperometry measurements at Zn-ZnMOF/ITO electrode in pure buffer and in the presence of 40 μM 3-nitrophenol, 40 μM 2-nitrophenol, 40 μM 4-nitrophenol, 40 μM 2-aminophenol, 40 μM 3-aminophenol, 40 μM 4-aminophenol and 40 μM bisphenol A at -0.4 V in 0.1 M pH 7.4 PBS with 420 light irradiation.
**Fig. S12.** Calibration curve of current intensity vs different concentration of 2-Aminophenol at -0.4 V in 0.1 M pH 7.4 PBS with 420 nm light irradiation.

**Fig. S13.** Calibration curve of current intensity vs different concentration of 2-Nitrophenol at -0.4 V in 0.1 M pH 7.4 PBS with 420 nm light irradiation.
**Fig. S14.** Calibration curve of current intensity vs different concentration of 3-Aminophenol at -0.4 V in 0.1 M pH 7.4 PBS with 420 nm light irradiation.

**Fig. S15.** Calibration curve of current intensity vs different concentration of 3-Nitrophenol at -0.4 V in 0.1 M pH 7.4 PBS with 420 nm light irradiation.
**Fig. S16.** Calibration curve of current intensity vs different concentration of 4-Aminophenol at -0.4 V in 0.1 M pH 7.4 PBS with 420 nm light irradiation.

**Fig. S17.** Calibration curve of current intensity vs different concentration of 4-Nitrophenol at -0.4 V in 0.1 M pH 7.4 PBS with 420 nm light irradiation.
**Fig. S18.** Calibration curve of current intensity vs different concentration of Bisphenol A at -0.4 V in 0.1 M pH 7.4 PBS with 420 nm light irradiation.

Table S1. Comparison of the detection limit of hydroquinone (HQ) between the proposed method and other reported detection methods.

<table>
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<tr>
<th>Electrode</th>
<th>Technique</th>
<th>Detection limit (μM)</th>
<th>Refs</th>
</tr>
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<tbody>
<tr>
<td>Graphene-PANI/Tyr/ Nafion/GCE</td>
<td>LSV</td>
<td>200</td>
<td>1</td>
</tr>
<tr>
<td>GCE</td>
<td>CV</td>
<td>1.75</td>
<td>2</td>
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<tr>
<td>graphitized mesoporous carbon/GCE</td>
<td>DPV</td>
<td>0.91</td>
<td>3</td>
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<tr>
<td>LDH/GCE</td>
<td>DPV</td>
<td>2.6</td>
<td>4</td>
</tr>
<tr>
<td>CPE</td>
<td>SWV</td>
<td>2</td>
<td>5</td>
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<tr>
<td>Poly/GCE</td>
<td>LSV</td>
<td>3.91</td>
<td>6</td>
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<tr>
<td>Zn-ZnMOF/ITO</td>
<td>amperometry</td>
<td>0.8</td>
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**Reference**

