High-performance electrochemical sensor for sensitive detection of tetracycline based on Zr-UiO-66/MWCNTs/AuNPs composite electrode

Xueyu Weng[1, 2], Jingqi Huang[1], Huazhu Ye[1], He Xu[1]*, Dongqing Cai[1], Dongfang Wang [1],

[1] College of Environmental Science and Engineering, Donghua University, Shanghai 201620, China

[2] State Key Laboratory of Environmental Chemistry and Ecotoxicology, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, Beijing 100085, China; College of Resources and Environment, University of Chinese Academy of Sciences, Beijing 100049, China

* To whom correspondence should be addressed:

College of Environmental Science and Engineering, Dong Hua University, Shanghai 201620, China. Tel.: +86 21 67792548; fax: +86 21 67792159.

E-mail address: hexu@dhu.edu.cn.

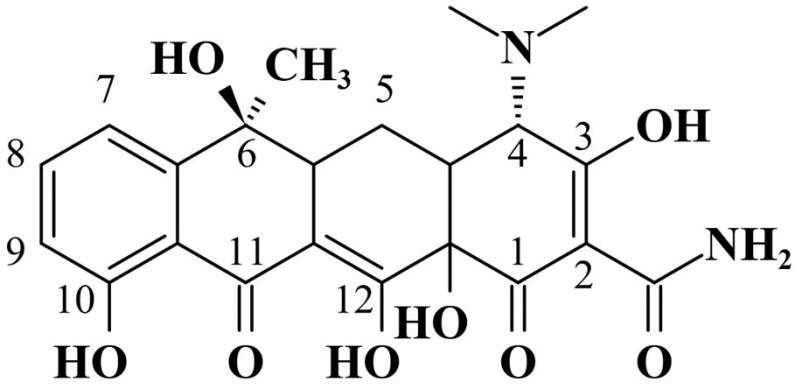

Fig. S1. The structure of tetracycline.

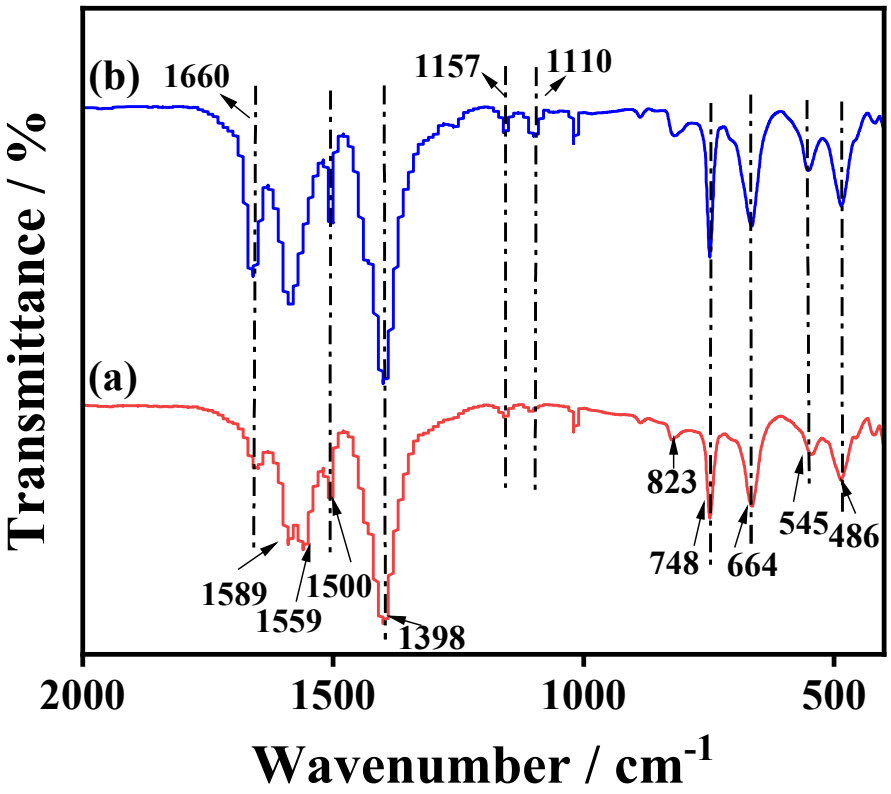

Fig. S2. The FTIR spectra of (a) Zr-UiO-66 and (b) Zr-UiO-66/MWCNTs composites.

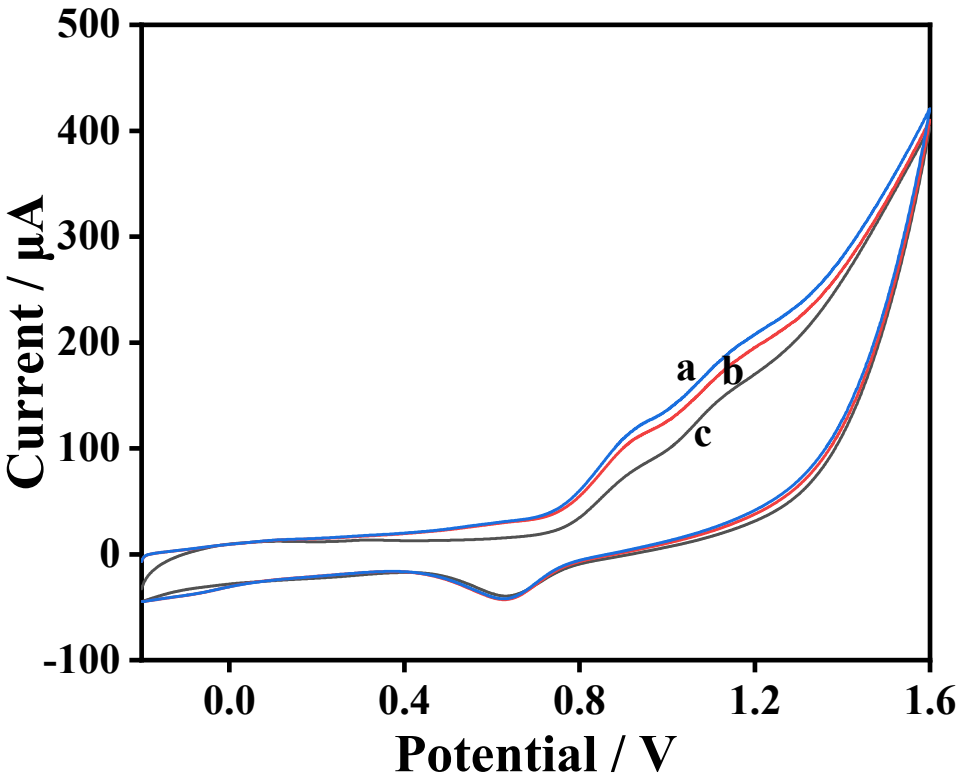

Fig. S3. The detection of tetracycline at Zr-UiO-66/MWCNTs/AuNPs/GCE in (a) phosphate buffer, (b) citric acid-sodium citrate buffer, (c) acetic acid-ammonium acetate buffer

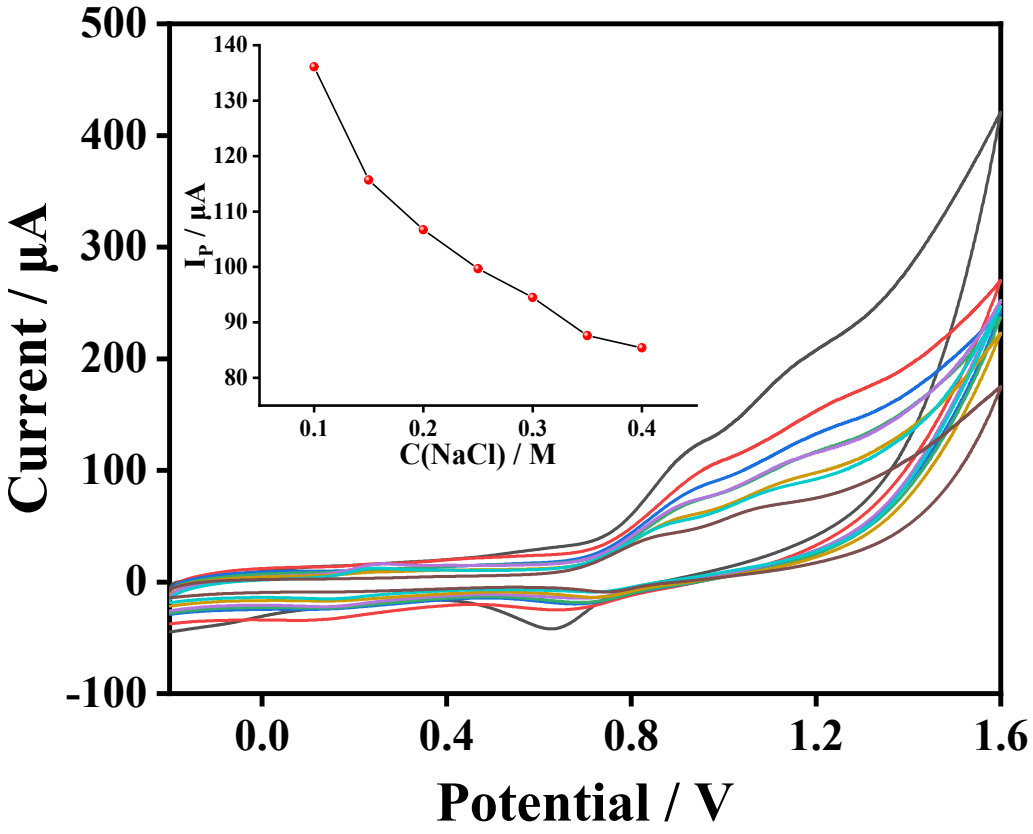

Fig. S4. Effect of ionic strength on the peak current of 2 mM tetracycline at the Zr-UiO-66/MWCNTs/AuNPs/GCE in the 0.1 M PBS (pH = 7) buffer solution; (Inset: The effect of different NaCl concentrations on peak current of tetracycline).

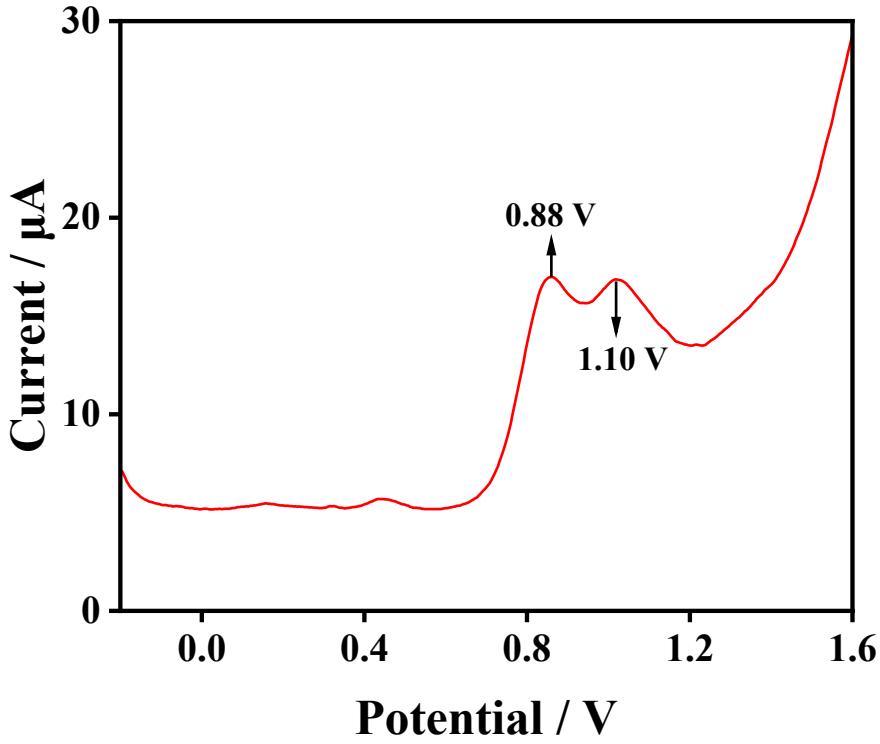

Fig. S5. The DPV test of Zr-UiO-66/MWCNTs/AuNPs/GCE in the detection of 2 mM tetracycline in 0.1 M PBS solution.

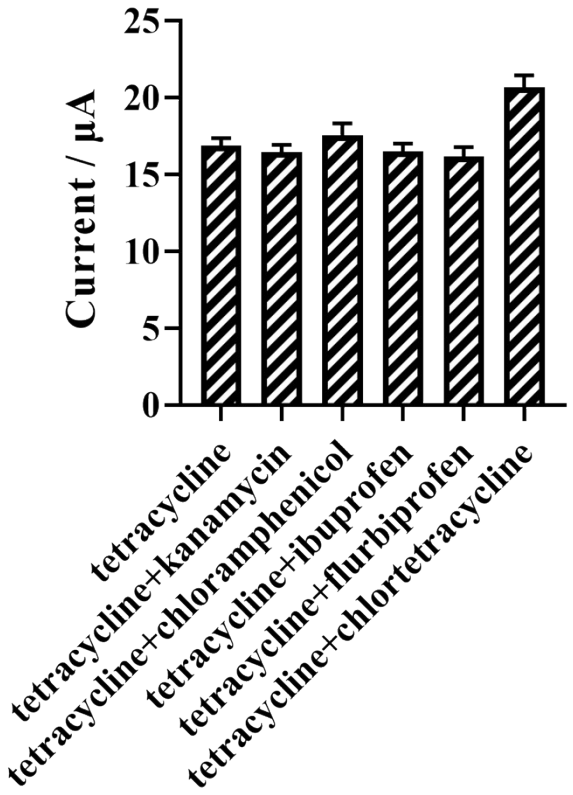

Fig. S6. Comparison of the current response of Zr-UiO-66/MWCNTs/AuNPs composites with 3.5×10^{-5} M tetracycline in the absence or presence of other antibiotics kanamycin, chloramphenicol, ibuprofen, flurbiprofen and chlortetracycline.

Table S1. Comparison of several typical electrochemical methods for tetracycline detection.

Modified Materials	Technique	Linear Range	Limit Detection	Ref.
[a] NIOPPy-AuNP/SPCE	DPV	1 ~ 20 μM	0.65 μM	1
[b] p-Mel@ERGO	DPV	5 ~ 225 μM	2.2 μM	2
[c] PtNPs/C	CV	9.99 ~ 44.01 μM	4.28 μM	3
Graphite/polyurethane	DPV	3.8 ~ 38 μM	2.6 μM	4
[d] GPUE/MIP	DPV	4 ~ 60 μM	0.55 μM	5
[e] ERGO/SPE	DPV	20 ~ 80 μM	12 μM	6
rGO/AuNPs/MWCNTs	DPV	0.12 ~ 12 μM	0.042 μM	7
CNT-COOHs/ZnO	ECL	0.01 ~ 100 μM	0.0067 μM	8
[h] IL/CNTPE	DPV	0.50 ~ 300 μM	0.2 μM	9
Zr-UiO-66/MWCNTs/AuNPs	Amperometry	0.5 ~ 225 μM	0.167 μM	This work

[a] Molecularly imprinted overoxidized polypyrrole-gold nanoparticles/screen-printed carbon electrode.

[b] Polymelamine@electrochemically reduced graphene oxide composites.

[c] Platinum nanoparticles/carbon electrode.

[d] Graphite-polyurethane composite/molecularly imprinted polymer electrode.

[e] Electrochemical reduced graphene oxide/ screen-printed carbon electrode.

[h] Ionic liquid-modified carbon nanotubes paste electrode.

Table S2. Comparison of several typical electrochemical methods for tetracycline detection in real samples.

Modified Materials	Recovery	Ref.
NIOPPy-AuNP/SPCE	92.2 ~ 105.0%	1
p-Mel@ERGO	99.0 ~ 99.8%	2
PtNPs/C	102.6%	3
Graphite/polyurethane	96 ~ 100%	4
GPUE/MIP	97 ~ 105%	10
ERGO/SPE	85 ~ 123%	11
rGO/AuNPs/MWCNTs	97.50 ~ 103.0%	12
CNT-COOHs/ZnO	97 ~ 97.6%	13
Zr-UiO-66/MWCNTs/AuNPs	99.0 ~ 100.7%	This work

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