Supporting Information

An electrochemical microsensor of osteopontin based on a molecularly imprinted layer and a built-in probe-functionalized acupuncture needle

Xue Kong[a, b], Yi Zhang[b], Yan Liu[b], Jinghui Lyu[a, *], and Zheng-Zhi Yin[a, b, *]

[a] College of Chemical Engineering, Zhejiang University of Technology, Hangzhou, 310014, China

[b] Jiaxing Key Laboratory of Molecular Recognition and Sensing, College of Biological and Chemical Engineering, Jiaxing University, Jiaxing 314001, China

Corresponding authors:

E-mail: lyujh@zjut.edu.cn (J.-H. Lyu); yinzhengzhi@zjxu.edu.cn (Z.-Z. Yin)

Table S1 Comparison of the microsensor developed with the electrochemical biosensors reported for OPN.

Modified electrode	Identification component	Technology	Signal source	Linear range	LOD	Ref.
GE/DPA/Streptavidin/DNA aptamer	aptamer	CV/SWV	$[Fe(CN)_6]^{3-/4-}$	0~91 ng mL^{-1}	1.40 nM	30
GE/DPA/Streptavidin/RNA aptamer	aptamer	CV	$[Fe(CN)_6]^{3-/4-}$	25~200 nM	3.70 nM	31
SPGE/Au/DPA/Streptavidin/RNA aptamer SPGE/Au/DPA/Streptavidin/DNA aptamer	aptamer	CV	$[Fe(CN)_6]^{3-/4-}$	—	—	32
GE/PMO_{12}/PPy@Ti_3C_2Tx/aptamer	aptamer	EIS	$[Fe(CN)_6]^{3-/4-}$	0.05~10000 pg mL^{-1}	0.98 fg mL^{-1}	33
GE/ZrO_2@GNF_{700}/aptamer	aptamer	EIS	$[Fe(CN)_6]^{3-/4-}$	0.01~2000 pg mL^{-1}	4.76 fg mL^{-1}	34
GE/MUA/Dextran/HA-7/antibody	antibody	EIS	$[Fe(CN)_6]^{3-/4-}$	2.27~20.43 nM	0.17 nM	35
Au microelectrode/SAM/SA/Biotin-antibody	antibody	EIS	$[Fe(CN)_6]^{3-/4-}$	0.5~512 pg mL^{-1}	0.171 pg mL^{-1}	36
GCE/AuNPs-anti-OPN-antibody	antibody	DPV	$[Fe(CN)_6]^{3-/4-}$	0.001~1000 ng mL^{-1}	0.005 ng mL^{-1}	37
ANME//pMB//SMIP	SMIP	DPV	Built-in pMB	0.01~1000 ng mL^{-1}	3.00 pg mL^{-1}	This study

GE: Gold electrode, EIS: Electrochemical impedance spectroscopy, SPGE: Screen-printed gold electrodes, SWV: Square wave voltammetry, DPA: Dithiodipropionic acid, DNA: Deoxyribonucleic acid, PPy: Polypyrrole, RNA: Ribonucleic acid, PMO_{12}: Phosphomolybdic acid, GNF_{700}: Sraphene-like nanofiber, MUA: Mercaptoundecanoic acid, HA-7: Acetylated-HWRGWVA, SAM: Self-assembling monolayer, SA: Streptavidin, GCE: Glassy carbon electrode.

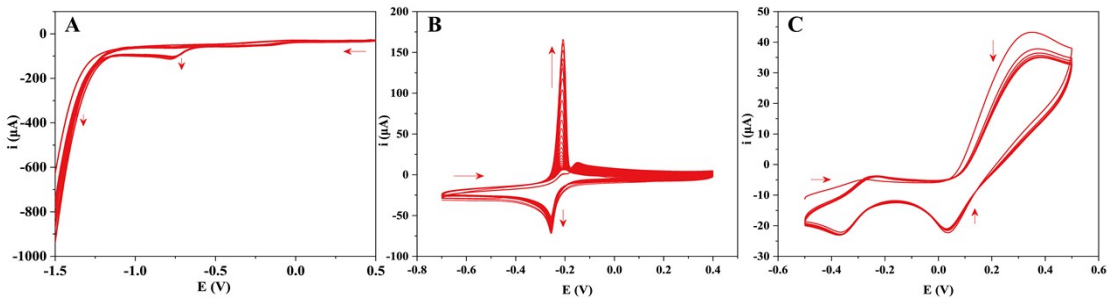

Fig. S1 (A) CVs of ANE electrodeposition in 2.5 mM $HAuCl_4$ solution containing 0.1 M KCl (5 cycles). Scan rate is 25 mV s^{-1}. (B) CV on ANE/AuNPs~4-MPBA~OPN in 0.1 M PBS containing 2.5 mM MB (30 cycles). Scan rate is 70 mV s^{-1}. (C) CV of electropolymerization on ANE/AuNPs~4-MPBA~OPN@pMB in 0.01 M PBS containing 5 mM DA and 20% ethanol (10 cycles). Scan rate is 100 mV s^{-1}.

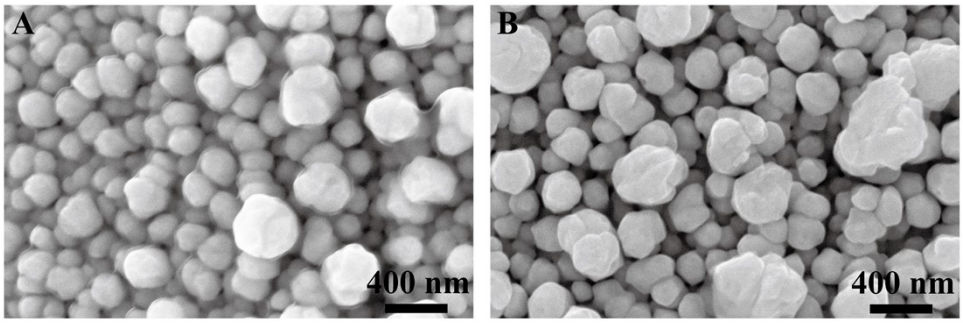

Fig. S2 SEM images of ANME//pMB//pDA (A) and ANME//pMB//SMIP (B).

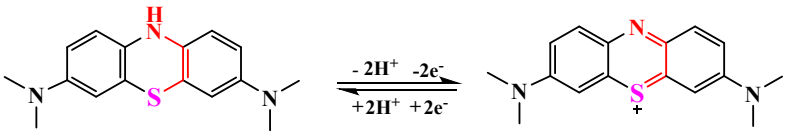

Fig. S3 The electrochemical redox process of methylene blue (MB).

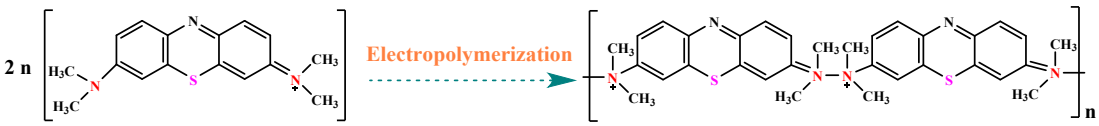

Fig. S4 The proposed mechanism for electropolymerizing MB.

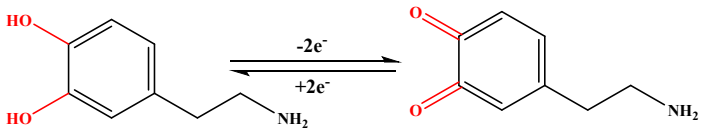

Fig. S5 The electrochemical redox process of dopamine (DA).

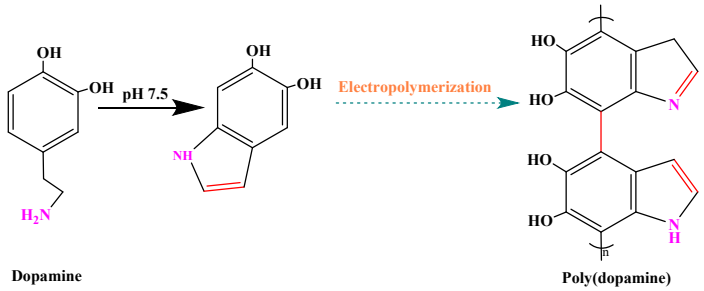

Fig. S6 The proposed mechanism for electropolymerizing DA.

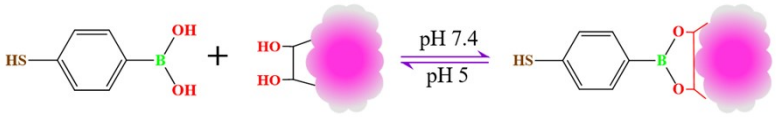

Fig. S7 The reversible binding process of 4-MPBA with OPN in this work.

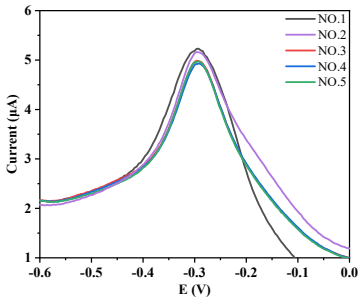

Fig. S8 The reproducibility of the five prepared microsensors.