Electronic Supplementary Material (ESI) for Polymer Chemistry

Supplementary Materials

One-step electropolymerization of xanthurenic acid-graphene film prepared by pulse potentiostatic method for simultaneous detection of guanine and adenine

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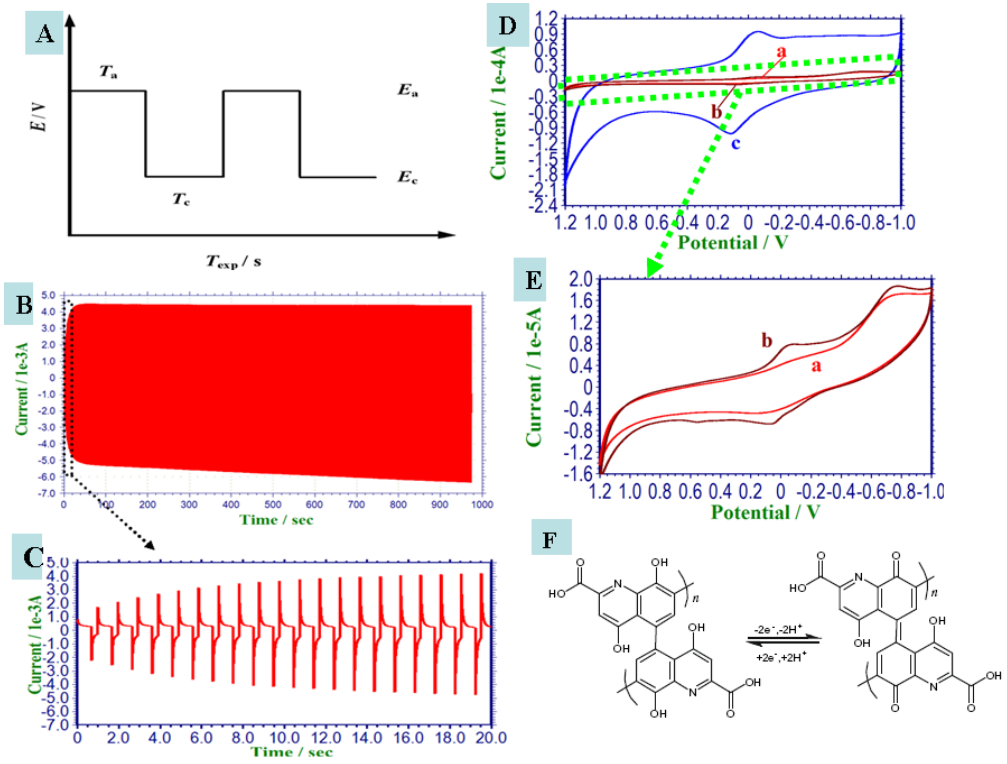

Fig. S1. (A) Schematic representation; (B, C) experimental images of the pulse potentiostatic method (PPM). (D,E) CVs of GCE (a); PXa/GCE (b), and PXa-ERGNO/GCE (c) obtained from PPM recorded in 0.3 mol/L PBS (pH 7.0). (F) The electrochemical process of PXa polymer

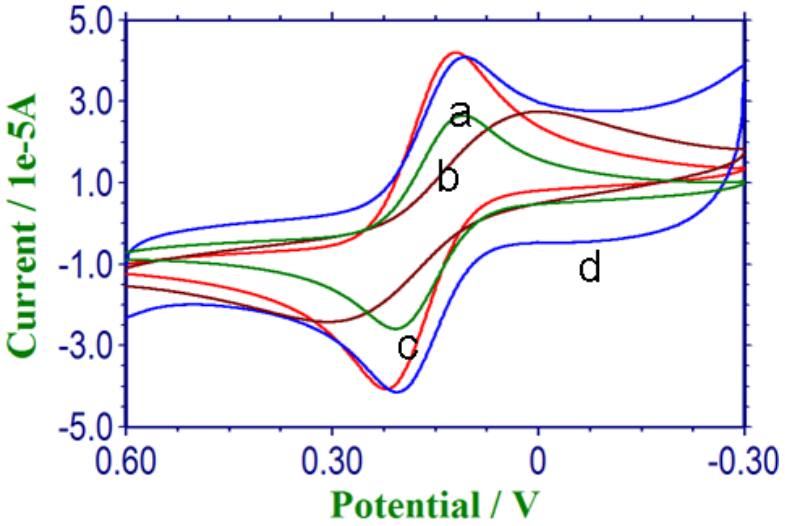

Fig. S2 CVs of $[Fe(CN)_6]^{3-/4-}$ recorded at GCE (a), PXa/GCE (b), ERGNO/GCE(c), PXa-ERGNO/GCE(d) obtained from PPM

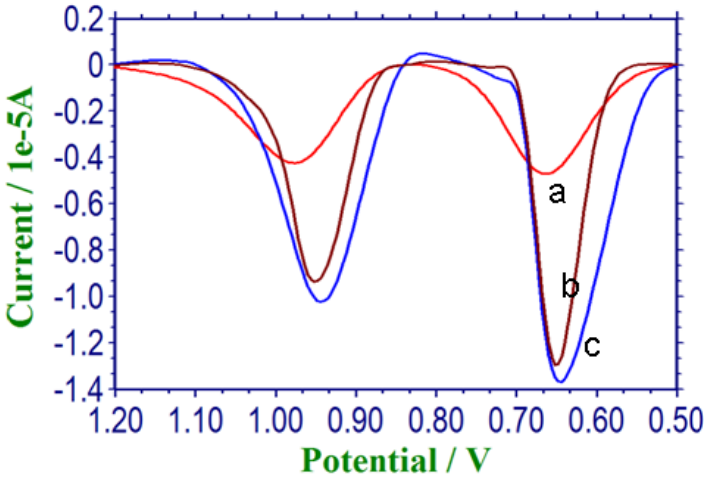

Fig. S3 Baseline-corrected DPVs of 3×10^{-4} mol/L guanine and 3×10^{-4} mol/L adenine recorded at PXa-ERGNO/GCE prepared under different values of E_c : (a) -0.8 V, (b) -1.3 V, (c) -1.6 V with E_a = 0.65 V, T_{exp} = 1000 s, T_c/T_a = 7/3 (one pulse period was 1 s).

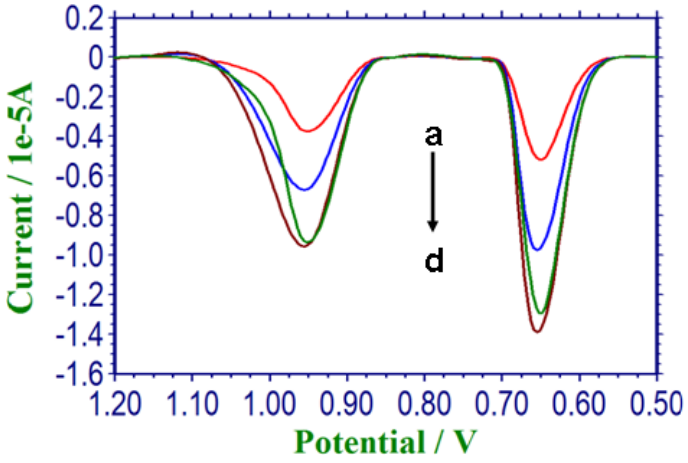

Fig. S4 Baseline-corrected DPV of 3×10^{-4} mol/L guanine and 3×10^{-4} mol/L adenine recorded at PXa-ERGNO/GCE with different T_{exp} : (a) 500 s, (b) 800 s (c) 1000 s, (d) 2000 s, with E_a = 0.65 V, E_c = -1.3 V and T_c/T_a = 7/3 (one pulse period was 1 s).

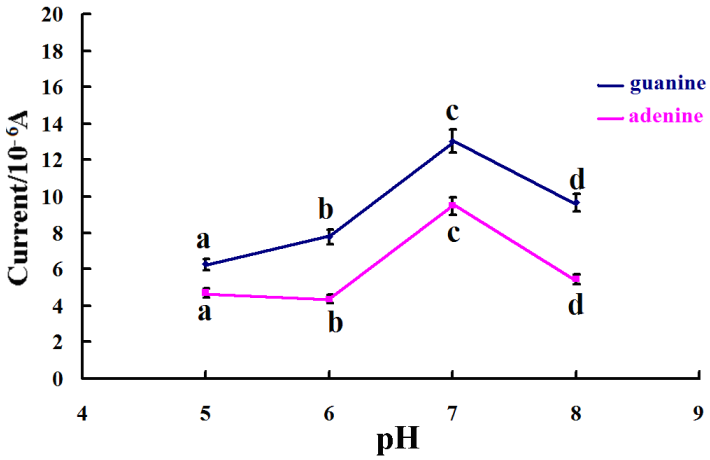

Fig. S5 Calibration plots of the oxidation peak current of guanine and adenine versus different values of pH.

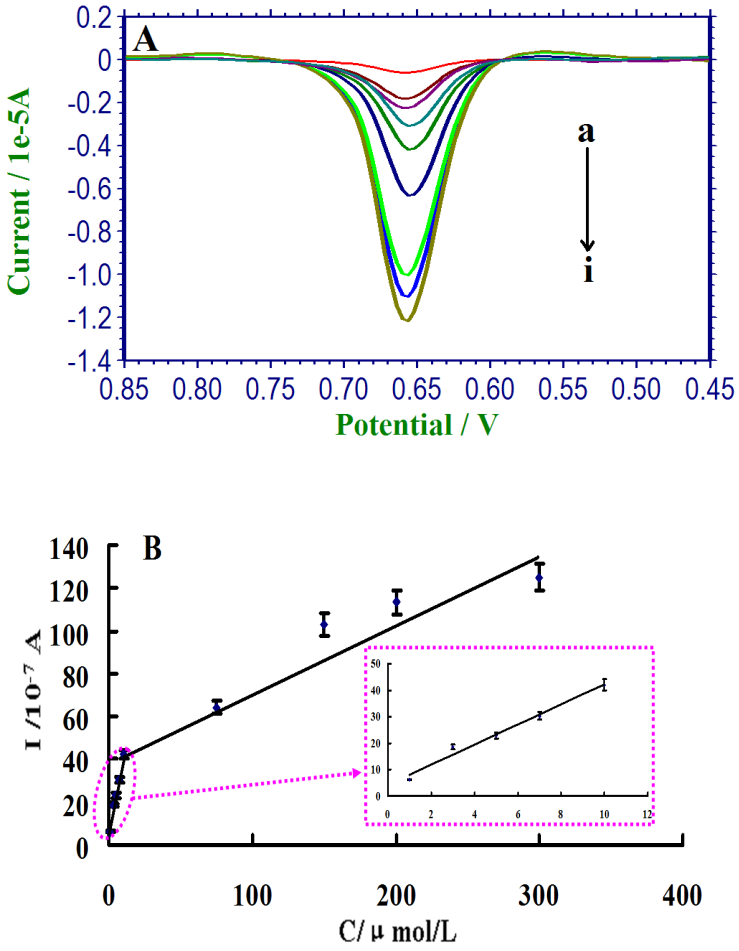

Fig. S6 (A) Baseline-corrected DPVs of various guanine concentrations at PXa-ERGNO/GCE (from a to i: 1, 3, 5, 7, 10, 75, 150, 200, 300 μmol/L); (B) Calibration plots of the oxidation peak current versus different concentrations of guanine.

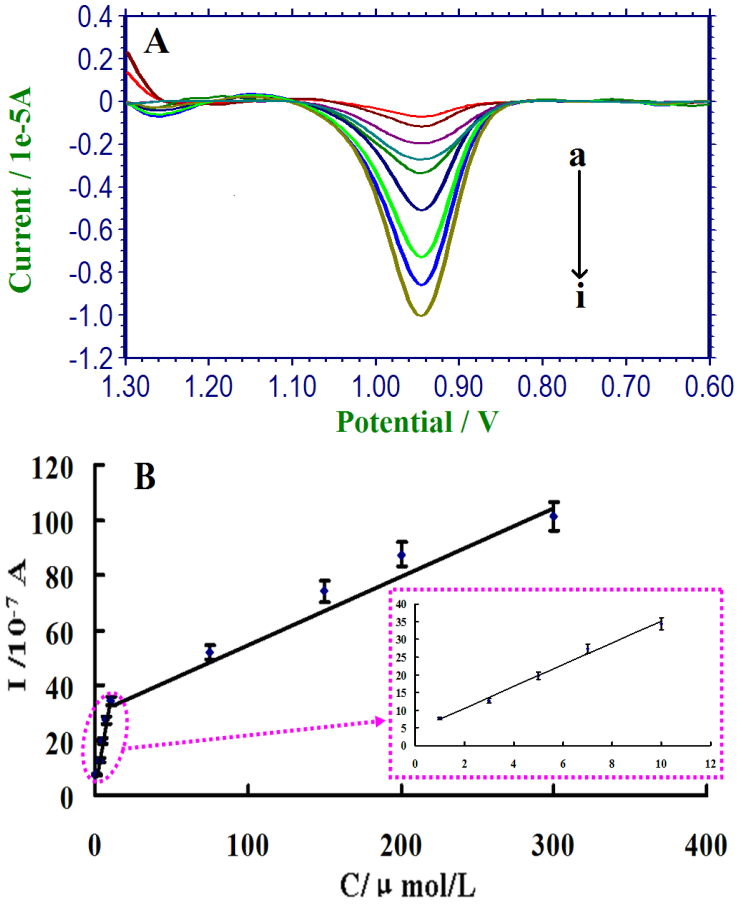

Fig. S7 (A) Baseline-corrected DPVs of various adenine concentrations at PXa-ERGNO/GCE (from a to i: 1, 3, 5, 7, 10, 75, 150, 200, 300 μmol/L); (B) Calibration plots of the oxidation peak current versus different concentrations of adenine.

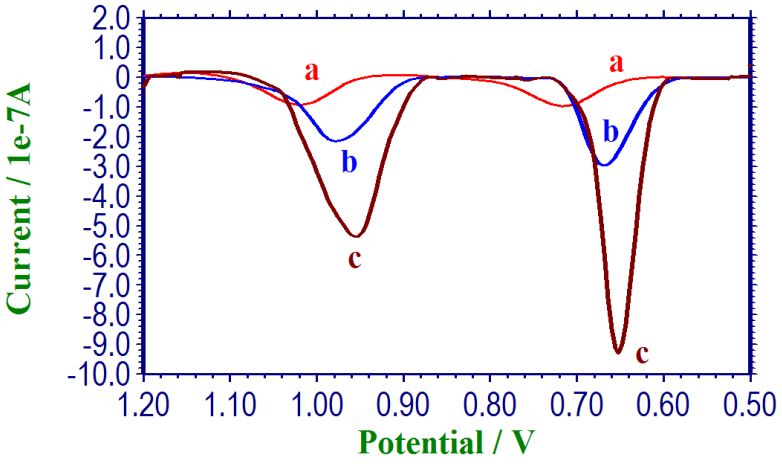

Fig. S8 Baseline-corrected DPVs of 1×10^{-6} mol/L guanine and adenine at different modified electrodes: (a) PXa, (b) ERGNO, and (c) PXa-ERGNO obtained from PPM

Table S1 Comparison of different modified electrodes (PXa, ERGNO, and PXa-ERGNO) obtained from PPM for 1×10^{-6} mol/L guanine (G) and adenine (A) detection

Electrodes	Bases	Methods	Potential (V)
PXa/GCE	G+A	DPV	0.72(G),1.02(A)
ERGNO/GCE	G+A	DPV	0.67(G),0.97(A)
PXa-ERGNO/GCE	G+A	DPV	0.65(G),0.95(A)

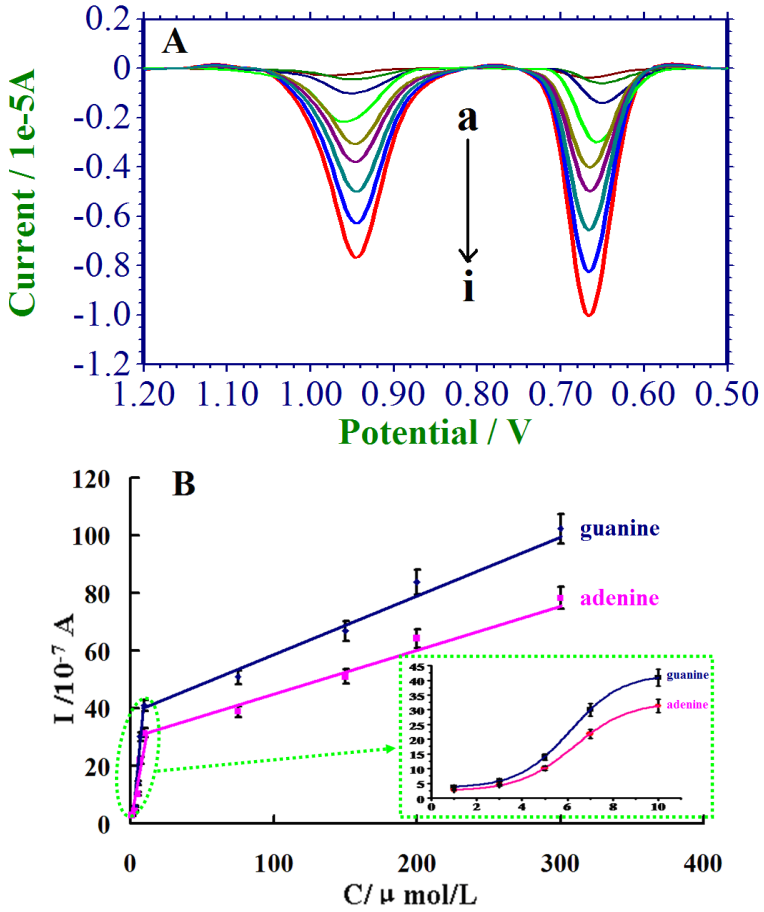

Fig. S9 (A) Baseline-corrected DPVs of different guanine and adenine concentrations at ERGNO/GCE obtained from PPM (from a to i: 1, 3, 5, 7, 10, 75, 150, 200, 300 μmol/L); (B) Calibration plots of the oxidation peak current versus different concentrations of guanine and adenine.

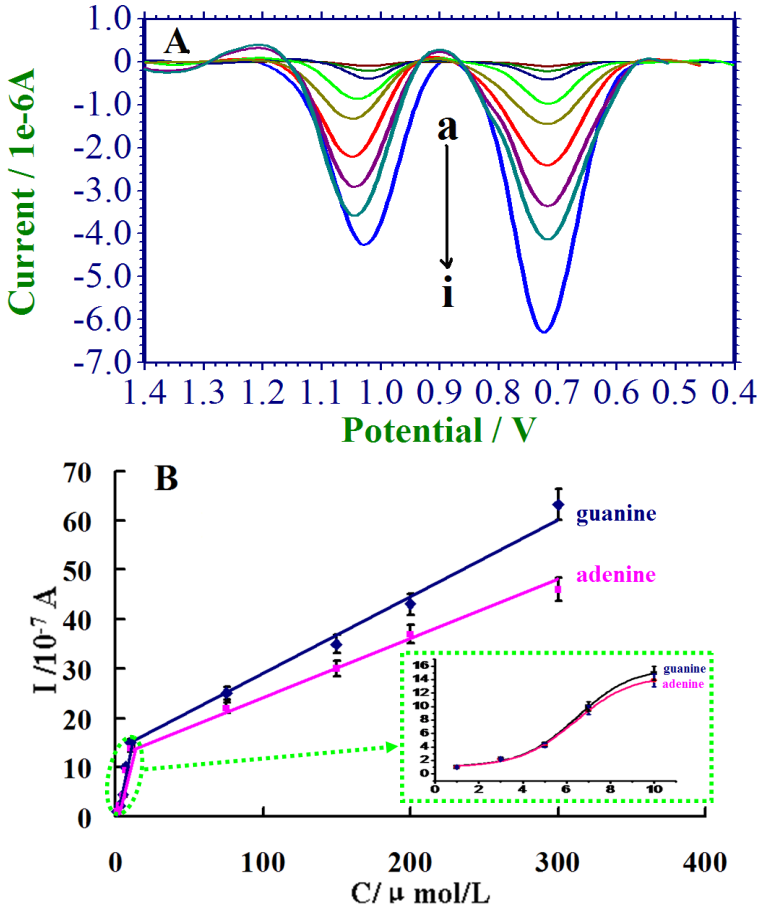

Fig. S10 (A) Baseline-corrected DPVs of different guanine and adenine concentrations at PXa/GCE obtained from PPM (from a to i: 1, 3, 5, 7, 10, 75, 150, 200, 300 μmol/L); (B) Calibration plots of the oxidation peak current versus different concentrations of guanine and adenine.

Table S2 Comparison of different modified electrodes with previous reports for guanine (G) and adenine (A)

Electrodes	Bases	Methods	Potential (V)	Linear rang(μmol/L)	Detection limit(mol/L)
Our work	G	DPV	0.65	1-10;10-300	4.0×10^{-7}
PXa-ERGNO/GCE(PPM)	A	DPV	0.95	1-10;10-300	6.0×10^{-7}
	G+A	DPV	0.65(G),0.95(A)	1-10;10-300	5.5×10^{-7}(G),7.3×10^{-7}(A)
	G	DPV	0.97	8-68	
TiO_2-graphene/GCE[1]	A	DPV	1.26	6-72	
	G+A	DPV		0.5-200(G),0.5-200(A)	1.5×10^{-7}(G),1.0×10^{-7}(A)
	G	DPV	0.9	0.5-200	5.0×10^{-8}
graphene-COOH/GCE[2]	A	DPV	1.3	0.5-200	2.5×10^{-8}
	G+A	DPV	0.9(G),1.23(A)	0.5-200(G),0.5-200(A)	5.0×10^{-8}(G),2.5×10^{-8}(A)
	G	DPV		2-200	5.8×10^{-7}
graphene-Nafion/GCE[3]	A	DPV		5-200	7.5×10^{-7}
	G+A	DPV	0.82(G),1.184(A)	4-200(G),8-150(A)	

1 Y. Fan, K. J. Huang, D. J. Niu, C. P. Yang and Q. S. Jing, *Electrochim. Acta*, 2011, **56**, 4685.

2 K. J. Huang, D. J. Niu, J. Y. Sun, C. H. Han, Z. W. Wu, Y. L. Li and X. Q. Xiong, *Colloids Surf. B*, 2011, **82**, 543.

3 H. S. Yin, Y. L. Zhou, Q. Ma, S. Y. Ai, P. Ju, L. S. Zhu and L. N. Lu, *Process Biochem.*, 2010, **45**, 1707.

Stability and reproducibility of the modified electrode

The stability of the PXa-ERGNO modified electrode was tested. The electrochemical responses of modified electrodes preserved about 91.1% and 87.8% of original values of guanine and adenine after being stored at the room temperature for four days, indicating that the electrode has good stability. The relative standard deviation (RSD) was 7.6% for the oxidation peak current of 1.0×10^{-6} mol/L base with five PXa-ERGNO modified electrodes which were made in the same condition, demonstrating the excellent reproducibility.[4]

4 M. Zhou, Y. M. Zhai and S. J. Dong, *Anal. Chem*., 2009**, 81**, 5603.