Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.
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Supporting Information

Fabrication of NiFeB flexible electrode via electroless deposition towards selective and sensitive detection of dopamine

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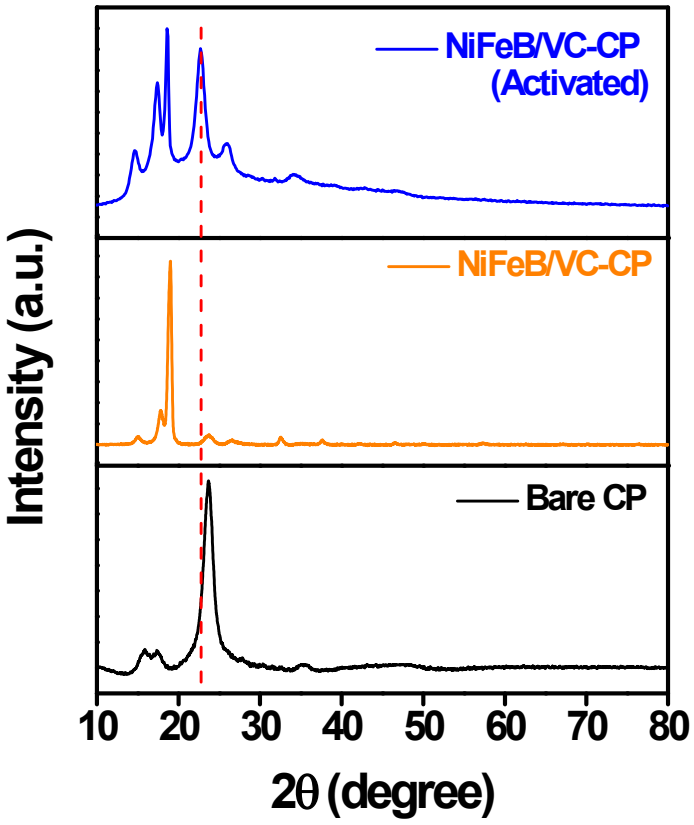

Figure S1. PXRD pattern of bare cellulose paper and NiFeB/VC-CP electrode.

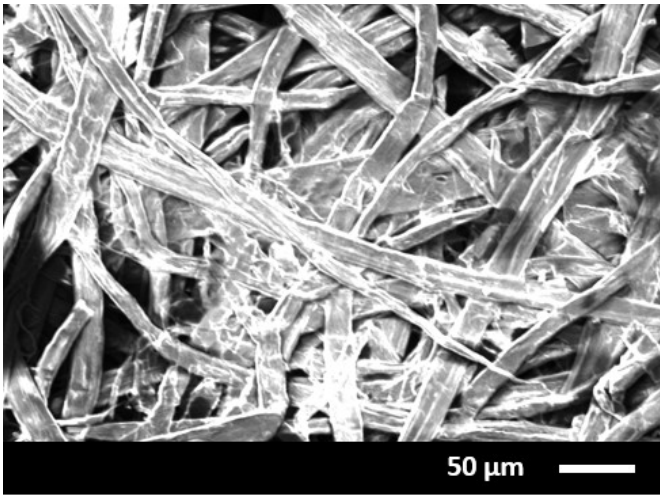

Figure S2. SEM image of bare cellulose paper.

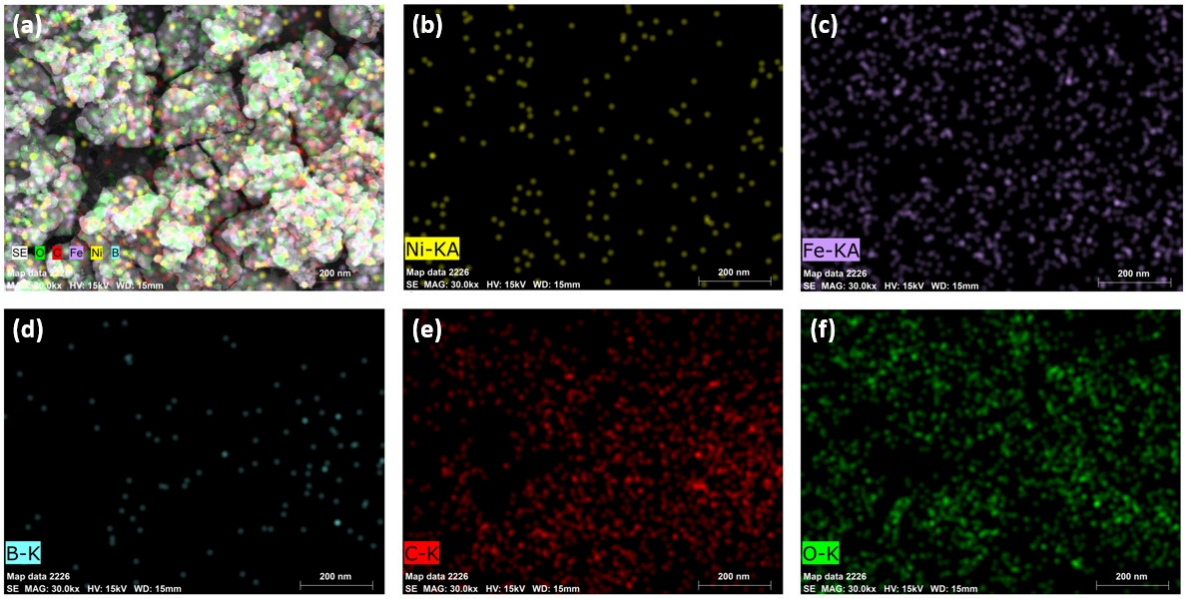

Figure S3. Elemental dot mapping images (a) all elements, (b) Ni, (c) Fe, (d) B (e) C and (f) O for NiFeB/VC-CP electrode.

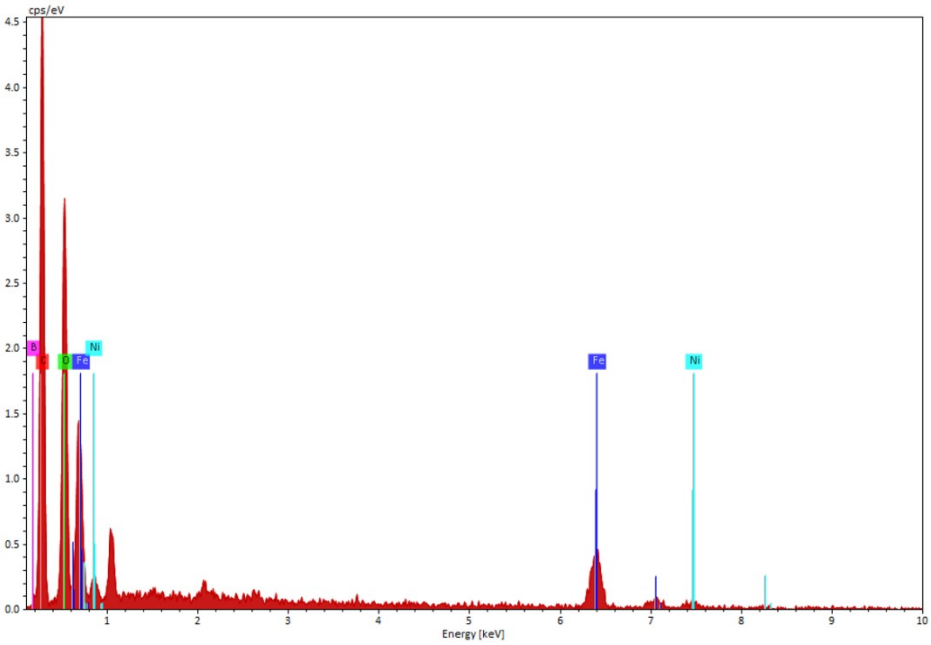

Figure S4. EDS spectrum for NiFeB/VC-CP electrode.

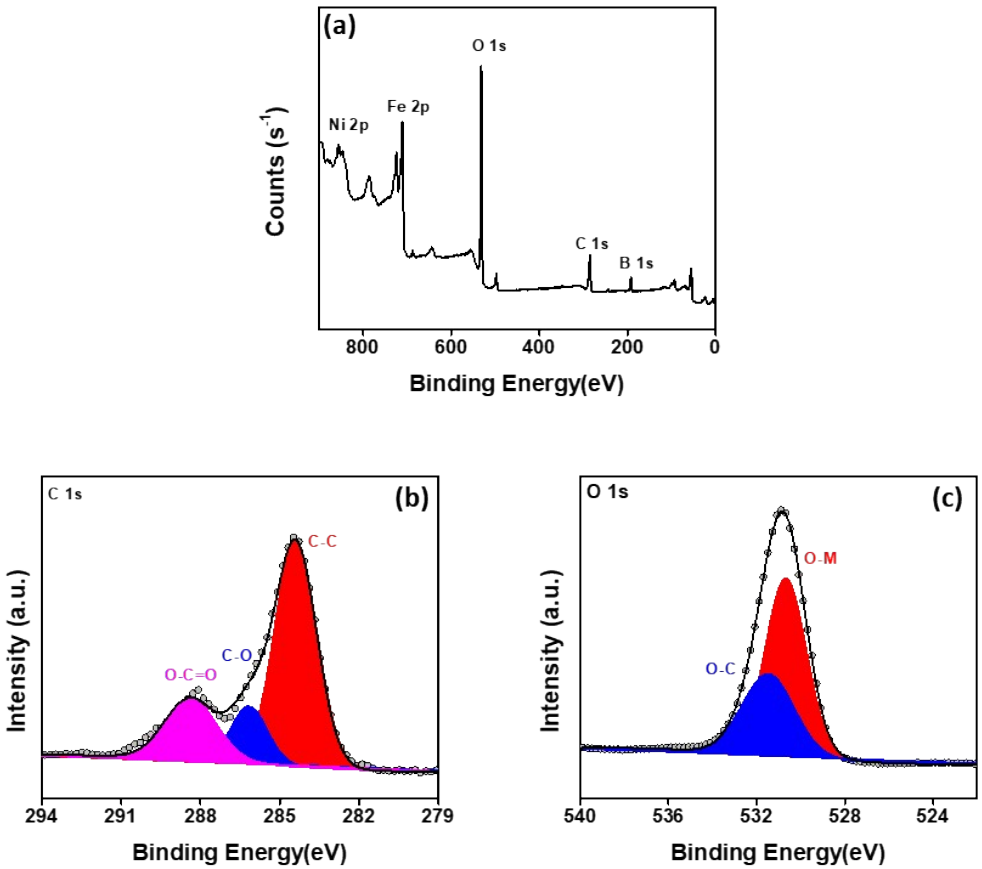

Figure S5A. (a) XPS survey spectra and deconvoluted XP spectra of (b) C 1s and, (c) O 1s for NiFeB/VC-CP.

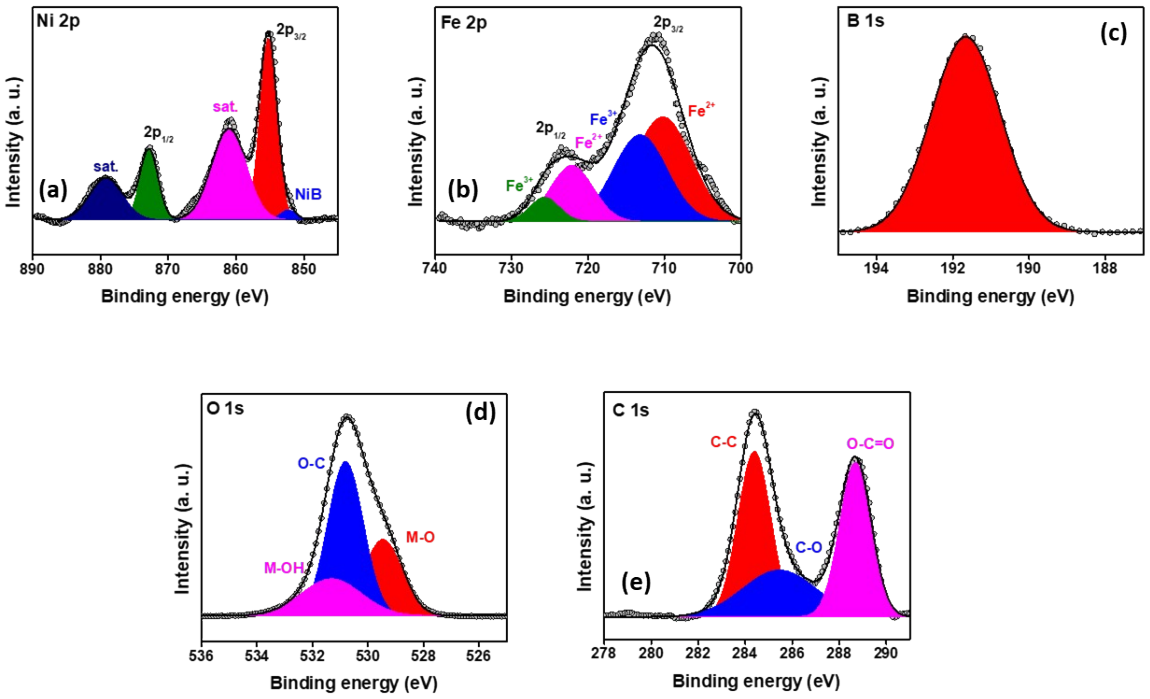

Figure S5B. Deconvoluted XP spectra for (b) Ni 2p, (c) Fe 2p, (d) B 1s, (e) O 1s and (f) C 1s after electrochemical pre-treatment.

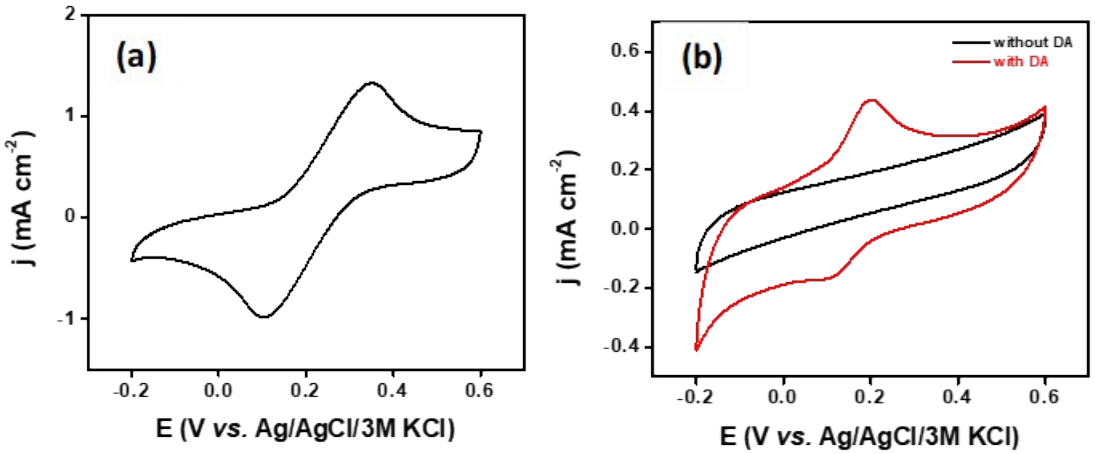

Figure S6. Cyclic voltammogram of NiFeB/VC-CP in 0.1 M PBS electrolyte containing (a) 400 µM $K_4[Fe(CN)_6]$ only and (b) 200 µM AA in presence and absence of 50 µM DA at a scan rate of 10 mV s^{-1}; CE: Pt wire, RE: Ag/AgCl/3 M KCl.

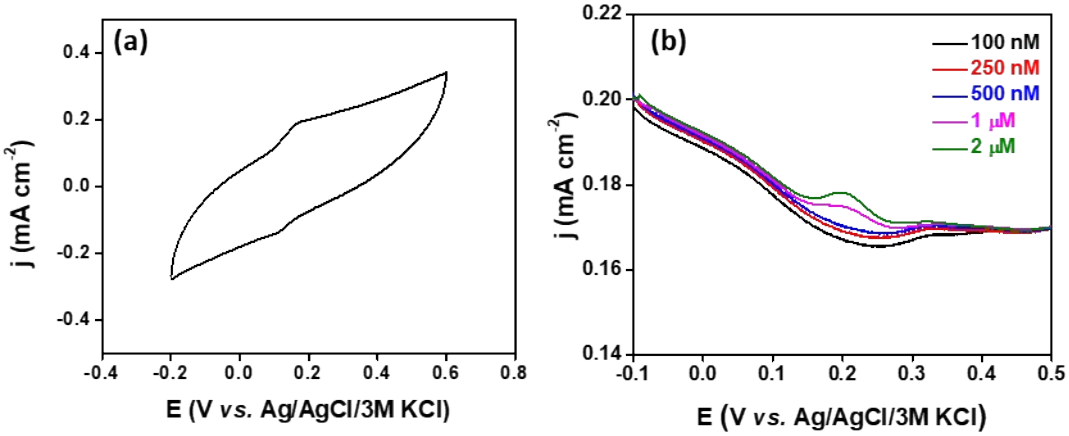

Figure S7. (a) Cyclic voltammogram of VC-CP in 0.1 M PBS electrolyte containing 200 µM AA and 50 µM DA at a scan rate of 10 mV s^{-1} and (b) Differential pulse voltammogram in various concentration of DA in 0.1 M PBS containing 200 µmol L^{-1} AA; CE: Pt wire, RE: Ag/AgCl/3 M KCl.

Electrochemical surface area (ECSA):

The electrocatalytically active surface area of the electrodes was determined by means of double-layer pseudo-capacitance (C_{dl}). A series of cyclic voltammetry were performed in the non-faradic potential region of -0.1 V to 0.1 V *vs.* RHE with various scan rate (40 to 140 mV s^{-1}). The C_{dl} was determined by the slope obtained from the plot of average current density ($j_c + j_a$) versus the scan rate. Finally, the ECSA was calculated by dividing the Cdl by the specific capacitance of the flat standard surface (20-60 µF cm^{-2}), here it is considered to be 40 µF cm^{-2}.

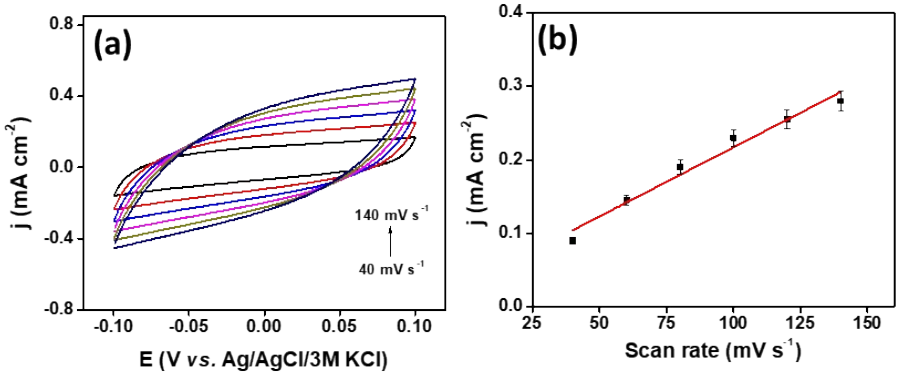

Figure S8. (a) Cyclic voltammogram of NiFeB/VC-CP in non-faradic potential region at various scan rates and (b) corresponding average current density versus scan rate plot for ECSA determination.

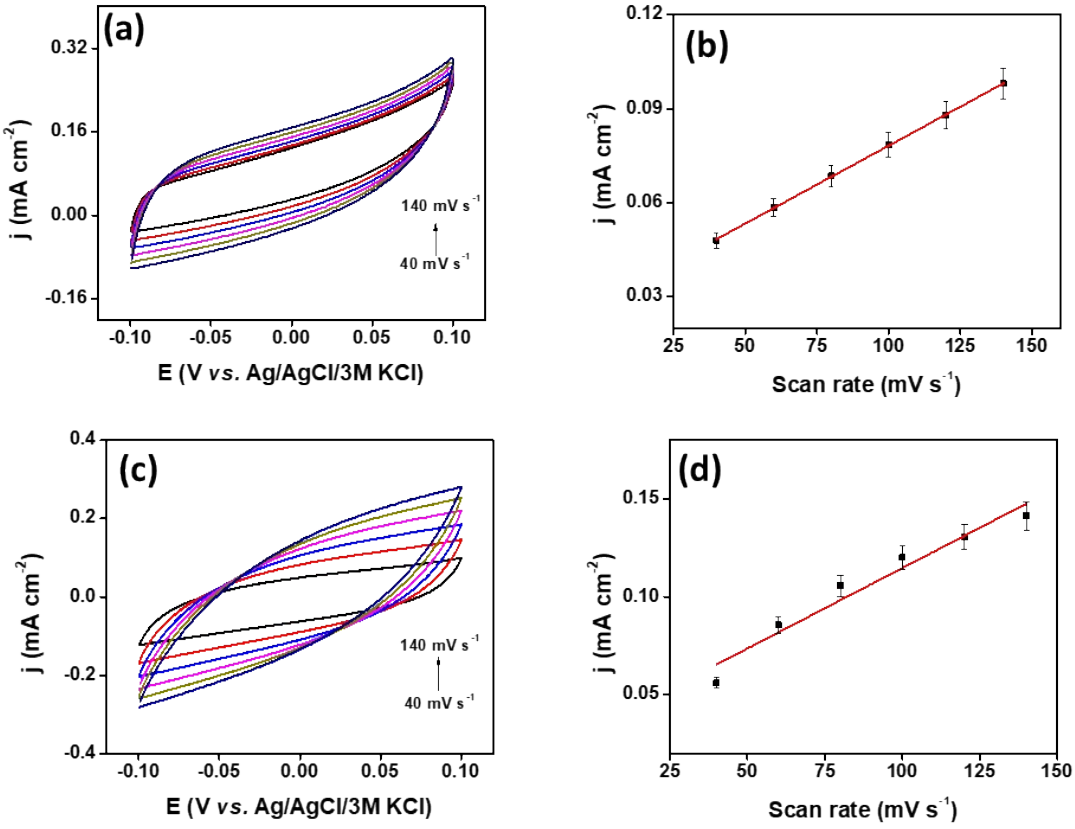

Figure S9. Cyclic voltammograms of (a) NiB/VC-CP and (c) FeB/VC-CP in non-faradic potential region at various scan rates and (b) & (d) corresponding average current density versus scan rate plot for ECSA determination.

Table S1: Electrochemical surface area (ECSA) determination.

S. No.	Composite	C_{dl} (mF)@ 0.0 V *vs.* Ag/AgCl/3M KCl	ECSA (cm^2)
1	NiB/VC-CP	0.49	12.25

2	FeB/VC-CP	0.82	20.5
3	NiFeB/VC-CP	1.89	27.23

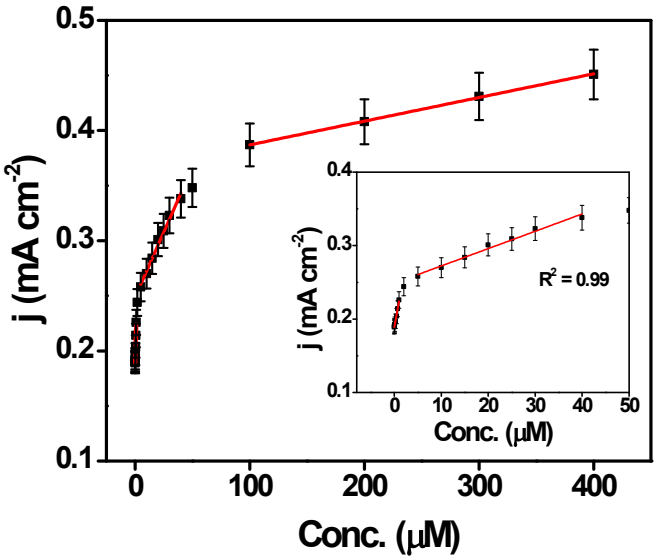

Figure S10. Plot of current density versus concentration of DA for NiFeB/VC-CP electrode extracted from Fig. 2f.

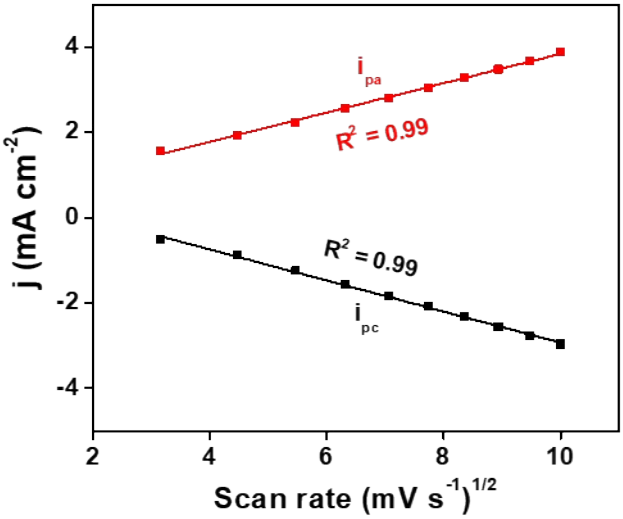

Figure S11. Peak current density versus square root of scan rate curve extracted from Fig. 3c.

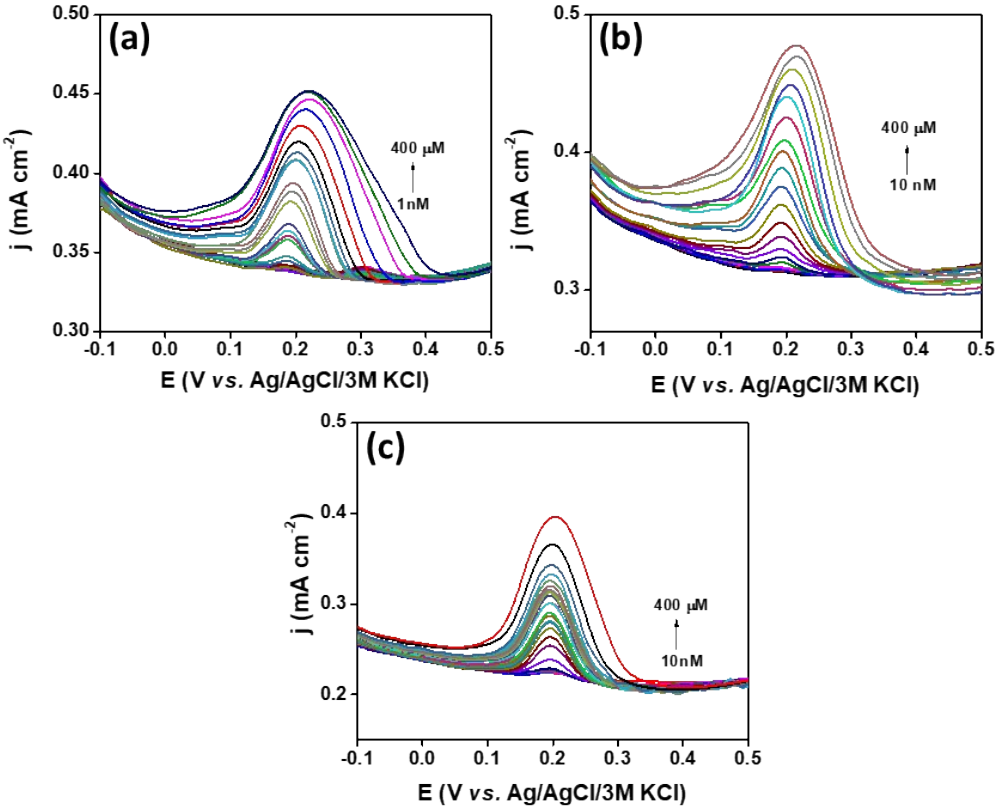

Figure S12. Differential pulse voltammogram of NiFeB/VC-CP in presence of interferants (a) 200 µM UA, (b) 1000 µM AA and (c) 3000 µM glucose at various concentrations of DA with step height of 10 mV and pulses width of 900 ms.

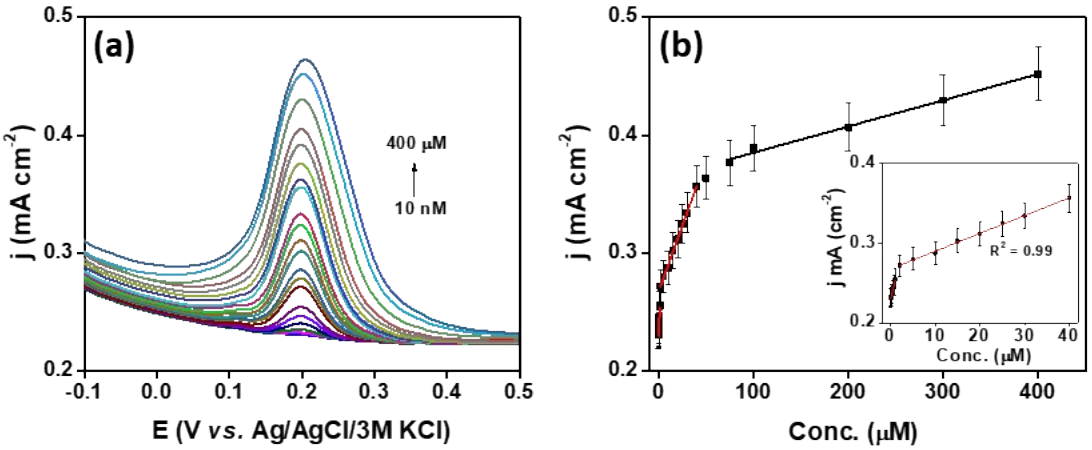

Figure S13. (a) DPV of NiFeB/VC-CP electrode at various concentrations of DA with step height of 10 mV and pulses width of 900 ms, (b) Plot of current density versus concentration of DA for NiFeB/VC-CP electrode extracted from DPV.

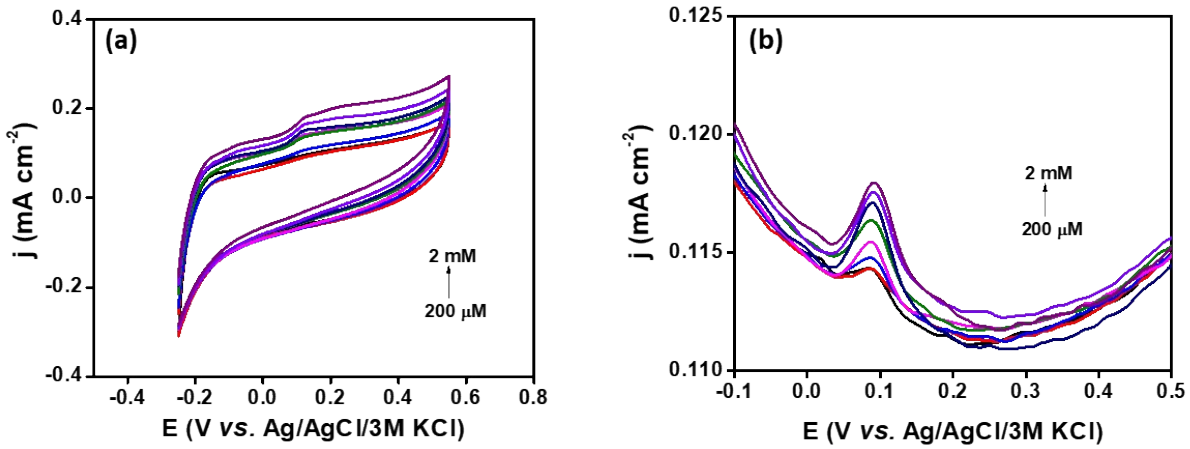

Figure S14. (a) CV and (b) DPV of NiFeB/VC-CP in 0.1 M PBS (pH 7.0) electrolyte containing various concentrations of only AA with step height of 10 mV and pulses width of 900 ms.

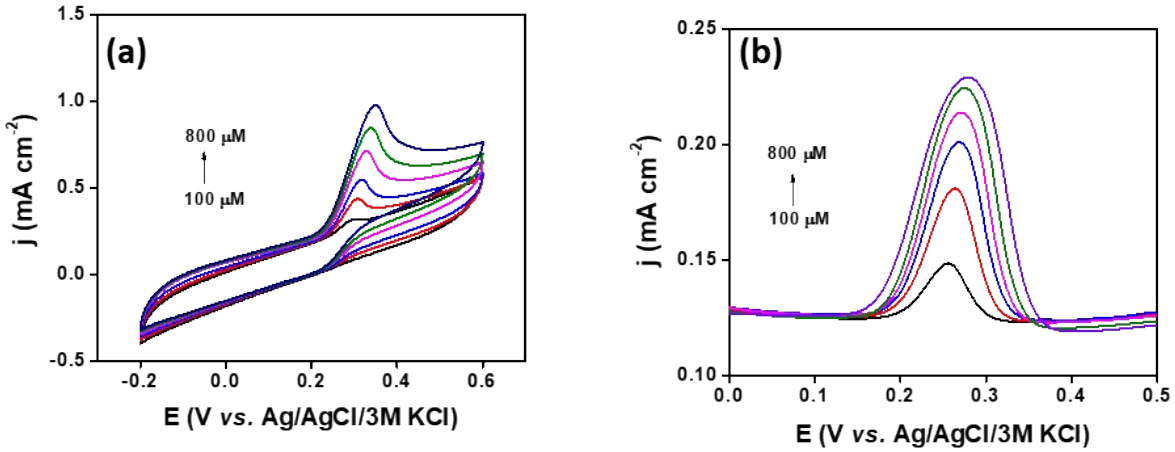

Figure S15. (a) CV and (b) DPV of NiFeB/VC-CP in 0.1 M PBS (pH 7.0) electrolyte containing various concentrations of only UA with step height of 10 mV and pulses width of 900 ms.

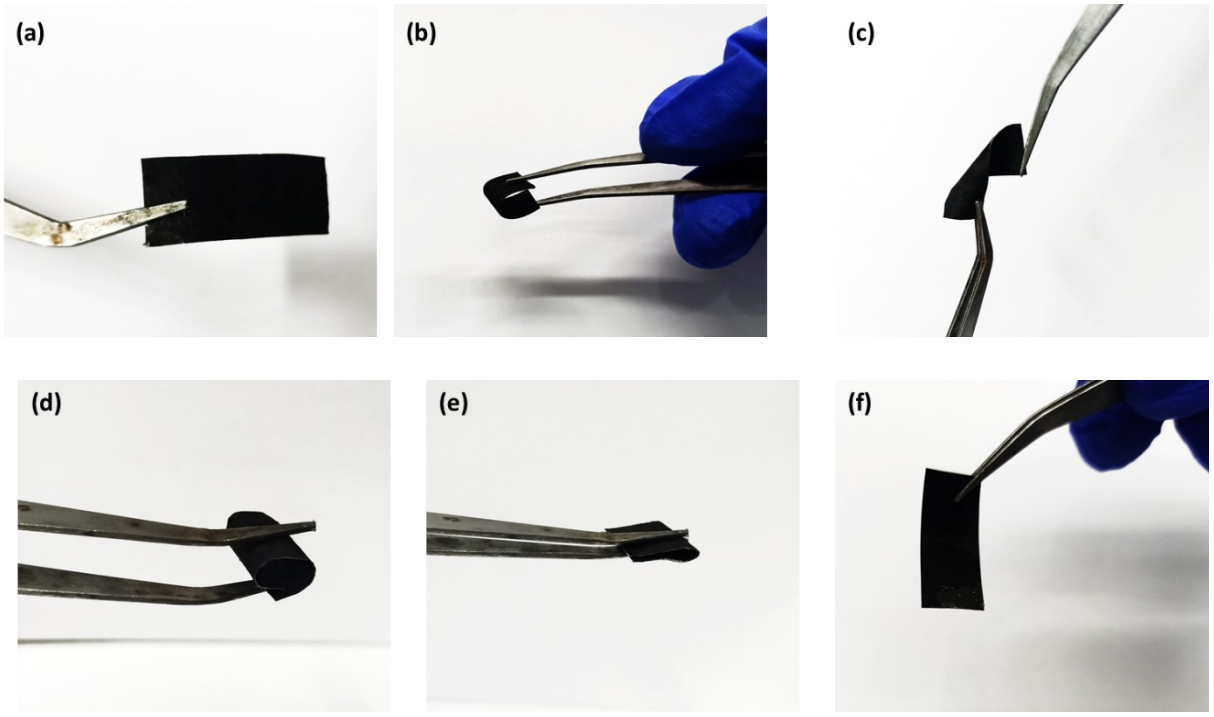

Figure S16. Photographs of the electroless deposited flexible paper electrode under (a) normal, (b) bending, (c) twisting, (d) rolling, (e) folding and (f) relaxing conditions.

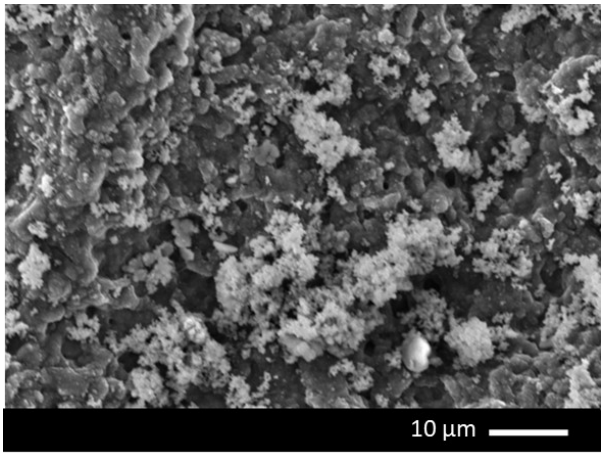

Figure S17. SEM image of NiFeB/VC-CP catalyst after 100 CV cycling in 0.1 M PBS electrolyte containing 200 µM DA and 200 µM AA at a scan rate of 50 mVs^{-1}.

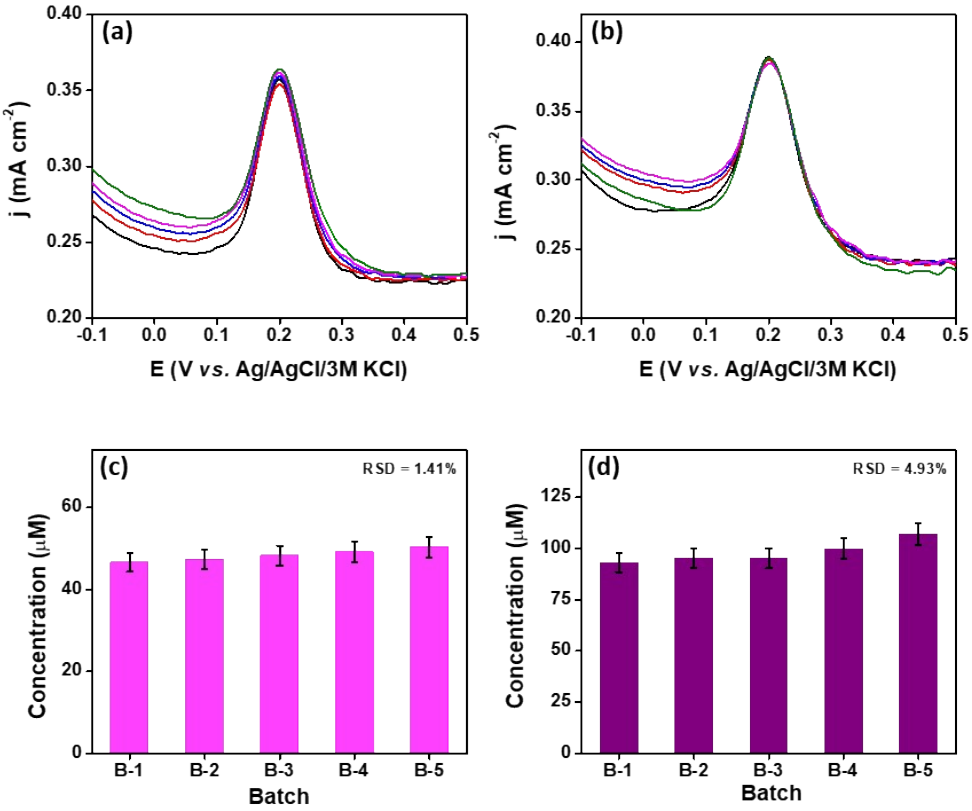

Figure S18. Differential pulse voltammogram for the five successive measurements performed with five separately fabricated NiFeB/VC-CP electrodes at DA concentration (a) 50 μmol L^{-1} and (b) 100 μM and (c) & (d) corresponding bar diagram for the measured concentration performed in 0.1 M PBS electrolyte containing 200 μM AA.

Table S2. Analytical results of NiFeB/VC-CP electrode towards determination of dopamine from commercially available dopamine hydrochloride injection.

S. No.	Conc. (taken)	Conc. (added)	Conc. (actual)	Conc. (found)	Recovery (%)
1	5 µM	5 µM	10 µM	9.8 µM	98
2	5 µM	10 µM	15 µM	15.6 µM	104
3	5 µM	20 µM	25 µM	25.8 µM	103.2
4	5 µM	30 µM	35 µM	34.5 µM	101.4
5	5 µM	50 µM	55 µM	54.2 µM	98.5