Supplementary Information

Manganese Tetraphenylporphyrin and Carbon Nanocoils Interface based Electrochemical Sensing of Tyrosine

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Figures

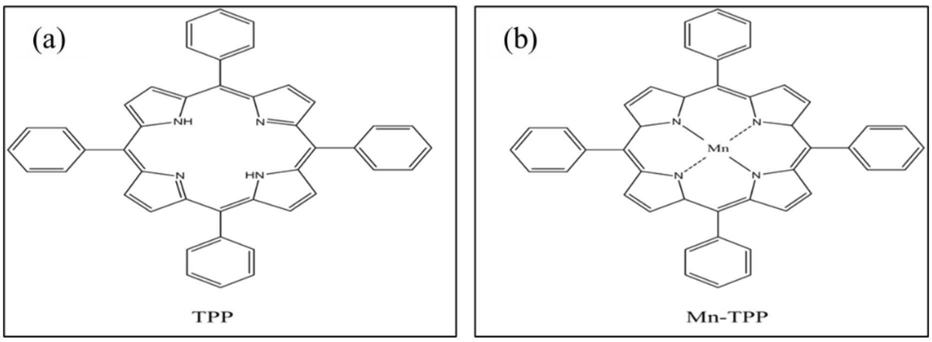


Figure S1. Chemical structure of (a) tetraphenylporphyrin and (b) Manganese tetraphenylporphyrin.

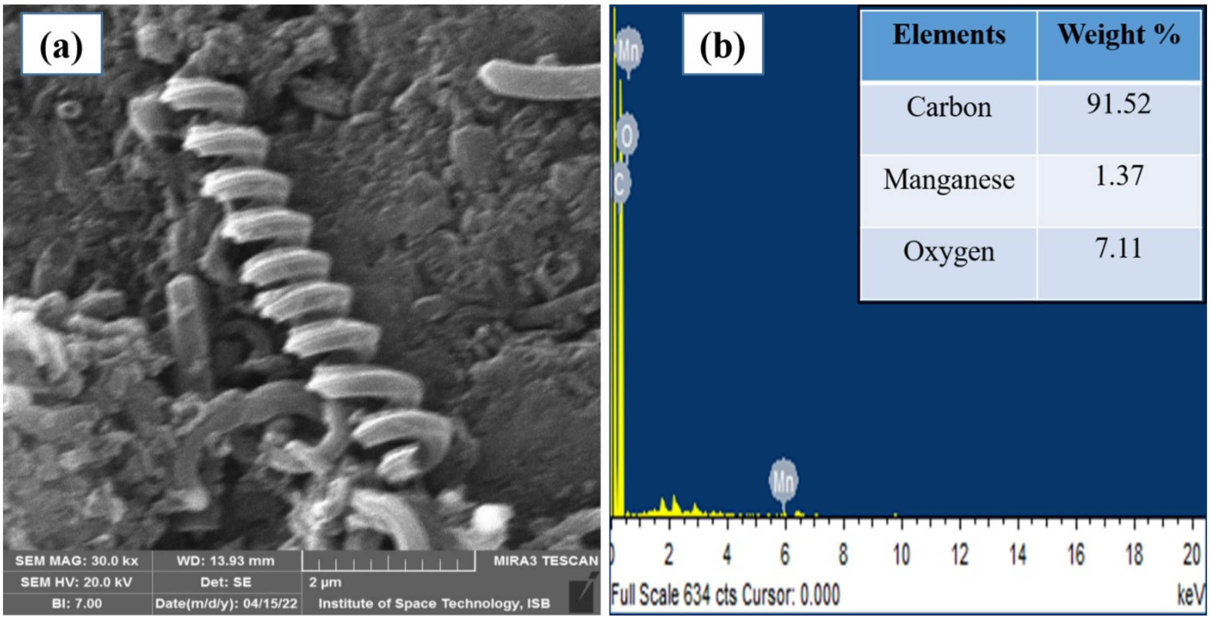


Figure S2. Analysis of CNC/MnTPP nanocomposite (a) SEM and (b) EDS.

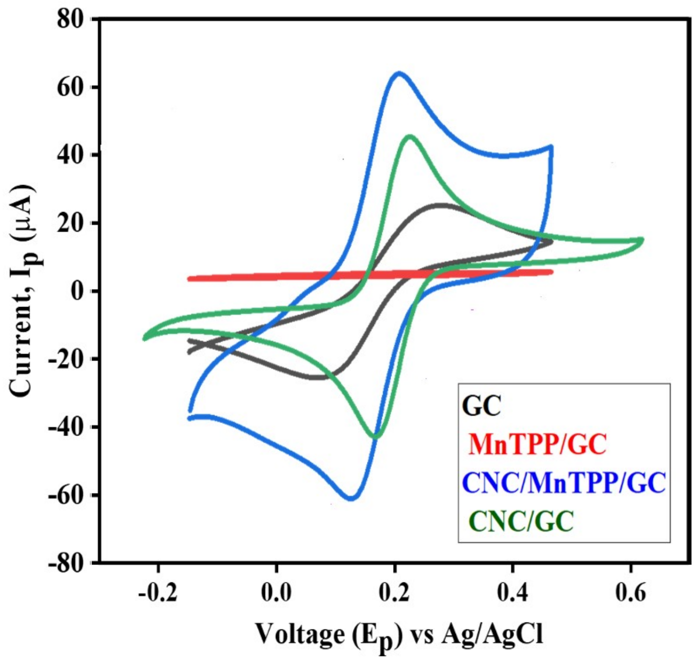


Figure S3. Cyclic voltammograms obtained in 5 mM potassium ferricyanide solution (0.1 M KCl).

Schemes

Calculation:

$$Slope\ of \frac{E_{pa}}{\log v} = 0.06\ (From\ calibration\ curve\ of\ Figure\ 9\ d)$$

As we know that, $$Slope\ of \frac{E_{pa}}{\log v} = \frac{2.303\ R \times T}{n\alpha F}$$ Eq. 1

By substituting the values of R, T, F which are the parameters with usual meanings such as gas constant, absolute temperature, Faraday's constant, respectively and Slope in Eq.1, the value obtained for **nα equals to 1.002**.

While the value of α can be obtained from another equation (Eq. 2)

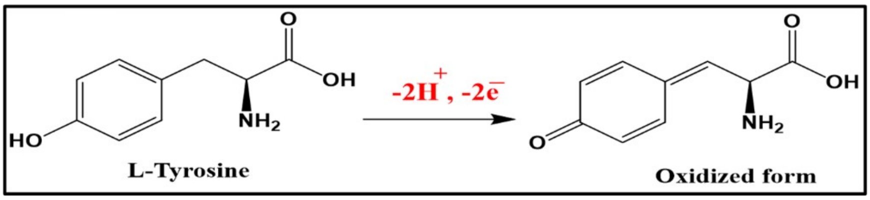
$$\alpha = \frac{47.7}{E_p - E_{p_{1/2}}} \qquad Eq.\ 2$$

Whereas $E_p = E_{pa} = 800$ mV ; $E_{p1/2} = 715$ mV, so by placing these values in Eq. 2 the value of **α equals to 0.56**

After solving Eq. 3

$$n\alpha = 1.002 \qquad Eq.\ 3$$

$$n = \frac{1.002}{0.56} = 1.78 \cong 2$$



Scheme S1. Probable mechanism of tyrosine detection.

Tables

Table S1. Selectivity study data for CNC/MnTPP/GC towards tyrosine at pH 5.

Interfering agents	Current (μA)	Tolerance (%)
Tyrosine	9.67	--
Tyrosine + Dopamine	10.06	-4.03 %
Tyrosine + Ascorbic acid	9.68	-0.10 %
Tyrosine + Uric acid	8.91	+7.85 %

Tyrosine + Glucose	9.19	+4.96 %
Tyrosine + Glycine	9.63	+0.41 %

Table S2. Comparison of the Performance of CNC/MnTPP/GC Sensor with Existing Literature.

Sr. #	Electrode	Linear range	LoD	Method	Reference
1	CB–GO/CP[a]	0.1–2 mM	100 µM	--	[1]
2	GR/ZnO/GSPE[b]	1.0×10^{-6} to 8.0×10^{-4} M	3.4×10^{-7} M	SQV	[2]
3	CoTPyPRu(bipy)$_2$–Ba[c]	1 to 24 µM	0.5 µM	SQV	[3]
4	Hemin/PAMAM/MWCNT[d]	0.1 µM to 28.8 µM	0.01 µM	Chronoamperometry	[4]
5	TCPP–Sa/CPE[e]	3 to 51 µM	0.7 µM	SQV	[5]
6	CNC/MnTPP/GC	0.05 to 100 µM	0.021 µM	DPV	Present work

[a] CB–GO/CP: carbon black/graphene oxide/hydrophilic carbon paper
[b] GR/ZnO/GSPE: Graphene oxide/ZnO nanorods/graphite screen-printed electrodes.
[c]CoTPyPRu(bipy)$_2$–Ba:µ-*meso*-tetra(4-pyridyl)porphyrinatecobalt(II)tetrakis[bis(bipyridine)(chlorido) ruthenium(II)- Cameroonian smectite clay form Bagba hill.
[d] Hemin/PAMAM/MWCNT: iron protoporphyrin IX/poly(amidoamine)/multi-walled carbon nanotube.
[e] TCPP–Sa/CPE: Meso-tetra(4-carboxyl phenyl) porphyrin immobilized Cameroonian smectite clay from Sabga hill deposited on carbon paste electrode.

References

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