Supporting Information

Iron (III) Oxide anchored conductive polymer-graphene ternary nanocomposite decorated disposable paper electrodes for non-enzymatic detection of serotonin

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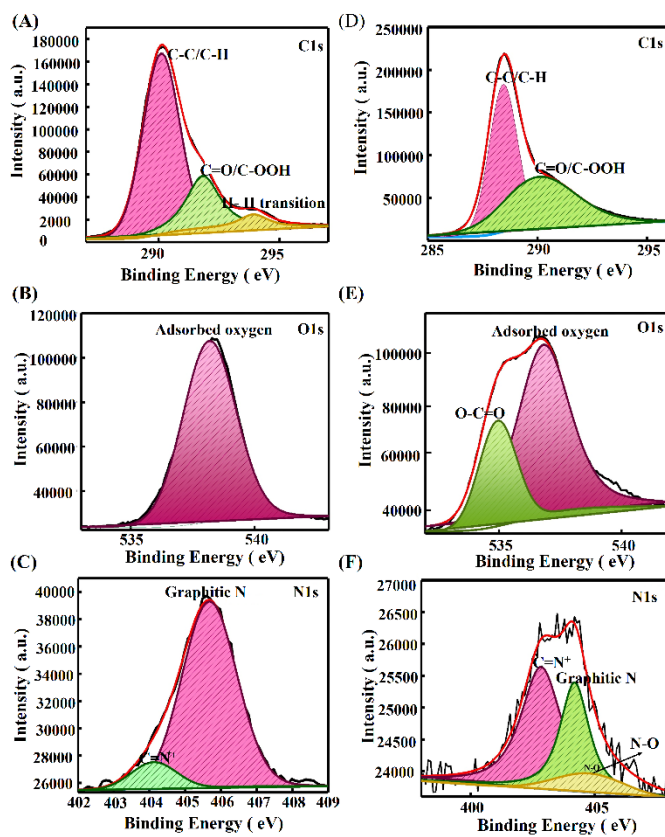
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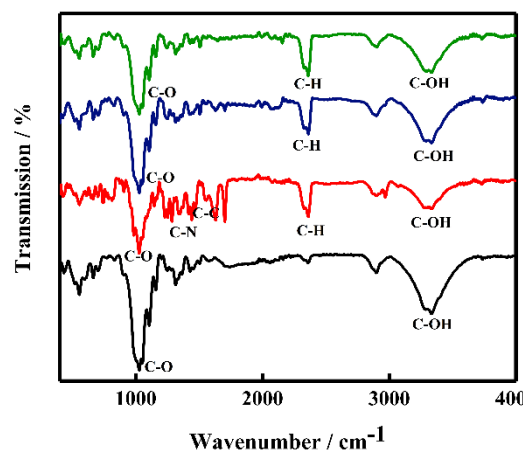
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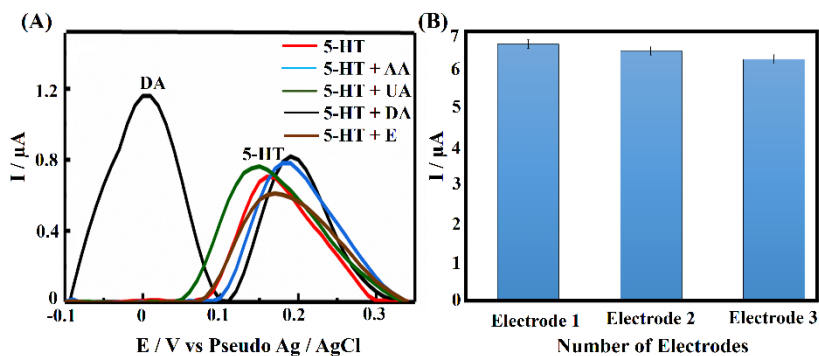**RESULTS AND DISCUSSIONS**

XPS characterization of the sensor

Figure S1. Deconvoluted C 1s, O 1s, N 1s XPS spectrum for **(A)** PPE-P (py) (A, B, and C) and **(B)** PPE-P (py) - rGO (D, E, and F).

FTIR characterization of the sensor

Figure S2 FTIR spectrum obtained for PPE (black), PPE-P(py) (red), PPE-P(py)-rGO (blue), and PPE-P(py)-rGO-Fe$_2$O$_3$ (green).


Selectivity and stability studies

Figure S3 (**A**) Background subtracted DPV response for selectivity studies conducted for 5-HT at a concentration of 75 μM, with 75 μM concentrations of ascorbic acid (AA), uric acid (UA), dopamine (DA), and epinephrine (E) (**B**) Average current response for four electrodes recorded using DPV for 500 μM 5-HT.
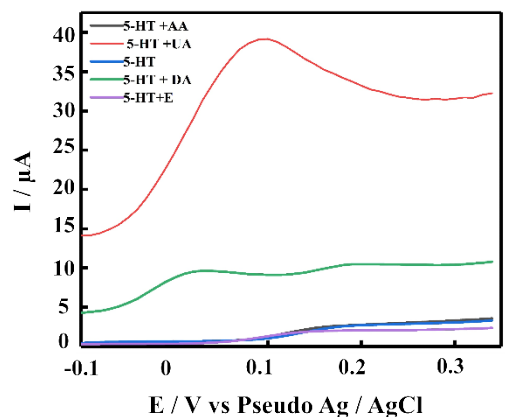
Figure S4 Raw DPV response for selectivity studies conducted for 5-HT at a concentration of 75 µM, with 75 µM concentrations of ascorbic acid (AA), uric acid (UA), dopamine (DA), and
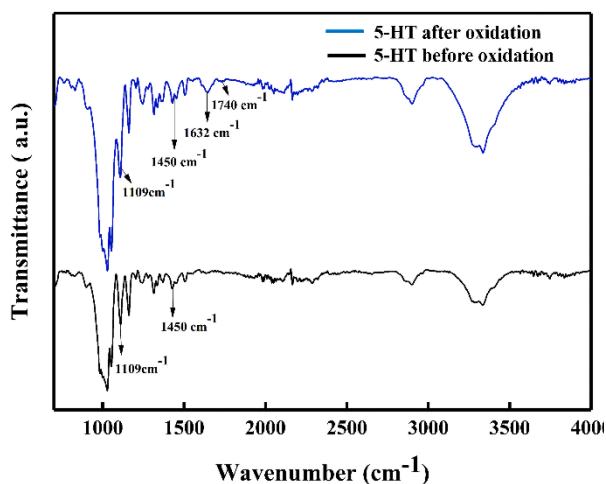
epinephrine (E) without background subtraction

Figure S5 FTIR spectrum obtained for 5-HT before oxidation (blue) and after oxidation (black)

Real sample analysis by HPLC-UV method

Chromatographic conditions used to determine the concentration of 5-HT are as follows (1). Solution A: 0.1% formic acid in milli-Q water

Solution B: acetonitrile

Mobile phase: solution A: solution B (90:10%)

Column: shim-pack GIST 5C1g, 4.6*250 mm

Elution method: Isocratic

Detector wavelength: 280 nm

Flow rate: 1.0 mL/min

Column oven temperature: 25^0C

Run time: 8 min

Injection volume: 60 Ul

The concentration of 5-HT in Drosophila melanogaster was determined by comparing the peak area obtained from the real sample analysis with the peak area obtained from the standard 5-HT solution of known concentrations (Figure S4)
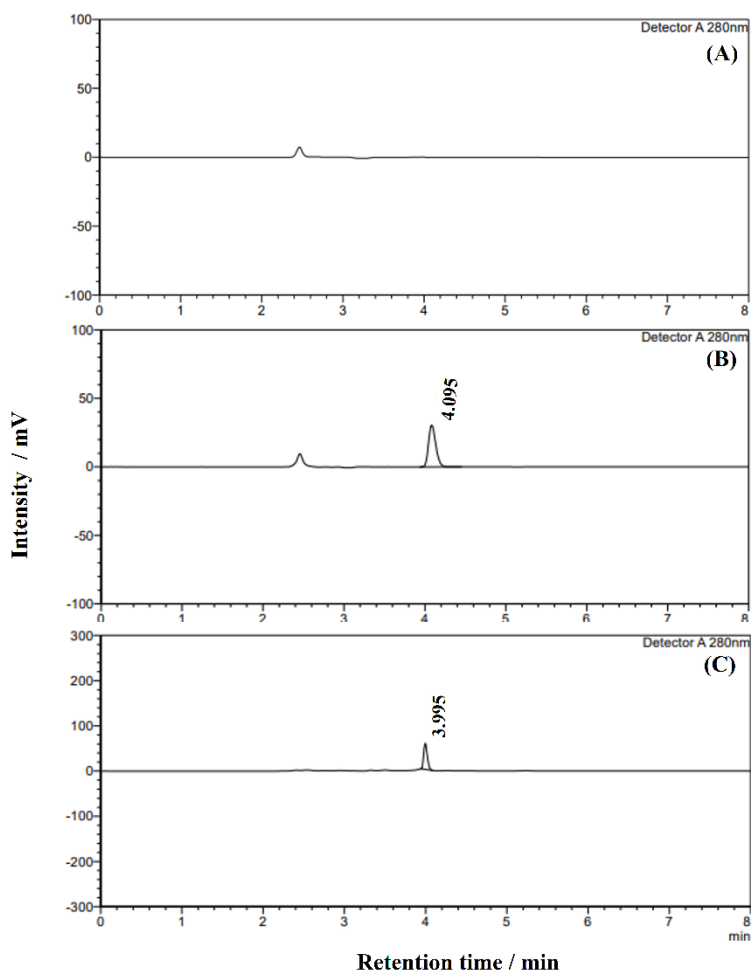
Figure S6(A) Chromatogram of blank solution (**B**) Chromatogram of standard 5-HT solution (**C**) Chromatogram of real sample solution.

Table S1. Recovery analysis was carried out by standard addition method.

Sl. No	Actual conc. (µM)	Calculated conc. (µM)	% recovery
1.	25	25.0	100
2.	50	47.22	99.4
3.	75	81.38	104.4
4.	100	96.66	96.7

Table S2. Comparison of composition, detection limit and linear range of different modified electrodes for the determination of 5-HT.

Electrode type	Modification	Electrode modification	LOD (µM)	Linear range (µM)	Real sample	Ref
GCE	Ag/PPy/Cu_2O	Sonochemical and oxidative polymerisation	0.0124	0.01-250	-	(2)
SPE	MWCNT-AONP	Hydrothermal method	0.0246	0.016-0.16	Tomato	(3)
GCE	rGO-Co_3O_4	Hydrothermal	1.128	1 - 10	-	(4)
GCE	MWCNT-NiO, MWCNT-ZnO MWCNT-Fe_3O_4	Drop – dry	0.118 0.129 0.166	0.0059– 62.8	Urine	(5)
GCE	Fe_3O_4-MWCNT-poly(BCG)	Electropolymerisation followed by drop-dry method	0.080	0.5 - 100	Serum	(6)
Gold mylar substrate	rGO-PEDOT/PSS-nafion	Drop cast method	0.1	1 - 10	-	(7)
PPE	P(py)-rGO-Fe_2O_3	Amperometry, CV	0.022	0.01-500	Brain sample of *Drosophia melanogaster*	This work

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