SUPPLEMENTARY INFORMATION

$NiFe_2O_4$ nanoparticles decorated activated carbon nanocomposite based electrochemical sensor for selective detection of dopamine in presence of uric acid and ascorbic acid

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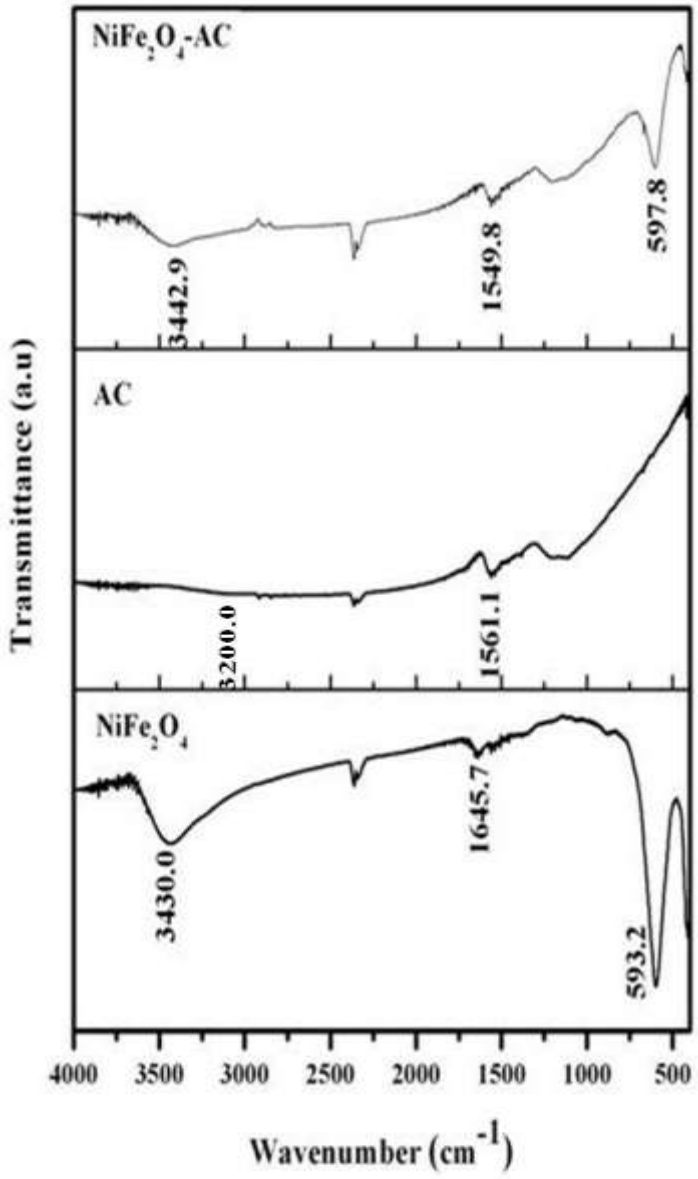

Figure S1. FTIR spectrum of $NiFe_2O_4$, AC and $NiFe_2O_4$-AC nanocomposite.

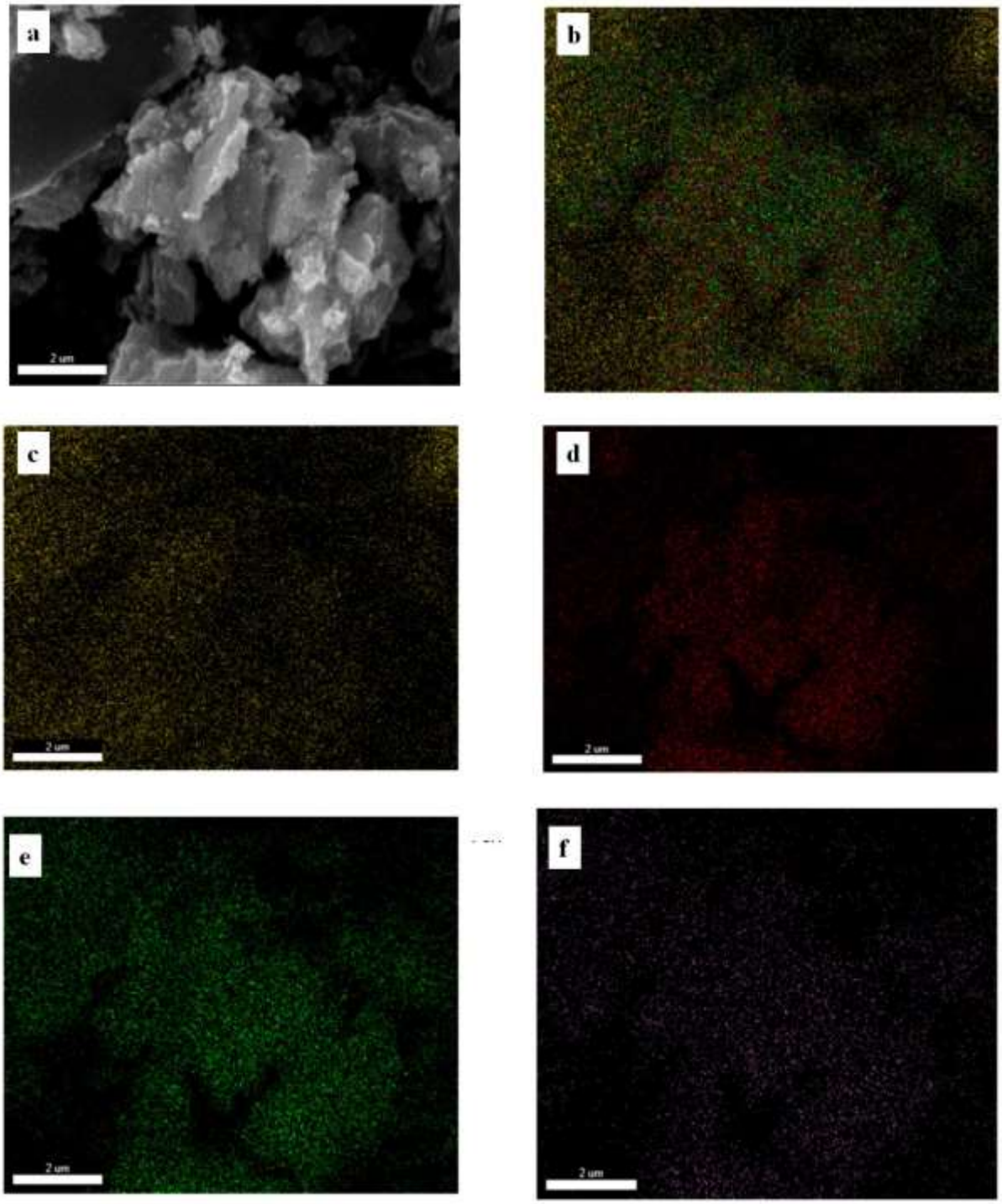

Figure S2. (a) SEM image of $NiFe_2O_4$-AC; (b) their overall elemental mapping and (c to f) depicts the elemental mapping of individual constituents viz (c) C, (d) O, (e) Fe and (f) Ni.

Table S1. Impedance parameters obtained from the Nyquist plot of the modified electrode.

Modified electrode	R_s (Ω)	R_{ct} (Ω)	C_{dl} (F)	W
$NiFe_2O_4$/GCE	17.17	3517.00	$0.86x10^{-7}$	0.000184
AC/GCE	19.64	43.05	$6.25x10^{-7}$	0.000237
$NiFe_2O_4$-AC/GCE	21.99	14.46	$1.39x10^{-6}$	0.000439

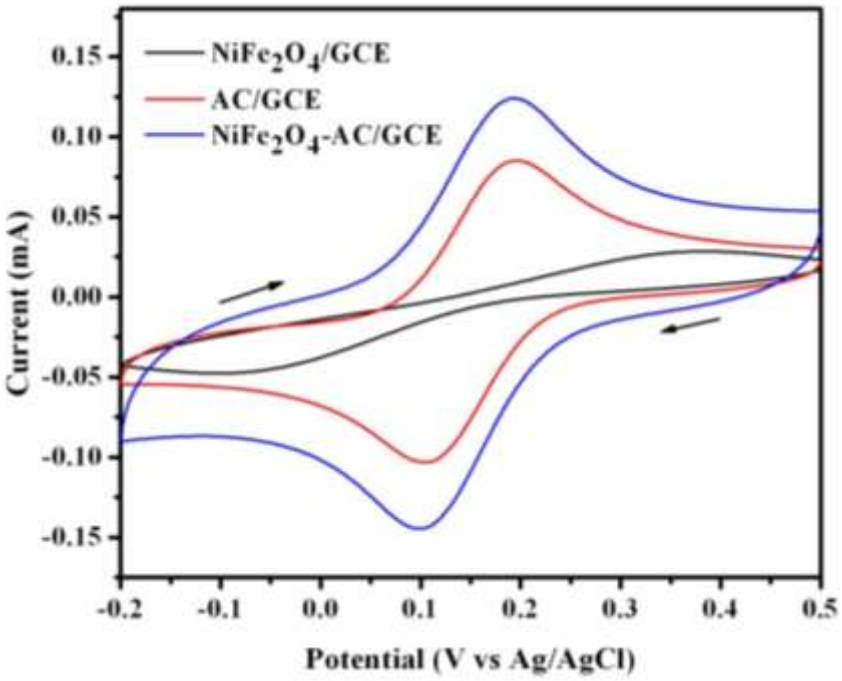

Figure S3. CV response on $NiFe_2O_4$/GCE, AC/GCE and $NiFe_2O_4$-AC/GCE from a solution of 1 mM $K_4[Fe(CN)_6]$ and 0.1 M PBS at a scan rate of 100 mV s^{-1}.

Estimation of Active surface area using Randles-Sevcik Equaiton

Given as

$$I_p = 2.65x10^5\ n^{3/2}\ ACD^{1/2}\nu^{1/2} \qquad (1)$$

Where i_p is the peak current (mA), n is the number of electrons, A is the active surface area of the electrode (cm^2), C is the concentration of $K_4[Fe(CN)_6]$, D is the diffusion coefficient ($7.6x10^{-6}$ $cm^2\ s^{-1}$) and ν is the scan rate (V s^{-1})

Table S2. Peak current and surface area parameters estimated from Randles-Sevcik equation.

Modified electrode	Anodic Peak current (mA)	Active Surface Area (cm^2)
$NiFe_2O_4$/GCE	0.028	0.120
AC/GCE	0.084	0.362
$NiFe_2O_4$-AC/GCE	0.123	0.530

Calculation of limit of detection (LOD):

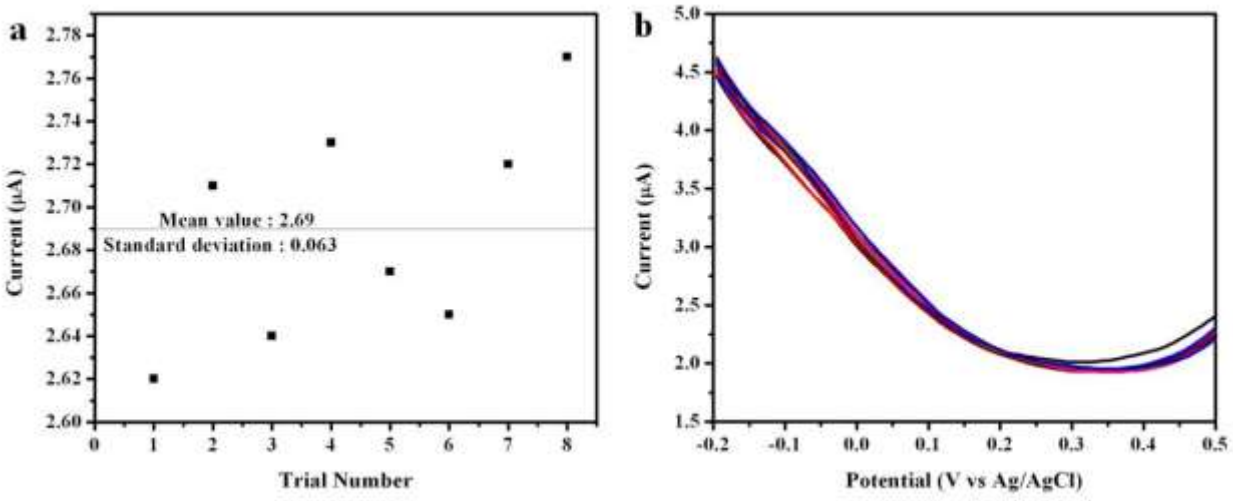

Figure S4 (a) depicts the plot between current obtained at 0.06 V vs trial number constructed from the DPV response of blank voltammogram (without addition of DA) on $NiFe_2O_4$-AC/GCE in 0.1 M PBS. (b) shows the corresponding blank DPV response recorded in the range of -0.2 V to 0.5 V.

The limit of detection (LOD) is estimated by

$$LOD = (S_m - S_{bl})/m \qquad (2)$$

where S_m is the minimum distinguishable analytical signal (µA), S_{bl} is the mean value of the blank signal (µA) and m is the slope of the calibration plot (µA μM^{-1}). m= 0.47 µA μM^{-1}

S_m is defined as

$$S_m = S_{bl} + k\sigma_{bl} \qquad (3)$$

Where k is a number illustrating the confidence level of the detection, usually 3 and σ_{bl} is the standard deviation of the blank (0.063 µA).

hence equation (3) can be modified as

$S_m - S_{bl} = 3\ \sigma_{bl}$ (4)

Substituting equation (4) in equation (2) we get

$LOD = 3\ \sigma_{bl} / m$ (5)

By substituting the values of σ_{bl} and m in equation (5) the LOD is determined as

$LOD = (3x\ 0.063\ \mu A)/0.47\ \mu A\ \mu M^{-1}$

$= 0.4\ \mu M$