Supplementary material for the article:

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Carboxylated single-wall carbon nanotubes decorated with SiO_2 coated-Nd_2O_3 nanoparticles as an electrochemical sensor for *L*-DOPA detection

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Supplementary material

Figure S1.

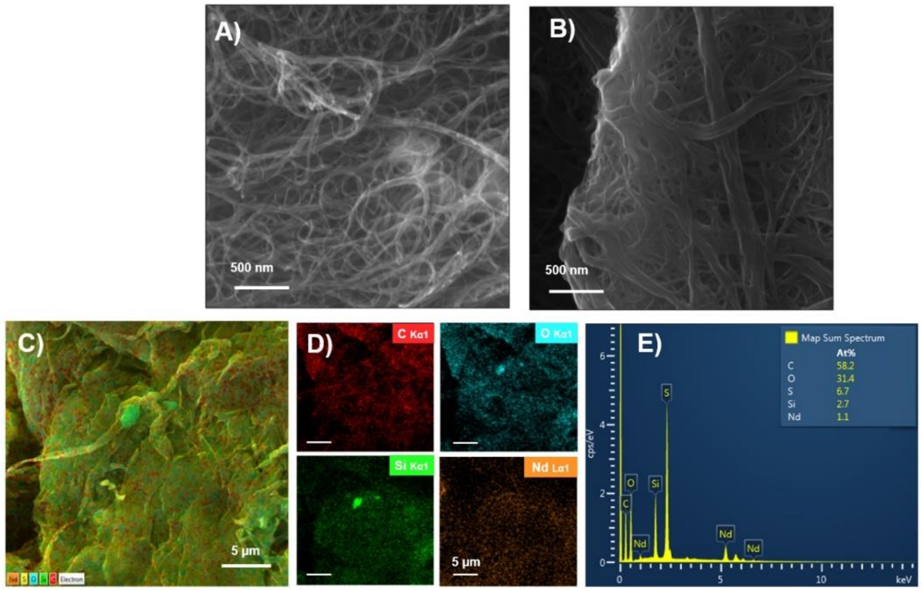


Figure S2.

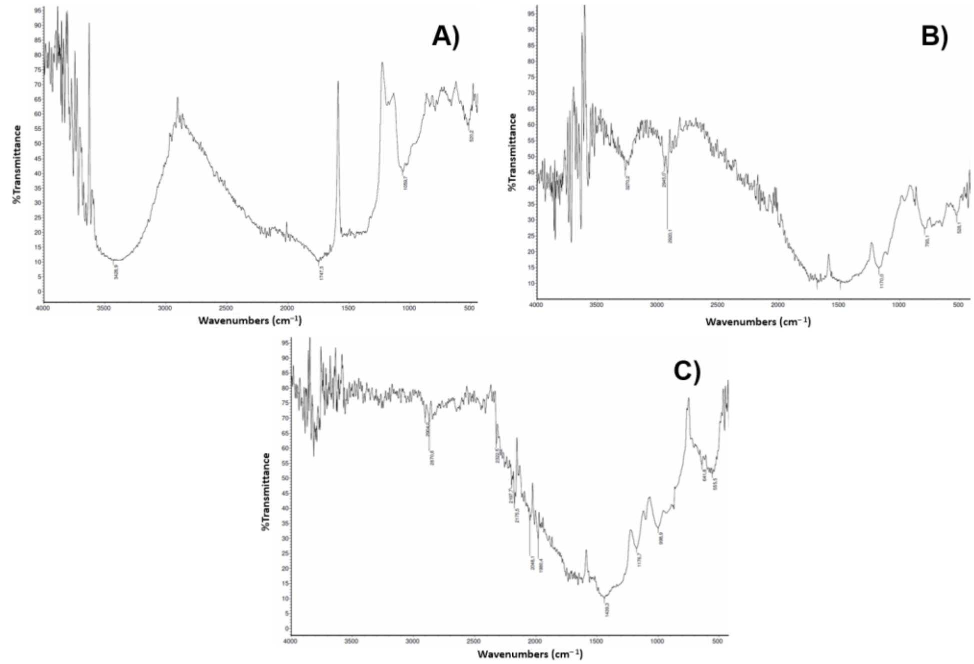


Figure S3.

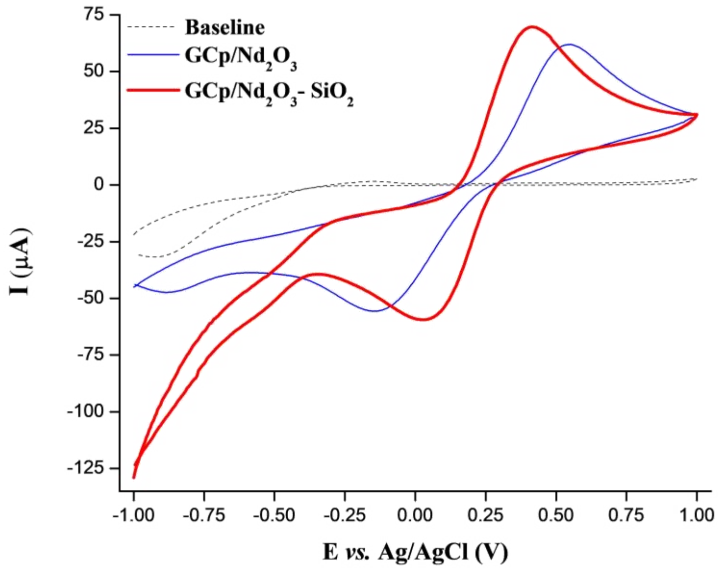

Baseline
GCp/Nd2O3
GCp/Nd2O3- SiO2
I (µA)
E vs. Ag/AgCl (V)
75
50
25
0
-25
-50
-75
-100
-125
-1.00
-0.75
-0.50
-0.25
0.00
0.25
0.50
0.75
1.00

Figure S4.

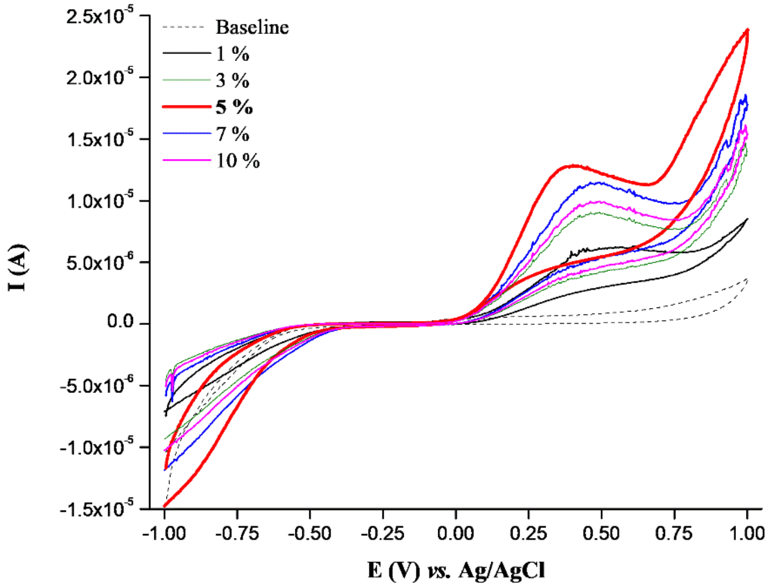
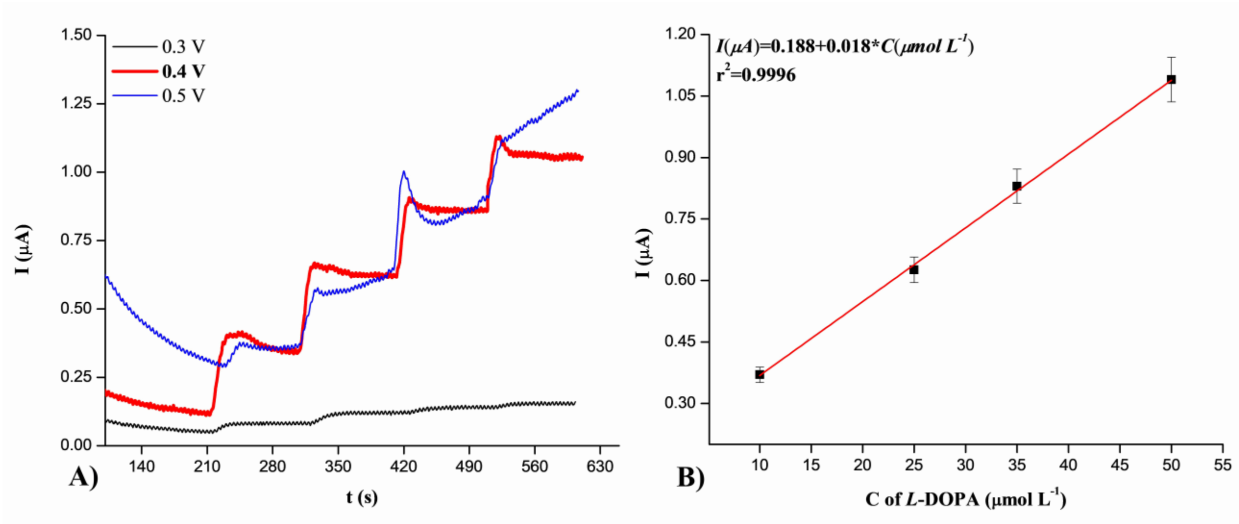

Baseline
1 %
3 %
5 %
7 %
10 %
I (A)
2.5x10^{-5}
2.0x10^{-5}
1.5x10^{-5}
1.0x10^{-5}
5.0x10^{-6}
0.0
-5.0x10^{-6}
-1.0x10^{-5}
-1.5x10^{-5}
-1.00
-0.75
-0.50
-0.25
0.00
0.25
0.50
0.75
1.00
E (V) *vs.* Ag/AgCl

Figure S5.



0.3 V
0.4 V
0.5 V
I (μA)
t (s)
A)
$I(\mu A)=0.188+0.018*C(\mu mol\ L^{-1})$
$r^2=0.9996$
I (μA)
C of L-DOPA (μmol L^{-1})
B)

Figure S6.

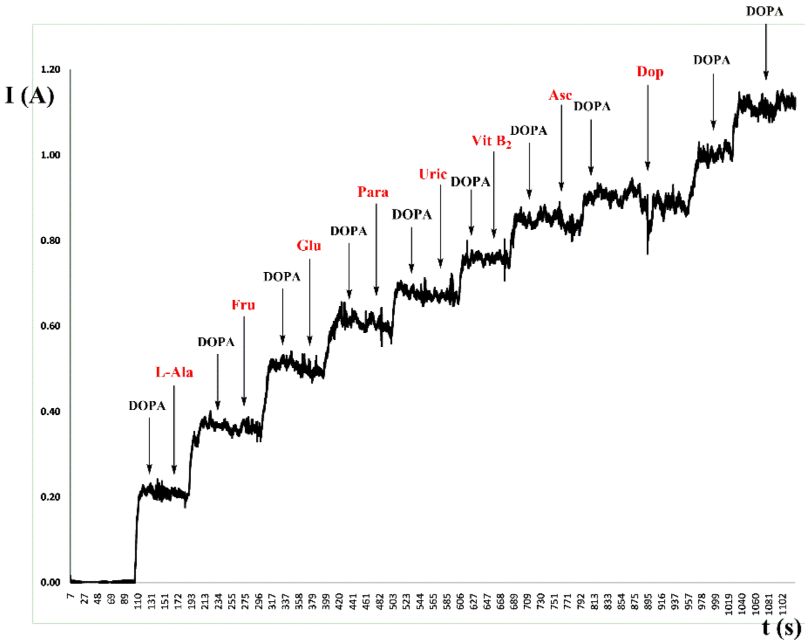

I (A)
1.20
1.00
0.80
0.60
0.40
0.20
0.00
t (s)
DOPA
L-Ala
DOPA
Fru
DOPA
Glu
DOPA
Para
DOPA
Uric
DOPA
Vit B2
DOPA
Asc
DOPA
Dop
DOPA
DOPA

Figure captions

Figure S1. FE-SEM Images of A) SWCNT, B) SWCNT-COOH, C-D) Energy dispersive spectroscopy (EDS) elemental maps of the SWCNT-COOH@Nd_2O_3-SiO_2 composite; E) EDX spectra of the as-synthesized material.

Figure S2. ATR-FTIR spectra of A) SWCNT, B) SWCNT-COOH and SWCNT-COOH@Nd_2O_3-SiO_2 composite

Figure S3. Cyclic voltammograms obtained from 2.5 mmol L^{-1} $[Fe(CN)_6]^{4-}/[Fe(CN)_6]^{3-}$ in 0.1 mol L^{-1} PBS (pH=6.80) measurements, with GCp modified with 5% of SiO_2 coated-Nd_2O_3 (*GCp/Nd_2O_3-SiO_2*) and 5% of pure Nd_2O_3 nanopowder (*GCp/Nd_2O_3*). The scan rate of 50 mV s^{-1}.

Figure S4. Selection of the most suitable SWCNT-COOH@Nd_2O_3-SiO_2 nanocomposite amount (1, 3, 5, 7 and 10 %) in GCp. Cyclic voltammograms obtained in 0.1 mol L^{-1} PBS (pH=6.80) containing 0.2 mmol L^{-1} *L*-DOPA; scan rate of 50 mV s^{-1}.

Figure S5. A) Hydrodynamic chronoamperograms of *L*-DOPA recorder with GCp/SWCNT-COOH@Nd_2O_3-SiO_2 electrode in 0.1 mol L^{-1} PBS (pH=7.40) at different working potentials. B) Calibration curve for a chronoamperometric response of GCp/SWCNT-COOH@Nd_2O_3-SiO_2 electrode to different concentrations of *L*-DOPA at potential of 0.4 V.

Figure S6. Amperometric *i-t* response at GCp/SWCNT-COOH@Nd_2O_3-SiO_2 sensor for the successive addition of *L*-DOPA and different interfering compounds. Applied potential: 0.4 V, supporting electrolyte: 0.1 mol L^{-1} PBS (pH=7.40).

Tables

Table S1. Peak analysis data for XRPD peaks of Nd_2O_3.

$P\bar{3}m1$ (hkl)	**Peak angle** (degree)	**FWHM** (degree)	**Crystallite size** (nm)	**Average size** (nm)
(100)	26.85	0.1499	56.93	44.43
(101)	30.77	0.2829	30.77	
(102)	40.39	0.4938	40.39	
(110)	47.43	0.3240	27.98	
(103)	53.48	0.3502	53.48	
(112)	57.01	0.4902	57.01	

Table S2. Determination of *L*-DOPA in pharmaceutical MADOPAR tablets and human urine samples by amperometric detection on GCp/SWCNT-COOH@Nd_2O_3-SiO_2 electrode

MADOPAR tablets			
Samples	Declared (mg)	Found (mg)	Recovery (%)
Tablet 1	200	202	101
Tablet 2	200	196	98
Tablet 3	200	194	97
Tablet 4	200	204	102
Tablet 5	200	198	99

Urine samples			
Samples	Spiked ($\mu mol\ L^{-1}$)	Found ($\mu mol\ L^{-1}$)	Recovery (%)
Urine 1	0 12.0	<LOD* 12.2	102
Urine 2	0 28.0	<LOD 27.1	97
Urine 3	0 42.0	<LOD 39.6	94

*LOD - limit of detection