applied sciences

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Supplementary Materials

Tyrosinase/Chitosan/Reduced Graphene Oxide Modified Screen-printed Carbon Electrode for Sensitive and Interference-free Detection of Dopamine

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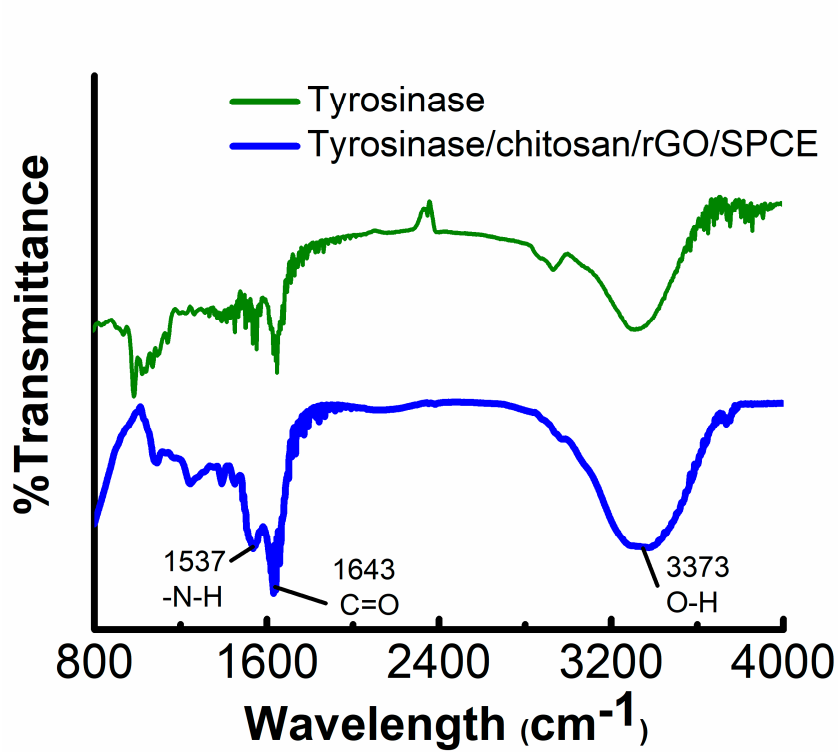

Figure S1. The ATR- FTIR spectra of chitosan-modified electrode with tyrosinase (blue line) and spectra of tyrosinase alone (green line).

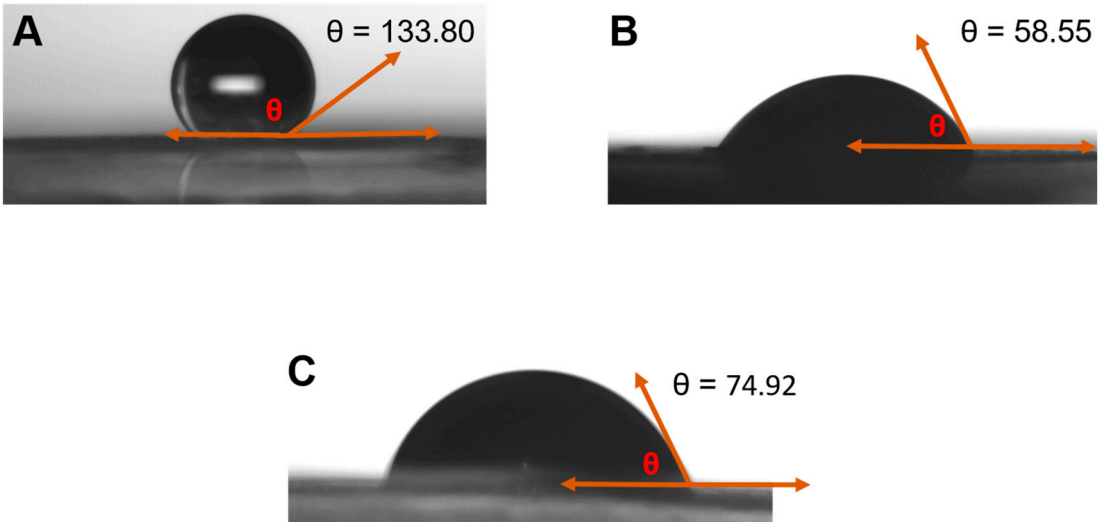

Figure S2. Contact angles of different electrode surfaces. (**A**) reduced graphene oxide (rGO)/screen-printed carbon electrode (SPCE), (**B**) chitosan/rGO/SPCE, and (**C**) tyrosinase/chitosan/rGO/SPCE.

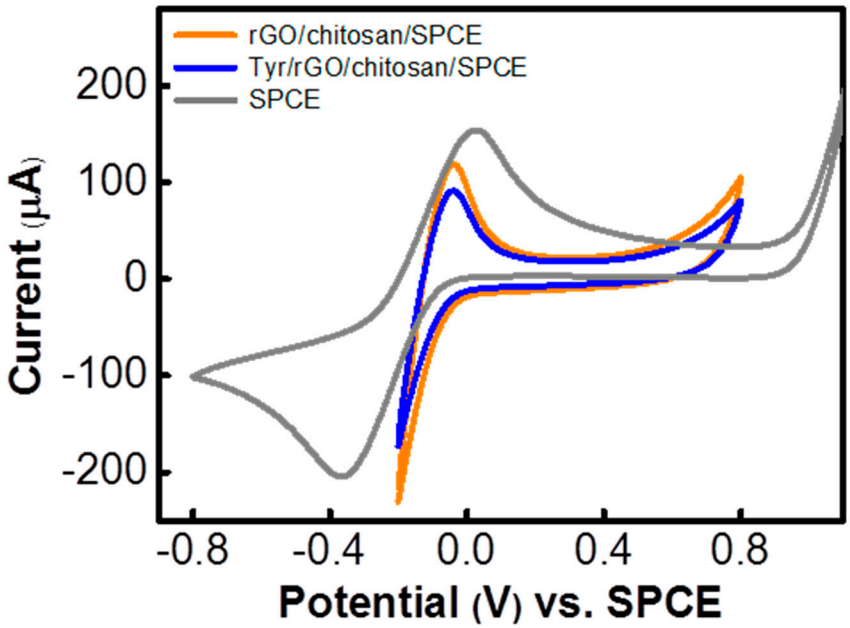

Figure S3. Cyclic voltammetry (CVs) (at a scan rate of 100 mVs^{-1}) of different electrodes in a standard redox system containing 5 mM $Fe[CN_6]^{4-}$ in 0.1 M KCl.

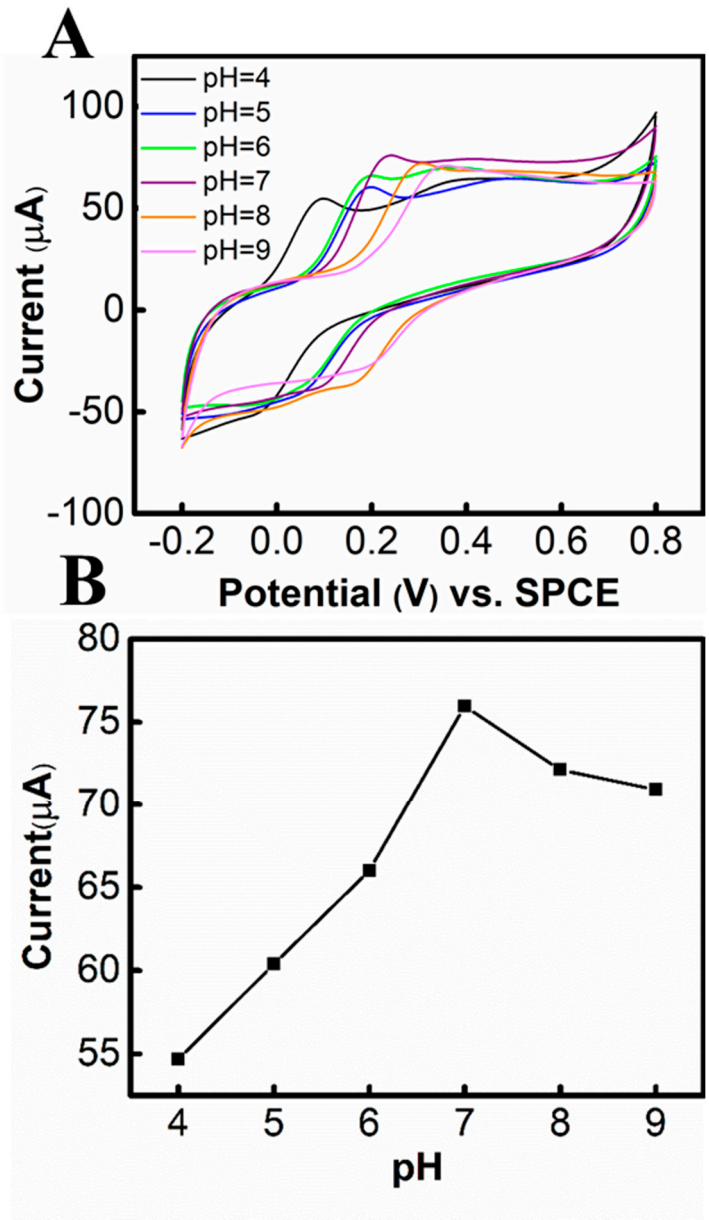

Figure S4. (**A**) CV curves and (**B**) current response (at a scan rate of 100 mVs^{-1}) vs. various pH levels of tyrosinase/chitosan/rGO/SPCE. Dopamine (DA) concentration was 1 mM in 10 mM phosphate buffer.

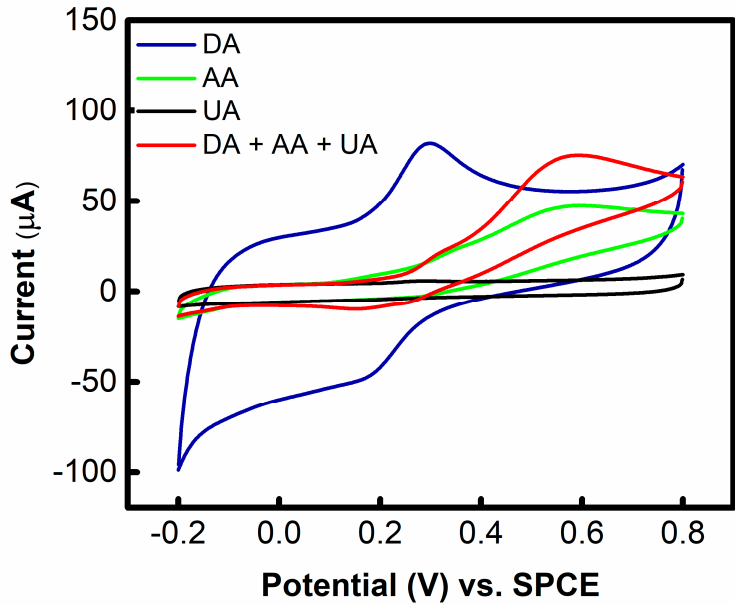

Figure S5. CV curves of chitosan/rGO/SPCE in the presence of DA (100 M), Ascorbic acid (AA) (100 M), Uric acid (UA) (100 M), and a mixture of three.

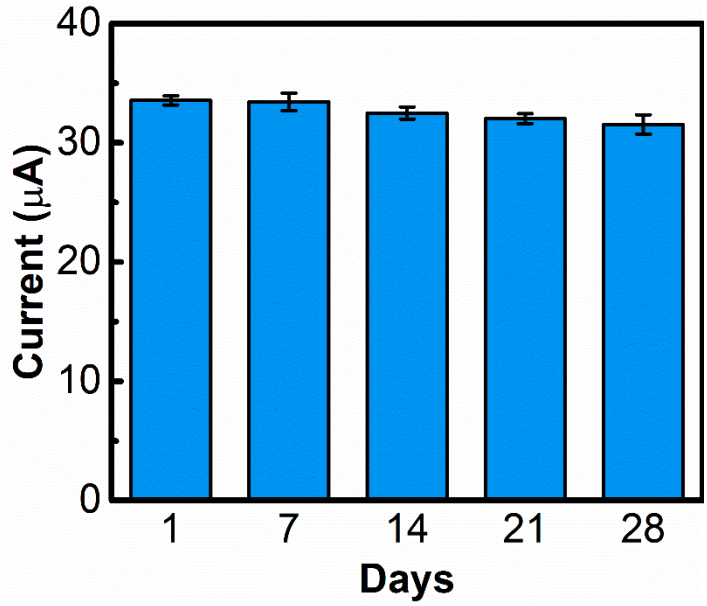

Figure S6. Stability of tyrosinase/chitosan/rGO/SPCE. Error bars represent the standard deviation from triplicate measurements.

Table S1. Electroanalytical performances of carbon-based sensors for the detection of DA.

Electrode	Detection method	LOD (M)	Linear range (M)
rGO/GCE [1]	DPV	2.64	4–100
rGO/chitosan/GCE [2]	DPV	-	5–200
rGO/AuNPs/ GCE [3]	DPV	0.6	0.6–44
rGO/β-CD/GCE [4]	CV	0.005	0.9–200
AuNP/β-CD/rGO [5]	SWV	0.15	0.5–150
Tyr/TiO_2/CeO_2/chitosan/CF [6]	Amperometric	0.011	0.01–200
APPJ-c/rGO/SPCE [7]	CV	1.00	-
Tyr/chitosan/rGO/SPCE(This work)	CV	0.022	0.1–500

DPV = differential pulse voltammetry.
CV = cyclic voltammetry.
SWV = square wave voltammetry.
rGO = reduced graphene oxide.
Tyr = tyrosinase.
CF = carbon fiber.
β-CD = β-cyclodextrin.
APPJ = atmospheric-pressure plasma jet.

Table S2. Kinetics studies of electrode surfaces.

Electrode	Cathodic peak current (I_{pc}; mA)	Diffusion co-efficient (D; cm^2/s)
Tyr/Chitosan/rGO/SPCE	41.88	4.93×10^{-6}

ip = 2.69 × 105n3/2AD1/2Cv1/2.

ip = peak current (A)
n = number of electrons transferred in redox reaction
A = electrode area (cm^2)
F = Faraday constant ($C\ mol^{-1}$)
D = diffusion coefficient (cm^2/s)
C = concentration (mol/cm^3)
V = scan rate (V/s)
R = gas constant ($J\ K^{-1}\ mol^{-1}$)
T = temperature (K)

Reference

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