

Supporting information

A time-division multiplexing multi-channel micro-electrochemical workstation with carbon-based material electrodes for online L-tyrosine detection

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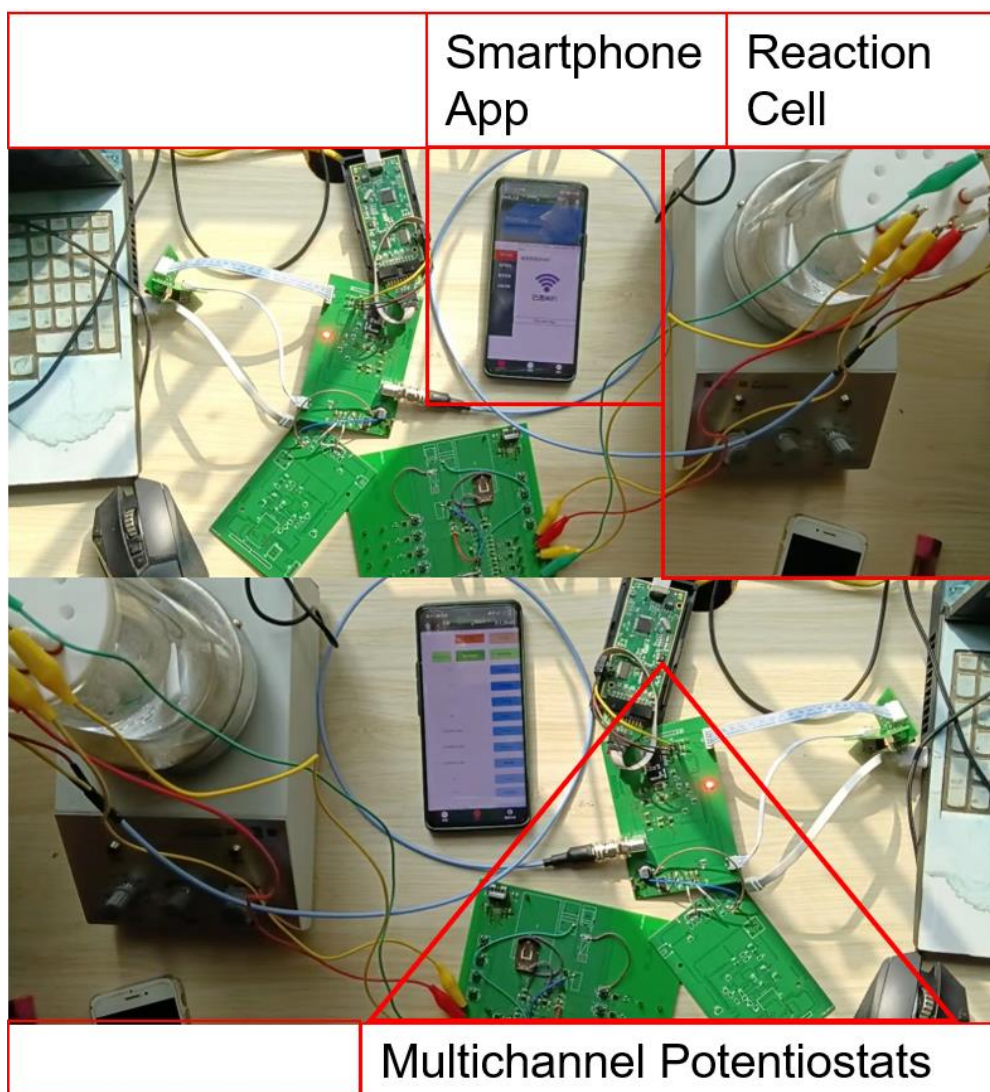


Figure S1 Working diagram of multi-channel electrochemical sensor test platform.

Table S1

Comparison of the analytical parameters obtained for the Bi NPs@GO-MWCNT modified nanocomposite electrode with previously reported modified electrodes.

Electrode	LOD (nM)	Sensitivity	Liner Range (μM)	Ref
Macroporous carbon embedded with sulfato-beta-cyclodextrin (MPC-SCD) hybrid	260	$73.02 \mu\text{A}/\text{mM cm}^2$	1–500	[1]
Screen Printed Carbon Electrode (SPCE) with	0.05	–	0.1–60	[2]

Graphene Oxide-COOH/Chitosan (GO-COOH/Chitosan) electro-deposition				
Graphene Oxide-epsilon-MnO ₂ Microspheres/Chitosan Modified Activated Glassy Carbon Electrode	8.3	–	0.02–20	[3]
Cysteric acid - modified glassy carbon electrode	1100	–	3.5-96	[4]
Poly L-methionine/Electrochemically Reduced Graphene Oxide Composite Film Modified Glassy Carbon Electrode (poly(L-Met)/ERGO/GCE))	0.27		1–70	[5]
Crown Ether/Ionic Liquid Crystal-Carbon Nanotubes	1.42	–	0.01-60	[6]
Poly (Diphenylamine) Modified Electrode	20000		20–1000	[7]
Carbon-graphene oxide/screen-printed carbon electrodes (CB-GO/SPCE)	20×10 ³		20-200	This work

References

1. Zhao, J.; Cong, L.R.; Ding, Z.Y.; Zhu, X.J.; Zhang, Y.F.; Li, S.H.; Liu, J.; Chen, X.; Hou, H.B.; Fan, Z.; et al. Enantioselective electrochemical sensor of tyrosine isomers based on macroporous carbon embedded with sulfato-beta-Cyclodextrin. *Microchemical Journal* **2020**, *159*, doi:10.1016/j.microc.2020.105469.
2. Fooladi, E.; Razavizadeh, B.M.; Noori, M.; Kakooei, S. Application of carboxylic acid-functionalized of graphene oxide for electrochemical simultaneous determination of tryptophan and tyrosine in milk. *Sn Applied Sciences* **2020**, *2*, doi:10.1007/s42452-020-2332-0.
3. Wang, S.Q.; Zhai, H.Y.; Chen, Z.G.; Wang, H.H.; Tan, X.C.; Sun, G.H.; Zhou, Q. Constructing a Sensitive Electrochemical Sensor for Tyrosine Based on Graphene Oxide-epsilon-MnO₂

Microspheres/Chitosan Modified Activated Glassy Carbon Electrode. *Journal of the Electrochemical Society* **2017**, 164, B758-B766, doi:10.1149/2.0571714jes.

4. Hassanvand, Z.; Jalali, F. Simultaneous determination of L-DOPA, L-tyrosine and uric acid by cysteine acid - modified glassy carbon electrode. *Materials Science and Engineering C-Materials for Biological Applications* **2019**, 98, 496-502, doi:10.1016/j.msec.2018.12.131.
5. Swathy, S.; Mathew, M.R.; Kumar, K.G. Poly L- methionine/Electrochemically Reduced Graphene Oxide Composite Film Modified Glassy Carbon Electrode for the Simultaneous Determination of 5-hydroxyindole Acetic Acid and Tyrosine. *Journal of the Electrochemical Society* **2022**, 169, doi:10.1149/1945-7111/ac8ad3.
6. Atta, N.F.; Galal, A.; Ahmed, Y.M. Highly Conductive Crown Ether/Ionic Liquid Crystal-Carbon Nanotubes Composite Based Electrochemical Sensor for Chiral Recognition of Tyrosine Enantiomers. *Journal of the Electrochemical Society* **2019**, 166, B623-B630, doi:10.1149/2.0771908jes.
7. Krishnan, R.G.; Saraswathyamma, B. Simultaneous Resolution and Electrochemical Quantification of Tyrosine and Tryptophan at a Poly (Diphenylamine) Modified Electrode. *Journal of the Electrochemical Society* **2021**, 168, doi:10.1149/1945-7111/abe1dd.