

Supplementary Data

# Simultaneous Electrochemical Detection of Dopamine and Tryptophan using 3D Goethite-Spongin Composite

Sedigheh Falahi <sup>1</sup>, Anita Kubiak <sup>2,3</sup>, Alona Voronkina <sup>4</sup>, Hermann Ehrlich <sup>2,5</sup>, Yvonne Joseph <sup>1,6</sup> and Parvaneh Rahimi <sup>1,6\*</sup>

<sup>1</sup> Institute of Nanoscale and Biobased Materials, Faculty of Materials Science and Material Technology, Technische Universität Bergakademie Freiberg, 09599 Freiberg, Germany; sedigheh.falahi@doktorand.tu-freiberg.de (S.F.); yvonne.joseph@esm.tu-freiberg.de (Y.J.)

<sup>2</sup> Faculty of Chemistry, Adam Mickiewicz University, Uniwersytetu Poznańskiego 8, 61-614 Poznań, Poland; anikub@amu.edu.pl (A.K.)

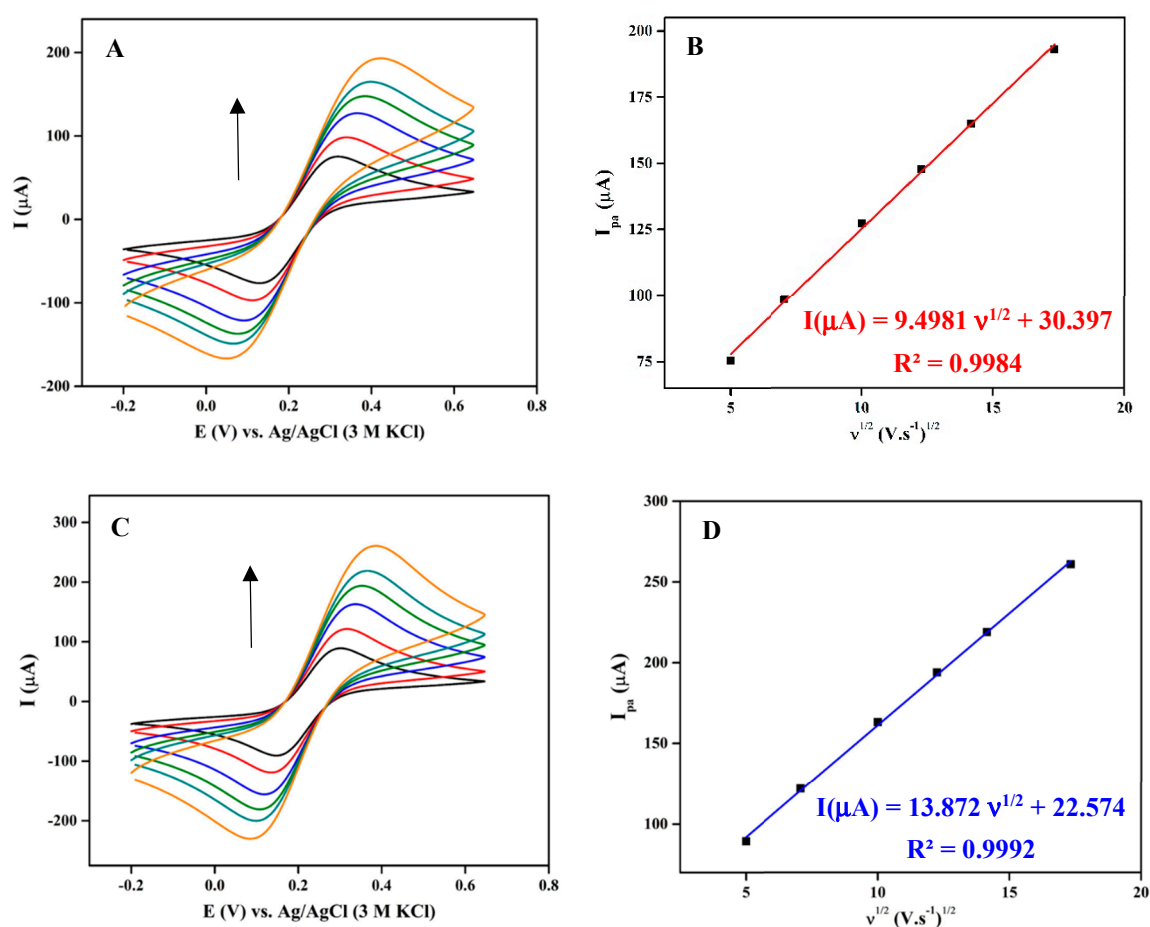
<sup>3</sup> Center of Advanced Technology, Adam Mickiewicz University, Uniwersytetu Poznańskiego 10, 61-614 Poznań, Poland;

<sup>4</sup> Department of Pharmacy, National Pirogov Memorial Medical University, Vinnytsya, Pyrogov Street 56, 21018 Vinnytsya, Ukraine; voronkina@vnmu.edu.ua (A.V.)

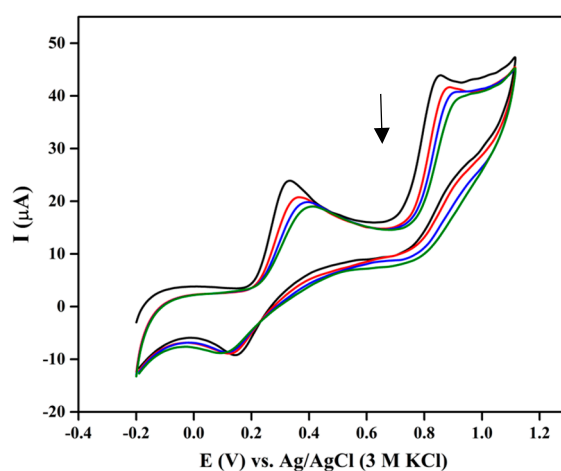
<sup>5</sup> Faculty of Chemical Technology, Institute of Chemical Technology and Engineering, Poznań University of Technology, Berdychowo 4, 60-965 Poznań, Poland; isididae@gmail.com (H.E.)

<sup>6</sup> Freiberg Water Research Center, Technische Universität Bergakademie Freiberg, 09599 Freiberg, Germany; Parvaneh.Rahimi@esm.tu-freiberg.de (P.R.)

\* Correspondence: Parvaneh.Rahimi@esm.tu-freiberg.de; Tel.: +49-3731-39-2644



**Figure S1.** CVs of (A) CPE and (C) 3DGS/CPE in a solution of 0.1 M KCl containing 5 mM  $[\text{Fe}(\text{CN})_6]^{3-}$  at different scan rates (25, 50, 100, 150, 200, and 300  $\text{mV}\cdot\text{s}^{-1}$ ), and plots of  $I_{pa}$  versus the square root of the scan rate recorded at (B) CPE, and (D) 3DGS/CPE

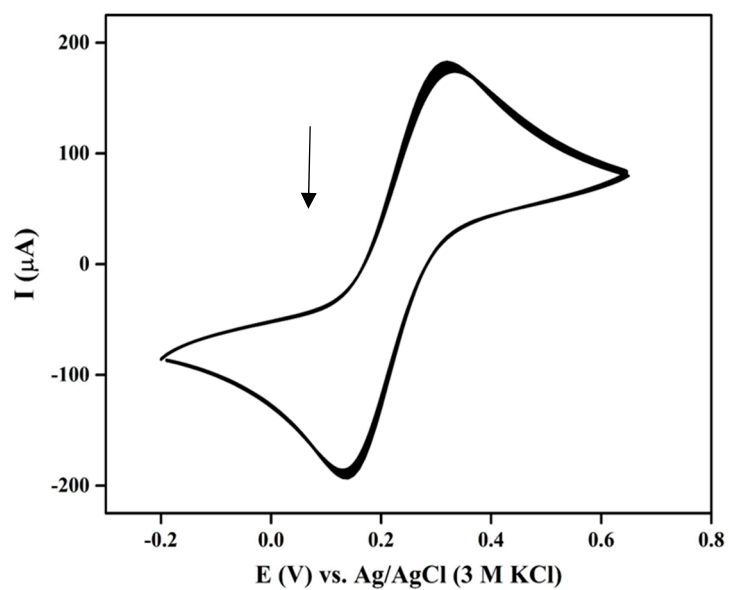


**Figure S2.** CVs of 3DGS/CPE in 0.1 M phosphate buffer pH 6 in the presence of 300  $\mu\text{M}$  DA and TRP at a scan rate of 0.1  $\text{V}\cdot\text{s}^{-1}$  (5 cycles)

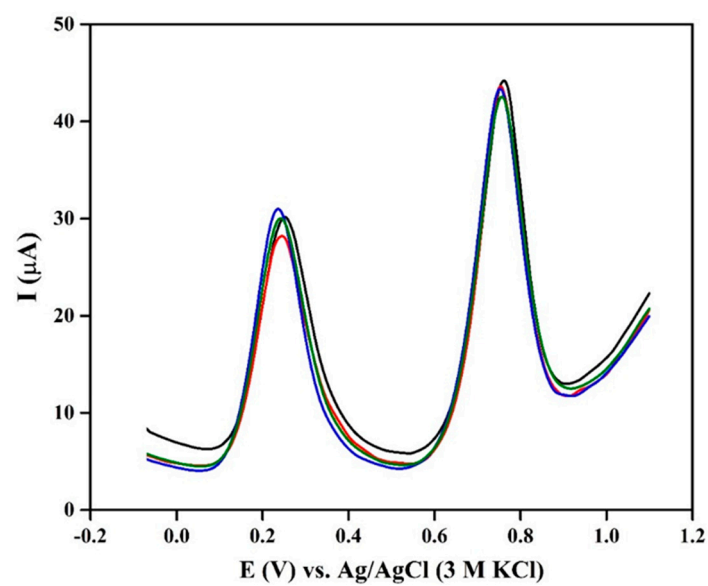
**Table S1.** Comparative study of the 3DGS/CPE performance for simultaneous detection of DA and TRP with literature reports.

Electrode	Linear range ( $\mu\text{M}$ )		LOD ( $\mu\text{M}$ )		Ref.
	DA	TRP	DA	TRP	
ZrO <sub>2</sub> -CuO-CeO <sub>2</sub> /CPE	0.008-185	0.009-194	0.003	0.005	24
NiO/CNT/PEDOT/GCE	0.03-20	1-41	0.026	0.21	26
CDs <sup>1</sup> /GCE	0.5-50	1-65	0.007	0.11	27
MIP/GCE	0.05-500	0.1-250	0.016	0.03	28
AuPdCu-rGO-MWCNTs/CPE	0.01-8.3	0.01-9.4	0.003	0.004	31
TiO <sub>2</sub> -GR/4-ABSA <sup>2</sup> /GCE	1-400	1-400	0.1	0.3	32
2, 3, 4, 6, 7, 8, 9, 10-octahydropyrimido[1, 2-a]azepine/PGE <sup>3</sup>	1-20	1.5-750	0.05	0.05	69
NiO-CuO/GR/GCE	0.5-20	0.3-40	0.17	0.1	70
AgNPs/P(Arg) <sup>4</sup> -GO/GCE	0.05-50	1-150	0.01	0.122	71
$\beta$ -CD <sup>5</sup> /CQDs <sup>6</sup> /GCE	4-220	5-270	0.14	0.16	72
CNOs <sup>7</sup> /GCE	0.01-38	1-108	0.0039	0.0087	73
Au-PDNs <sup>8</sup> /SPE	1-350	1-280	0.0001	0.0001	74
Ni-ZIF <sup>9</sup> -8/N S-CNTs/CS <sup>10</sup> /GCE	8-500	5-850	0.93	0.69	75
MWNTs/MGF <sup>11</sup> /GCE	0.3-10	5-500	0.06	0.87	76
WB-S <sup>12</sup> La <sup>3+</sup> /TiO <sub>2</sub> -NS <sup>13</sup> /SPE	0.001-900	0.001-900	0.0005	0.0008	77
PTh <sup>14</sup> /GPE <sup>15</sup>	10-180	6-180	1	0.61	78
3DGS/CPE	4-246	2-150	1.9	0.3	This work

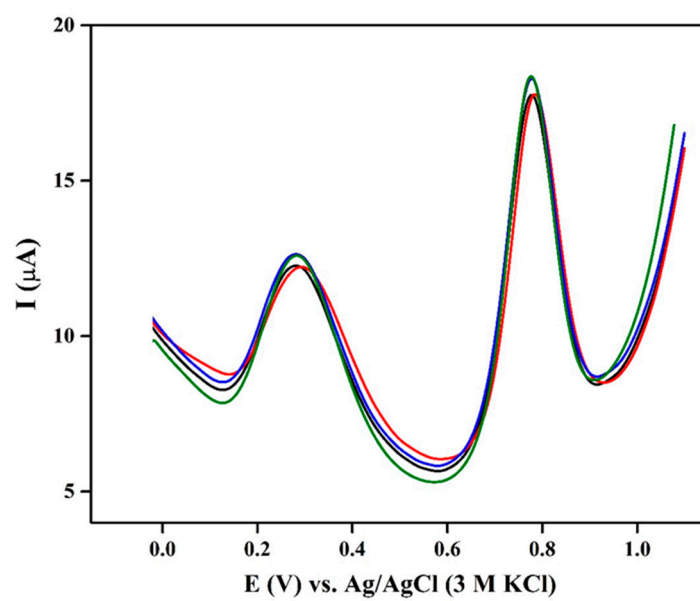
<sup>1</sup>Carbon dots, <sup>2</sup>Aminobenzenesulfonic acid, <sup>3</sup>Pencil graphite electrode, <sup>4</sup>Poly(l-arginine), <sup>5</sup>Poly( $\beta$ -cyclodextrin), <sup>6</sup>Carbon quantum dots, <sup>7</sup>Carbon nano-onions, <sup>8</sup>Polydopamine nanospheres, <sup>9</sup>Zeolitic imidazolate framework, <sup>10</sup>Chitosan, <sup>11</sup>Mesocellular graphene foam, <sup>12</sup>Woolen ball-shaped, <sup>13</sup>Nanostructure, <sup>14</sup>Polythiophene, <sup>15</sup>Graphite paste electrode



**Figure S3.** CVs of 3DGS/CPE in a solution of 0.1 M KCl containing 1 mM  $[\text{Fe}(\text{CN})_6]^{3-/4-}$  (100 cycles)



**Figure S4.** DPVs of 3DGS/CPE in 0.1 M phosphate buffer pH 6 containing 150  $\mu\text{M}$  DA and TRP at a scan rate of 0.1  $\text{V.s}^{-1}$  (4 fresh electrodes)



**Figure S5.** DPVs of 3DGS/CPE in 0.1 M phosphate buffer pH 6 containing 30  $\mu\text{M}$  DA and TRP at a scan rate of 0.1  $\text{V.s}^{-1}$  (4 replicates)