Electronic Supplementary Material (ESI) for Analytical Methods.

Supporting Information

Covalent organic frameworks and electron mediator-based open circuit potential biosensor for in vivo electrochemical measurements

Dan Su, Bingwei Feng, Pengfei Xu, Qiang Zeng, Baixi Shan, Yonggui Song*

Jiangxi University of Traditional Chinese Medicine, 1688 Meiling Road, Nanchang 330006, China.

*Corresponding author: Tel/Fax: +86 791 87119632. E-mail: songyonggui1999@163.com (Yonggui Song).

Table S1. A comparison of the performance of various GOD-based glucose biosensors.

Glucose sensors	Detection limit μM	Linear range mM	Sensitivity μA $mM^{-1}cm^{-2}$ or mV mM^{-1} cm^{-2}	Ref.
CPE/GOx-SiO_2 /Lig/Fc	145	0.5-9.0	0.78	S1
GOD/NCNTs/KSC	1.9	0.0058-18.0	29.4	S2
4-Amino thiophenol/AuNP/ GOD–HRP/MUA–MCH/Au	5.4	0.0165-10.0	41.78	S3
GOD/ERGO –MWCNTs	4.7	0.01-6.5	7.95	S4
GOD/PVA -Au-pphTEOS	0.7	1.0-8.0	43.22	S5
GOD/graphene-chitosan	20.0	0.08-12.0	37.93	S6
GOD/Ag-Pdop@CNTs	17.0	0.05-1.1	3.1	S7
GOD/NECFE	0.36	0.00108 - 8.50	46.55*	This work

* This means that the units in such cases are (mV mM^{-1} cm^{-2}) instead of (μA $mM^{-1}cm^{-2}$)

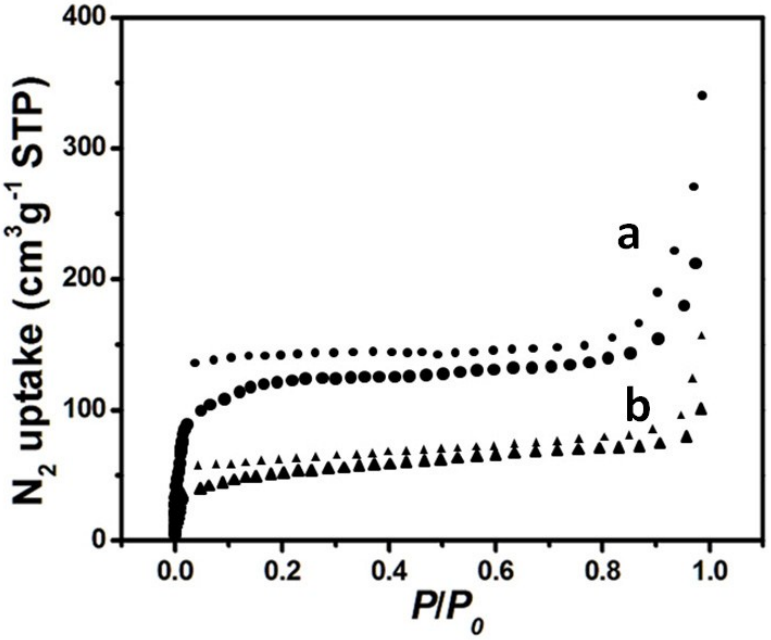

Fig. S1. Nitrogen adsorption desorption isotherms of COF-LZU1 (cycles) and GOD/DMFc/COF-LZU1 (triangles). Adsorption and desorption points are represented by big and little symbols, respectively.

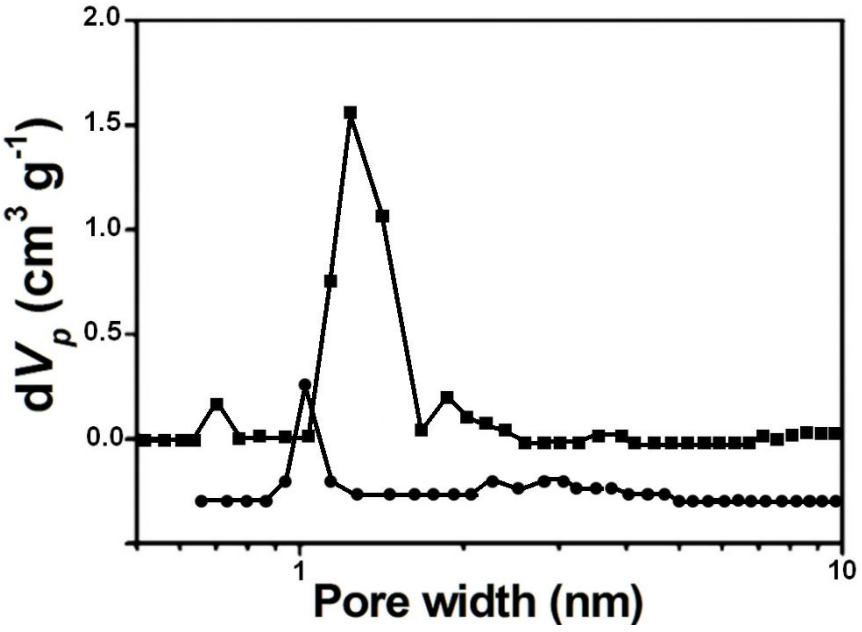

Fig. S2. Pore size distribution of COF-LZU1 (squares) and DMFc/COF-LZU1 (rounds).

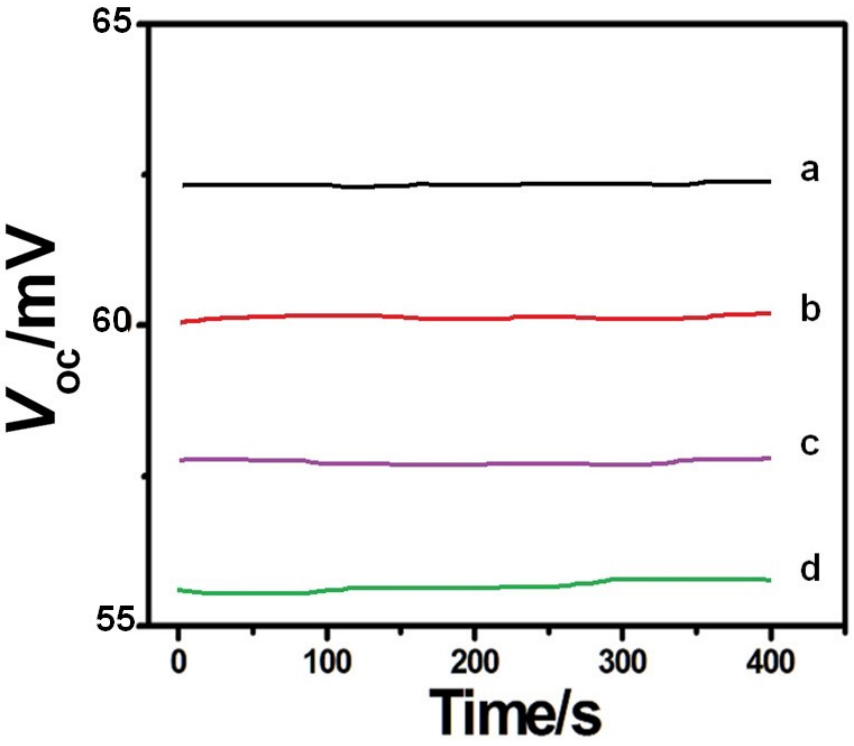

Fig. S3. V_{oc}-t curves obtained at GOD/COF-LZU1/CFMEs in the absence (a) and presence of 1.0 (b), 2.0 (c) and 3.0 mM (d) glucose in nitrogen saturated aCSF (pH7.4), respectively.

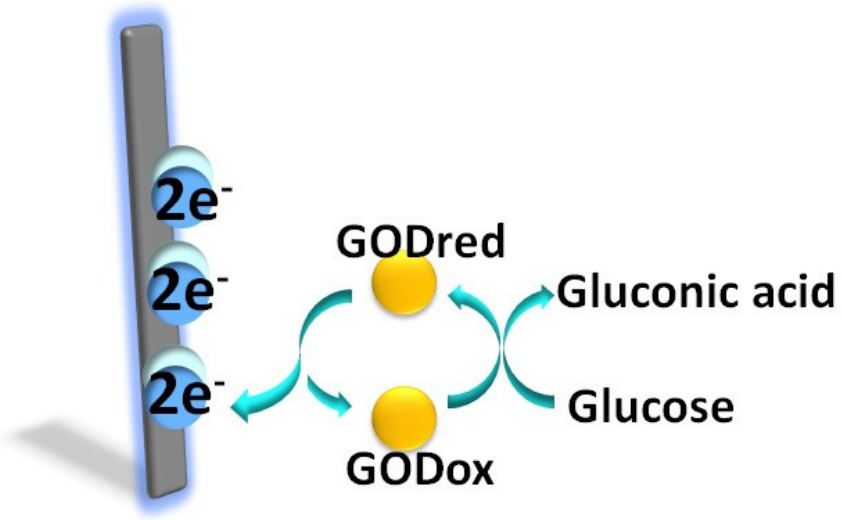

Fig. S4. Schematic illustration of GOD/COF-LZU1/CFMEs catalyzing glucose without mediator.

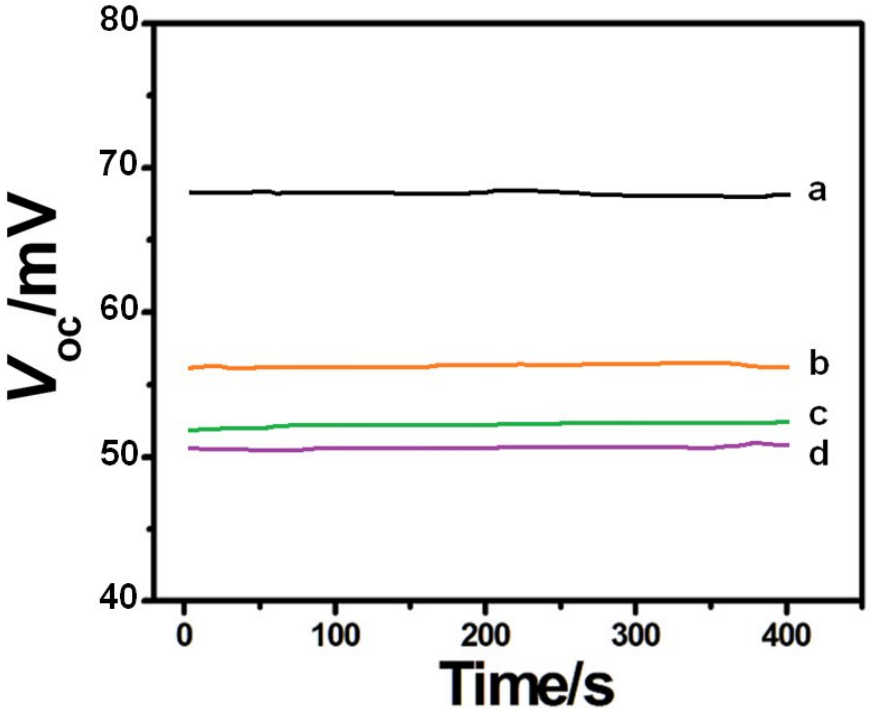

Fig. S5. V_{oc}-t curves obtained at GOD/DMFc/CFMEs in the absence (a) and presence of 1.0 (b), 2.0 (c) and 3.0 mM (d) glucose in nitrogen saturated aCSF (pH7.4), respectively.

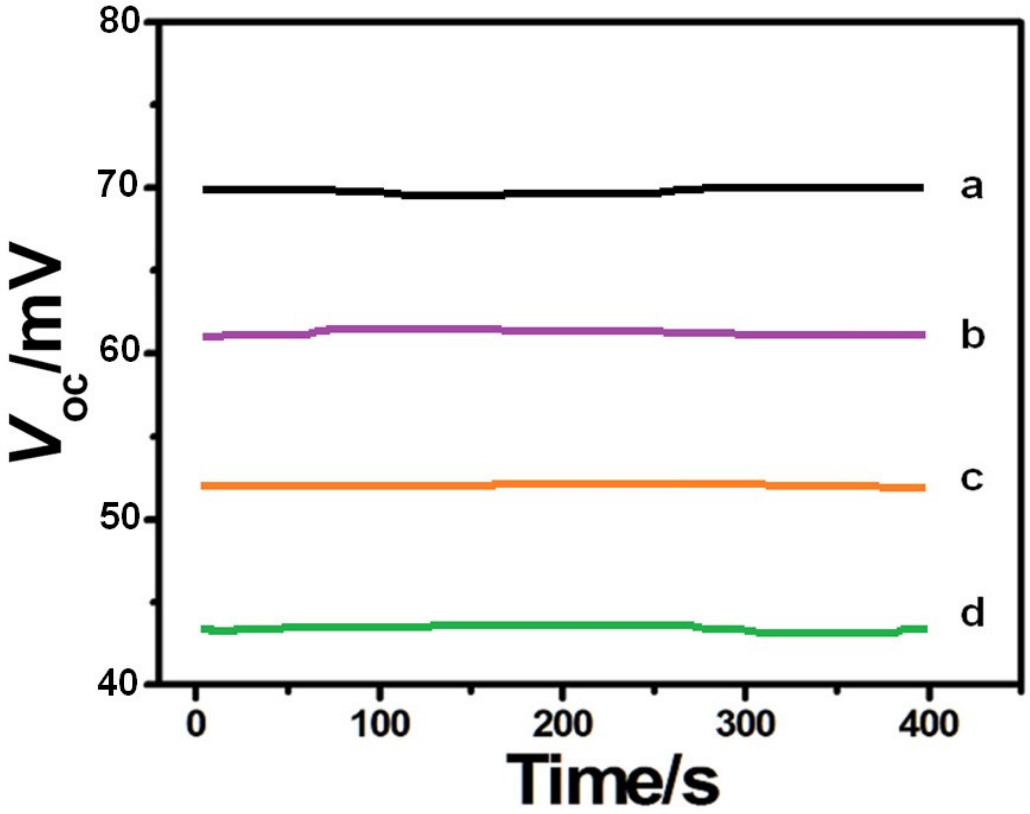

Fig. S6. V_{oc}-t curves obtained at GOD/DMFc/COF-LZU1/CFMEs in the absence (a) and presence of 1.0 (b), 2.0 (c) and 3.0 mM (d) glucose in nitrogen saturated aCSF (pH7.4), respectively.

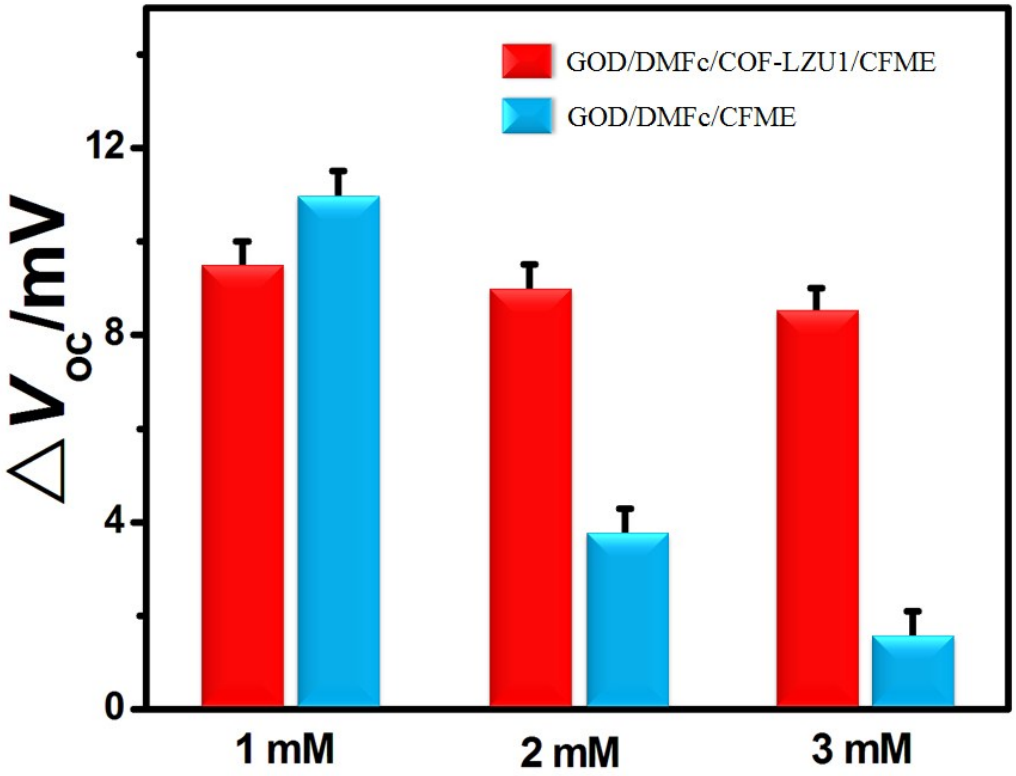

Fig. S7. The electrochemical response of GOD/DMFc/COF-LZU1/CFMEs and GOD/DMFc/CFMEs in the absence (a) and presence of 1.0 (b), 2.0 (c) and 3.0 mM (d) glucose in nitrogen saturated aCSF (pH7.4), respectively.

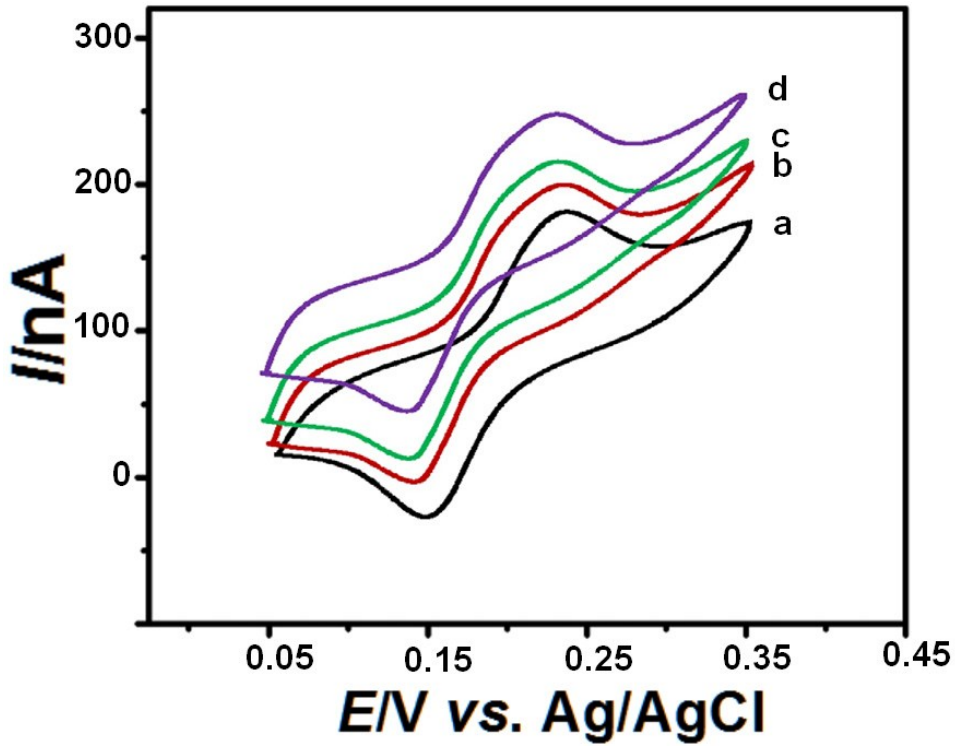

Fig. S8. CVs of the GOD/DMFc/COF-LZU1/CFMEs in the absence (a) and presence of 1.0 (b), 2.0 (c) and 5.0 mM (d) glucose in pH 7.4 nitrogen saturated aCSF at 100 mV s^{-1}, respectively.

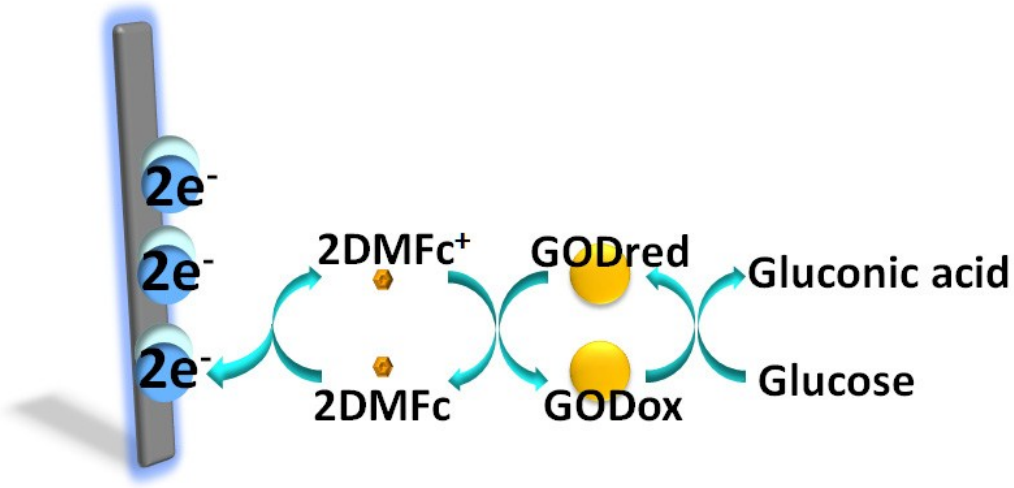

Fig. S9. Schematic illustration of GOD/DMFc/COF-LZU1/CFMEs catalyzing glucose.

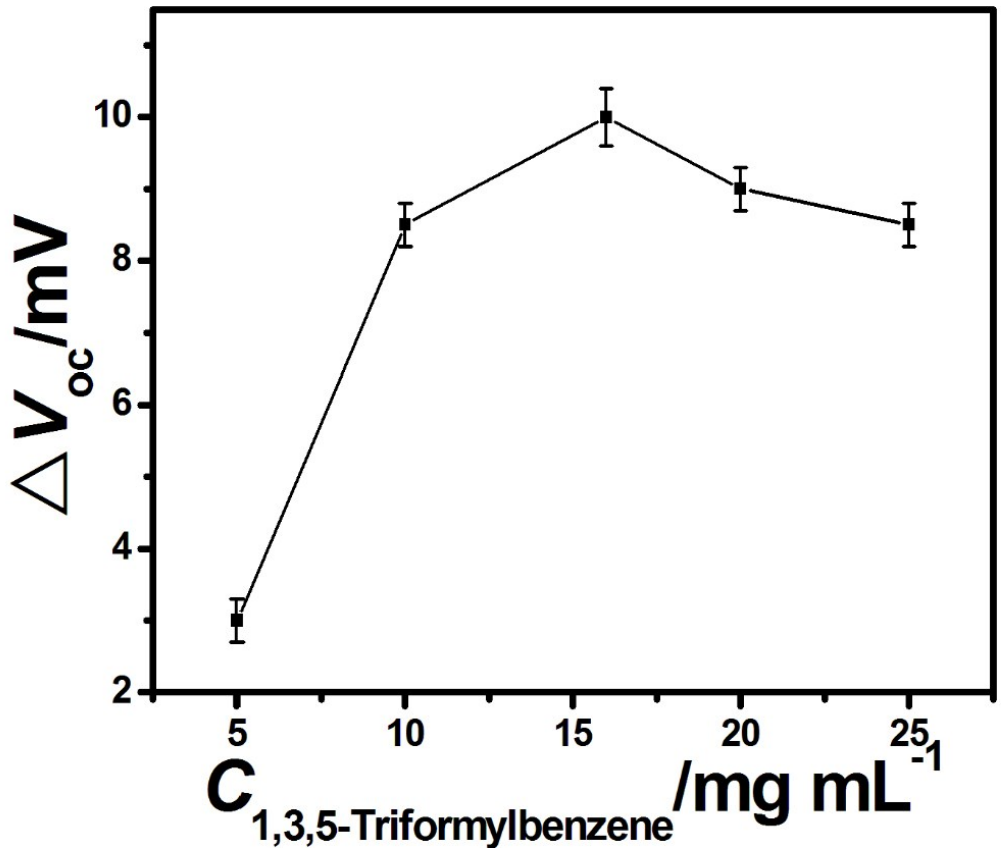

Fig. S10. The electrochemical response of the different GOD/DMFc/COF-LZU1/CFMEs in aCSF (pH7.4) containing 1.0 mM glucose to different 1,3,5-Triformylbenzene concentrations.

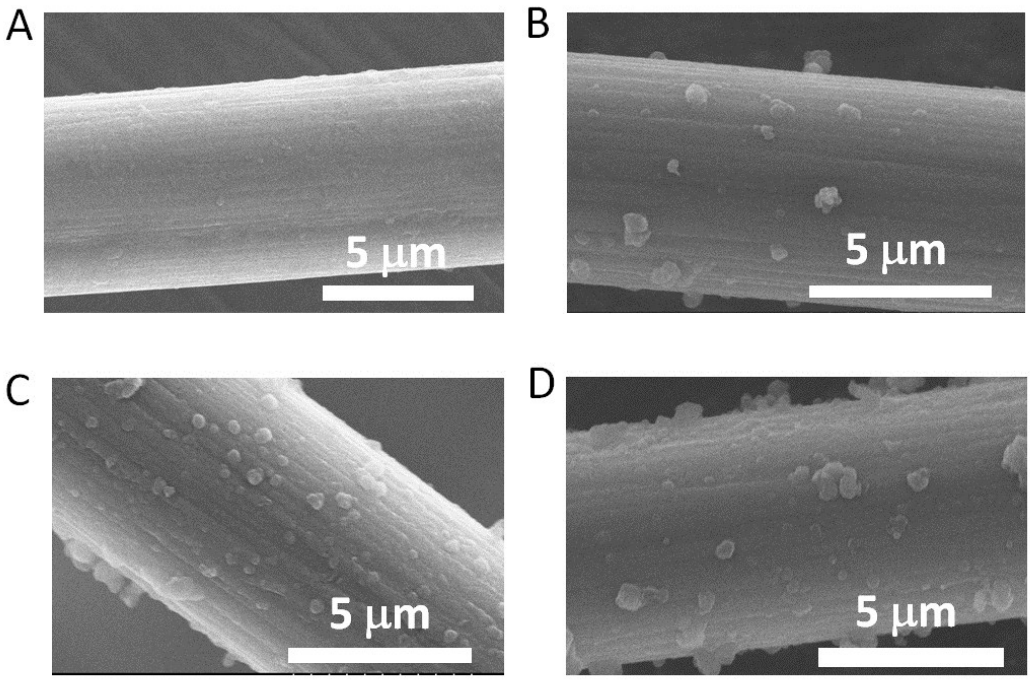

Fig. S11. SEM images of the GOD/DMFc/COF-LZU1/CFMEs prepared by (A) 5 mg ml^{-1} (B) 10 mg ml^{-1} (C) 16 mg ml^{-1} (D) 25 mg ml^{-1} 1,3,5-Triformylbenzene, and the concentration ratio of 1,3,5-Triformylbenzene and 1,4-diaminobenzene is 1:1.

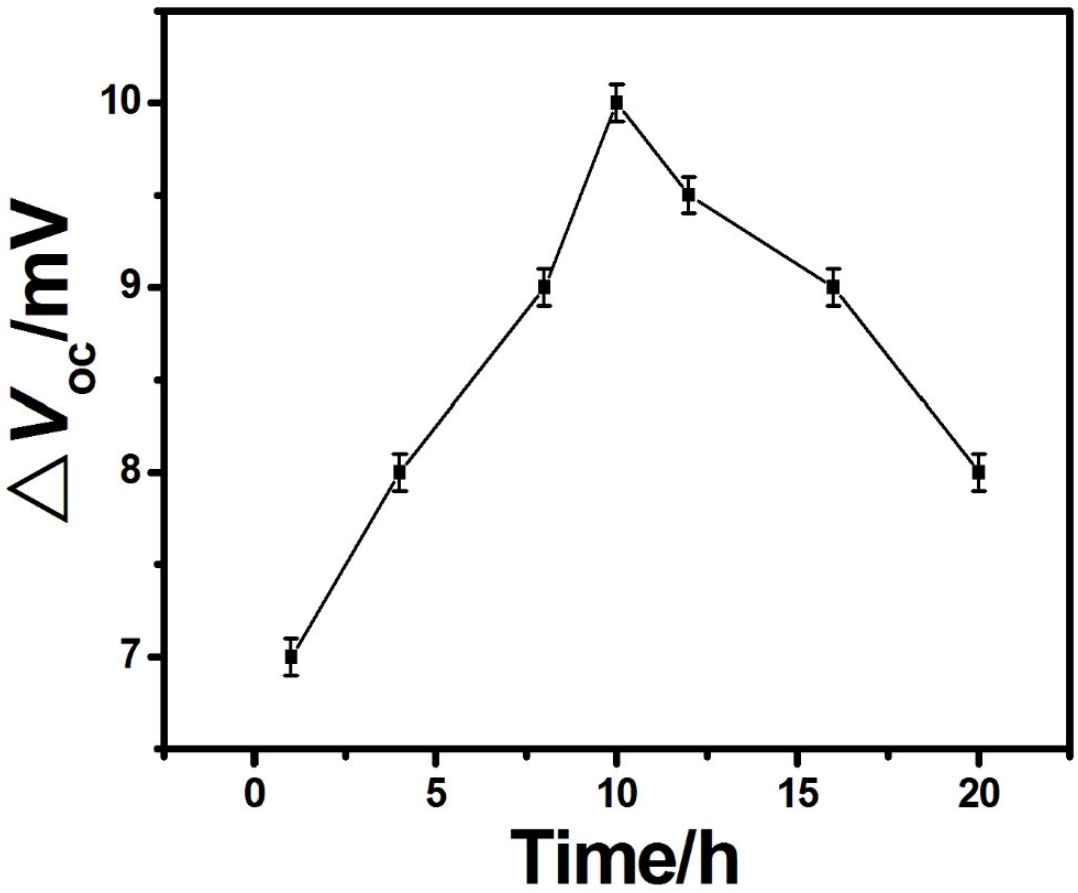

Fig. S12. The electrochemical response of the different GOD/DMFc/COF-LZU1/CFMEs in aCSF (pH7.4) containing 1.0 mM glucose to different soaking time in DMFc saturated solution.

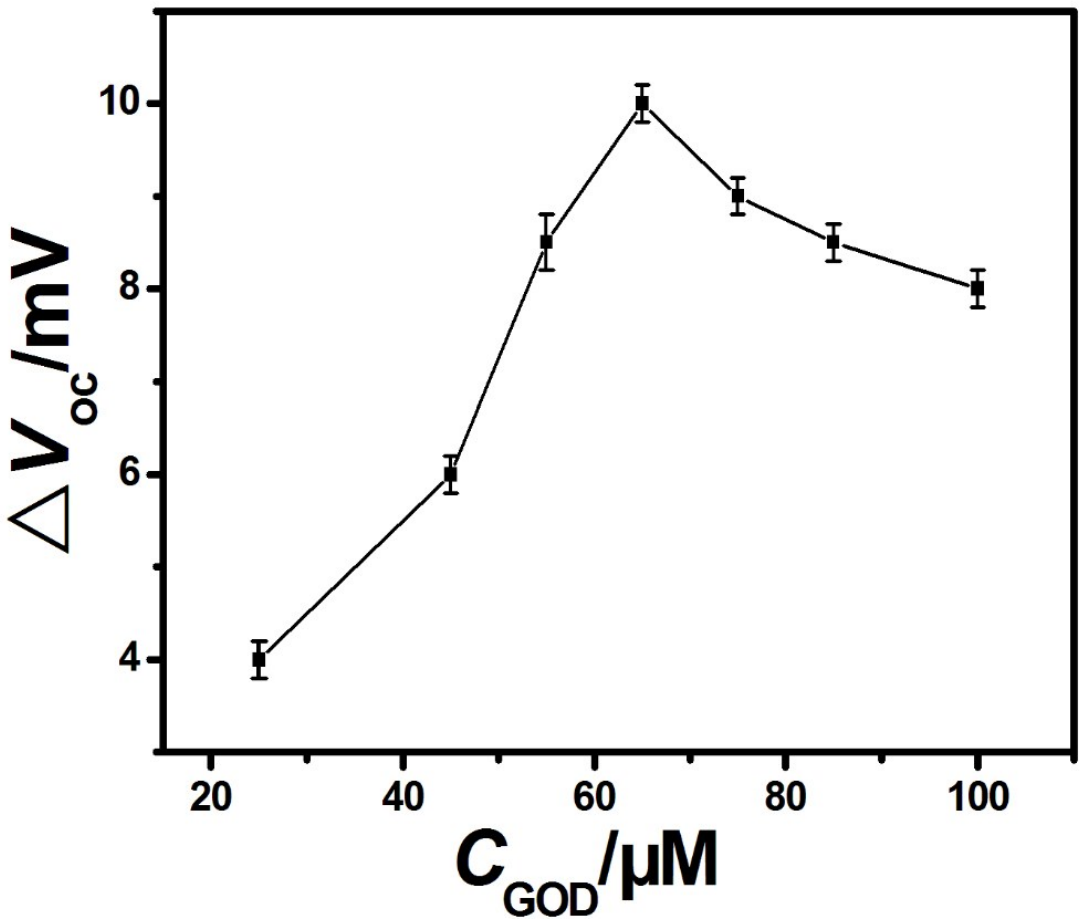

Fig. S13. The electrochemical response of the GOD/DMFc/COF-LZU1/CFMEs in aCSF (pH7.4) containing 1.0 mM glucose to different GOD solution.

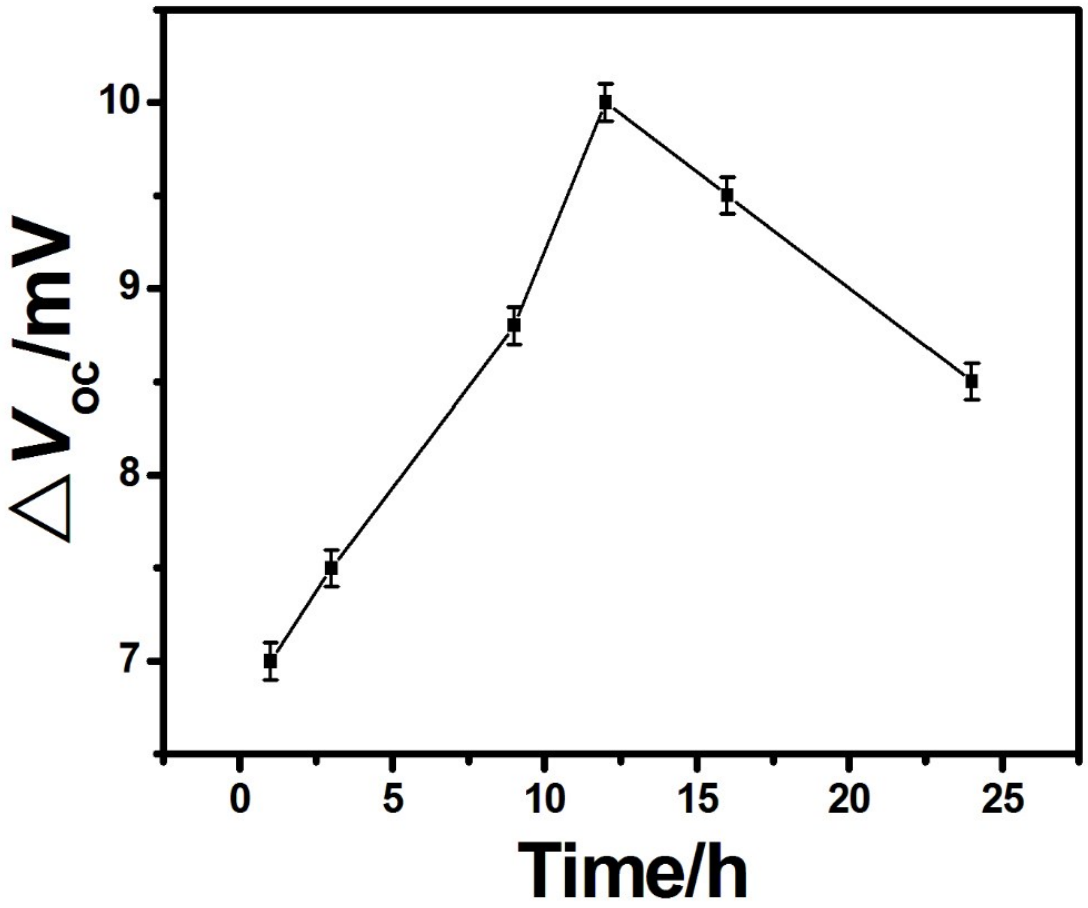

Fig. S14. The electrochemical response of the different GOD/DMFc/COF-LZU1/CFMEs in aCSF (pH7.4) containing 1.0 mM glucose to different soaking time in 65 μM GOD solution.

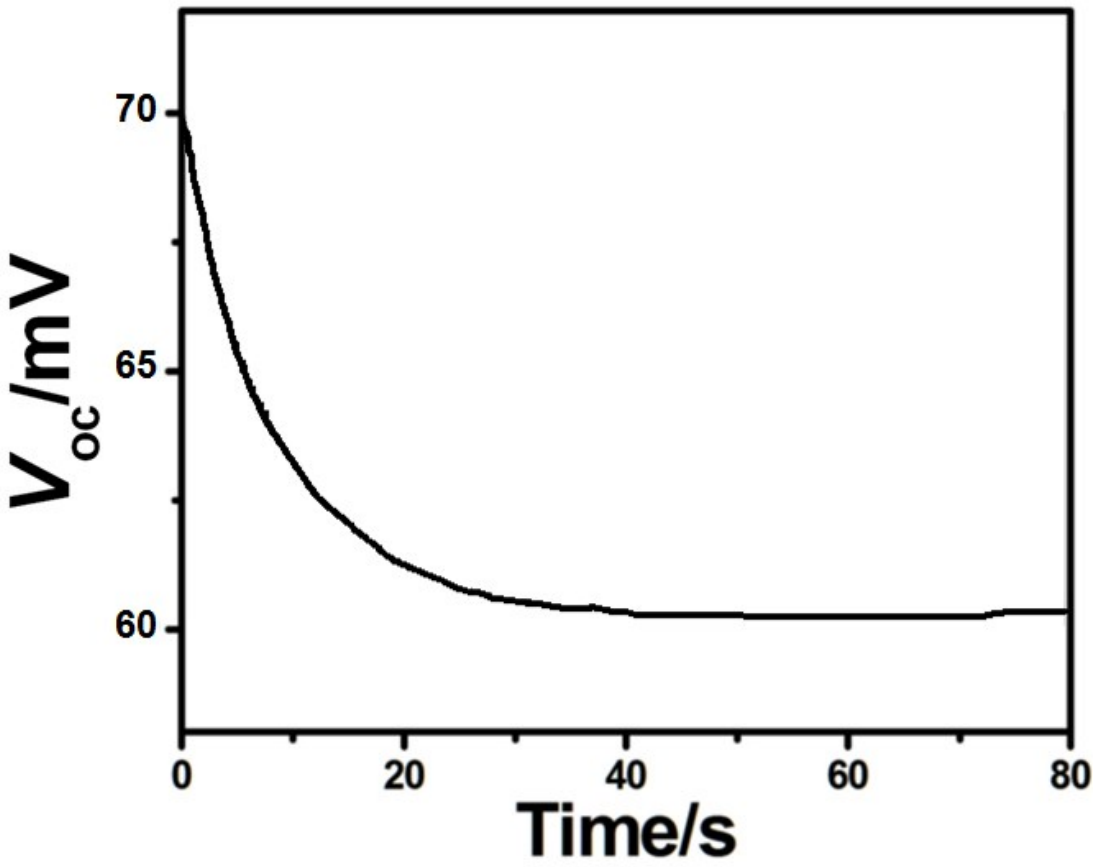

Fig. S15. Time-dependent signal response of GOD/DMFc/COF-LZU1/CFMEs for 1 mM glucose.

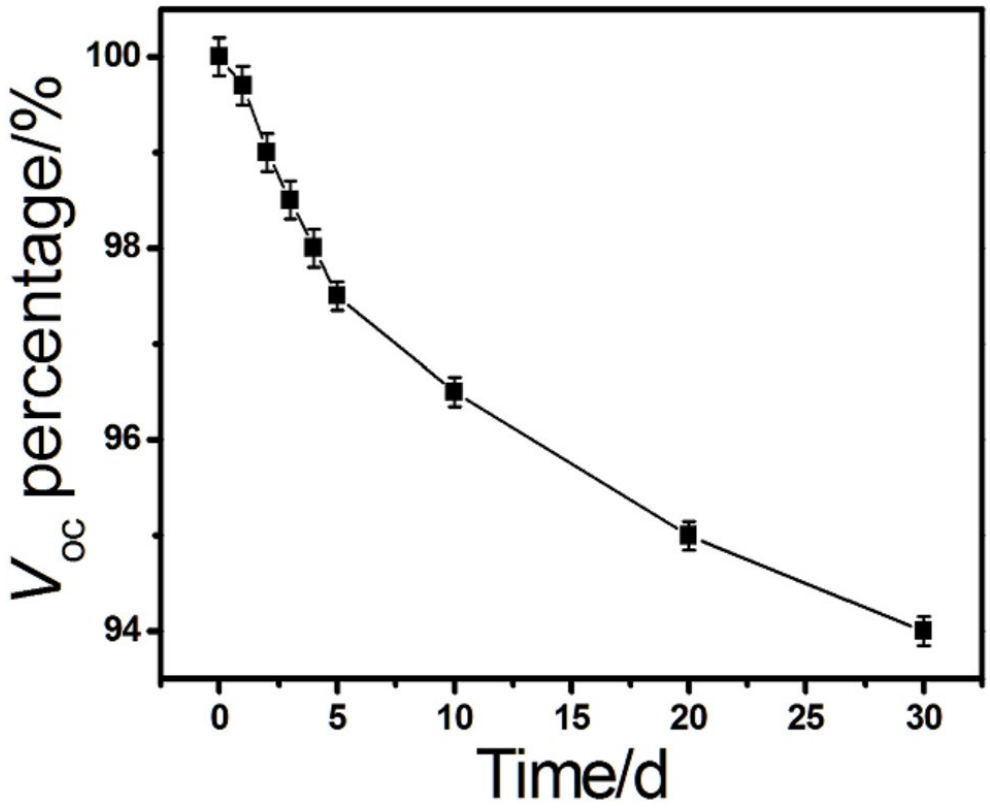

Fig. S16. Stability test of the GOD/DMFc/COF-LZU1/CFMEs in determination of 2.0 mM glucose in 30 days.

References

S1 A. Jędrzak, T. Rębiś, Ł. Klapiszewski, J. Zdarta, G. Milczarek, T. Jesionowski, *Sens. Actuators B*, 2018, 256, 176-185.

S2 Y. Song, X. Lu, Y. Li, Q. Guo, S. Chen, L. Mao, H. Hou and L. Wang, *Anal. Chem.*, 2016, 88, 1371-1377.

S3 C. Gong, J. Chen, Y. Song, M. Sun, Y. Song, Q. Guo and L. Wang, *Anal. Methods,* 2016, 8, 1513-1519.

S4 V. Mani, B. Devadas, S. Chen, *Biosens. Bioelectron*. 2013, 41, 309-315.

S5 U. Lad, G. Kale, R. Bryaskova, *Anal. Chem.* 2013, 85, 6349-6355.

S6 X. Kang, J. Wang,; Wu, H.; I. Aksay, J. Liu, Y. Lin, *Biosens. Bioelectron.* 2009, 25, 901-905.

S7 Y. Wang, L. Liu, M. Li, S. Xu, F. Gao, *Biosens. Bioelectron*. 2011, 30, 107-111.