Electronic Supplementary Material (ESI) for Analytical Methods.

Supporting Information

Highly Sensitive Poly(chrysoidine G)-Gold Nanoparticles Composite Based Nitrite Sensor for Food Safety Application

Sajid Ali Ansari[a,*,‡], Nasrin Siraj Lopa[b,‡], Nazish Parven,[c] A. A. Shaikh[d], and Md. Mahbubur Rahman[b,*]

[a]*Department of Physics, College of Science, King Faisal University, P.O. Box 400, Hofuf, Al-Ahsa 31982, Saudi Arabia.*

[b]*Department of Energy and Materials, Konkuk University, Chungju 27478, Korea*

[c]*Department of Chemistry, College of Science, King Faisal University, P.O. Box 400, Hofuf, Al-Ahsa 31982, Saudi Arabia*

[d]*Department of Chemistry, University of Dhaka, Dhaka-1000, Bangladesh*

*To whom correspondence should be addressed. E-mail: sansari@kfu.edu.sa (S. A. Ansari); mahbub1982@kku.ac.kr (M. M. Rahman)

‡Both the authors contributed equally.

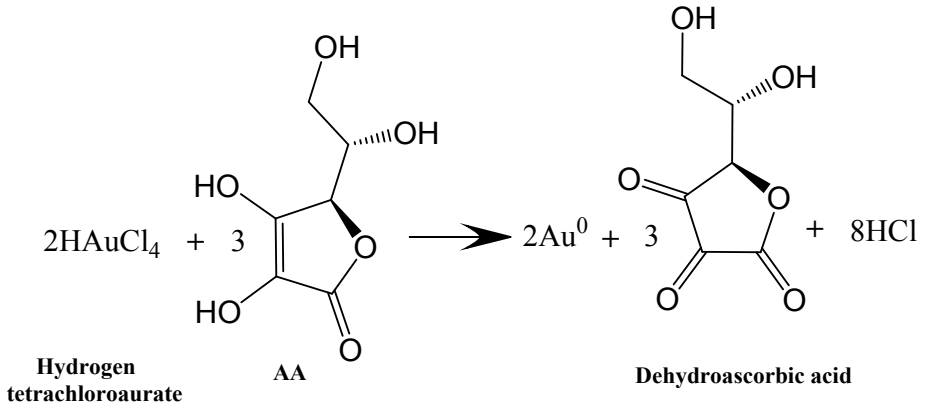

Fig. S1: Reaction mechanism for the reduction of Au^{3+} by ascorbic acid.[S1]

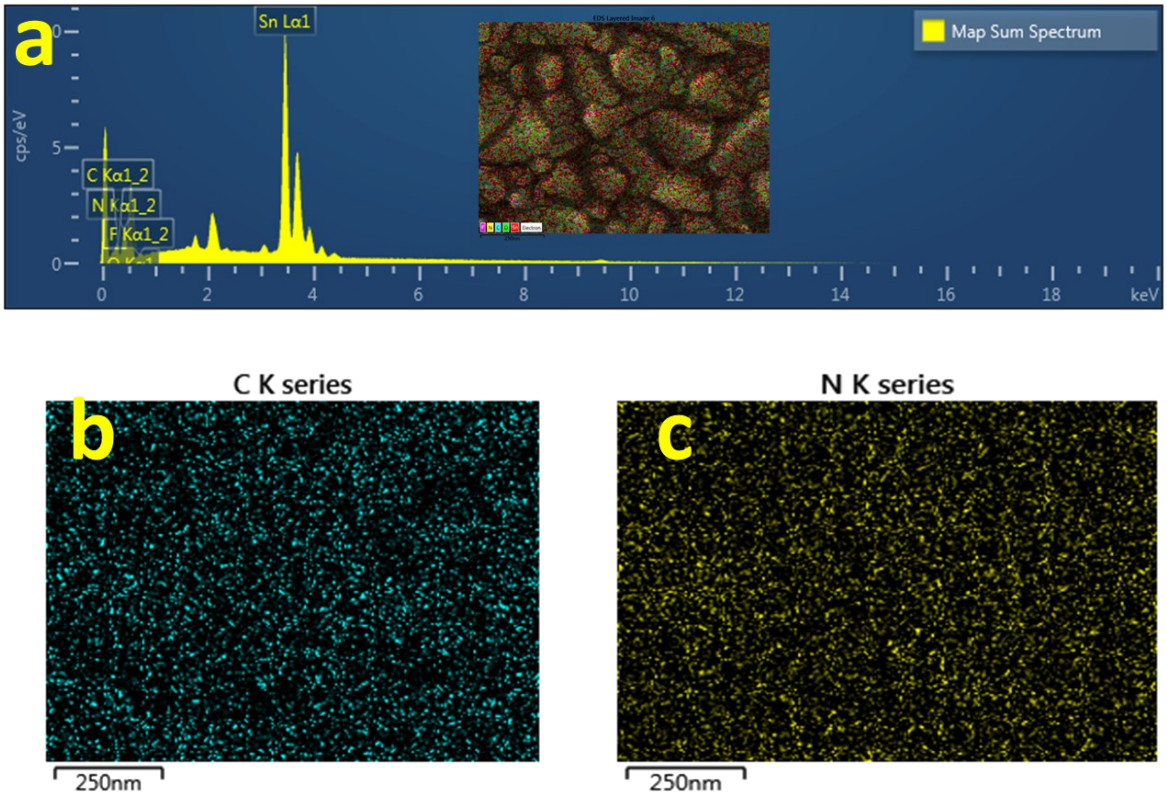

Fig. S2: (a) EDS spectra of PCG/FTO electrode (inset shows the FE-SEM image of the selected area for the measurement of EDS spectra and mapping). EDS elemental mapping of (b) C and (c) N atoms in the PCG/FTO electrode.

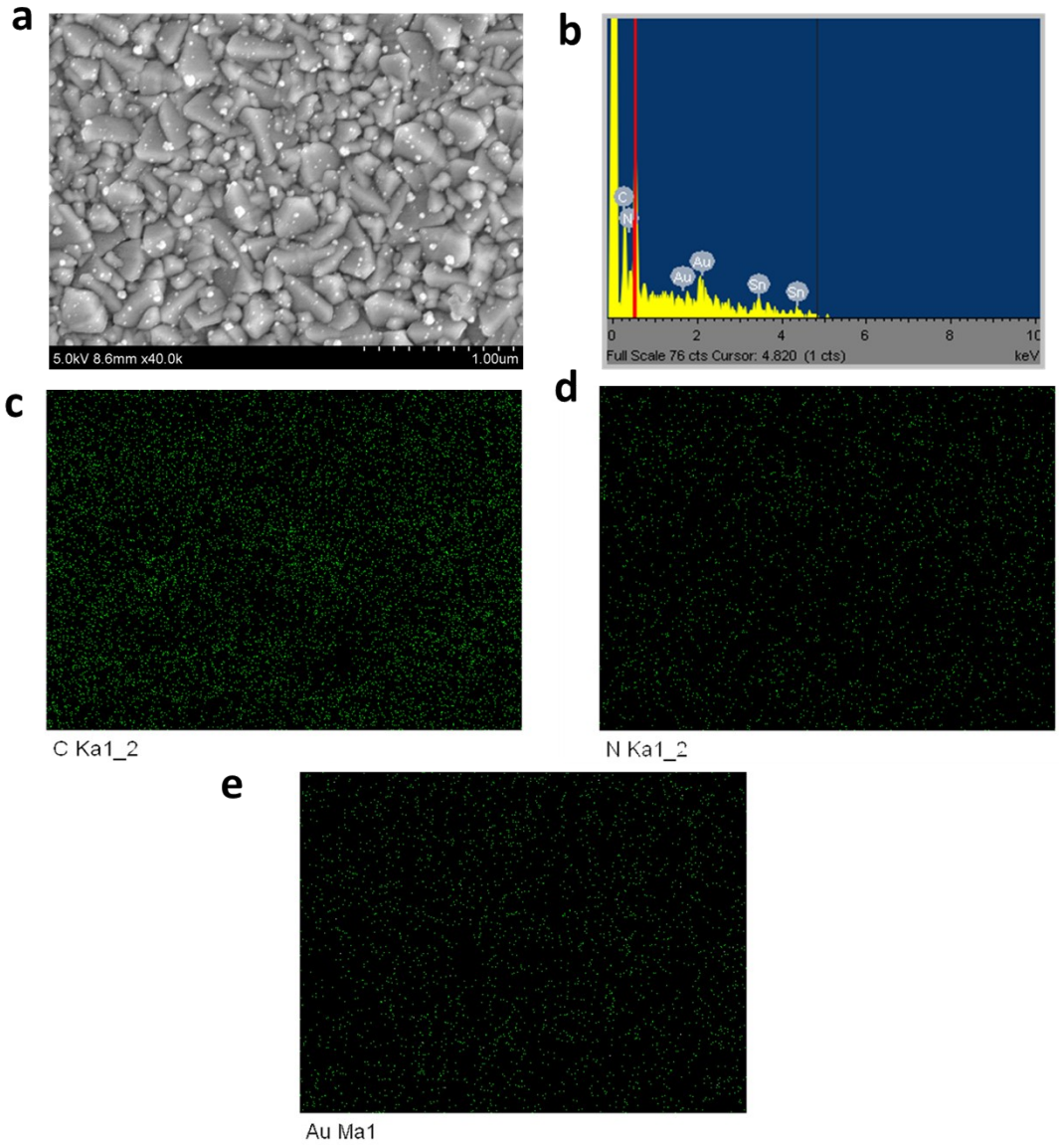

Fig. S3: (a) Low magnification FE-SEM image and (b) the corresponding EDS spectra of AuNP/PCG/FTO electrode. (c-e) EDS elemental mapping of C, N, and Au, respectively, in the AuNP/PCG/FTO electrode.

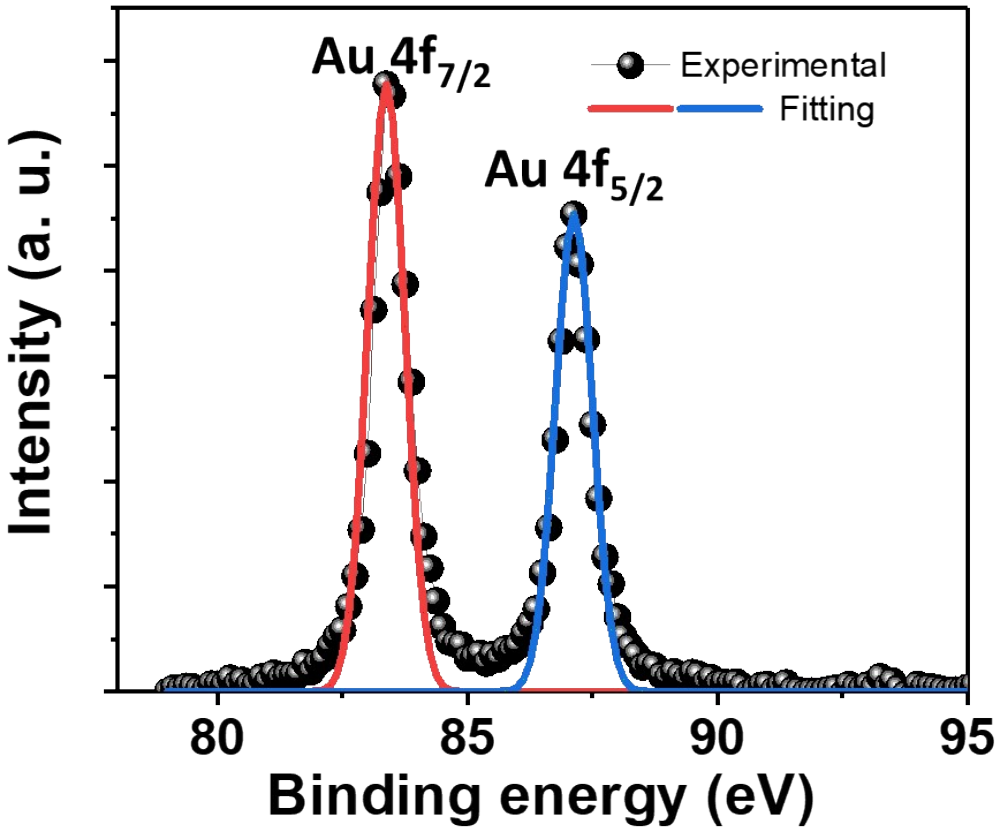

Fig. S4: Core-level XPS spectra of Au 4f in AuNP/PCG/FTO electrode

Table S1: Comparison of the analytical performance for the detection of NO_2^- at various nanomaterials modified electrode.

Electrode materials	Detection method	Linear range/ μM	Sensitivity	LOD/ μM	Ref.
Ag/Cu/MWNT nanoclusters	Amperometry	1-1000	-	0.2	2
AuNPs decorated MoS_2 nanosheets	Amperometry	10-2100	0.0247 μA/μM	0.09	3
Ag Nanosphere	Amperometry	0.1-8	0.580 μA/μM/cm^2	0.031	4
Au Nanoparticle/Graphene-Chitosan	Amperometry	0.9-18.9	0.2612 μA/μM	0.3	5
3D Au-reduced graphene oxide	CV	4-2400	0.41 μA/μM/cm^2	12.10	6
Activated jute carbon paste	Amperometry	2.5-1300	0.863 μA/μM/cm^2	0.437	7
CuO-2TiO_2 composite	Linear sweep voltammetry	10-200	-	0.0166	8
AuNP/PCG	DPV	0-200	0.63 μA/μM/cm^2	0.095	**This work**

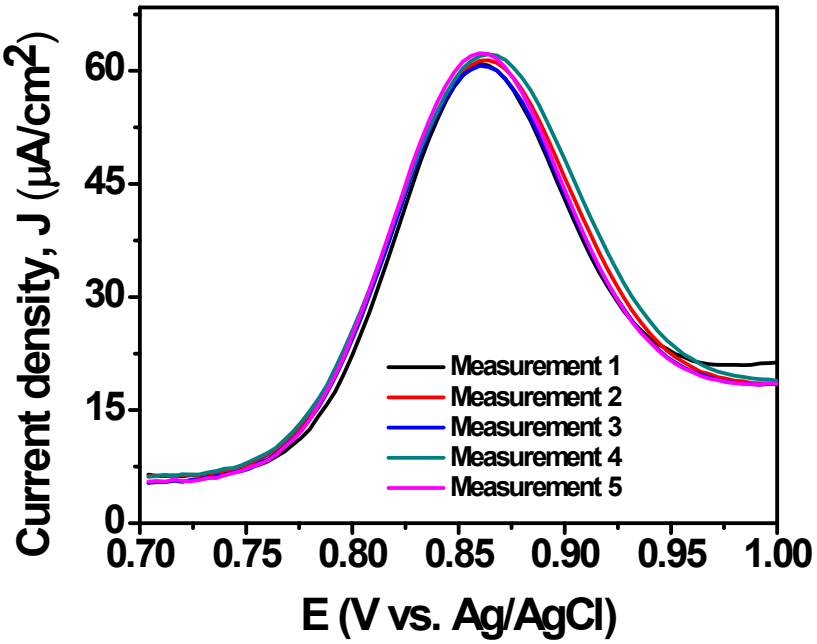

Fig. S5: Successive DPV plots for the oxidation of NO_2^- (100 μM) at the AuNP/PCG/FTO after 24 hours intervals.

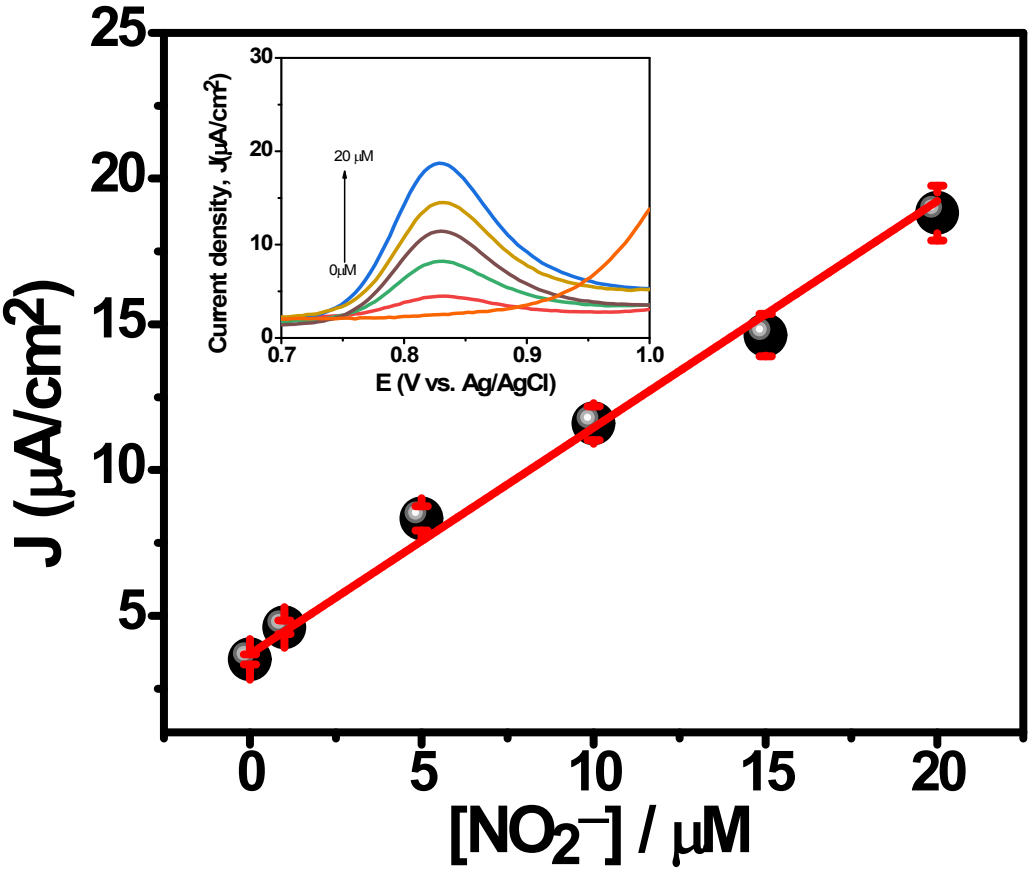

Fig. S6: Plot of *J vs.* [NO_2^-] / μM (r^2 = 0.990) for the oxidation of NO_2^- at the AuNP/PCG/FTO sensor with varying spiked concentrations in diluted tap water samples. Inset shows the corresponding DPV responses with the NO_2^- concentrations of 0, 1, 5, 10, 15, and 20 μM.

References

1. A. Sood, V. Arora, J. Shah, R. K. Kotnala and T. K. Jain, *J. Exp. Nanosci.*, 2016, **11**, 370–382.
2. Y. Zhang, J. Nie, H. Wei, H. Xu, Q. Wang, Y. Cong, J. Tao, Y. Zhang, L. Chu, Y. Zhou and X. Wu, Sensor Actuat. B-Chem., 2018, **258**, 1107–1116.
3. X. Li, N. Zou, Z. Wang, Y. Sun, H. Li, C. Gao, T. Wang and X. Wang, *Chem. Pap.*, 2020, **74**, 441–449.
4. M. Shivakumar, K. L. Nagashree, S. Manjappa and M. S. Dharmaprakash, *Electroanalysis*, 2017, **29**, 1434–1442.
5. R. Mo, X. Wang, Q. Yuan, X. Yan, T. Su, Y. Feng, L. Lv, C. Zhou, P. Hong, S. Sun, Z. Wang and C. Li, *Sensors*, 2018, **18**, 1986.
6. C. Li, D. Chen, Y. Wang, X. Lai, J. Peng, X. Wang, K. Zhang and Y. Cao, *Sensors*, 2019, **10**, 1304.
7. A. J. S. Ahammad, P. R. Pal, S. S. Shah, T. Islam, M. M. Hasan, M. A. A. Qasem, N. Odhikari, S. Sarker, D. M. Kim and M. A. Aziz, *J. Electroanal. Chem.*, 2019, **832**, 368–379.
8. M. A. Ehsan, R. Naeem, V. Mckee, A. H. Saeed, A. Pandikumar, N. M. Huang and M. Mazhar, *RSC Adv.*, 2016, **6**, 27852–27861.