Electronic Supplementary Material (ESI) for Analytical Methods.

Supporting information

Highly sensitive enzyme-free amperometric sensing of hydrogen peroxide in real samples based on Co_3O_4 nanocolumn structures

Palanisamy Kannan,[a]* Thandavarayan Maiyalagan,[b] Alagarsamy Pandikumar,[c] Longhua Guo,[a,d]* Pitchaimani Veerakumar,[e] and Perumal Rameshkumar [f]

[a] College of Biological, Chemical Sciences and Engineering, Jiaxing University, Jiaxing, 314001, PR China.

[b] SRM Research Institute, Department of Chemistry, SRM University, Kattankulathur – 603203, Chennai, India.

[c] Electrochemical Materials Science and Functional Materials Division, CSIR-Central Electrochemical Research Institute, Karaikudi, 630003, India.

[d] Institute of Nanomedicine and Nanobiosensing; MOE Key laboratory for analytical science of food safety and biology; Fujian Provincial Key Laboratory of Analysis and Detection Technology for Food Safety; College of Chemistry, Fuzhou University, Fuzhou, 350116, PR China.

[e] Institute of Atomic and Molecular Sciences, Academia Sinica, Taipei, 10617 Taiwan.

[f] Department of Chemistry, Kalasalingam University (Kalasalingam Academy of Research and Education), Krishnankoil, India.

* Corresponding Authors: ktpkannan@mail.zjxu.edu.cn (Kannan); Tel: +86-19857386580; Fax: +86-573 83643264: guolh@fzu.edu.cn (Guo); Tel: +86 15280077696, Fax: +86 591 22866135.

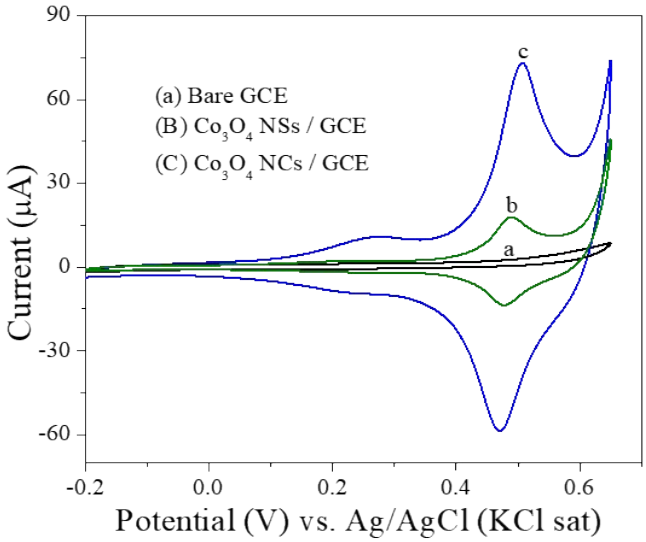

Figure S1. CVs obtained at bare GCE (a), Co_3O_4 NSs GCE (b), and Co_3O_4 NCs GCE (c) in Ar saturated 0.1 M NaOH aqueous solution at a scan rate of 50 mV s^{-1}.

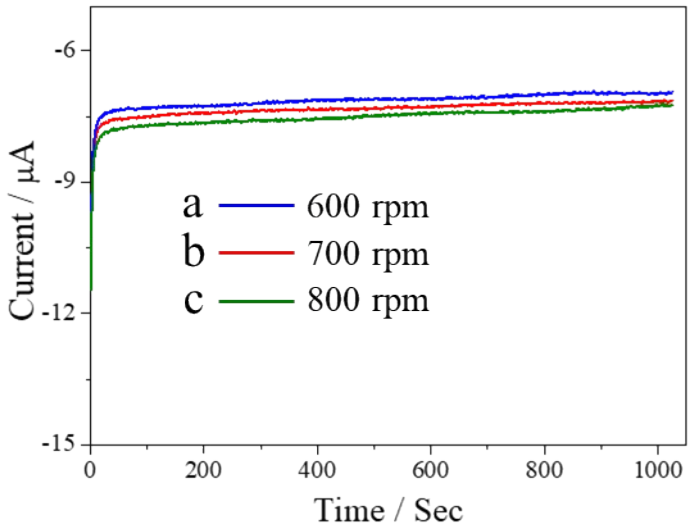

Figure S2. Optimization of stirring rate for amperometric detection of H_2O_2 using Co_3O_4 NCs / GCE in 0.1 M NaOH solution.

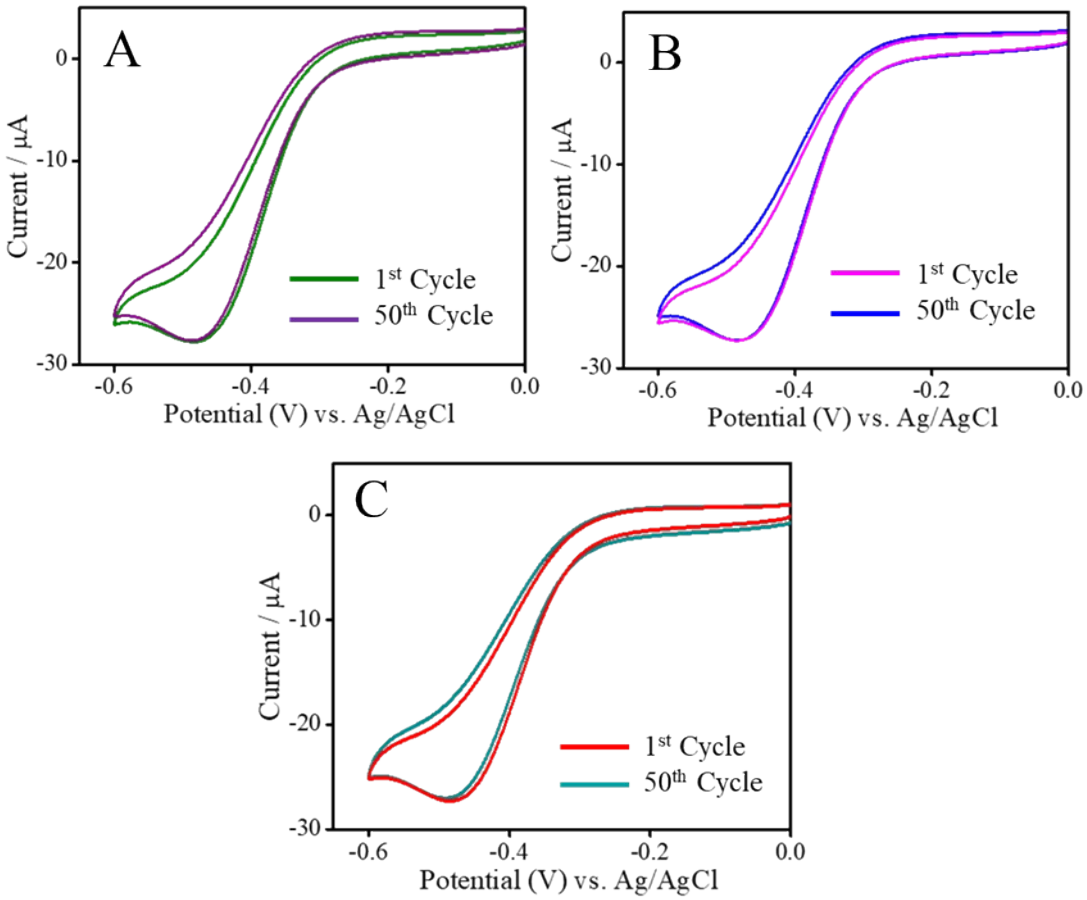

Figure S3: Reproducibility analysis of H_2O_2 electroreduction at three-different batch Co_3O_4 NCs electrodes.

Table S1. Comparison of the detection limit of the proposed non-enzymatic H_2O_2 sensor vs. other Co_3O_4 or Co_3O_4 based composite nanomaterials.

S. No	Electrodes	Detection Techniques	Detection limit (µM)	References
1	Co_3O_4 nanoparticles	Amperometry	4.40	[1]
2	Vertically aligned Co_3O_4 nanowalls	Amperometry	2.80	[2]
3	Co_3O_4 nanoporous thin film	Amperometry	200.0	[3]
4	Nafion/exfoliated graphene oxide–Co_3O_4 nanocomposite	Amperometry	0.30	[4]
5	Co_3O_4 nanoparticles on mesoporous carbon nanofibers	Amperometry	0.50	[5]
6	Co_3O_4 nanoparticles and multi-walled carbon nanotubes	Amperometry	0.74	[6]
7	Binary Mn-Co Oxides decorated graphene nanocomposites	Amperometry	0.80	[7]
8	Co_3O_4 nanoparticles anchored to porous silicon	Amperometry	0.80	[8]
9	Interconnected 1D Co_3O_4 nanowires on reduced graphene oxide	Amperometry	2.40	[9]
10	Co_3O_4 Nanoparticles anchored to multi-walled carbon nanotubes	Amperometry	2.46	[10]
11	Hexagonal CoAl-layered double hydroxide nanoshales/carbon nanotubes composite	Amperometry	10.0	[11]
12	Co_3O_4 nanoparticles anchored on nitrogen-doped reduced graphene oxide	Amperometry	100.0	[12]
13	$CoFe_2O_4$ hollow nanostructures	Amperometry	2.50	[13]
14	**Co_3O_4 nanocolumns arrays**	**Amperometry**	**0.28**	**This work**

Table S2. Determination of H_2O_2 in 8: 2 ratio of river water + 0.1M NaOH and antiseptic solution + 0.1M NaOH based on the Co_3O_4 NCs arrays electrode.

River Water Sample	Added (mM)	Found (mM)	RSD (%)[a]	Recovery (%)
1	1	0.96	2.51	96.00
2	2	1.93	2.23	96.50
3	3	2.92	2.06	97.33
4	5	4.91	1.98	98.20
5	7	6.89	2.01	98.42
Antiseptic Sample	Added (mM)	Found (mM)	RSD (%)	Recovery (%)
1	1	0.97	2.63	97.00
2	2	1.88	2.91	94.00
3	3	2.81	3.06	93.00
4	5	4.74	2.84	94.80
5	7	6.68	2.72	95.42

[a] Relative standard deviation was obtained from three independent measurements.

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