Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.

Co_3O_4@CeO_2 hybrid flower-like microspheres: a strong synergistic peroxidase-mimicking artificial enzyme with high sensitivity for glucose detection

Deshetti Jampaiah,[‡a] T. Srinivasa Reddy,[‡a] Victoria E. Coyle,[a] Ayman Nafady,[b c] and Suresh K. Bhargava[a]*

[a]Centre for Advanced Materials & Industrial Chemistry (CAMIC), School of Applied Sciences, RMIT University, GPO BOX 2476, Melbourne–3001,Australia. E-mail: suresh.bhargava@rmit.edu.in; Tel: +61 3 9925 3365

[b]Chemistry Department, College of Science, King Saud University, Riyadh, Saudi Arabia

[c]Chemistry Department, Faculty of Science, Sohag University, Sohag 82524, Egypt

***Corresponding Author**:

E-mail: suresh.bhargava@rmit.edu.in; Tel: +61 3 9925 3365

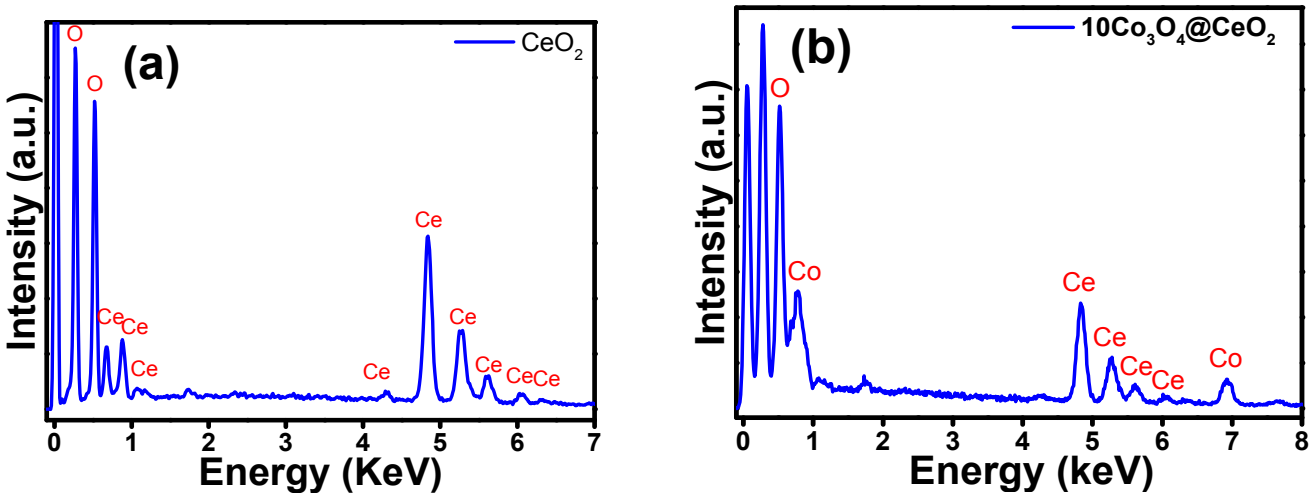

Fig. S1 SEM-EDX spectra for the (a) CeO_2, and (b) $10Co_3O_4$@CeO_2 hybrid microspheres.

Table S1

The content of Co values of $10Co_3O_4$@CeO_2 hybrid microspheres.

Catalyst	Designed Content of Co (wt%)	Calculated content of Co (wt%)[a]
10Co3O4@CeO2	10	9.95

[a]The metal content was tested by ICP-AES analysis.

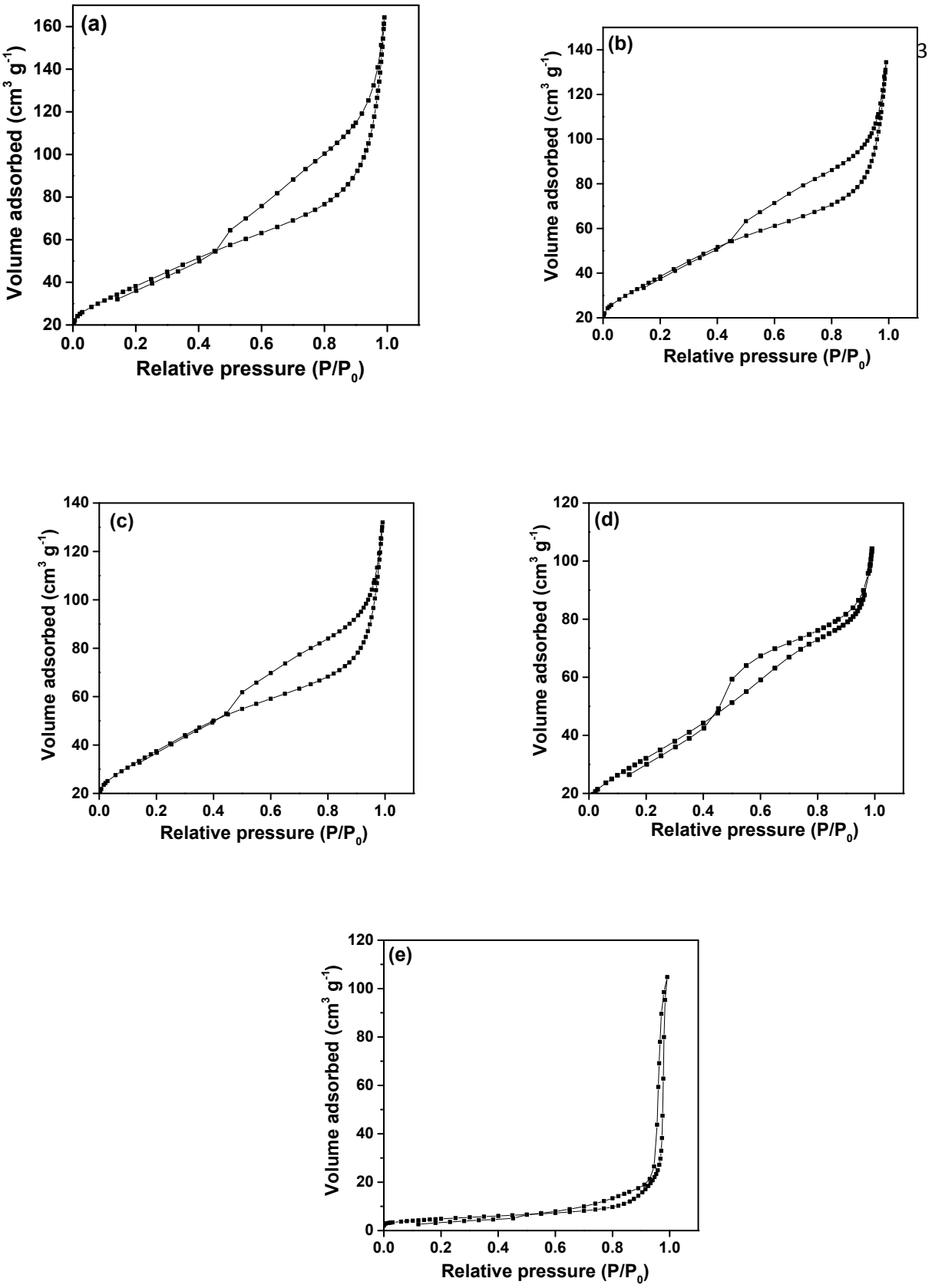

Fig. S2 Nitrogen adsorption−desorption isotherms for the (a) CeO_2, and (b) $5Co_3O_4@CeO_2$ (c) $10Co_3O_4@CeO_2$ (d)$20Co_3O_4@CeO_2$ and (e) Co3O4 catalysts.

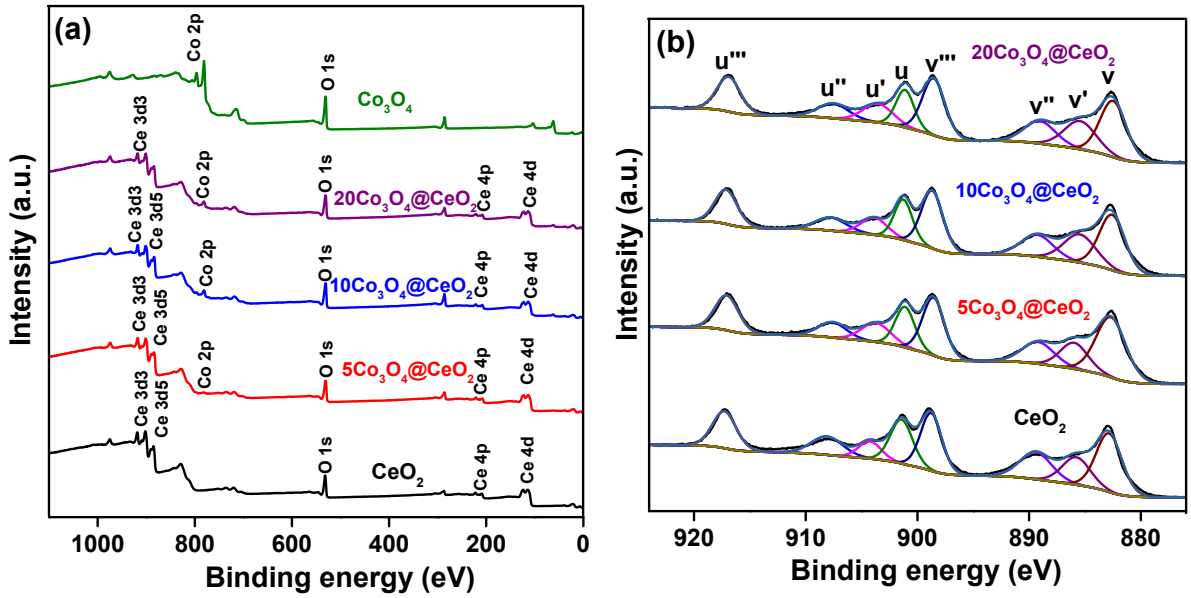

Fig. S3 XPS spectra of CeO_2, $5Co_3O_4@CeO_2$, $10Co_3O_4@CeO_2$, $20Co_3O_4@CeO_2$, and Co_3O_4 catalysts (a) survey scan, (b) Ce 3d.

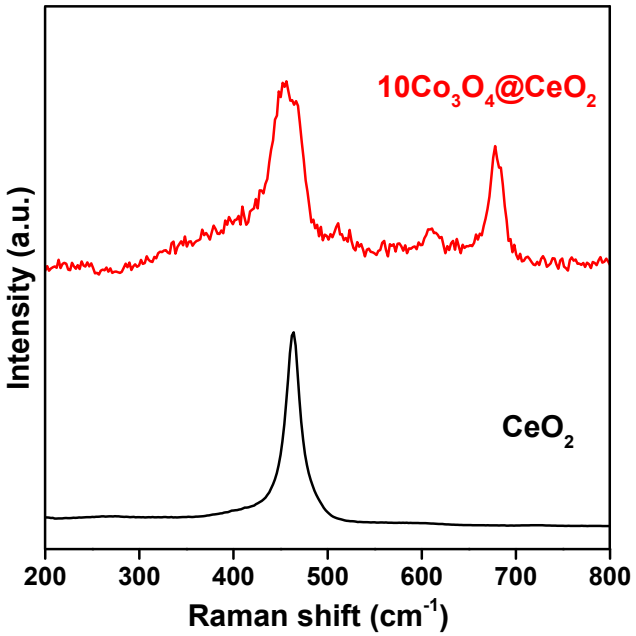

Fig. S4 Raman spectra of the CeO_2 and $10Co_3O_4@CeO_2$ microspheres.

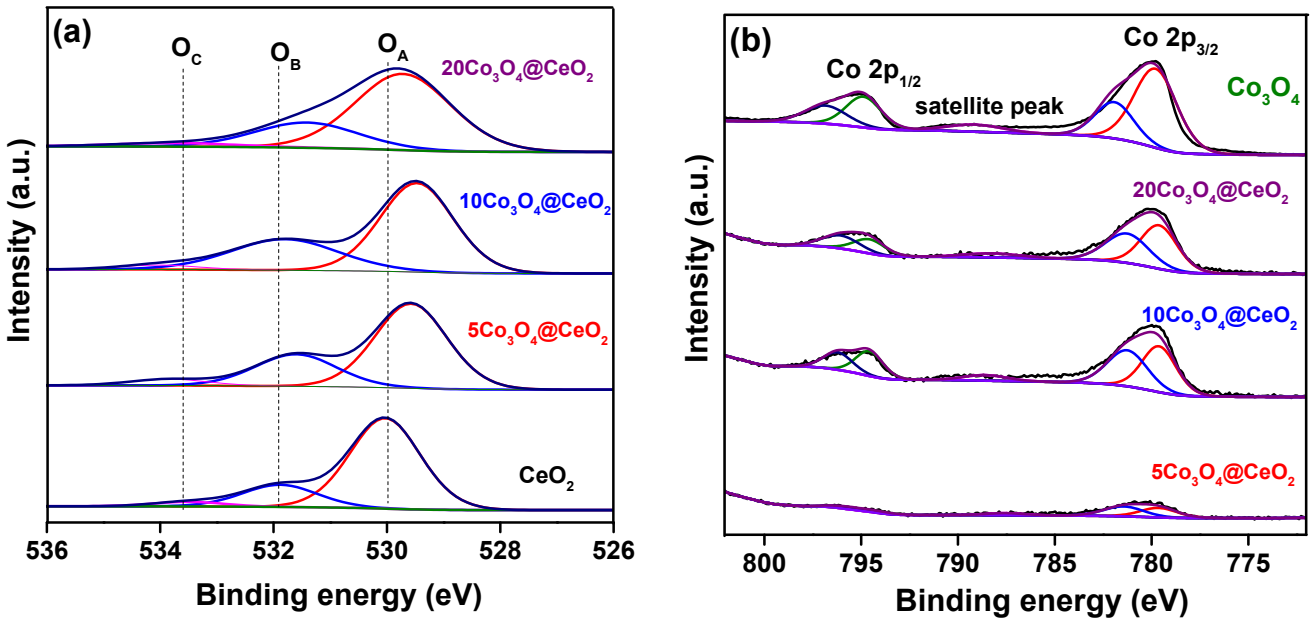

Fig. S5 XPS spectra of CeO_2, $5Co_3O_4@CeO_2$, $10Co_3O_4@CeO_2$, $20Co_3O_4@CeO_2$, and Co_3O_4 samples (a) O 1s, (b) Co 2p.

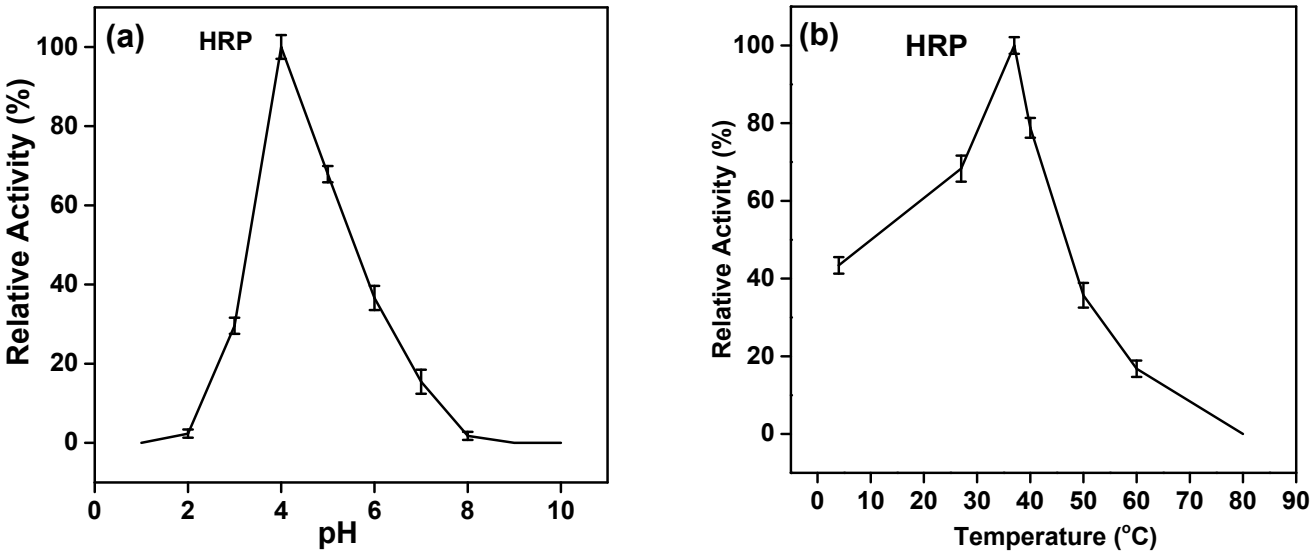

Fig.S6 The peroxidase-like activity of HRP is dependent on (a) pH, (b) temperature.

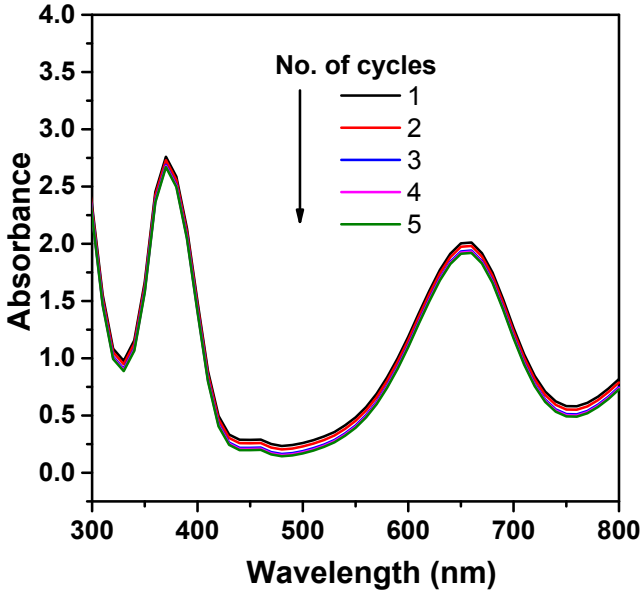

Fig. S7 Catalytic activity of $10Co_3O_4@CeO_2$ hybrid microspheres in five successive recycles.

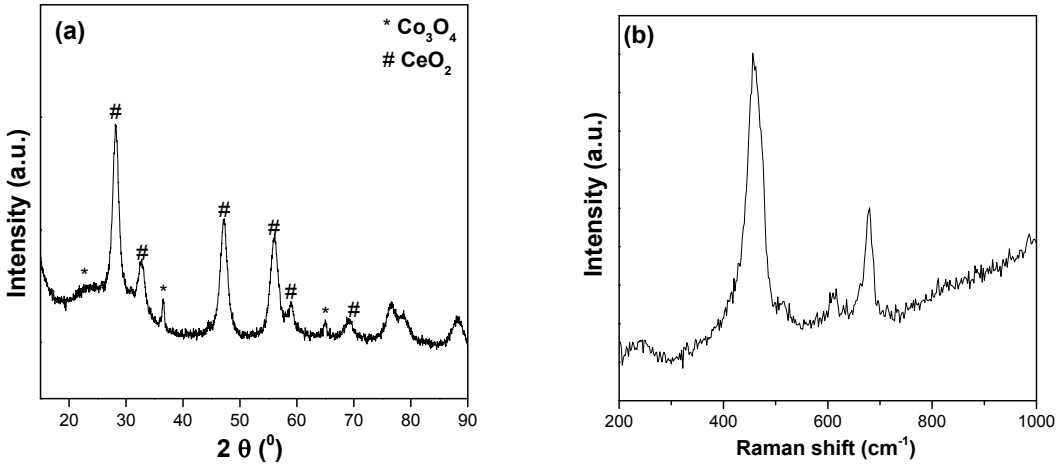

Fig. S8 (a) Powder XRD patterns and (b) Raman spectra of $10Co_3O_4@CeO_2$ hybrid microspheres after TMB substrate oxidation.

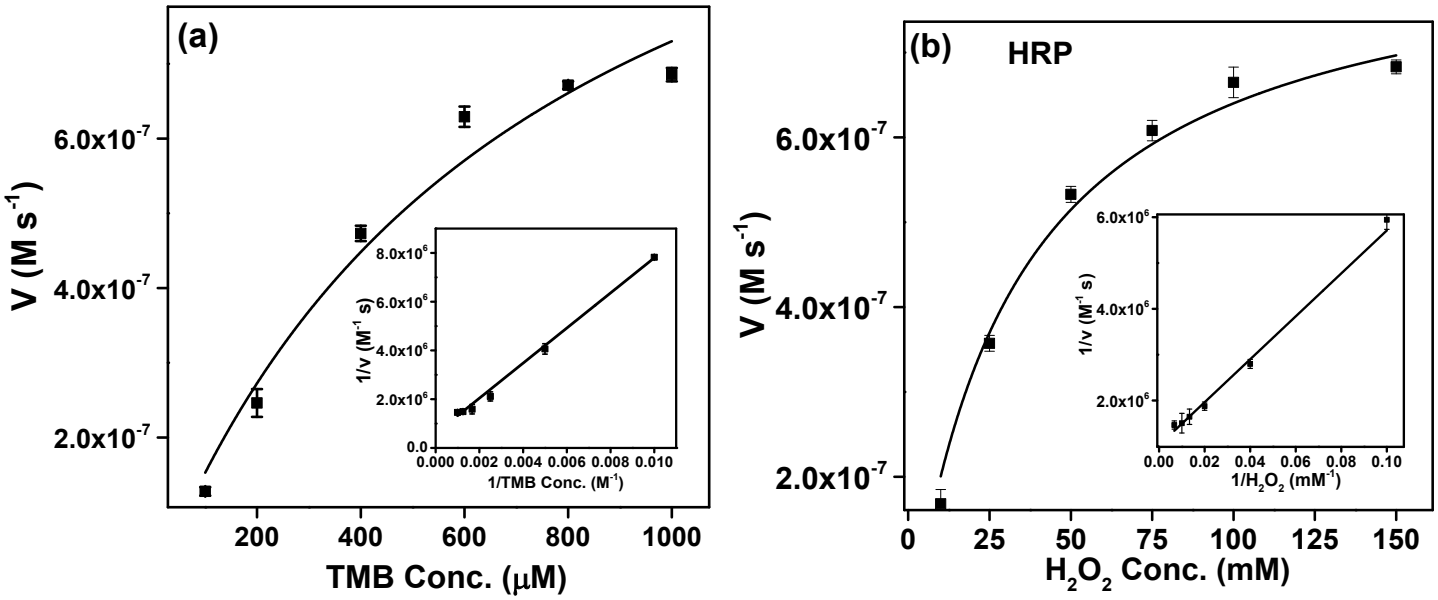

Fig. S9 Steady-state kinetic analyses using Michaelis-Menten and Lineweaver-Burk models (insets of figures) for HRP (1.5 ng/mL) by (a) varying the concentrations of TMB (100–1000 μM) with a fixed amount of H_2O_2 (100 mM) and (b) varying the concentrations of H_2O_2 (10–150 mM) with a fixed amount of TMB (800 μM).

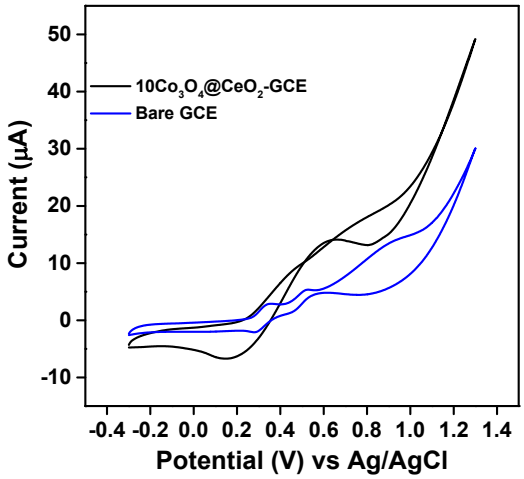

Fig. S10 Cyclic voltammogram curves of a bare glassy carbon electrode (GCE) and GCE modified $10Co_3O_4@CeO_2$ hybrid microspheres.

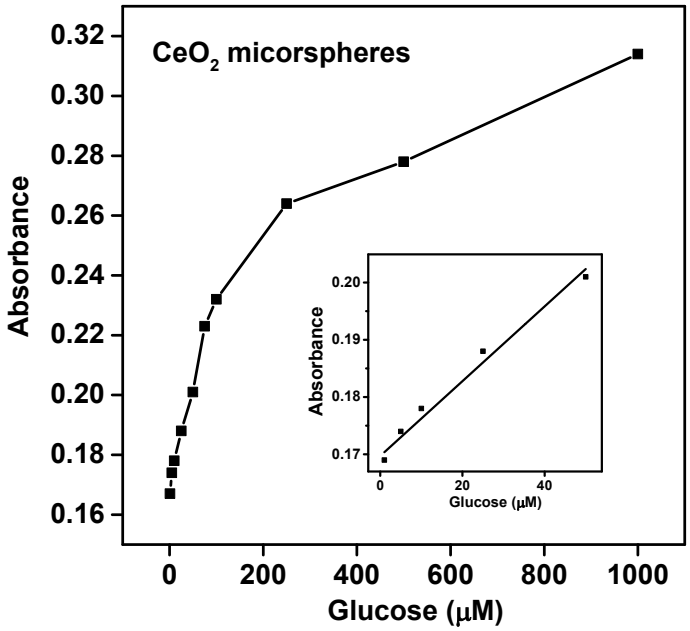

Fig. S11 Glucose concentration response curve for glucose detection using GO_x and the pure CeO_2 microspheres (inset: linear calibration plot for glucose). The error bars represent the standard deviation of three repeated measurements.