Electronic Supplementary Material (ESI) for RSC Advances.

Dual role of Hydrogen Peroxide on the Oxidase-like Activity of Nanoceria and its Application for Colorimetric Hydrogen Peroxide and Glucose Sensing

Ruochen Guo [a,1], Yanru Wang [a,1], Shaoxuan Yu [a], Wenxin Zhu [a], Fangqing Zheng [a], Wei Liu [a], Daohong Zhang [a], Jianlong Wang [a,*]

[a] College of Food Science and Engineering, Northwest A&F University, Yangling, 712100, Shaanxi, China

[1] Both Ruochen Guo and Yanru Wang rank as the first authors.
Corresponding Author: Tel/fax +86 29 87092275; Email: wanglong79@yahoo.com

Fig. S1 Photograph of nanoceria solution.

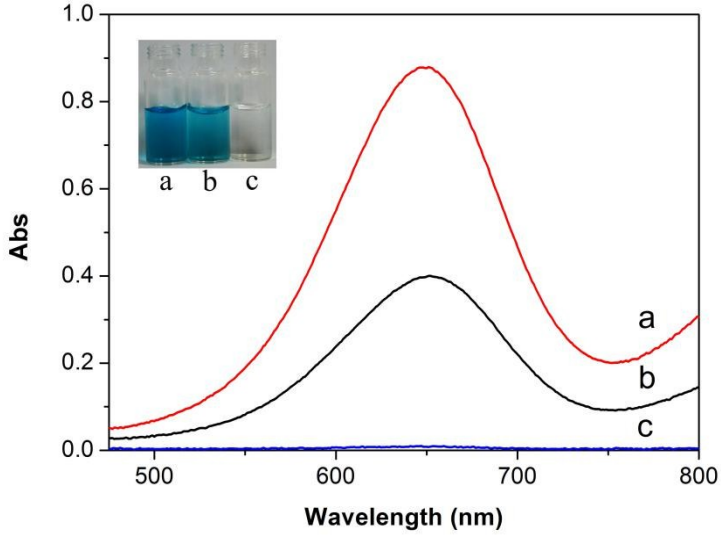

Fig. S2 Typical absorption curves of TMB reaction solutions mixing with (a) Ce NPs; (b) Ce NPs and H2O2; (c)H2O2 at room temperature in acetate buffer after reaction for 10 min. Inset: photographs of different solutions each corresponding to (a) to (c).

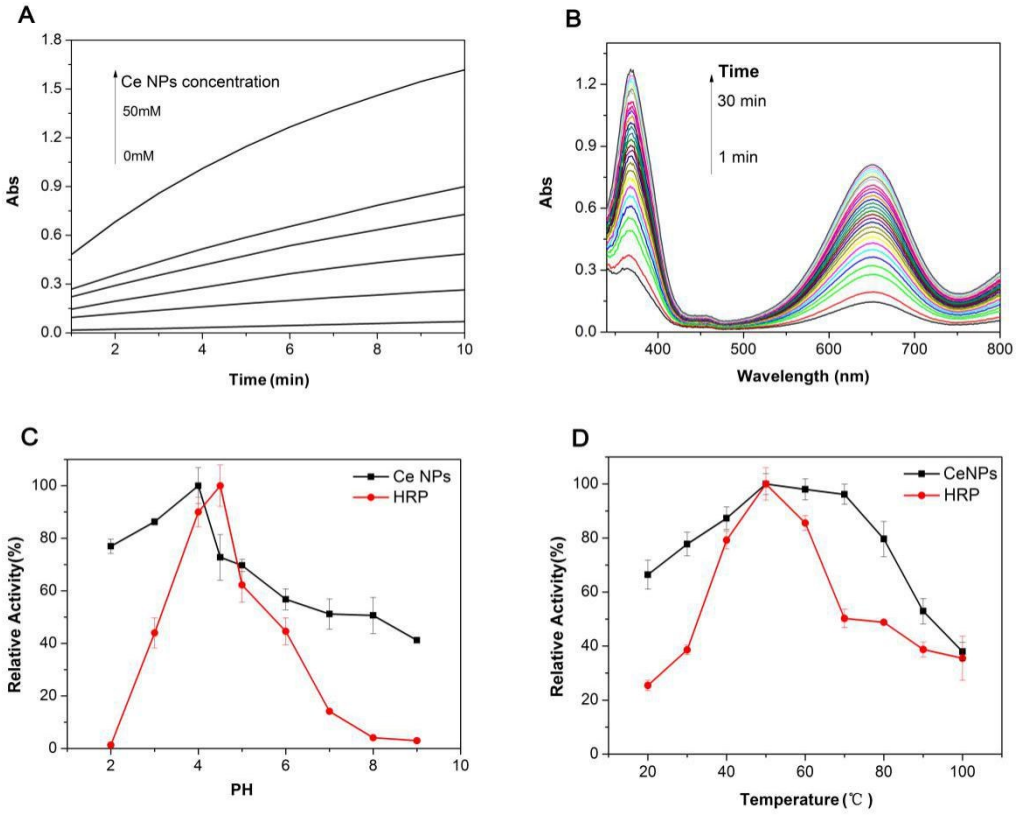

Fig.S3 Dependency of the Ce NPs oxidase-like activity on Ce NPs concentration (A), reaction time (B), pH (C) and temperature (D). Experiments were carried out using 0.8 mM TMB as a substrate and the reaction time was 10 min in the group of (A), 20 min in the group of (C) and (D). The H_2O_2 concentration was 0 mM in all Ce NPs catalysis experiments and 10 mM in the HRP catalysis experiments. The error bars represent the standard deviation for three measurements.

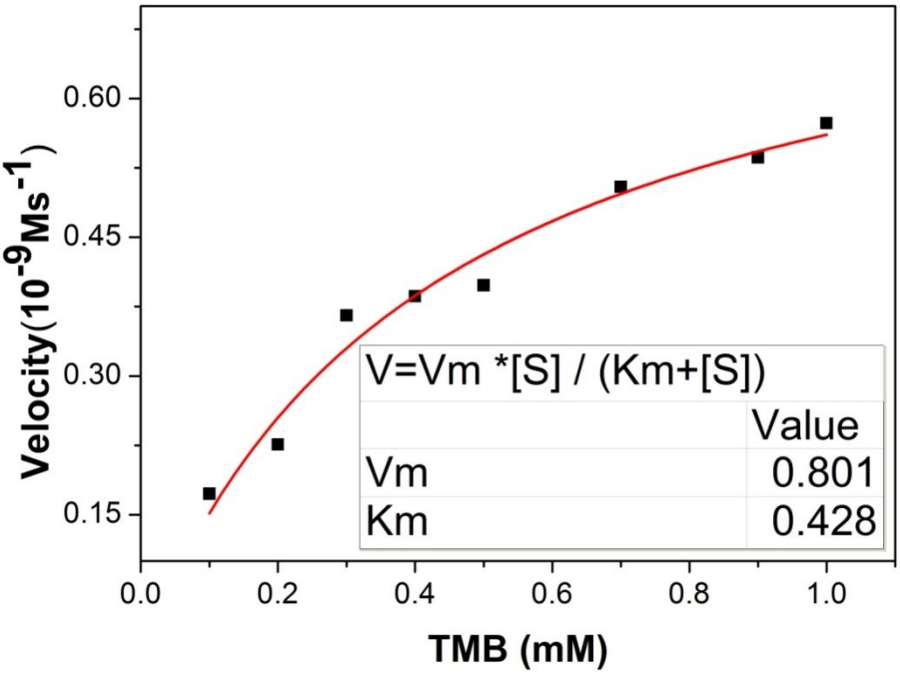

Fig. S4 Steady-state kinetic assay and catalytic mechanism of Ce NPs. The velocity (v) of the reaction was measured using 50 mg/L Ce NPs in 1 mL acetate buffer at pH 4.0 and room temperature (about 15^{o}C).

Table S1. Comparison of the proposed method with other colorimetric glucose sensors

Catalyst	Substrate	H_2O_2		Glucose		Reference
		LOD (μM)	Linear Range (μM)	LOD (μM)	Linear Range (μM)	
Nanoceria	TMB	2.5	4–40	2	4–40	This work
Gold clusters	TMB	–	–	–	2.0×10^3–1.0×10^4	[1]
Fe_3O_4	ABTS	3.0	5–100	30	50–1000	[2]
NiO	TMB	8.0	0.02–0.10	20	50–500	[3]
nitrogen-doped graphene quantum dots	TMB	5.3	20–1170	16	25– 375	[4]

References

1 X. Jiang, C. Sun, Y. Guo, G. Nie and L. Xu, *Biosens. Bioelectron.*, 2015, **64**, 165–70.

2 H. Wei and E. Wang, *Anal. Chem.*, 2008, **80**, 2250–4.

3 Q. Liu, Y. Yang, H. Li, R. Zhu, Q. Shao, S. Yang and J. Xu, *Biosens. Bioelectron.*, 2015, **64**, 147–53.

4 L. Lin, X. Song, Y. Chen, M. Rong, T. Zhao, Y. Wang, Y. Jiang and X. Chen, *Anal. Chim. Acta*, 2015, **869**, 89–95.