

## Supplementary information

### Conversion of straw to nitrogen doped carbon for efficient oxygen reduction catalyst in microbial fuel cells

Lang Liu, Qi Xiong, Chungen Li, Yan Feng, Shuiliang Chen\*

Department of Chemistry and Chemical Engineering, Jiangxi Normal University, 330022 Nanchang, China. E-mail: [slchenjxnu@jxnu.edu.cn](mailto:slchenjxnu@jxnu.edu.cn)

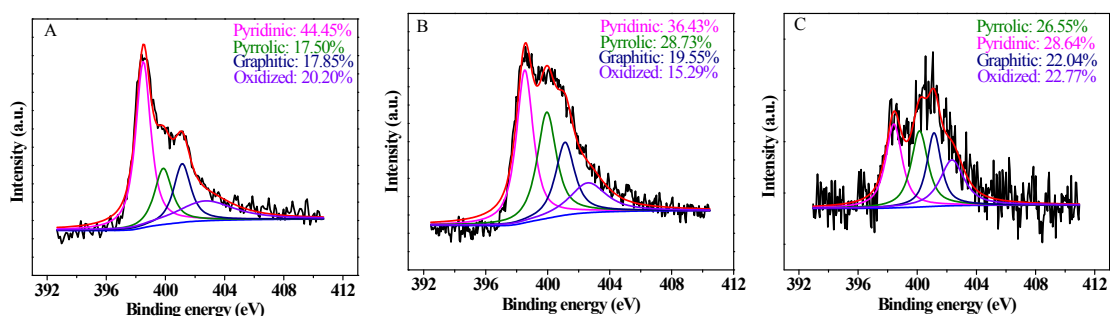


Fig. S1 N1s XPS spectra of (A) H-NC-1000, (B) H-NC-800 and (C) H-C-900 respectively.

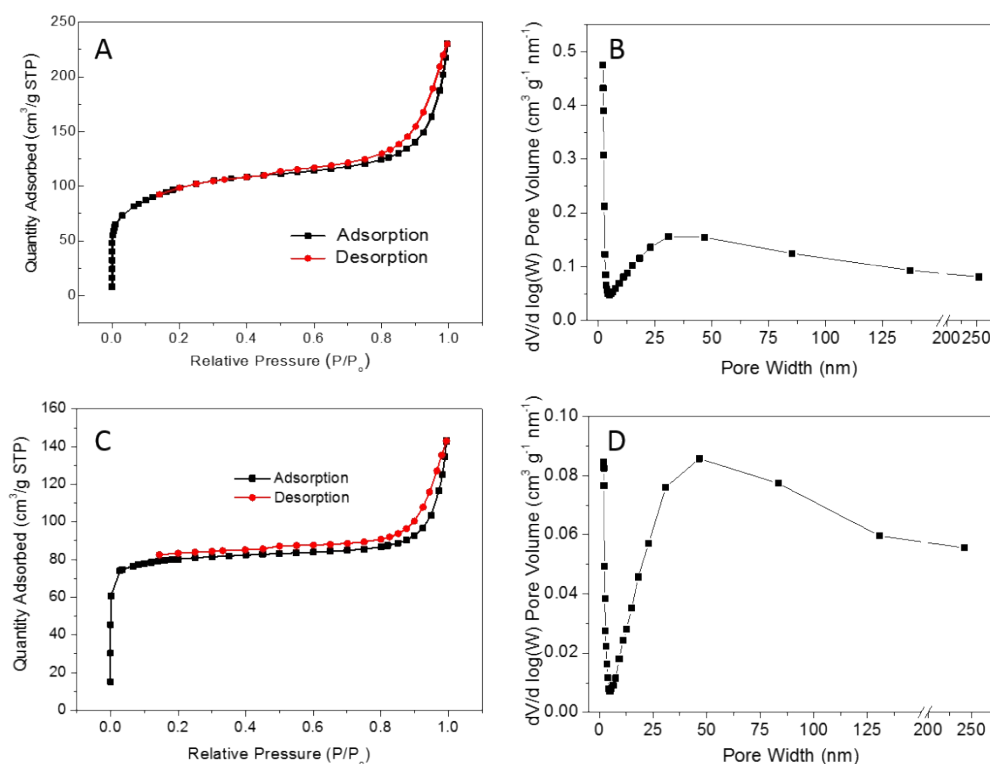


Fig. S2 (A and C) N<sub>2</sub> sorption isotherms and (B and D) the pore size distribution of H-NC-900 and H-C-900, respectively.

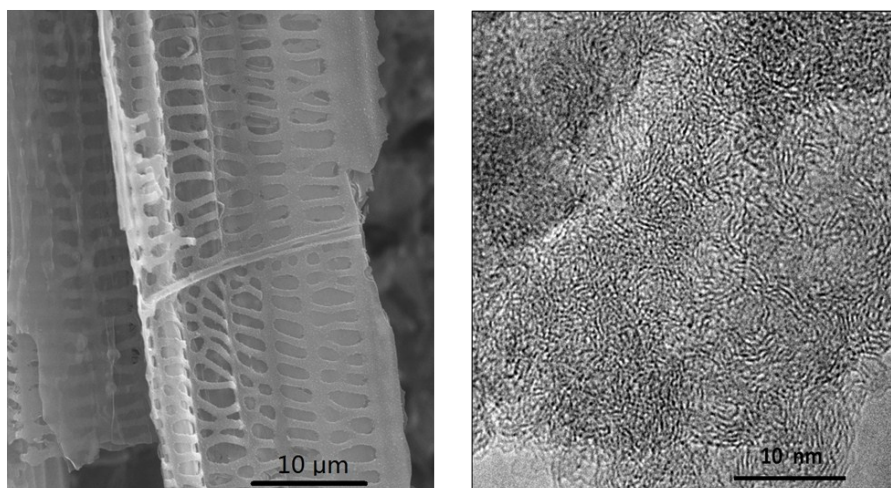


Fig. S3 (A) SEM and (B) High resolution TEM of H-NC-900

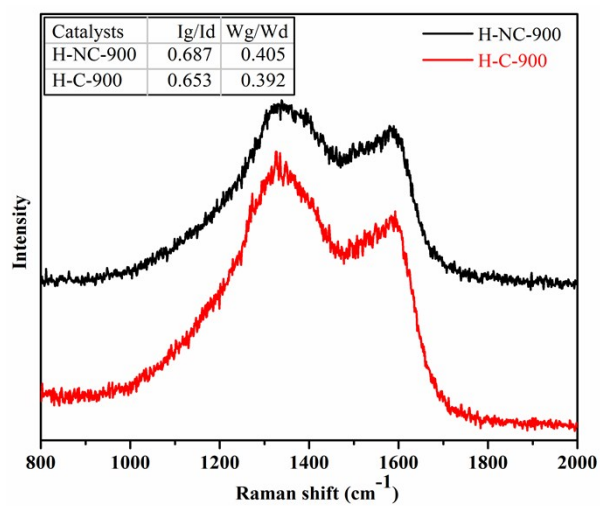


Fig. S4 Raman spectra of the H-NC-900 and H-C-900 (inset: table showing the ratio of peak intensity and half peak width of G bond and D bond)

Table S1. Comparison of the performance of various catalysts

materials	onset potential	electron-transfer number	power density	References
NCs	0.22 V (Ag/AgCl)	3.86	2300 mW m <sup>-2</sup>	<b>This work</b>
ANCNFs	0.12 V (Ag/AgCl)	3.6	1377 mW m <sup>-2</sup>	1
SSM/Co3O4	0 V (vs. SCE)	3.77	14.1 W m <sup>-3</sup>	2
BP-NF	0.20 V (Ag/AgCl)	3.8	672 mW m <sup>-2</sup>	3
Ag-WC/C	0.21 V (Ag/AgCl)	3.86	20.62 W m <sup>-3</sup>	4
N,P-doped carbon	About 0.2V (Ag/AgCl)	3.5	2293 mW m <sup>-2</sup>	5
NiO/CNT	-0.178 V (Ag/AgCl)	3.5	670 mW m <sup>-2</sup>	6
NB-CPs	-0.21 V (vs. SCE in 0.1 M KOH)	3.7	642 mW m <sup>-2</sup>	7
C-CoOx-CoPc	About -0.03 v (vs. SCE)	3.8	780 mW m <sup>-2</sup>	8
Pt-Co/C	1.012 v (vs. SCE)	3.9	1730 mW m <sup>-2</sup>	9

## Reference

1. X. Yang, W. Zou, Y. Su, Y. Zhu, H. Jiang, J. Shen and C. Li, *Journal of Power Sources*, 2014, **266**, 36-42.
2. X. B. Gong, S. J. You, X. H. Wang, J. N. Zhang, Y. Gan and N. Q. Ren, *Biosensors and Bioelectronics*, 2014, **55**, 237-241.
3. K. Meng, Q. Liu, Y. Huang and Y. Wang, *Journal of Materials Chemistry A*, 2015, **3**, 6873-6877.
4. X. B. Gong, S. J. You, X. H. Wang, Y. Gan, R. N. Zhang and N. Q. Ren, *Journal of Power Sources*, 2013, **225**, 330-337.
5. Q. Liu, Y. Zhou, S. Chen, Z. Wang, H. Hou and F. Zhao, *Journal of Power Sources*, 2015, **273**, 1189-1193.
6. J. Huang, N. Zhu, T. Yang, T. Zhang, P. Wu and Z. Dang, *Biosensors and Bioelectronics*, 2015, **72**, 332-339.
7. S. Zhong, L. Zhou, L. Wu, L. Tang, Q. He and J. Ahmed, *Journal of Power Sources*, 2014, **272**, 344-350.
8. J. Ahmed, H. J. Kim and S. Kim, *RSC Advances*, 2014, **4**, 44065-44072.
9. Z. Yan, M. Wang, Y. Lu, R. Liu and J. Zhao, *Journal of Solid State Electrochemistry*, 2014, **18**, 1087-1097.

