Electronic Supplementary Information

Oxygen Reduction Catalyzed by Gold Nanoclusters Supported on Carbon Nanosheets

Qiannan Wang,[a,#] Likai Wang,[a,#] Zhenghua Tang,*[,a,b] Fucai Wang,[c] Wei Yan,[a] Hongyu Yang,[a] Weijia Zhou,[a] Ligui Li,[a] Xiongwu Kang,[a] and Shaowei Chen*[,a, d]

[a] *New Energy Research Institute, School of Environment and Energy, South China University of Technology, Guangzhou Higher Education Mega Centre, Guangzhou, 510006, P. R. China. Email: zhht@scut.edu.cn*

[b] *Guangdong Provincial Key Laboratory of Atmospheric Environment and Pollution Control, Guangzhou, Guangdong, 510006, P. R. China*

[c] *Zijin Mining Group Co. Ltd, Shanghang, Fujian, 364200, P. R. China.*

[d] *Department of Chemistry and Biochemistry, University of California, 1156 High Street, Santa Cruz, California 95064, United States. Email: shaowei@ucsc.edu*

 # These authors contributed equally.

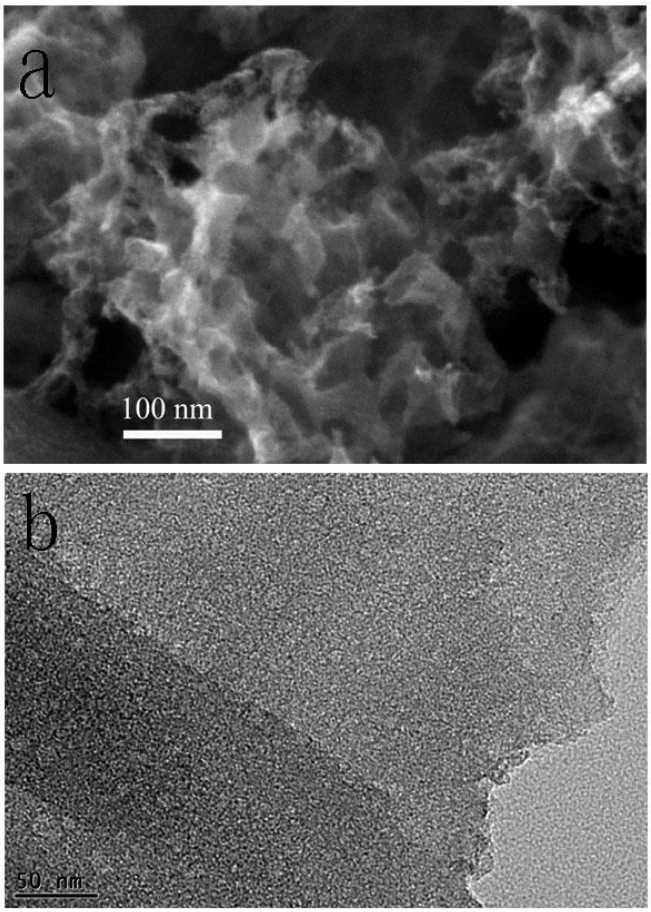

Figure S1. Representative (a) SEM and (b) TEM images of carbon nanosheets.

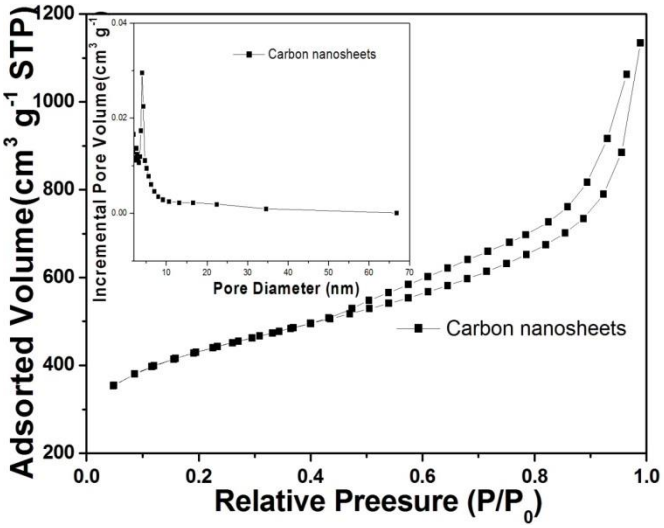

Figure S2. Nitrogen adsorption/desorption isotherms (inset is the corresponding pore size distributions) of carbon nanosheets.

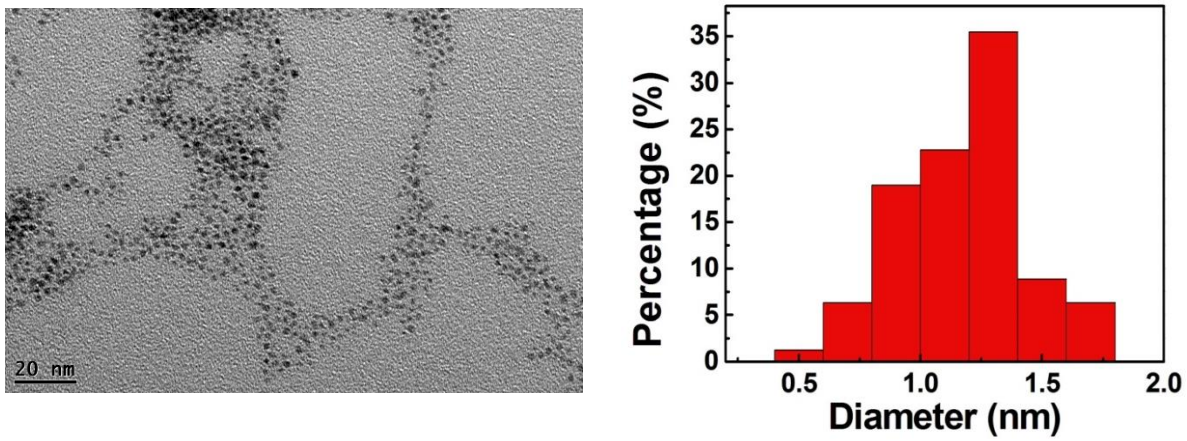

Figure S3. (left) Representative TEM image and (right) core size histogram of Au_{102}(*p*-MBA)$_{44}$. The average core diameter is 1.17 ± 0.26 nm.

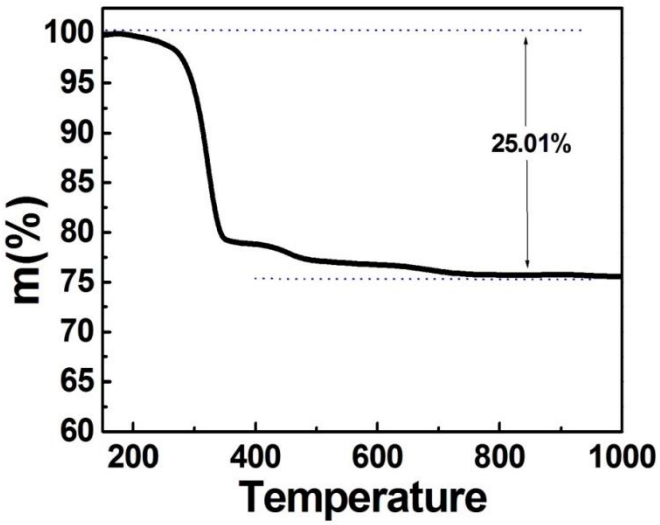

Figure S4. TGA profile of Au_{102}(*p*-MBA)$_{44}$.

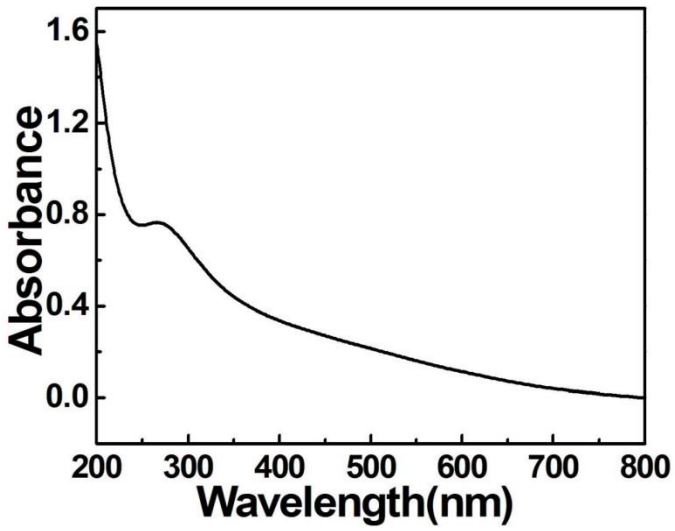

Figure S5. UV-visible absorption spectrum of Au_{102}(*p*-MBA)$_{44}$ in water.

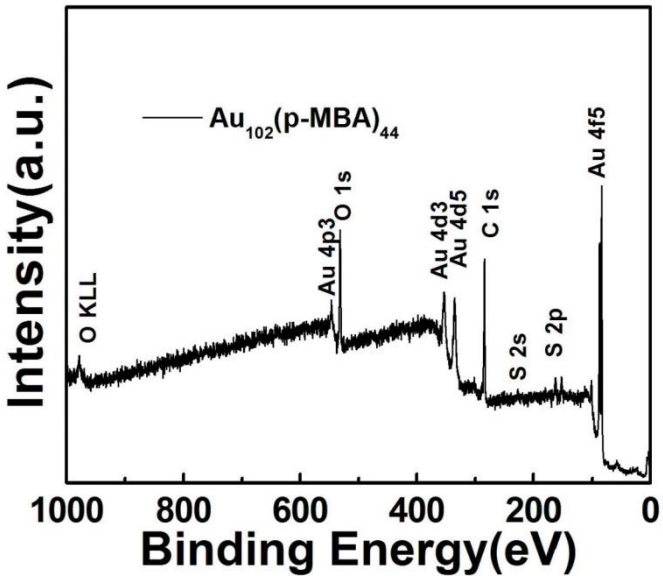

Figure S6. XPS survey spectrum of Au_{102}(*p*-MBA)$_{44}$.

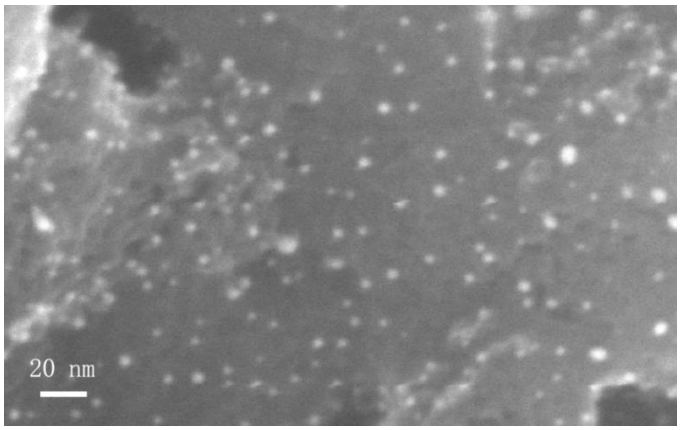

Figure S7. Representative SEM image of AuCNS-30% after calcination.

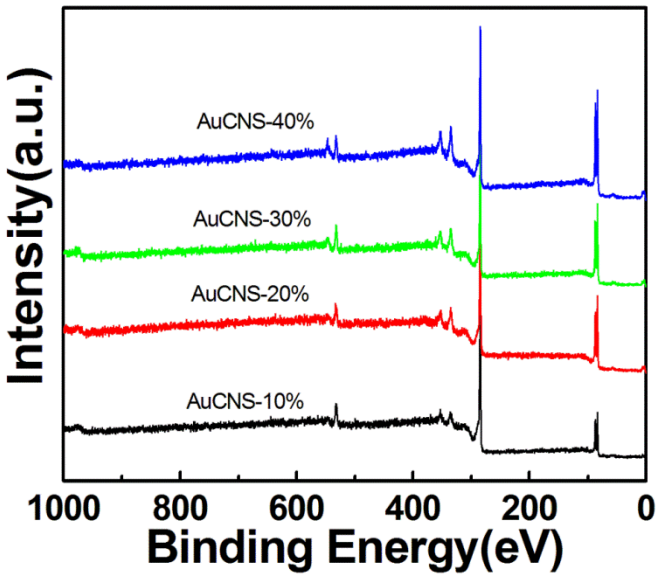

Figure S8. XPS survey spectra of AuCNS-10%, AuCNS-20%, AuCNS-30%, and AuCNS-40%.

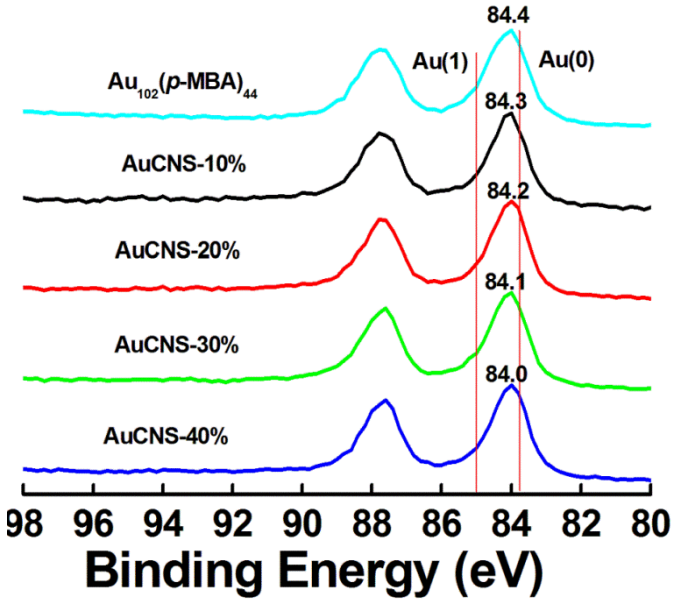

Figure S9. Au4f XPS spectra of Au_{102} nanoclusters, AuCNS-10%, AuCNS-20%, AuCNS-30%, and AuCNS-40%.

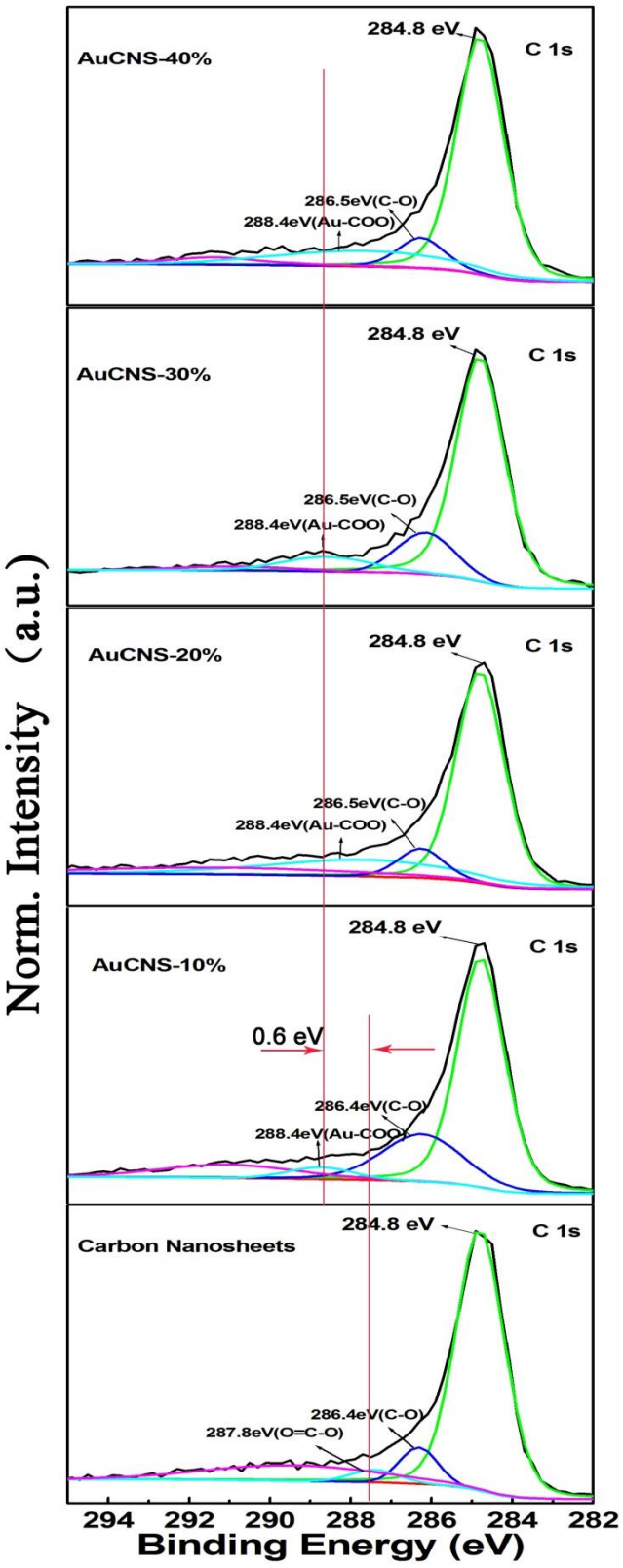

Figure S10. C1s XPS spectra of carbon nanosheets, AuCNS-10%, AuCNS-20%, AuCNS-30%, and AuCNS-40%.

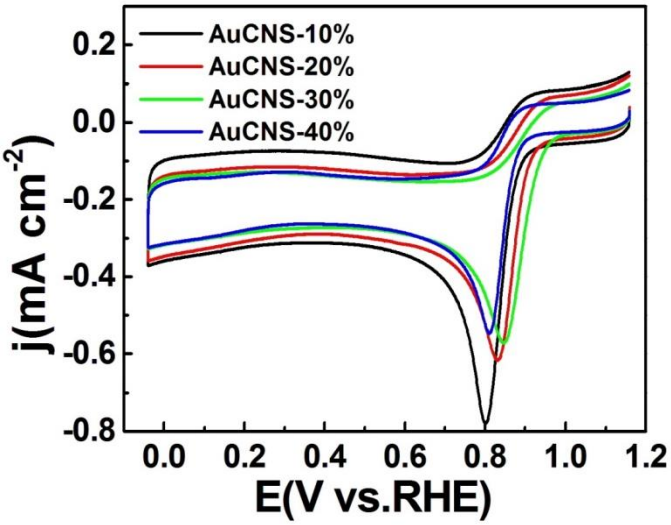

Figure S11. CVs of AuCNS-10%, AuCNS-20%, AuCNS-30%, and AuCNS-40% in O_2-saturated 0.1 M KOH at a potential scan rate of 10 mV s^{-1}.

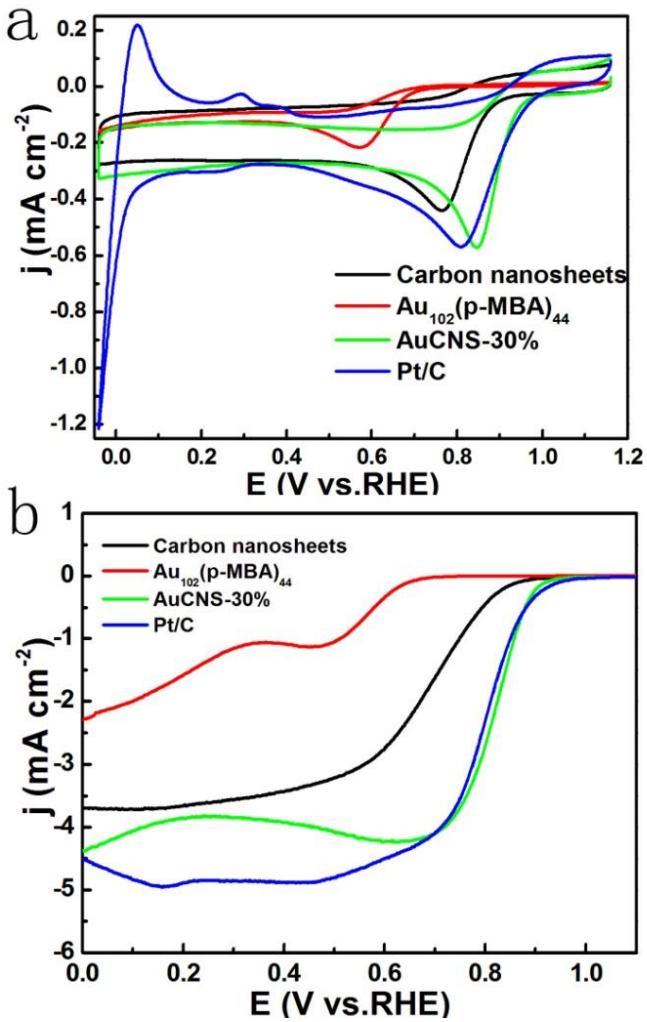

Figure S12. (a) Cyclic and (b) RRDE voltammograms at 2500 rpm of carbon nanosheets (black curve), $Au_{102}(p\text{-}MBA)_{44}$ (red curve), AuCNS-30% (green curve), and Pt/C (blue curve) on a glassy carbon electrode in O_2-saturated 0.1 M KOH.

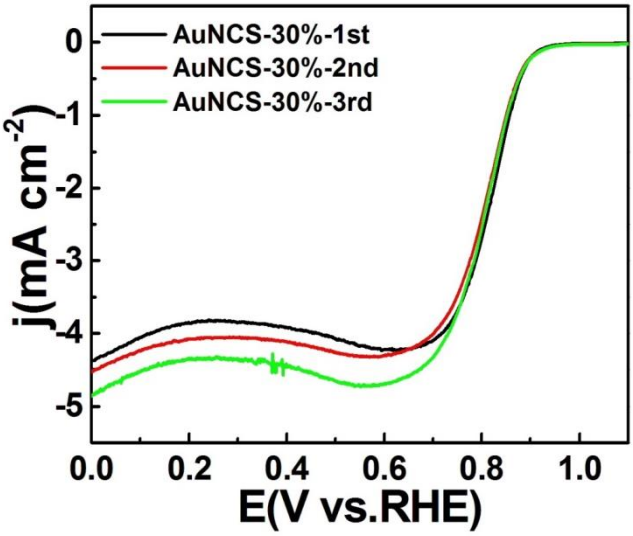

Figure S13. 1st, 2nd and 3rd scans of the RDE voltammograms of AuCNS-30% in O_2-saturaed 0.1 M KOH. Electrode rotation rate 2500 rpm.