Supporting Information

MOF-templated nitrogen-doped porous carbon materials as efficient electrocatalysts for oxygen reduction reaction

Suhong Wang, [a]† Lin Liu, [a]† Shi-Ming Wang,[b]* Zhengbo Han[a]*

a. College of Chemistry, Liaoning University, Shenyang 110036, People's Republic of China. E-mail: ceshzb@lnu.edu.cn

b. College of Light Industry, Liaoning University, Shenyang 110036, People's Republic of China. E-mail: wangsm383@163.com

† The two authors contributed equally to this paper.

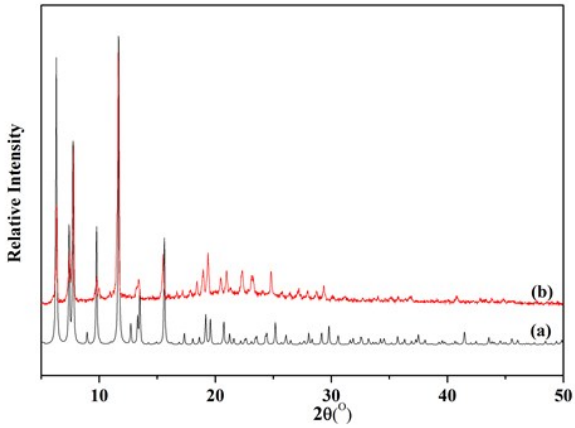

Figure S1. The simulated (a) and experimental (b) PXRD profiles of $[(CH_3)_2NH_2]_6[Ni(H_2O)_6]_3\{Ni_6(\eta^6\text{-TATAT})_4(H_2O)_{12}\}\bullet 11H_2O$.

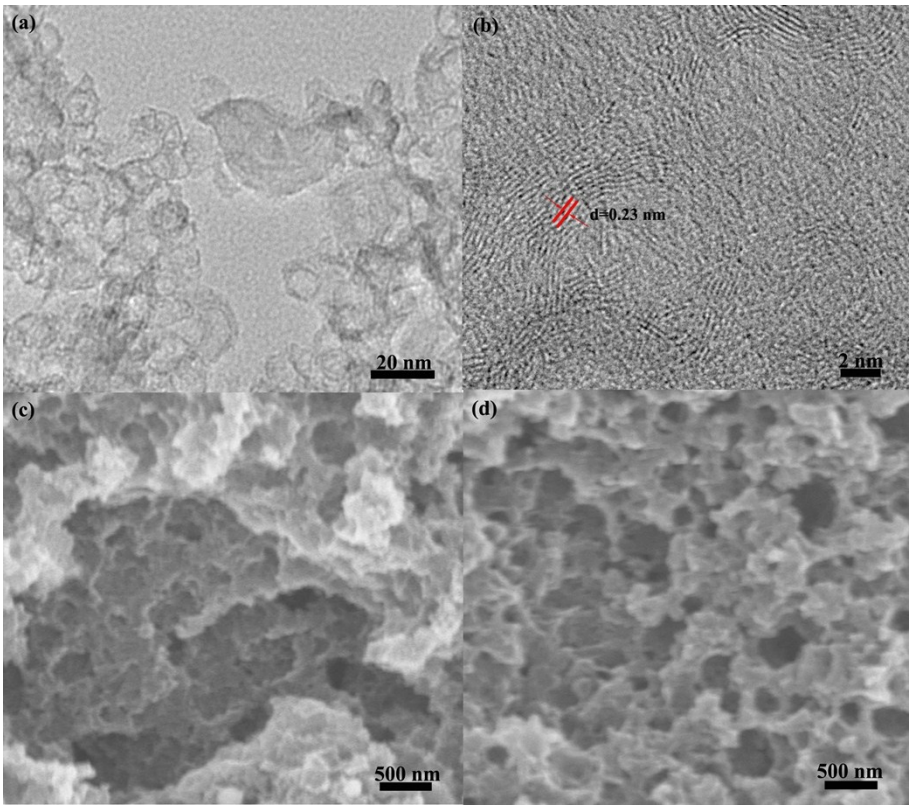

Figure S2. The TEM (a), HRTEM (b) and SEM (c and d) of NPC-800.

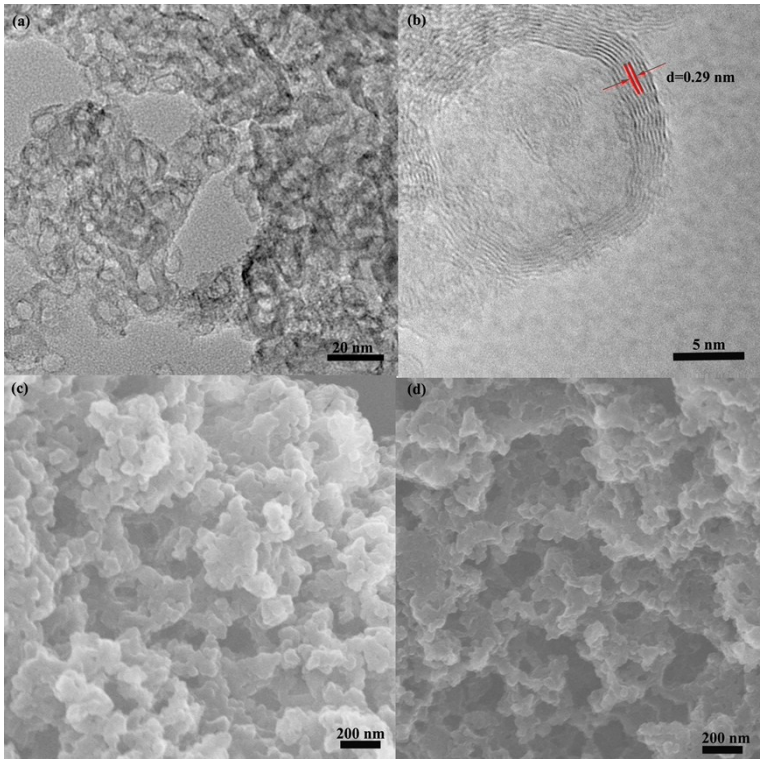

Figure S3. The TEM (a), HRTEM (b) images NPC-1000 and SEM (c and d) of NPC-1000.

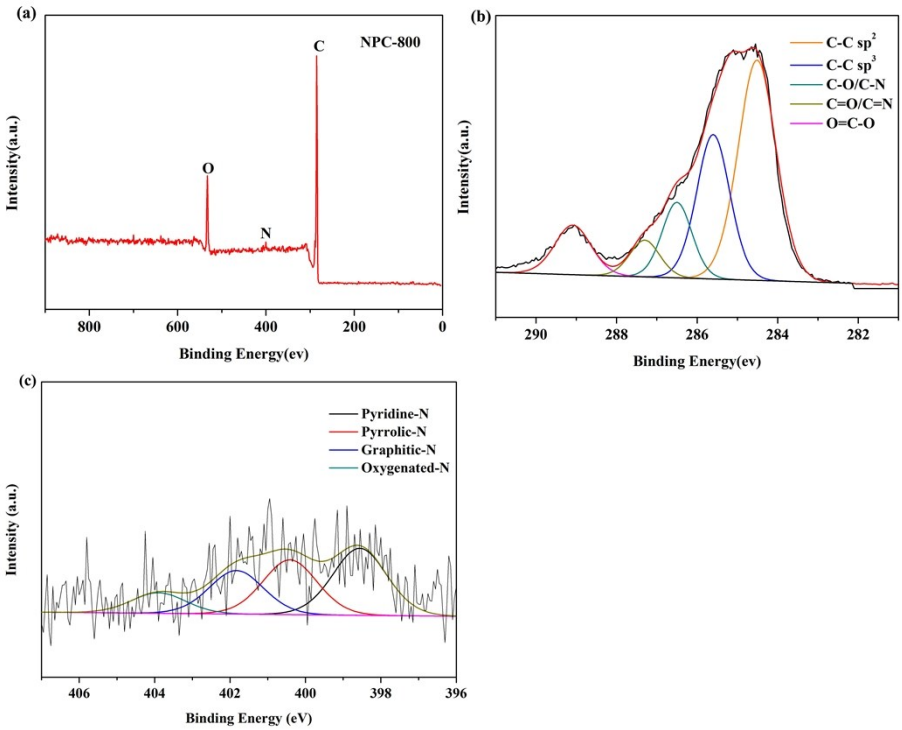

Figure S4. Typical survey scan XPS spectrum (a), deconvoluted C1s spectrum (b) and deconvoluted N1s spectrum (c) of NPC-800.

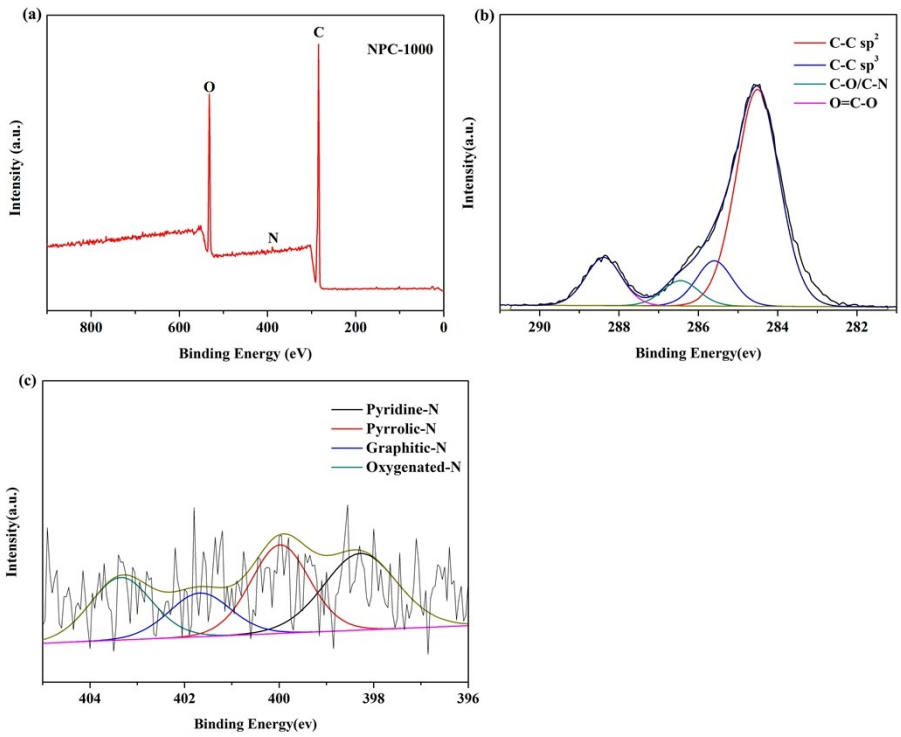

Figure S5. Typical survey scan XPS spectrum (a), deconvoluted C1s spectrum (b) and deconvoluted N1s spectrum (c) of NPC-1000.

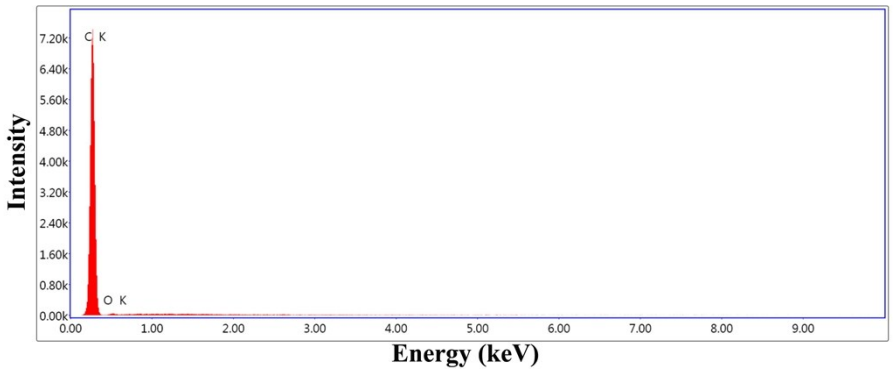

Figure S6. The EDS analysis of the carbonized MOF. The content of C is 97.64%, the content of O is 2.36%.

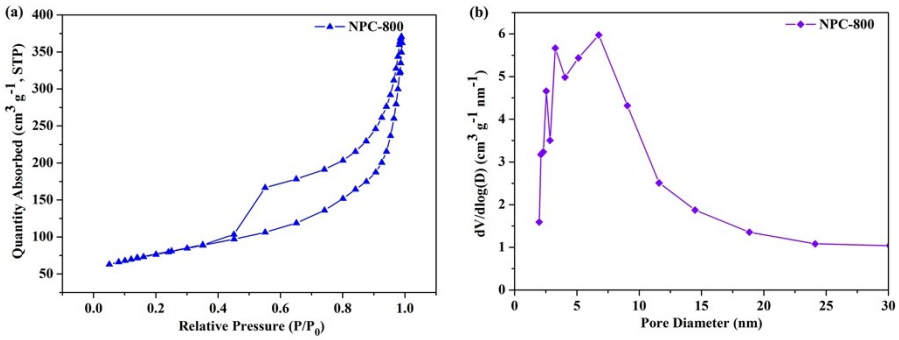

Figure S7. Nitrogen adsorption–desorption isotherm of NPC-800 (a), the

corresponding pore diameter distribution (b).

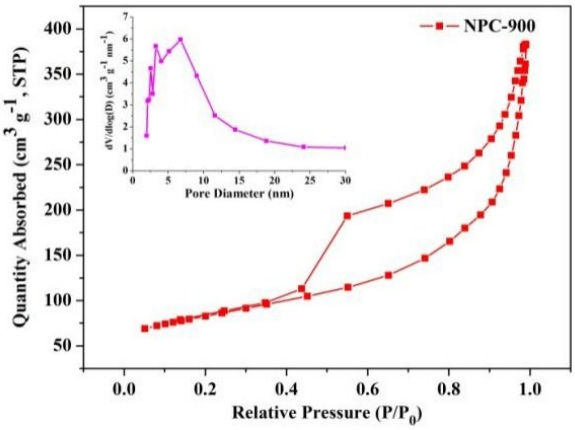

Figure S8. Nitrogen adsorption-desorption isotherm of NPC-900 (inset: the corresponding pore diameter distribution).

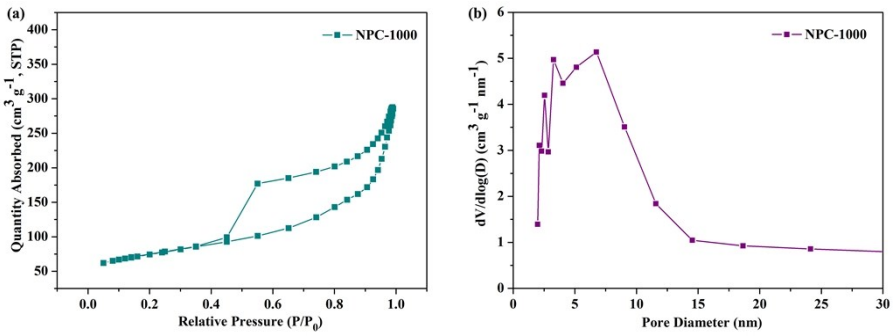

Figure S9. Nitrogen adsorption–desorption isotherm of NPC-1000 (a), the corresponding pore diameter distribution (b).

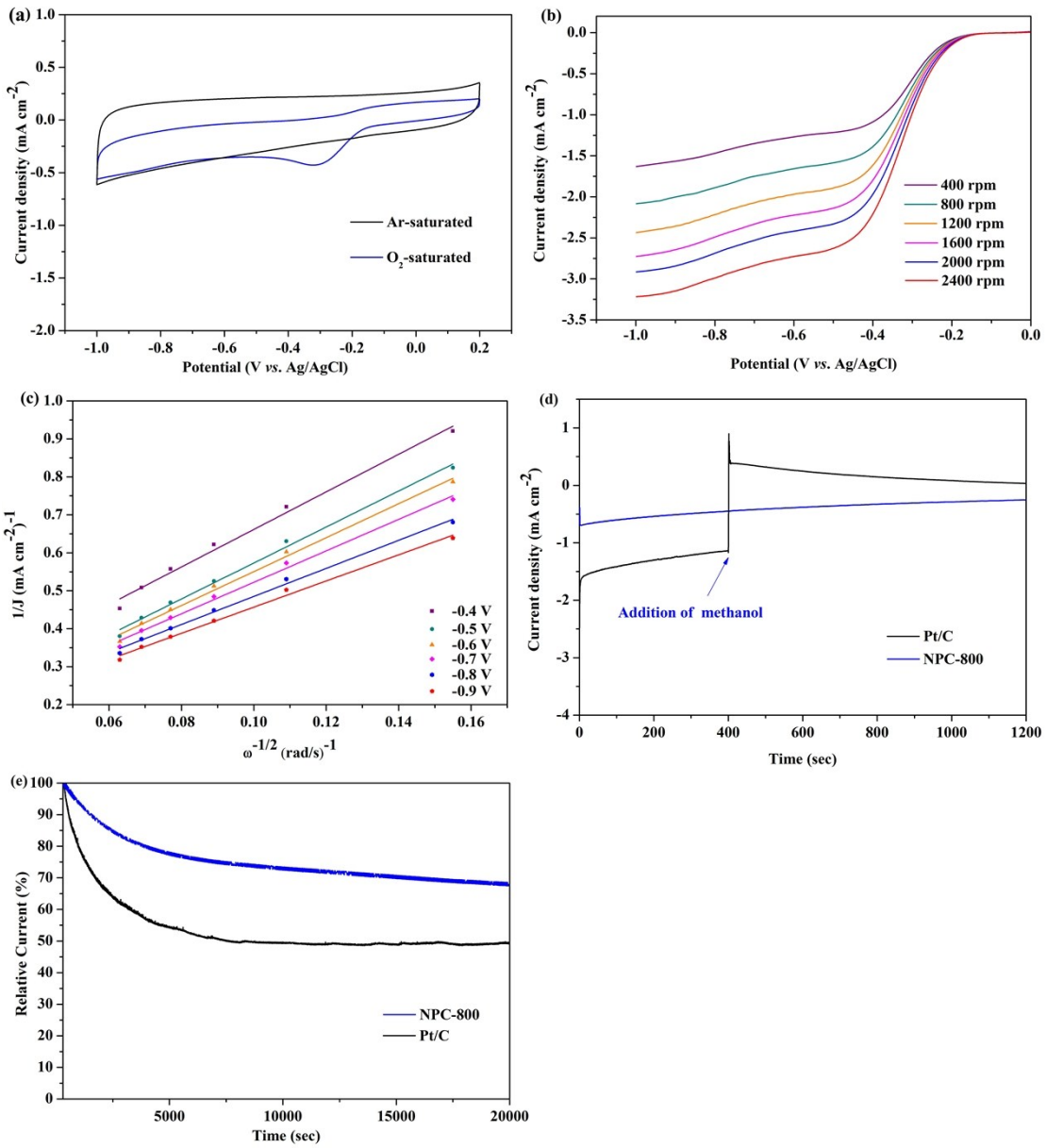

Figure S10. (a) CVs of the NPC-800 catalyst in O_2-saturated (blue line) or Ar-saturated (black line) 0.1 M KOH at a scan rate of 50 mV s^{-1}. (b) LSV of NPC-800 in O_2-saturated 0.1 M KOH with a sweep rate of 10 mV s^{-1} at the different rotation rates indicated. (c) Koutechy–Levich plots of NPC-800 at various potentials. (d) Chronoamperometric responses of NPC-800 and 20 wt% Pt/C upon addition of 3 M methanol into O_2-saturated 0.1 M KOH at -0.2 V. (e) Stability evaluation of Pt/C (black) and NPC-800 (blue) in O_2-saturated 0.1 M KOH at -0.2 V and rotation speed of 1600 rpm.

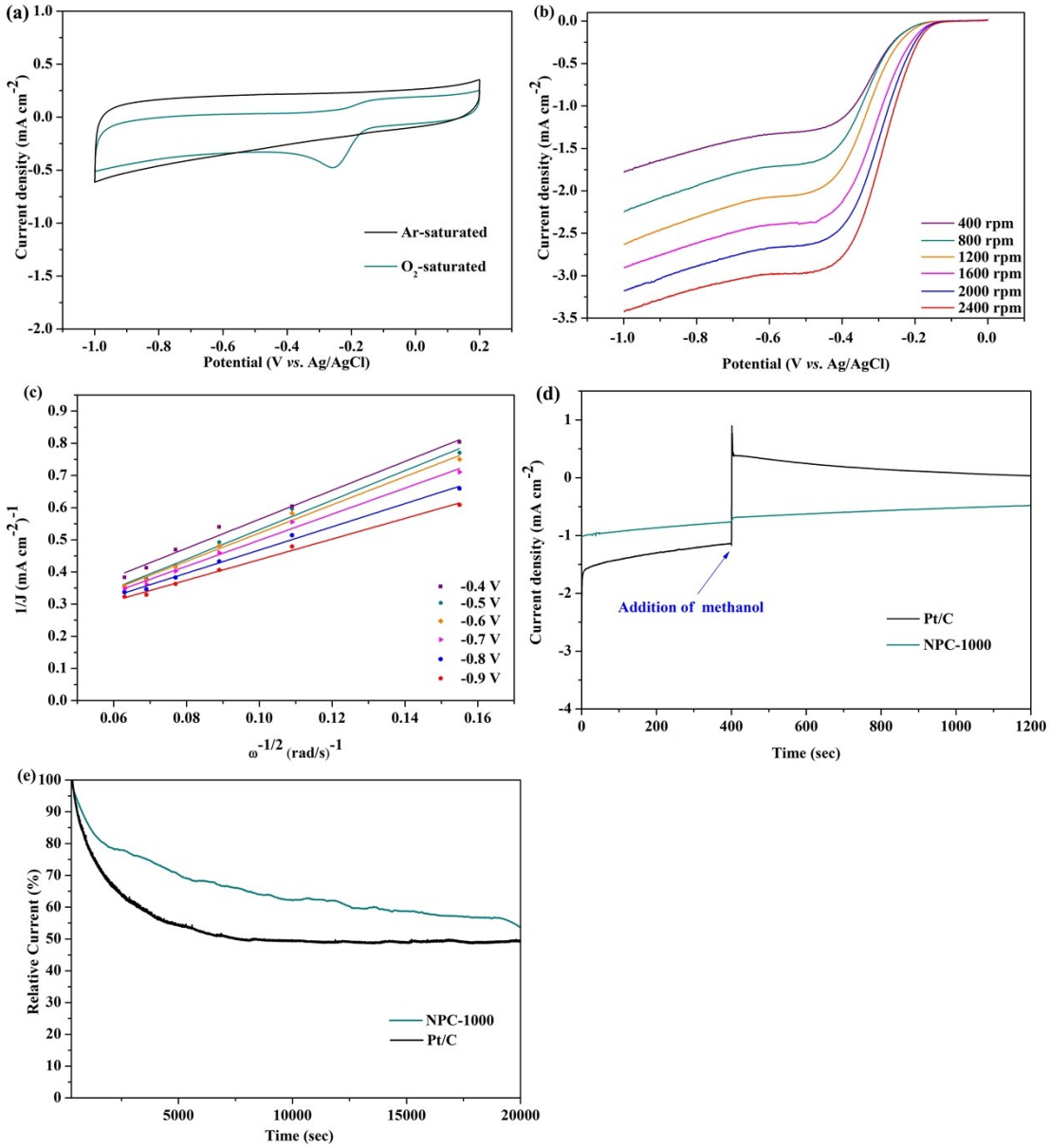

Figure S11. (a) CVs of ORR on the NPC-1000 catalyst in O_2-saturated (green line) or Ar-saturated (black line) 0.1 M KOH at a scan rate of 50 mV s^{-1}. (b) NPC-1000 in O_2-saturated 0.1 M KOH with a sweep rate of 10 mV s^{-1} at the different rotation rates indicated. (c) Koutechy–Levich plots of NPC-1000 at various potentials. (d) Chronoamperometric responses of NPC-1000 and 20 wt% Pt/C upon addition of 3 M methanol into O_2-saturated 0.1 M KOH at -0.2 V. (e) Stability evaluation of Pt/C (black) and NPC-1000 (green) in O_2-saturated 0.1 M KOH at -0.2 V and rotation speed of 1600 rpm.

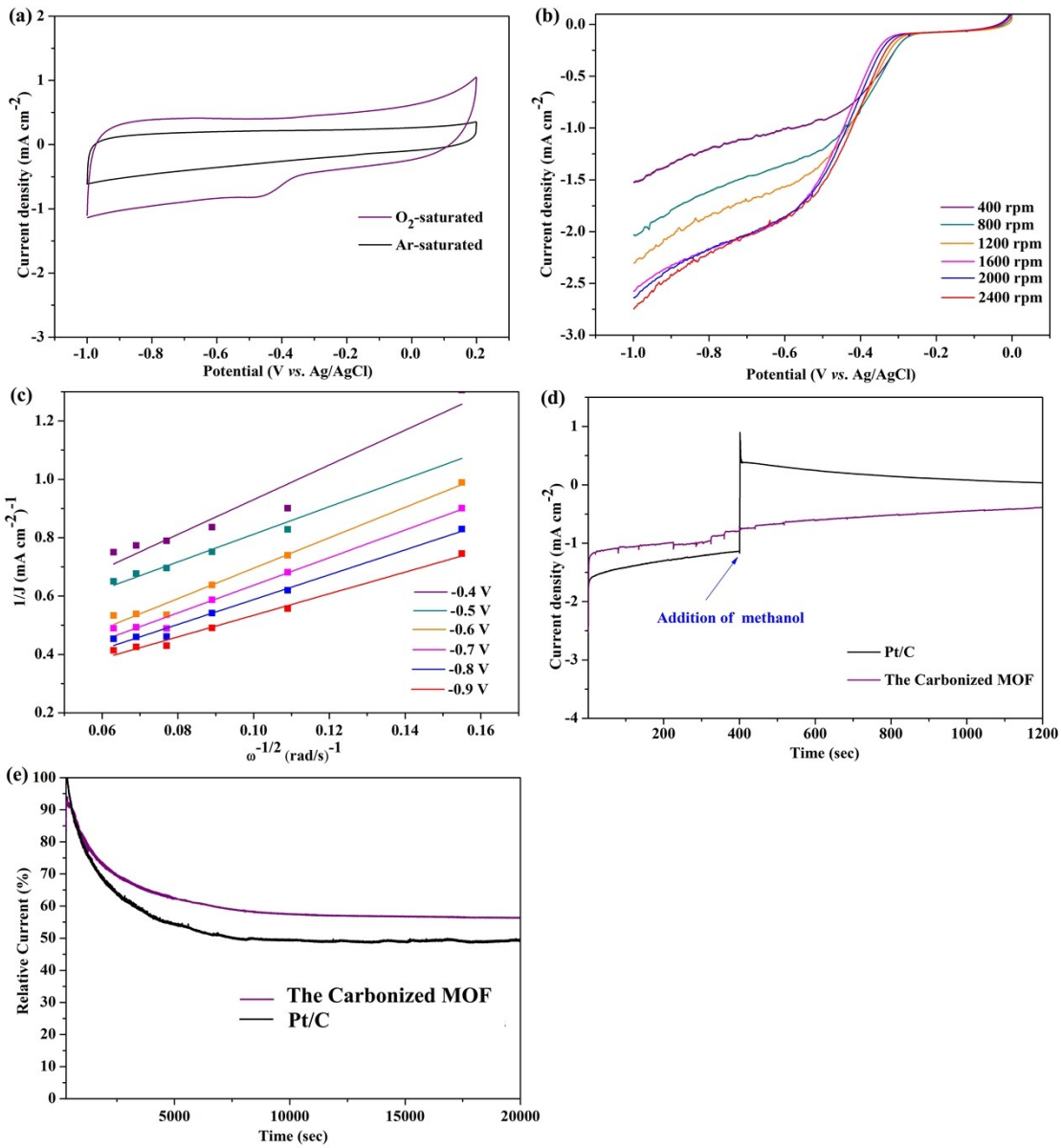

Figure S12. (a) CVs of ORR on the carbonized MOF catalyst in O_2-saturated (purple line) or Ar-saturated (black line) 0.1 M KOH at a scan rate of 50 mV s^{-1}. (b) the carbonized MOF in O_2-saturated 0.1 M KOH with a sweep rate of 10 mV s^{-1} at the different rotation rates indicated. (c) Koutechy–Levich plots of the carbonized MOF at various potentials. (d) Chronoamperometric responses of the carbonized MOF and 20 wt% Pt/C upon addition of 3 M methanol into O_2-saturated 0.1 M KOH at -0.2 V. (e) Stability evaluation of Pt/C (black) and the carbonized MOF (purple) in O_2-saturated 0.1 M KOH at -0.2 V and rotation speed of 1600 rpm.