Supporting Information

One-step synthesis of nitrogen-doped microporous carbon materials as metal-free electrocatalysts for oxygen reduction reaction

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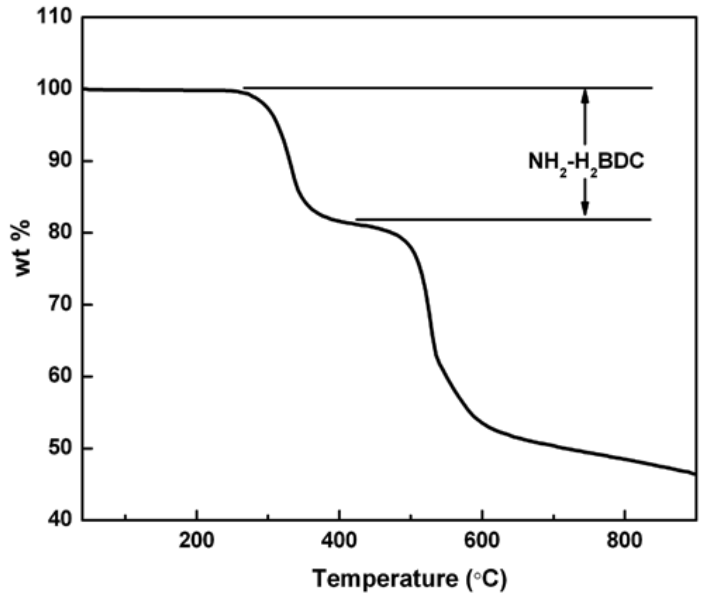


Figure S1. TG curve of amino-MIL-53(Al) synthesized in this work.

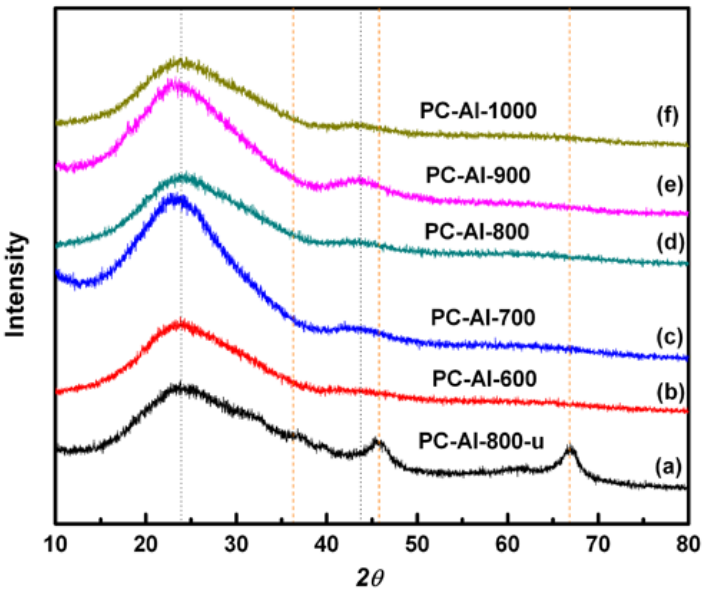
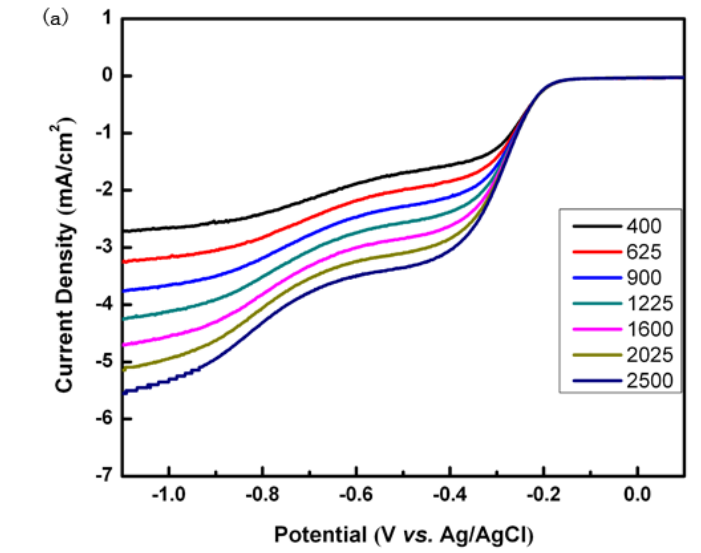
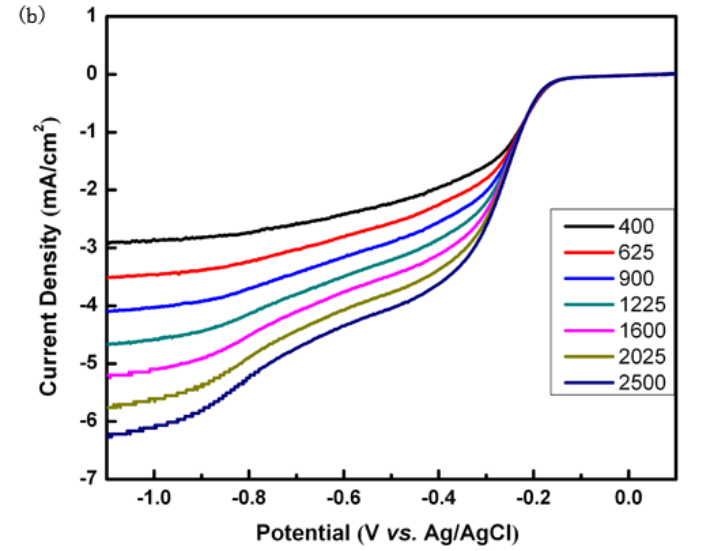
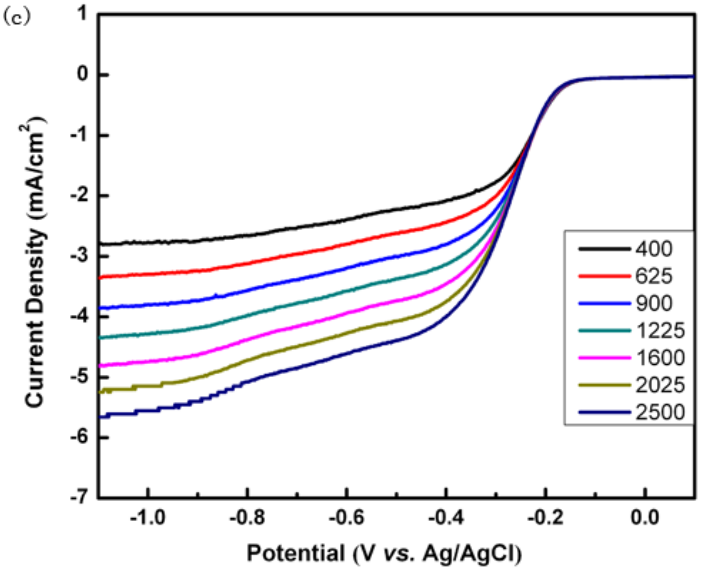


Figure S2. Wide-angle X-ray diffraction patterns of carbonized products: amino-MIL-53(Al) was carbonized at 800°C without HF treatment (a), PC-Al-600 (b), 700 (c), 800 (d), 900 (e) and 1000 (f).


(a)
Current Density (mA/cm^2)
Potential (V *vs.* Ag/AgCl)
400
625
900
1225
1600
2025
2500


(b)
Current Density (mA/cm^2)
Potential (V *vs.* Ag/AgCl)
400
625
900
1225
1600
2025
2500


(c)
Current Density (mA/cm^2)
Potential (V *vs.* Ag/AgCl)
400
625
900
1225
1600
2025
2500

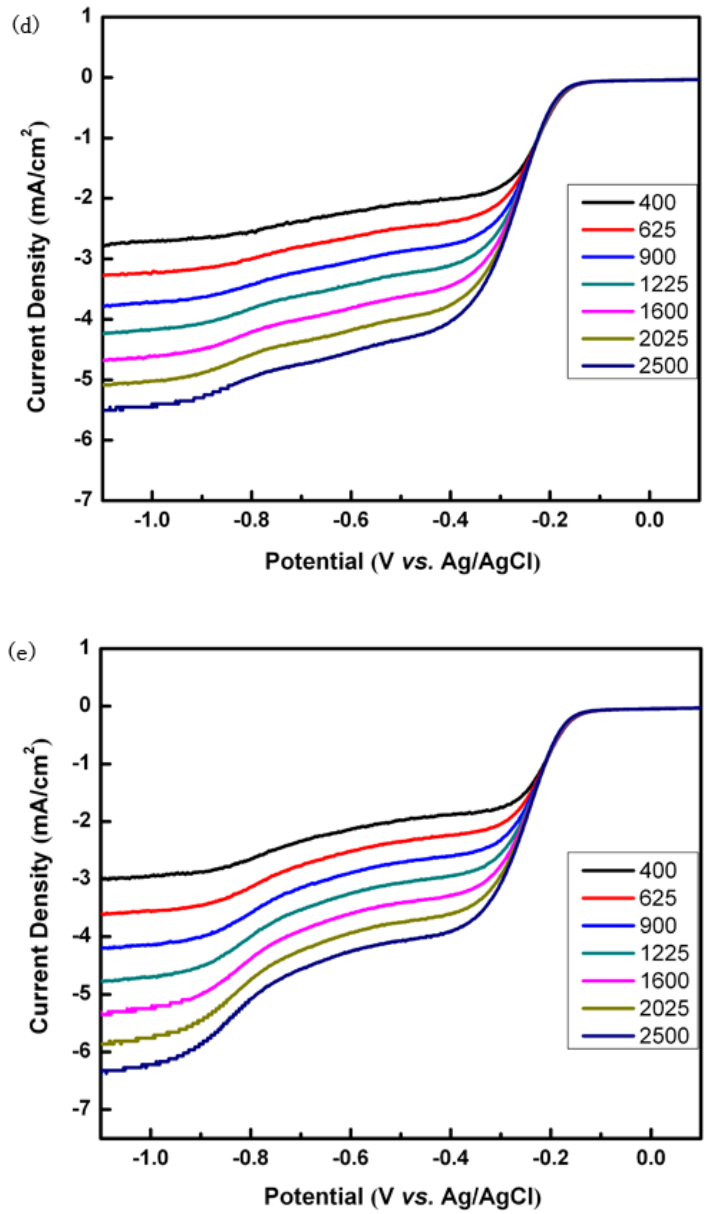


Figure S3. Linear sweep voltammogram (LSV) of PC-Al-*n* (*n* = 600 (a), 700 (b), 800 (c), 900 (d) and 1000 (e)) in oxygen -saturated 0.1M KOH solution. The rotation speed of GC electrode is varied from 400 to 2500 rpm and the scan rate is 10 mV·s^{-1}. Pt wire was used as the counter electrode and Ag/AgCl was used as the reference electrode.

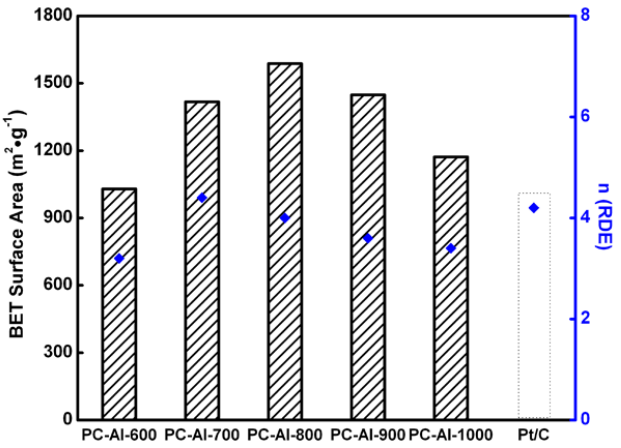


Figure S4. BET surface area and number of electron transferred for PC-Al-*n* samples and Pt/C. The number of electron transferred was calculated from Koutecky–Levich equation.

Table S1. The proportion of Carbon and nitrogen calculated by XPS

Temperature	C%	N%	N1%	N2%	N3%
600	94.24	5.76	1.22	4.54	0
700	93.79	6.21	1.00	5.21	0
800	94.48	5.52	0.61	4.91	0
900	96.68	3.32	0.43	2.89	0
950	98.12	1.88	0.21	1.67	0
1000	98.55	1.45	0.11	0	1.34
1050	98.99	1.01	0.13	0	0.88

Table S2. Number of electron Transferred and the kinetic current density calculated at –0.55 V (*vs* Ag/AgCl).

	PC-Al-600	PC-Al-700	PC-Al-800	PC-Al-900	PC-Al-1000	Pt/C
RDE	3.2	4.2	4.0	3.6	3.4	4.2
J_k /mA·cm^{-2}	8.6	8.7	11.8	14.4	12.5	28.8