Supporting material

Constructing of cobalt-embedded in nitrogen-doped carbon material with desired porosity derived from MOFs confined growth within graphene aerogel as a superior catalyst towards HER and ORR

Zhen Zhu, Yan Yang, Yue Guan, Juanhong Xue, Lili Cui*

Key Laboratory of Applied Chemistry and Nanotechnology at Universities of Jilin Province, Department of Chemistry and Chemical Engineering, Changchun University of Science and Technology, Changchun 130022, China

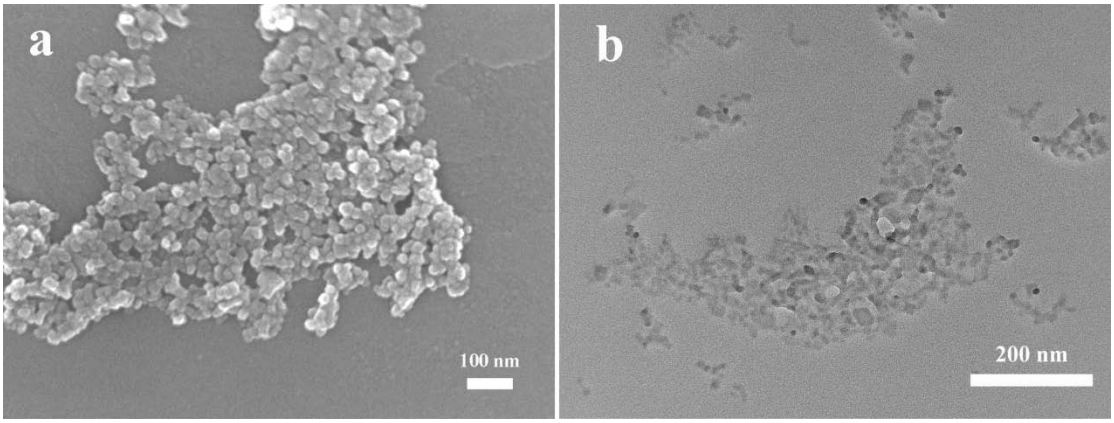

Figure S1. (a) SEM, (b) TEM of MOFs.

Corresponding author:
*E-mail:cuilili1127@gmail.com(Lili Cui)

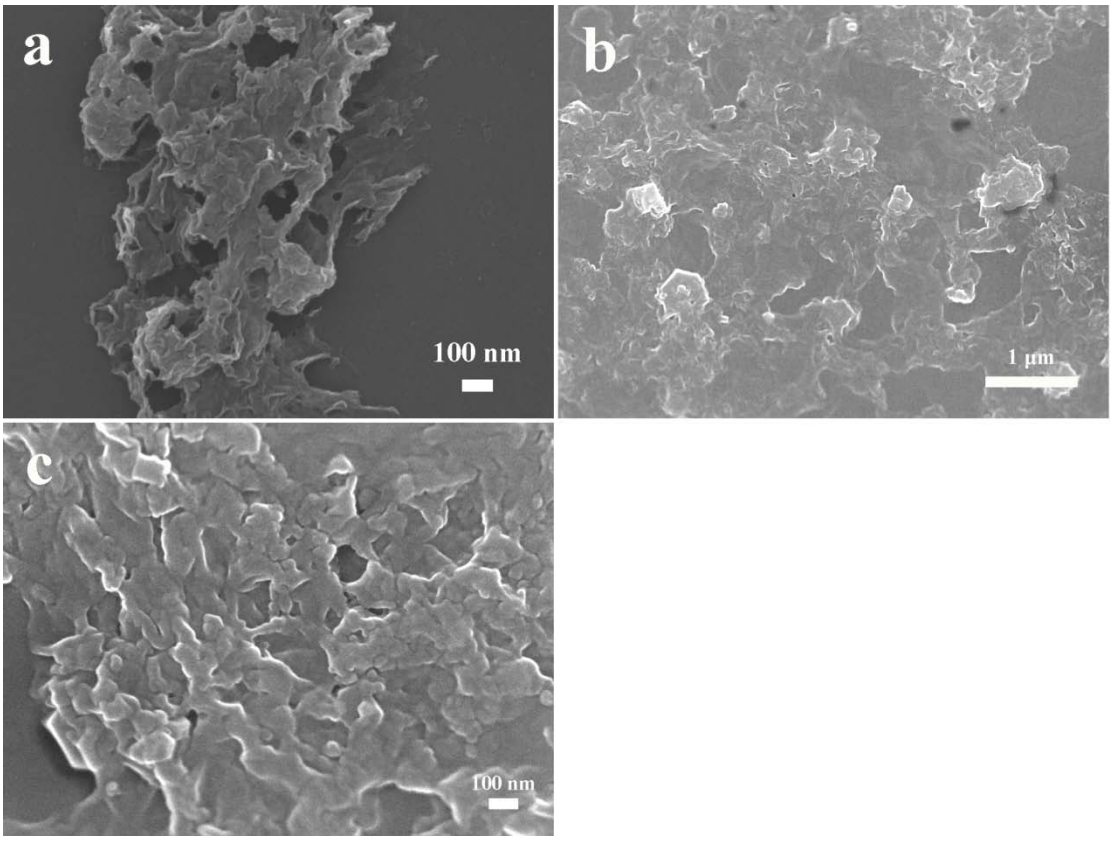

Figure S2. (a) SEM of GA, (b) and (c) SEM of MOFs@GA.

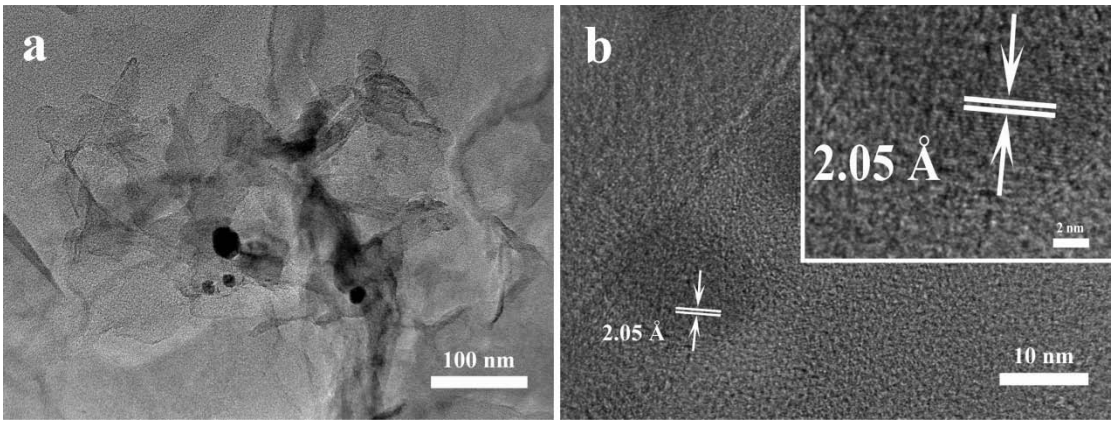

Figure S3. (a) TEM, (b) HRTEM of Co/N/GA.

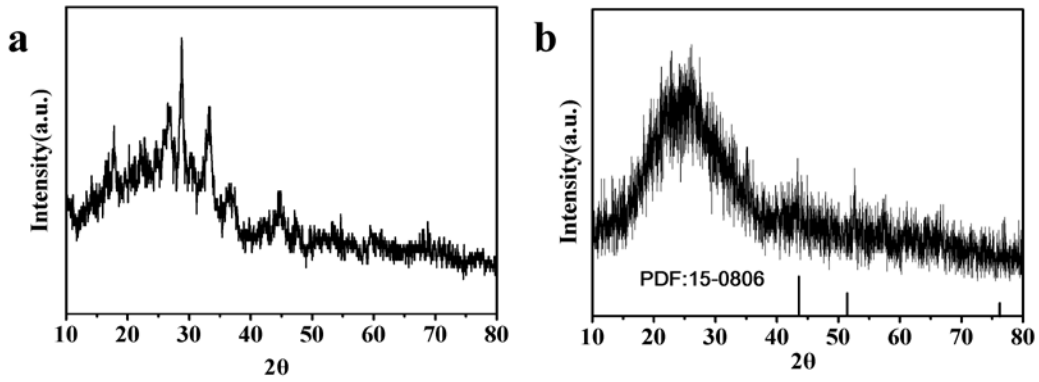

Figure S4. XRD of (a) MOFs and (b) Co/N/GA.

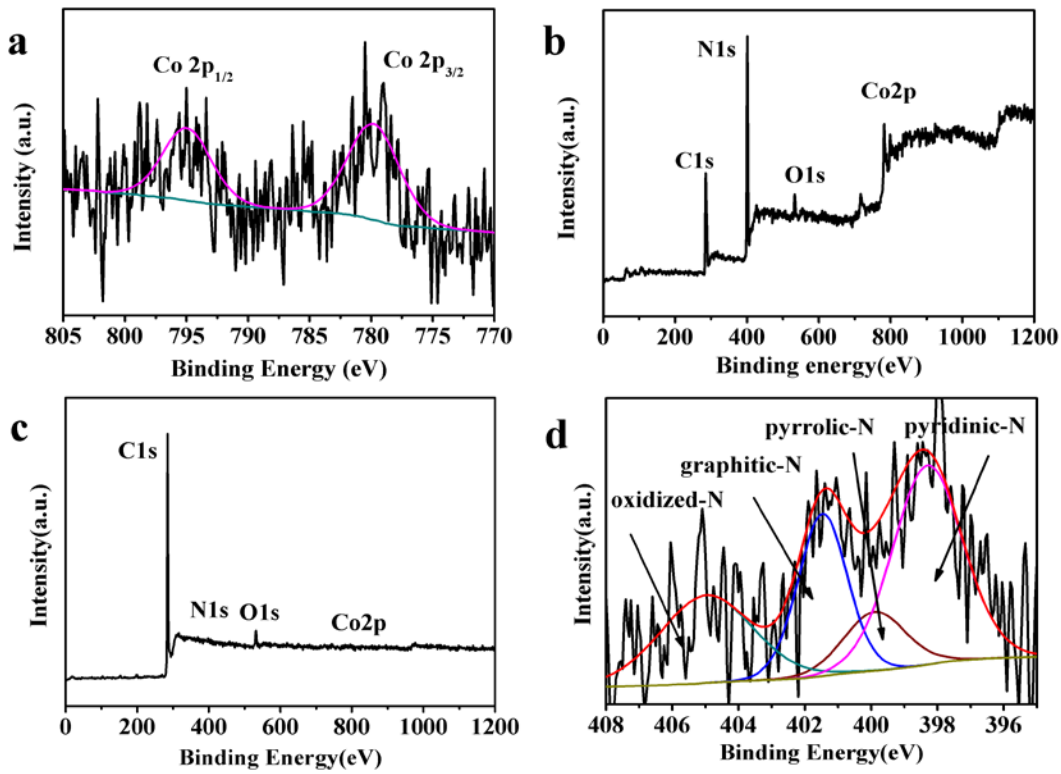

Figure S5. (a) Co 2p XPS spectrum of Co-N-GA, XPS survey spectrum of (b) MOFs and (c) Co/N/GA, (d) high-resolution N 1s XPS spectrum of Co/N/GA.

Table S1. Atomic percentage of C, N, Co, O and N functionalities of Co-N-GA and Co/N/GA from XPS survey spectrum.

element	C	N	Co	O	N			
					pyridinic N	pyrrolic N	graphitic N	oxidized N
Co-N-GA	95.4%	2.35%	0.44%	1.78%	0.48%	0.34%	1.30%	0.23%
Co/N/GA	94.5%	1.43%	0.17%	3.88%	0.59%	0.15%	0.34%	0.34%

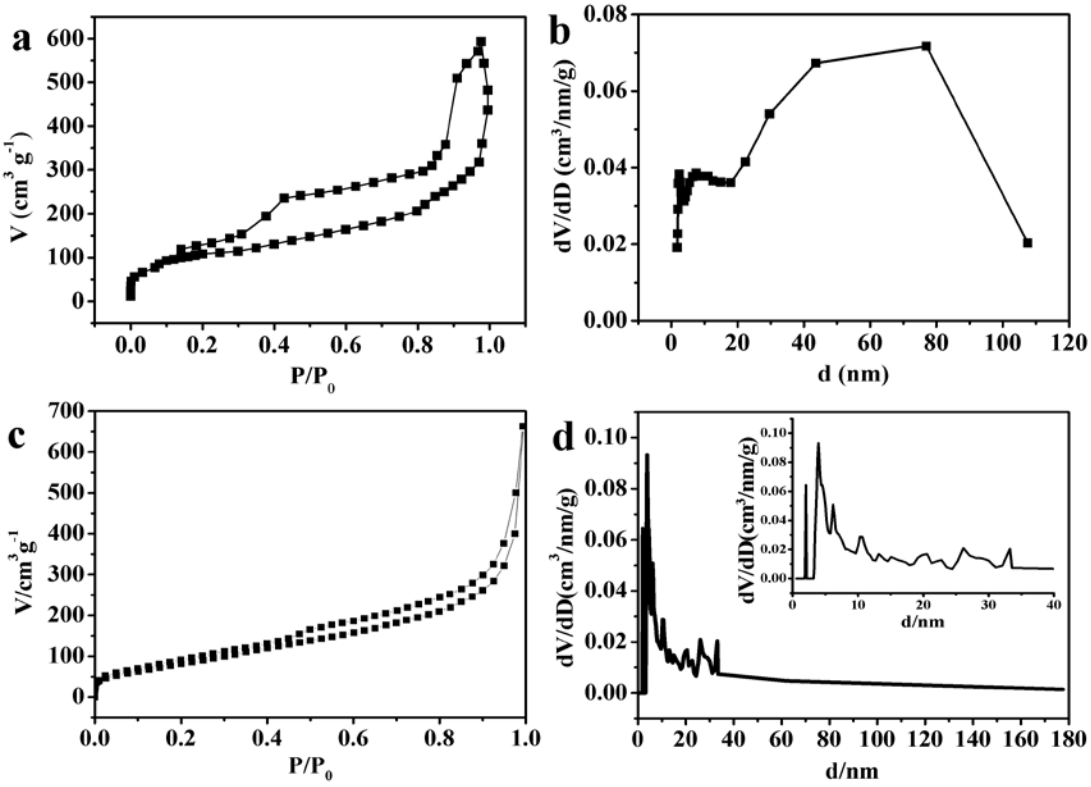

Figure S6. Nitrogen adsorption-desorption isotherms of (a) GA and (c) Co/N/GA, pore size distribution curve of (b) GA and (d) Co/N/GA.

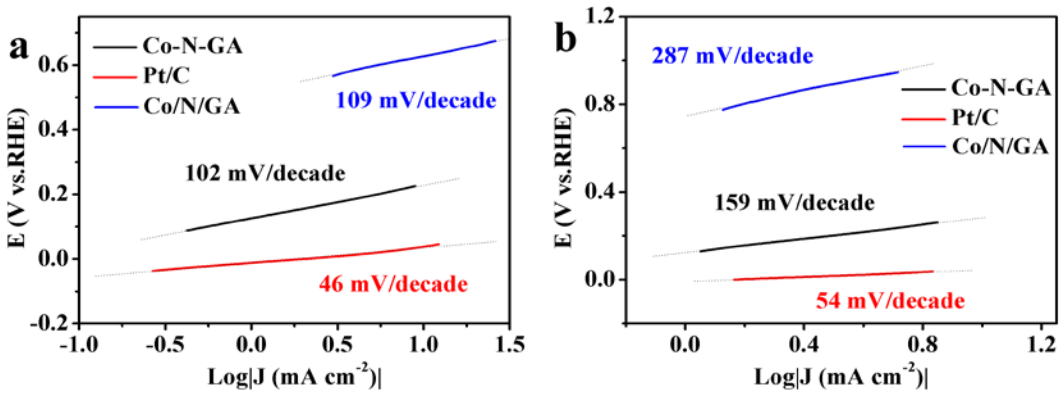

Figure S7. Tafel slopes of Co-N-GA, Co/N/GA and Pt/C in (a) 1 M KOH and (b) 1 M PBS (pH = 7).

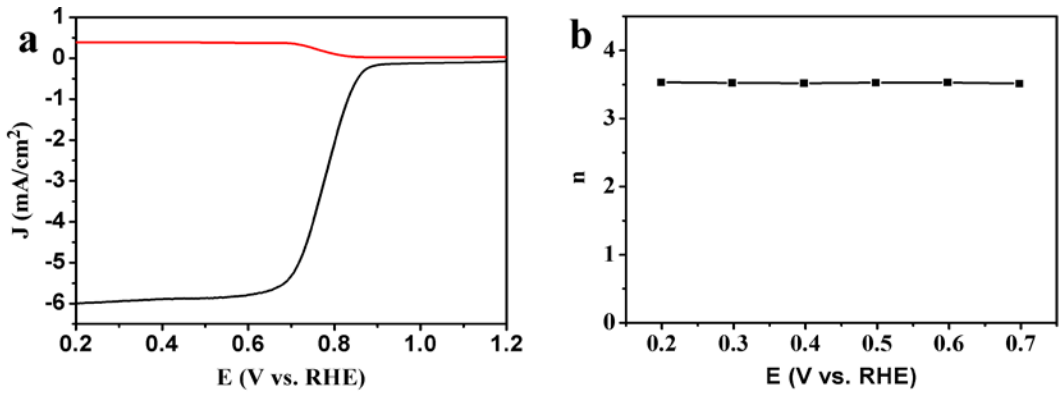

Figure S8. (a) LSV of Co-N-GA using rotating ring disk electrode (RRDE) at a rotation speed of 1600 rpm and (b) the corresponding electron transfer numbers.