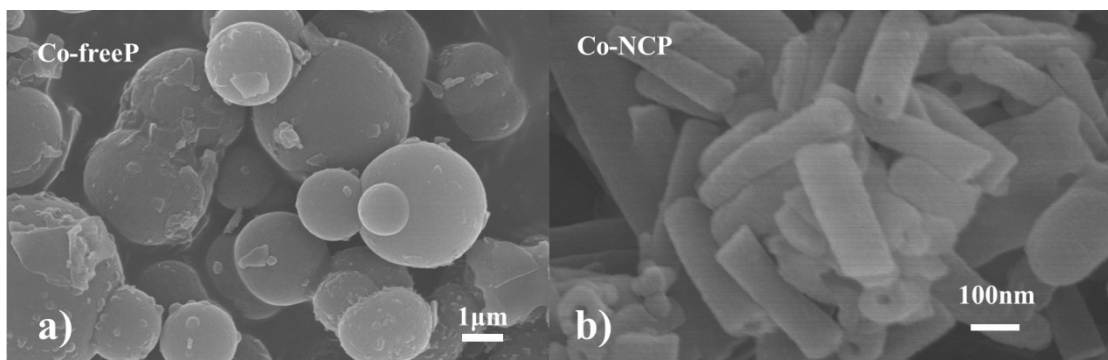
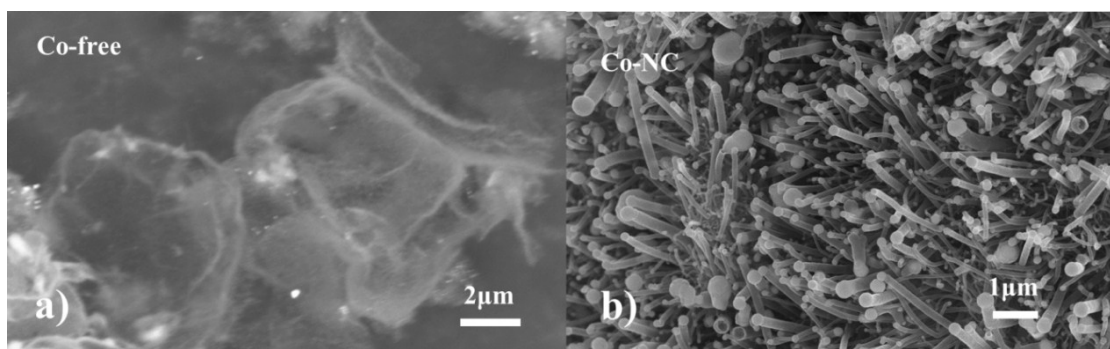


Supporting information

In Situ Synthesis of Metal Embedded Nitrogen doped Carbon Nanotubes as an Electrocatalyst for oxygen reduction reaction with High Activity and Stability



Fig—S1. a) SEM image of Co-freeP, b) SEM image of Co-NCP.



Fig—S2. a) SEM image of Co-free, b) SEM image of Co-NC.

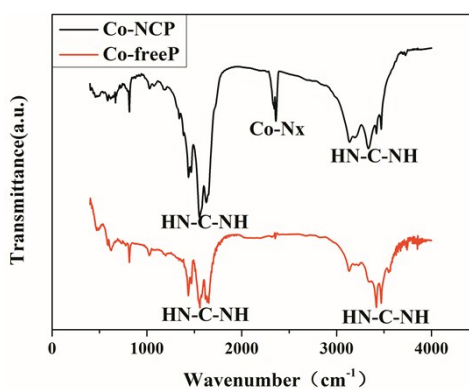


Figure S3. IR atlas of Co-freeP and Co-NCP.

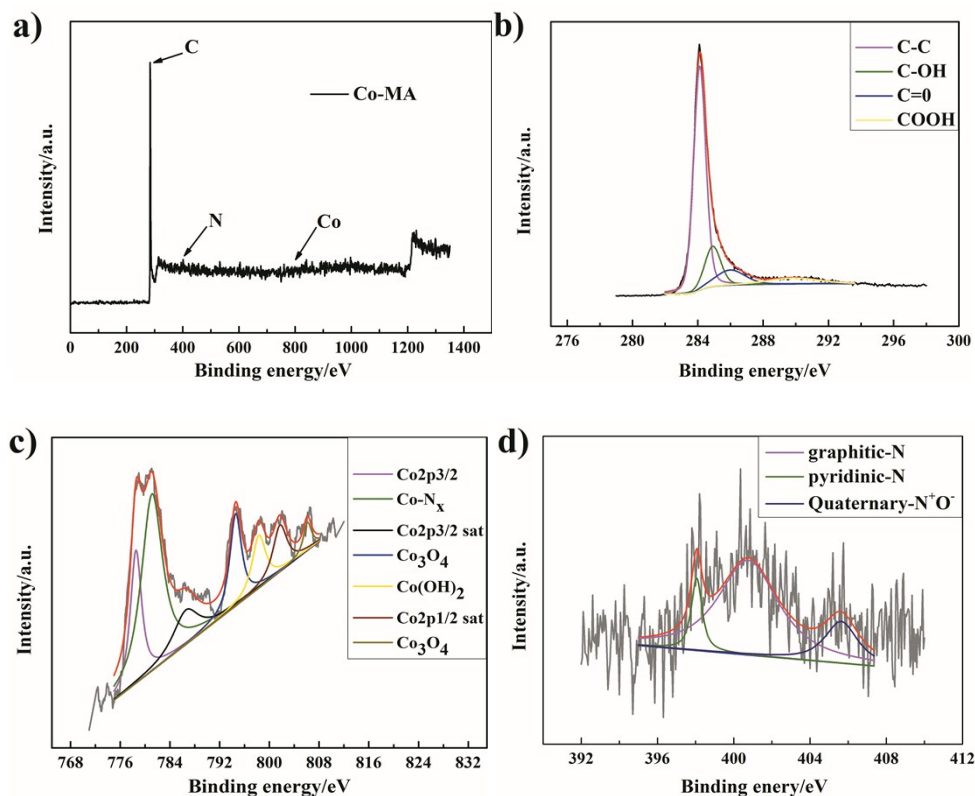


Figure 4S—a) XPS survey of Co-MA, b) the deconvoluted high-resolution C1s spectrum of Co-MA, c) the deconvoluted high-resolution Co2p spectrum of Co-MA, d) the deconvoluted high-resolution N1s spectrum of Co-MA.

Sample	Pyridinic N	Graphitic N	Quaternary-N ⁺ O ⁻	Co-N _x
Co-NC	48.1%	43.1%	6.9%	1.9%
Co-MA	10%	72.3%	17.7%	~

Table 1—The content of different N species in Co-NC and CoMA

Sample	Surface Area (m ² g ⁻¹)	Pore size (nm)	Pore Volume (cm ³ g ⁻¹)
Co-NC	116.57	207.30	0.83
Co-MA	115.95	134.23	0.44

Table 2—Comparison of surface area and pore structure of Co-NC and Co-MA materials.

Sample	E_0 (V vs. Ag/AgCl)	$E_{1/2}$ (V vs. Ag/AgCl)	J_{limit} (mA cm ⁻²)	n	Ref.
Co-NC	-0.13	-0.19	5.44	4	This work
Co-MA	-0.17	-0.25	4.63	3.5	This work
Co@Co ₃ O ₄ @C-CM	-0.04	-0.16	4.55	3.8-3.9	[1]
Fe-N-C	-0.02	-0.19	3.55	3.6-3.9	[2]
Ag/NC	-0.12	-0.20	5.20	3.98	[3]
Co@NSCNTs	-0.07	-0.17	4.90	3.94	[4]
Co-NHPC	--	-0.13	5.20	3.87	[5]
Pt/C	-0.01	0.10	4.88	3.9	This work

Table 3—Some of M/N/C catalysts and Pt/C ORR activity summary

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