Supplementary Information

MOF-derived PdNiCo alloys encapsulated in nitrogen-doped graphene for robust hydrogen evolution reactions

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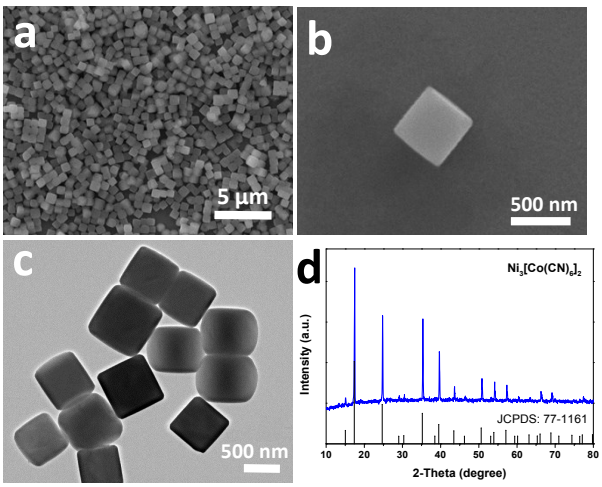

Fig. S1 The as-prepared $Ni_3[Co(CN)_6]_2$ MOF precursor particles. (a,b,c) FESEM and TEM images of the as-prepared $Ni_3[Co(CN)_6]_2$ MOF precursor particles. (d) The XRD result of the as-prepared $Ni_3[Co(CN)_6]_2$ MOF precursor particles.

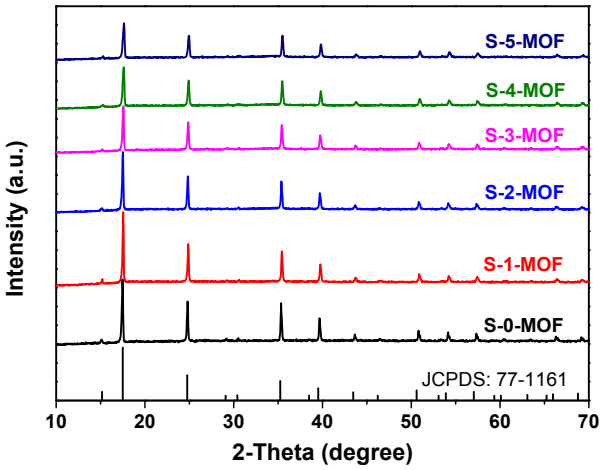

Fig. S2 The X-ray diffraction patterns of S-0-MOF, S-1-MOF, S-2-MOF, S-3-MOF, S-4-MOF and S-5-MOF.

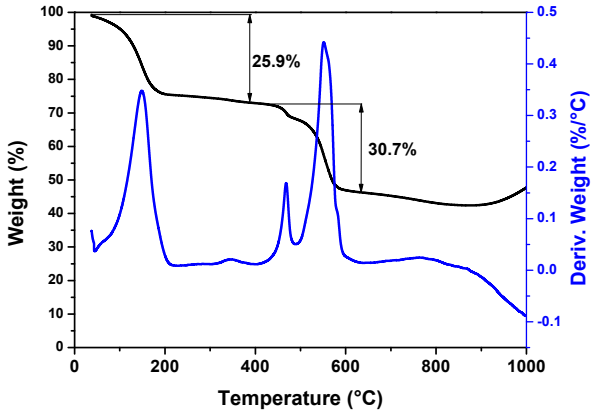

Fig. S3 The TG curve of as-prepared $Ni_3[Co(CN)_6]_2$precursor.

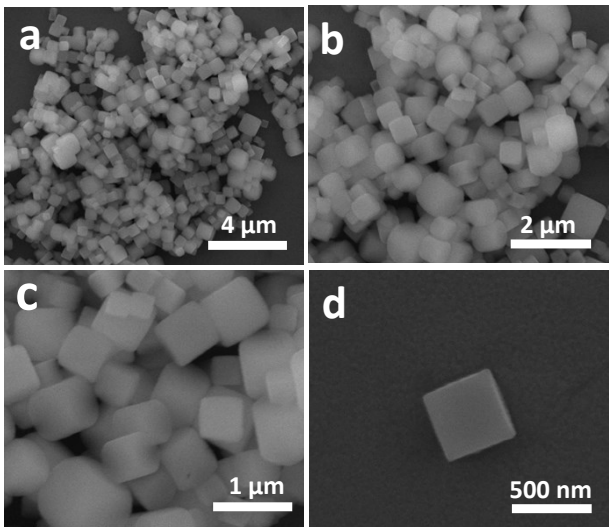

Fig. S4 SEM images of as-prepared Pd-doped $Ni_3[Co(CN)_6]_2$ precursor at different magnifications.

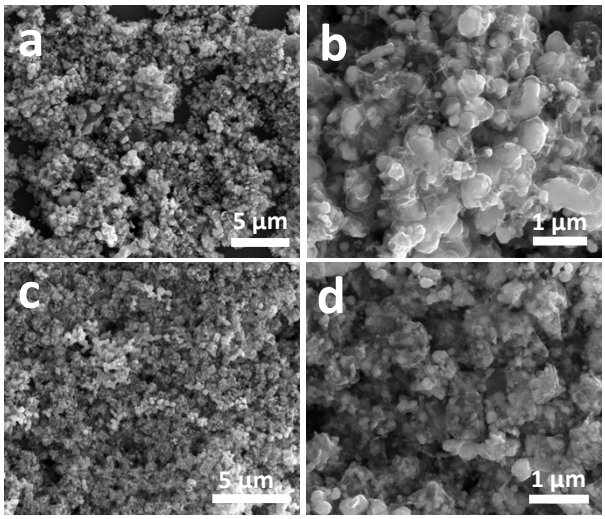

Fig. S5 SEM images of S-0 (a,b) and S-1(c,d).

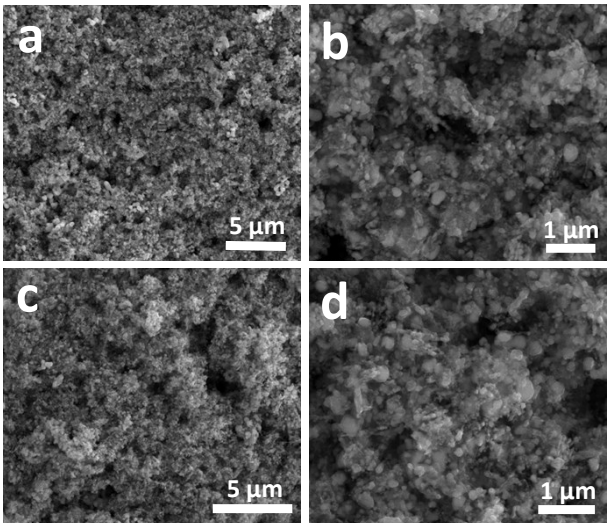

Fig. S6 SEM images of S-2 (a,b) and S-3(c,d).

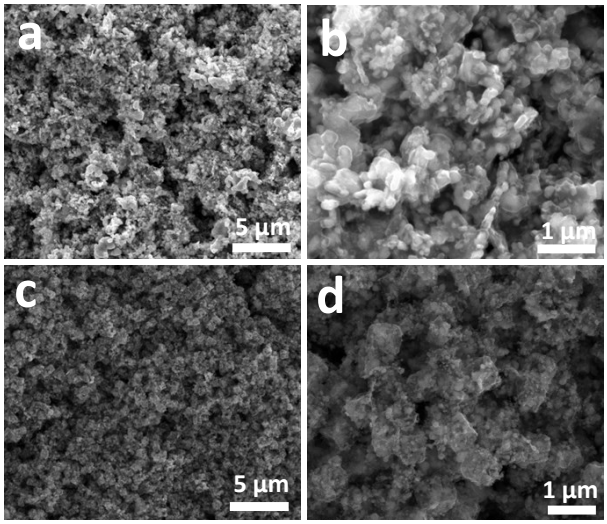

Fig. S7 SEM images of S-2 (a,b) and S-3(c,d).

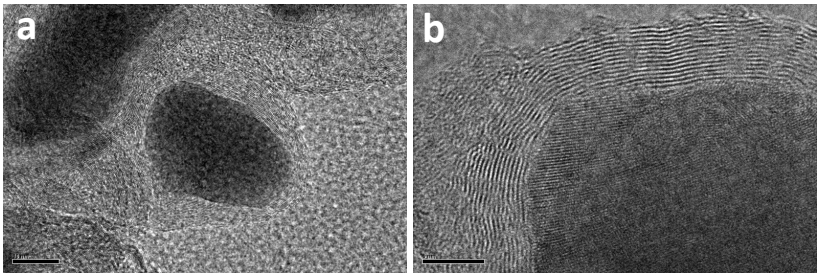

Fig. S8 TEM images of S-5.

Table S1. Various N atoms percentages of different samples from XPS results.

Sample	Pyridinic-N (%)	Pyrrolic-N (%)	Graphitic-N (%)	Total N content in different sample (%)
S-0	33.0	34.2	32.8	5.91
S-1	33.2	34.1	32.7	9.54
S-2	33.6	33.9	32.5	10.8
S-3	33.7	33.6	32.7	10.1
S-4	33.9	32.9	33.2	13.8
S-5	33.6	33.6	32.8	8.4

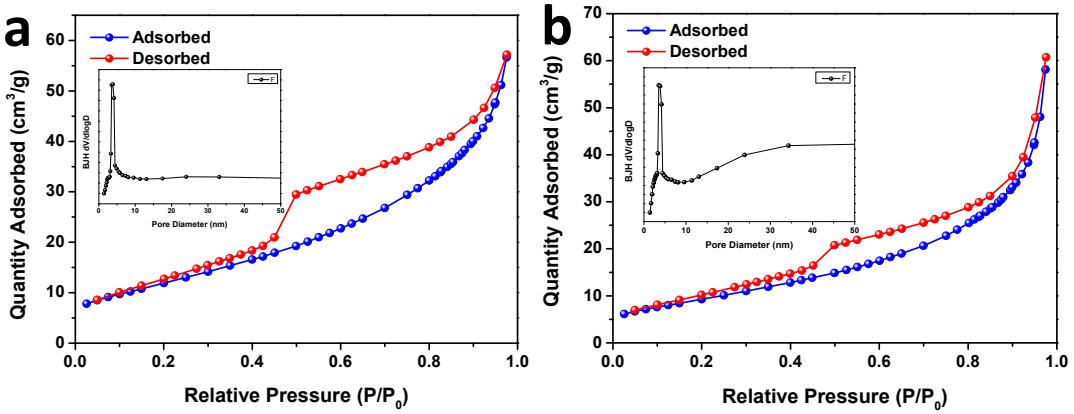

Fig. S9 Nitrogen adsorption-desorption isotherm and the corresponding BJH pore size distribution of S-4 (a) and S-5 (b).

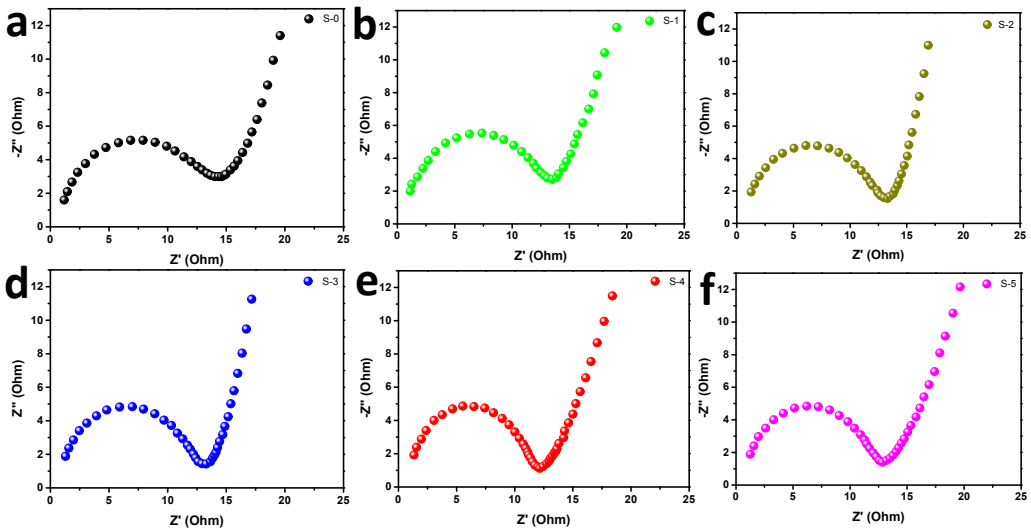

Fig. S10 Electrochemical impedance spectroscopy (EIS) Nyquist plots for S-0, S-1, S-2, S-3, S-4 and S-5 collected in frequency range of 1-10^5 Hz in 1 M KOH electrolyte.

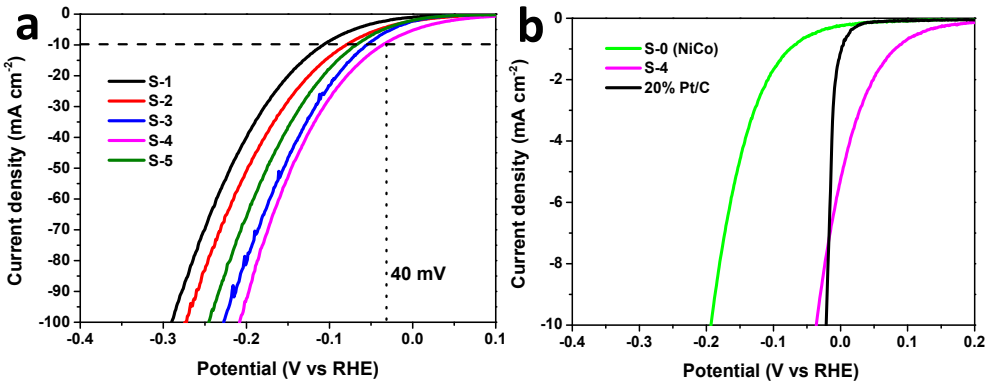

Fig. S11 The polarization curves of the as-prepared PdNiCo@NC samples (*vs.* RHE) in N_2 saturated 0.5 M H_2SO_4 solution.

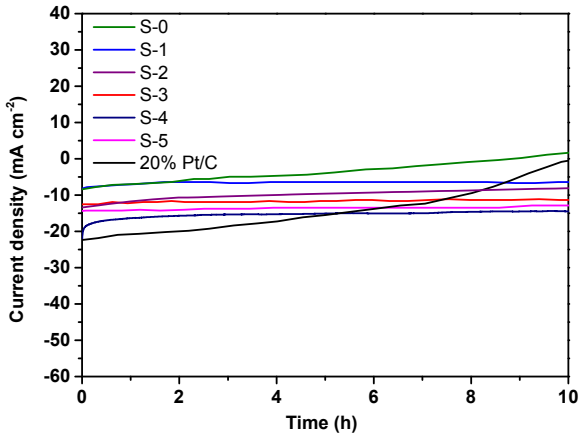

Fig. S12 Chronoamperometry current density curve (i-t curve) for Pt/C catalyst and PdNiCo@NC samples under static overpotential of 70 mV vs. RHE for 10 h in 1 M KOH electrolyte.

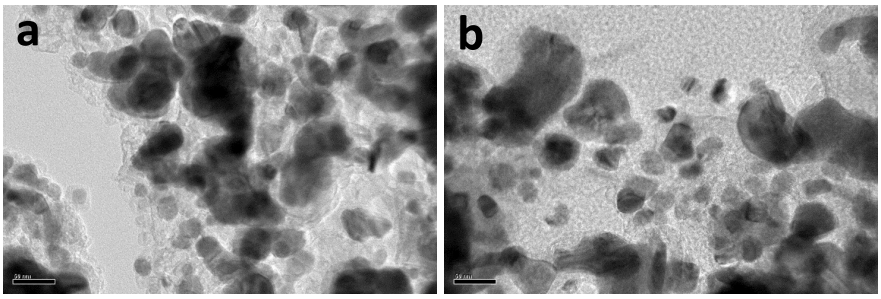

Fig. S13 TEM images of S-4 (a) and S-5(b) after cycling experiment.