## A novel and efficient method of MOF-derived electrocatalyst for HER performance through doping organic ligands

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Fig. S1 (a) XRD patterns of 2-Ni and 1-Co, (b) XRD patterns of Ni-MOF and Co-

MOF.



Fig. S2 (a) TEM images of Co/NC-700 and (b) HRTEM images of Co/NC-700.



Fig. S3 High-resolution Co 2p XPS of (a) Co/NC@PMDA and Co/NC-700.



Fig. S4 (a) LSV curves of Co/NC and (b) Co-MOF/NC at different temperatures.



Fig. S5 (a) XRD patterns of 2-Ni@PMDA、2-Ni and Ni-MOF, (b) Infrared spectra of 2-Ni@PMDA、2-Ni and Ni-MOF, (c) XRD patterns of Ni/NC-700, Ni-MOF/NC-700 and Ni/NC@PMDA, (d) Raman spectra of Ni/NC-700, Ni-MOF/NC-700 and Ni/NC@PMDA.



Fig. S6 (a)XPS survey spectra; high-resolution (b) C 1s, (c) Ni 2p, (d) O1s, (e) N 1s XPS of Ni/NC-700 and Ni/NC@PMDA.



Fig. S7 (a) LSV curves of Ni/NC and (b) Ni-MOF/NC at different temperatures.

Table S1. The electrocatalytic performance of Co/NC@PMDA and synthetic

MATERIAL	TESTING	E <sub>J=10</sub> VS. RHE	TAFEL	REF
Co/NC@PMDA	0.5M H <sub>2</sub> SO <sub>4</sub>	266	135.3	This work
Co-MOF-800	0.5M H <sub>2</sub> SO <sub>4</sub>	290	112	[33]
Co-MOF-800	0.5M H <sub>2</sub> SO <sub>4</sub>	200	77	[44]
N/Co-doped PCP	0.5M H <sub>2</sub> SO <sub>4</sub>	360	170	[45]
CoP/CC	0.5M H <sub>2</sub> SO <sub>4</sub>	67	51	[46]
complex 1 (Co)	0.5M H <sub>2</sub> SO <sub>4</sub>	223	121	[47]
1-900 (Co)	0.5M H <sub>2</sub> SO <sub>4</sub>	252	115	[48]
Gr(4 wt%)&Co-MOF	0.5M H2SO4	N.A.	91	[49]
Co-Cl <sub>4</sub> -MOF	0.5M H <sub>2</sub> SO <sub>4</sub>	283	86	[50]
Co-NC/NCT	1М КОН	200	125	[51]

compounds synthesized from cobalt metal salt in recent years.