Supporting Information

Co-N-C catalysts derived from folic acid and mediated by hydrazine hydrate for selective hydrogenation of quinoline

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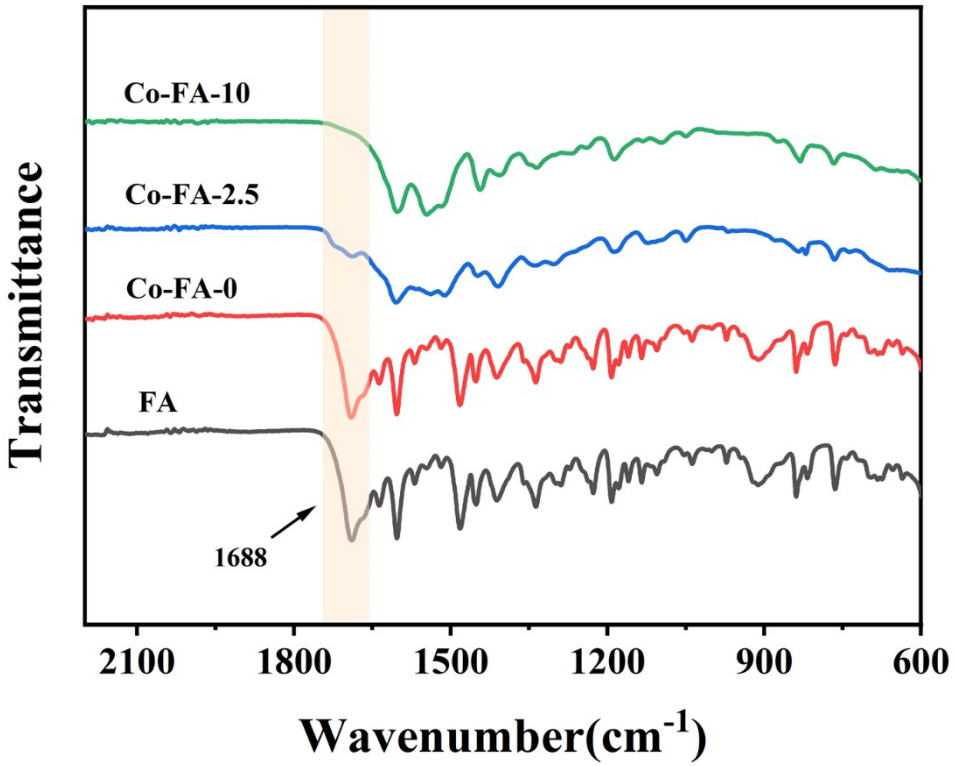

Fig. S1 FTIR spectra of FA and samples before pyrolysis by addition of 0 mL, 2.5 mL and 10 mL hydrazine.

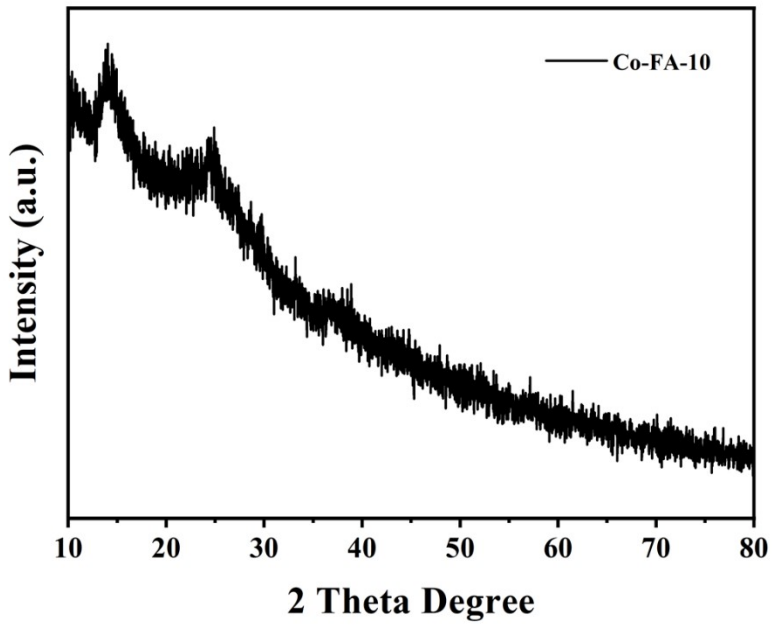

Fig. S2 XRD pattern of Co-FA-10.

Table S1 Particle sizes of Co-N-C-T-10 and Co-N-C-900-2.5 calculated by Debye-Scherrer Equation.

Sample	Co-N-C-700-10	Co-N-C-800-10	Co-N-C-900-10	Co-N-C-900-2.5	Co-N-C-1000-10
Size/ nm	4.8	7.8	17.3	24.6	28.6

The Debye Scherrer equation: $D = K\lambda / \beta Cos\theta$, it is used to calculate the crystalline size of the nanoparticles, where D is the nanoparticles crystalline size, K represents the Scherrer constant (0.98), λ denotes the wavelength (1.54), β denotes the full width at half maximum (FWHM).

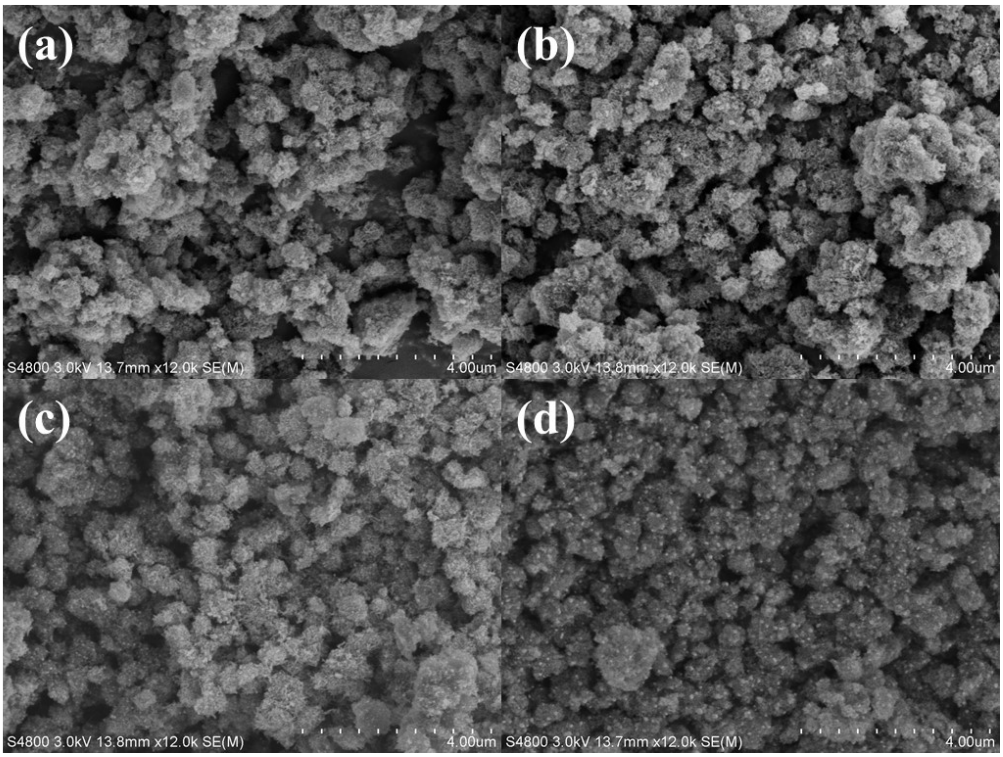

Fig. S3 SEM images of (a) Co-N-C-700-10, (b) Co-N-C-800-10, (c) Co-N-C-900-10, (d) Co-N-C-1000-10.

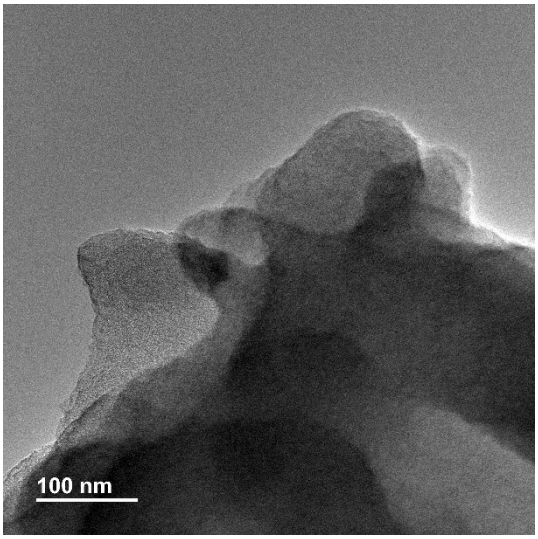

Fig. S4 TEM image of Co-N-C-900-0.

Table S2 Physicochemical properties of different Co-N-C catalysts.

complex	Surface area (m^2g^{-1})	Pore volume (cm^3g^{-1})	Pore Size (nm)	Content(wt%)				
				C	N	H	O	Co
Co-N-C-700-10	421.0	1.146	17.09	40.10	7.22	1.55	11.16	39.97
Co-N-C-800-10	370.1	1.063	16.51	40.99	3.41	1.04	6.27	48.28
Co-N-C-900-10	318.2	0.946	16.06	41.52	1.87	0.74	3.20	52.67
Co-N-C-900-2.5	362.3	0.663	8.69	43.49	1.69	0.55	1.35	52.92
Co-N-C-1000-10	297.0	0.890	15.62	44.01	1.24	0.61	3.90	50.23

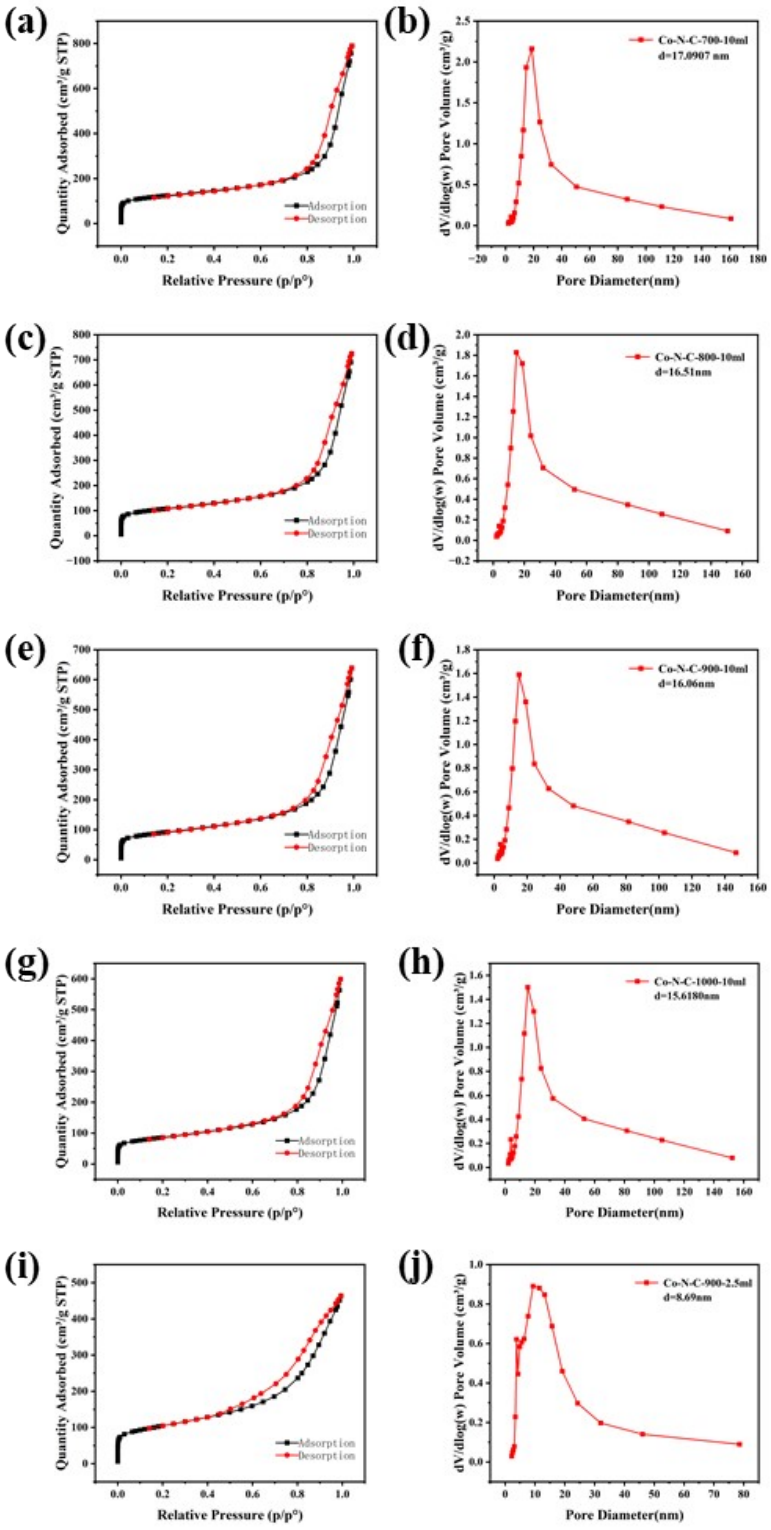

Fig. S5 N_2 adsorption/desorption isotherms of Co-N-C-700-10 (a), 800 (c), 900 (e),1000 (g) and Co-N-C-900-2.5 (i). Pore size distribution of Co-N-C-700-10 (b), 800 (d), 900 (f),1000 (h) and Co-N-C-900-2.5 (j).

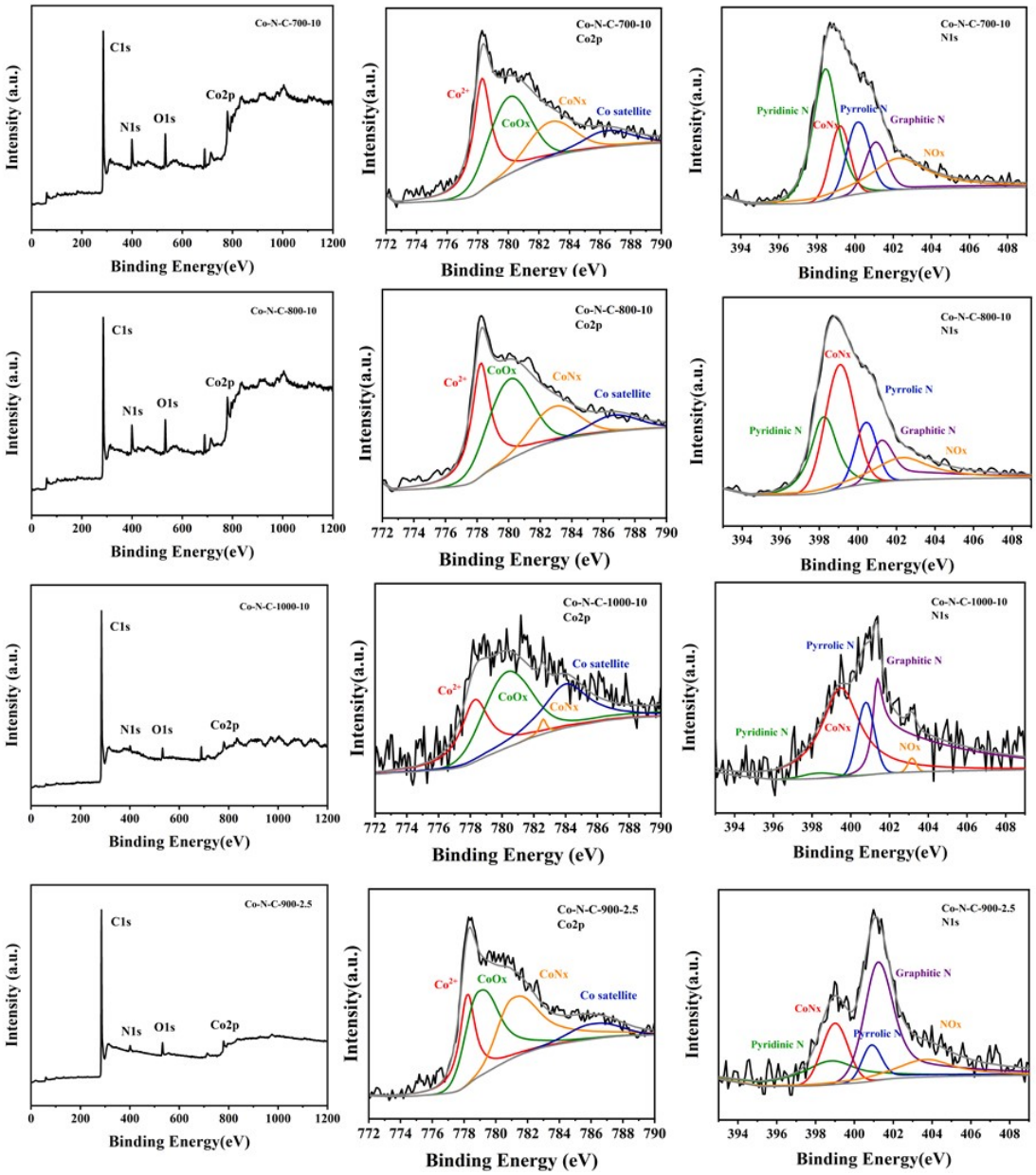

Fig. S6 XPS spectra of Co-N-C-700-10, Co-N-C-800-10, Co-N-C-1000-10 and Co-N-C-900-2.5.

Table S3 Content of different N doping modes according to XPS.

	Co-Nx	Pyridinic N	Pyrrolic N	Graphitic N	NOx
Co-N-C-700-10	13.52	34.42	16.03	13.06	22.97
Co-N-C-800-10	35.06	21.72	12.80	14.16	16.25
Co-N-C-900-10	57.46	5.94	4.04	31.12	1.44
Co-N-C-900-2.5	15.97	17.6	9.29	44.10	13.04
Co-N-C-1000-10	44.98	1.75	11.72	40.47	1.09

Table S4 Content of different Co species according to XPS.

	Co^0	Co-Ox	Co-Nx	Co satellite
Co-N-C-700-10	31.54	35.68	23.15	9.62
Co-N-C-800-10	31.96	38.16	19.21	10.67
Co-N-C-900-10	40.47	31.82	11.33	16.38
Co-N-C-900-2.5	21.90	34.74	34.93	8.42
Co-N-C-1000-10	23.73	49.44	1.2	25.64

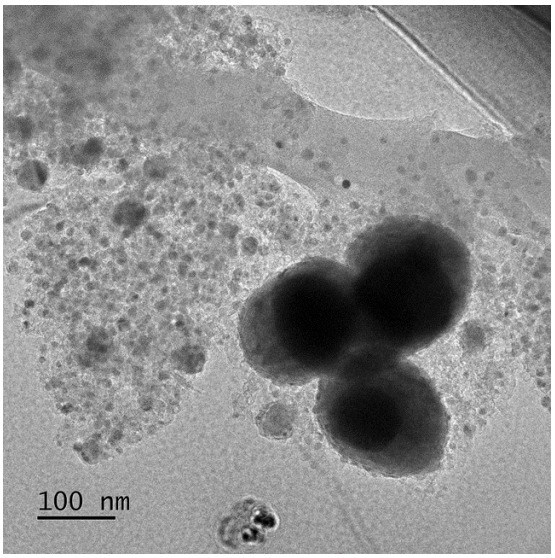

Fig. S7 TEM image of used catalyst.