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Synthesis and facile size control of well-dispersed cobalt nanoparticles supported on ordered mesoporous carbon

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Electrochemical test:

The electrochemical experiments were performed on Autolab PGSTAT30 (Eco Echemie B.V. company) with a three-electrode electrochemical cell system consisting of a working electrode, a platinum counter electrode and an Ag/AgCl reference electrode. The distance between the working electrode and the counter electrode was 1.5 cm. Cyclic voltammetry was carried out in 6 mol/L KOH electrolyte at room temperature.



Figure S1. TG-DTG curves of 15Co@C (A) and 15Co@C-A composites (B) under nitrogen atmosphere (TG – black curves, DTG – red curves).



Figure S2. FT-IR spectra of CMK-3 and m-CMK-3 treated with 2 M HNO₃ at 80 $^{\circ}$ C for 8 h.



Figure S3. Transmission electron microscope images of CMK-3 (*a*) and acid pre-treated CMK-3 with 4 M HNO₃ at 100 °C for 6 h (*b*), 1 M HNO₃ at 100 °C for 6 h (*c*) and 2 M HNO₃ at 80 °C for 8 h (*d*), and their nitrogen sorption isotherms (*e*).



Figure S4 (A) X-ray diffraction patterns of as prepared Co@C composites without calcinations; (B) X-ray diffraction patterns of CMK-3 (*a*) and 15Co@C_m-A composites calcined at 400 (*b*), 500 (*c*) and 700 °C (*d*)



Figure S5 X-ray photoelectron spectra of 15Co@C_m-A composites calcined at 400 (*a*), 500 (*b*) and 700 °C (*c*)



Figure S6. Cycling life test for 15Co@C-A_500 electrode.

Sample name	BET specific surface area (m ² /g)	Micropore volume (cm ³ /g)	Mesopore volume (cm ³ /g)	Total pore volume (cm ³ /g)	Pore size (nm)
СМК-3	1254	0.52	0.84	1.36	4.00
1m-CMK-3	962	0.40	0.48	0.88	3.41
2m-CMK-3	1230	0.50	0.68	1.18	3.40
4m-CMK-3	738	0.30	0.22	0.52	3.51

Table S1 Porosity parameters of carbon supports