Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supporting Information

Synthesis of hollow cobalt oxide nanopowders by salt-assisted spray pyrolysis process applying nanoscale Kirkendall diffusion and their electrochemical properties

Hyeon Seok Ju[a], Jung Sang Cho[a], Jong Hwa Kim[b], Yun Ju Choi[c],

and Yun Chan Kang[a,*]

[a]Department of Materials Science and Engineering, Korea University, Anam-Dong, Seongbuk-Gu, Seoul 136-713, Republic of Korea

[b]Daegu Center, Korea Basic Science Institute, 80 Daehakro Bukgu, Daegu 702-701, Republic of Korea

[c]Suncheon Center, Korea Basic Science Institute, Suncheon 540-742, Republic of Korea

E-mail: yckang@korea.ac.kr

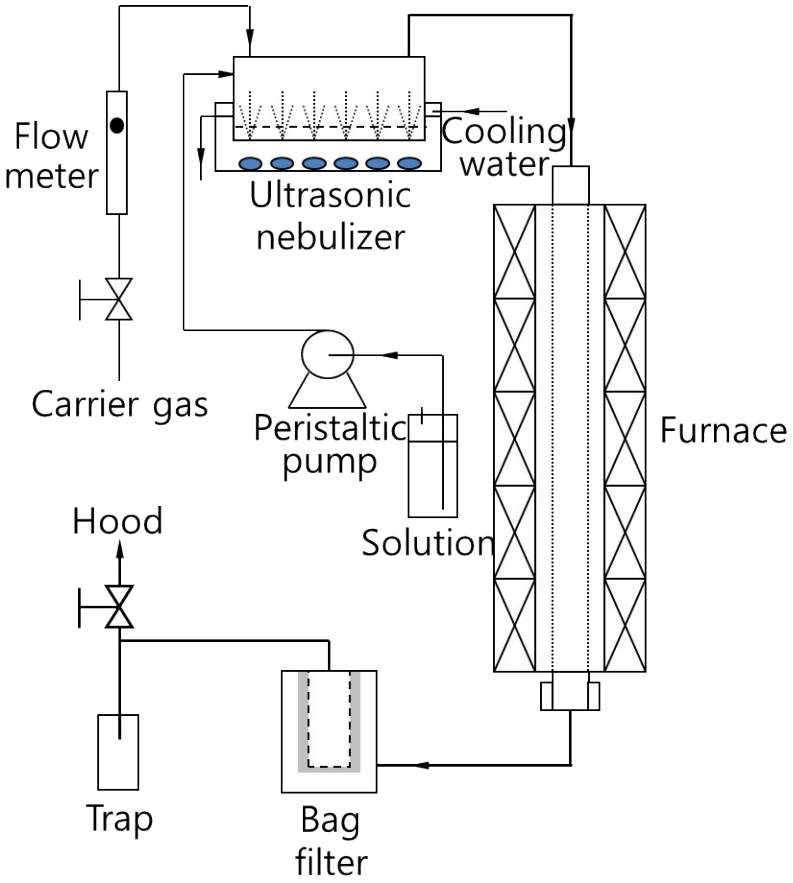

Figure S1. Schematic diagram of the ultrasonic spray pyrolysis system.

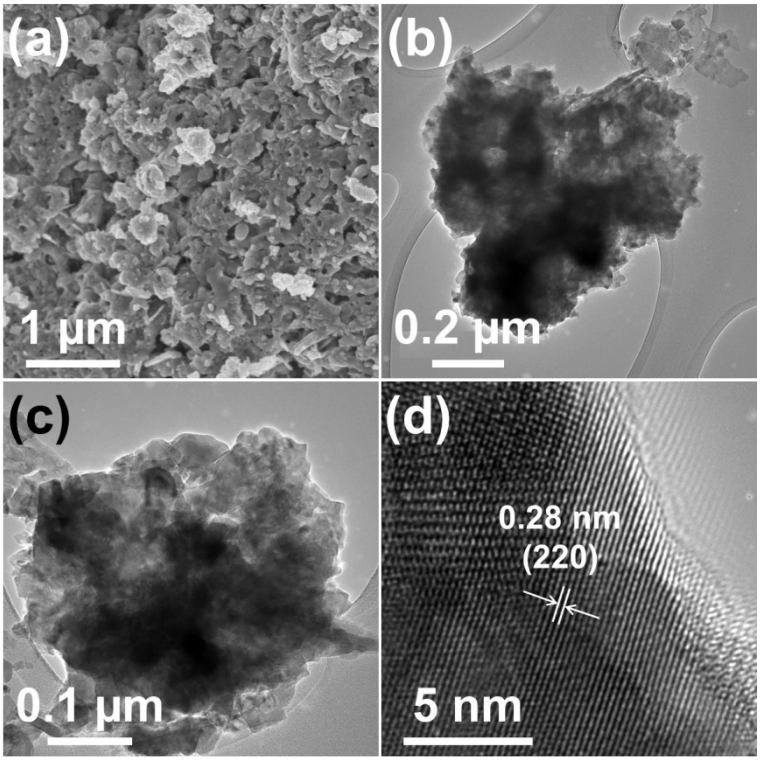

Figure S2. Morphologies of the nanopowders obtained by post-treatment of the metallic Co nanopowder under air atmosphere at a temperature of 300 °C: (a) SEM image, (b) and (c) TEM images, and (d) high resolution TEM image.

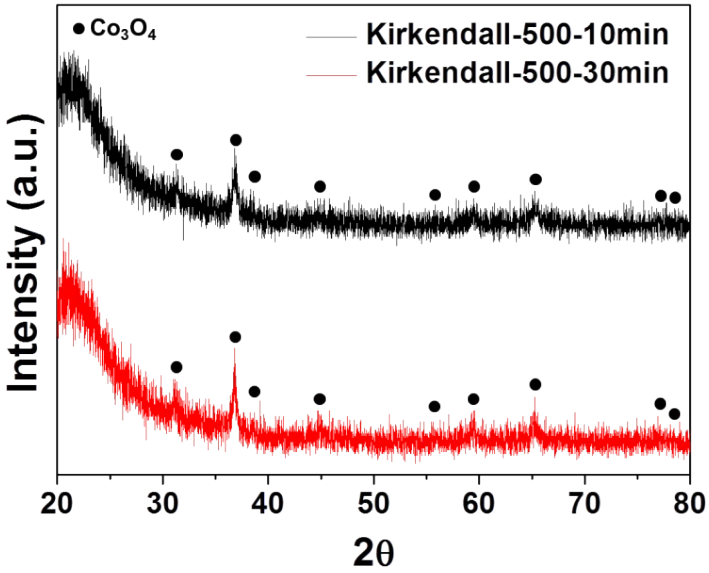

Figure S3. XRD patterns of the powders obtained after post-treatment for different oxidation time of the metallic Co nanopowders under air atmosphere at a temperature of 500 ^{o}C.

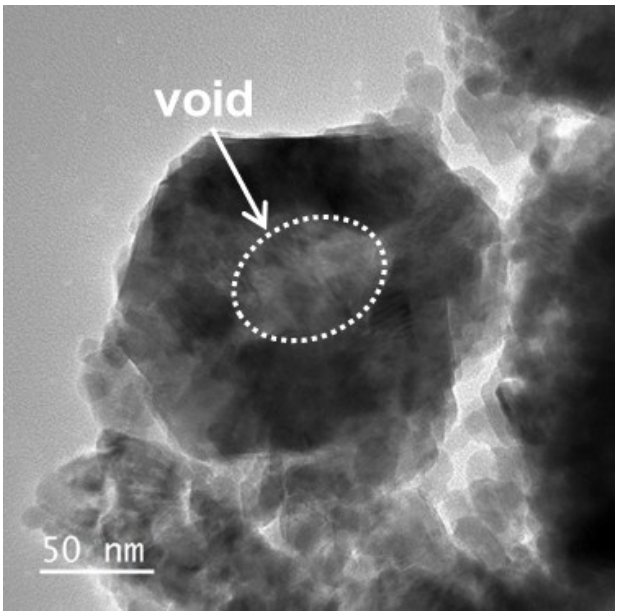

Figure S4. TEM image of the powder obtained after post-treatment for 10 min of the metallic Co nanopowders under air atmosphere at a temperature of 500 ^{o}C.

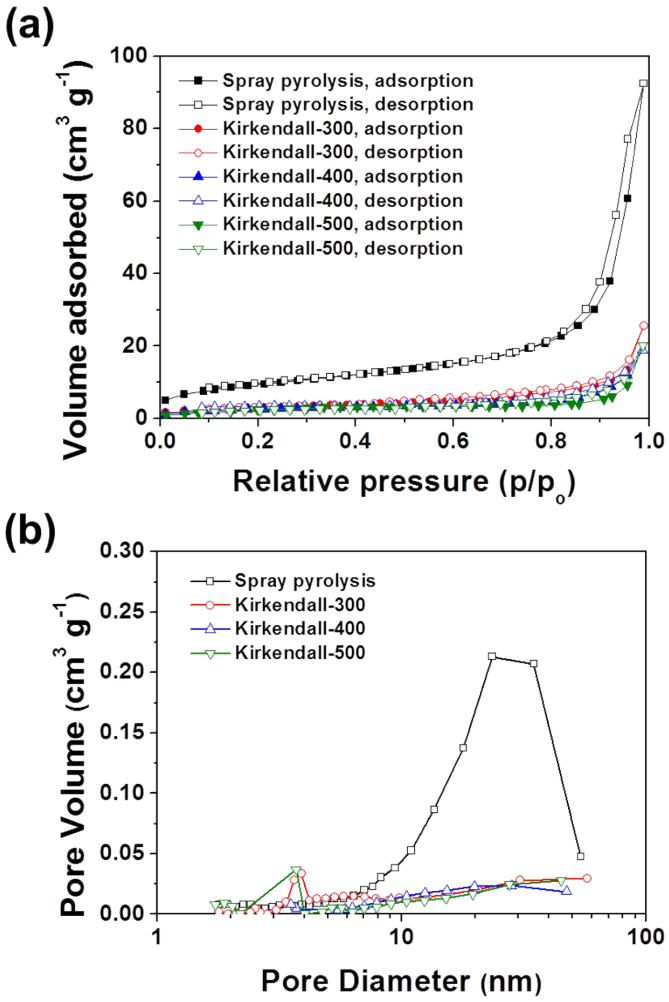

Figure S5. N_2 adsorption and desorption isotherms and BJH pore size distributions of the hollow and filled Co_3O_4 nanopowders.

Table S1. Comparison of the electrochemical performances of the hollow Co_3O_4 nanopowders prepared by nanoscale Kirkendall diffusion process with the reported results of the nanostructured cobalt oxide materials.

Materials	Voltage range (V)	Current rate	Initial C_{dis}/C_{cha} [mA h g^{-1}]	Discharge capacity [mA h g^{-1}]	Cycle number	Ref
Co_3O_4 hollow nanopowders	0.001-3	1000 mA g^{-1}	1182/882	775	150	In this work
Co_3O_4 nanoparticle	0.01-3	178 mA g^{-1}	1237/835	~150	100	[40]
Co_3O_4 nanowire	0.01-3	110 mA g^{-1}	1027/755	611	50	[41]
Co_3O_4 nanoparticle	0.01-3	30 mA g^{-1}	1334/~1070	407	100	[42]
Plate-like Co_3O_4	0.02-3	178 mA g^{-1}	1228/870	618	30	[43]
Hollow Co_3O_4@C sphere nanoparticle	0.01-3	74 mA g^{-1}	~1050/732	750	20	[44]
Nanosized Co_3O_4	0.01-3	220 mA g^{-1}	1411/931	913	20	[S1]
Co_3O_4 Hollow microsphere	0.01-3	60 mA g^{-1}	1241/1061	633	25	[S2]
Meso- and macro-porous Co_3O_4-carbon composite powders	0.01-3	1400 mA g^{-1}	~1150/~920	644	100	[S3]
Mesoporous Co_3O_4 cubes	0.01-3	89 mA g^{-1}	1298/986	980	60	[S4]
Co_3O_4@graphene nanocomposite	0.01-3	50 mA g^{-1}	1097/~753	~935	30	[S5]
Co_3O_4-nanobubble-decorated RGO spheres	0.001-3	2000 mA g^{-1}	1471/~1050	1156	200	[S6]
Multishelled Co_3O_4 hollow microspheres (triple-shelled)	0.05-3	50 mA g^{-1}	2064/~1600	1616	30	[S7]

(1 C = 890 mA g^{-1})

References

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