Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Morella-rubra-like metalorganic-framework-derived multilayered Co_3O_4/NiO/C hybrids as high-performance anodes for lithium storage

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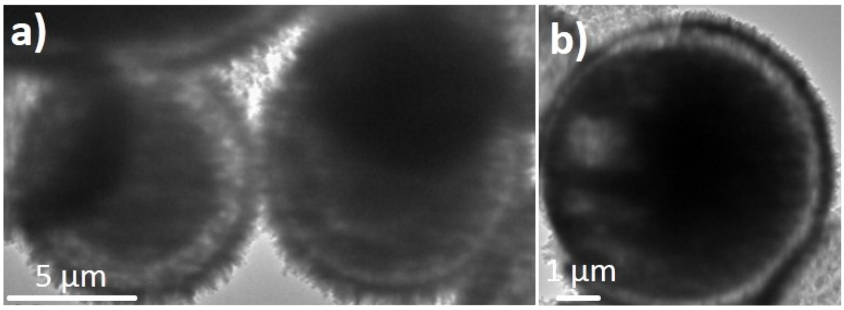

Fig. S1. TEM images of the morella rubra-like CoNi-MOFs.

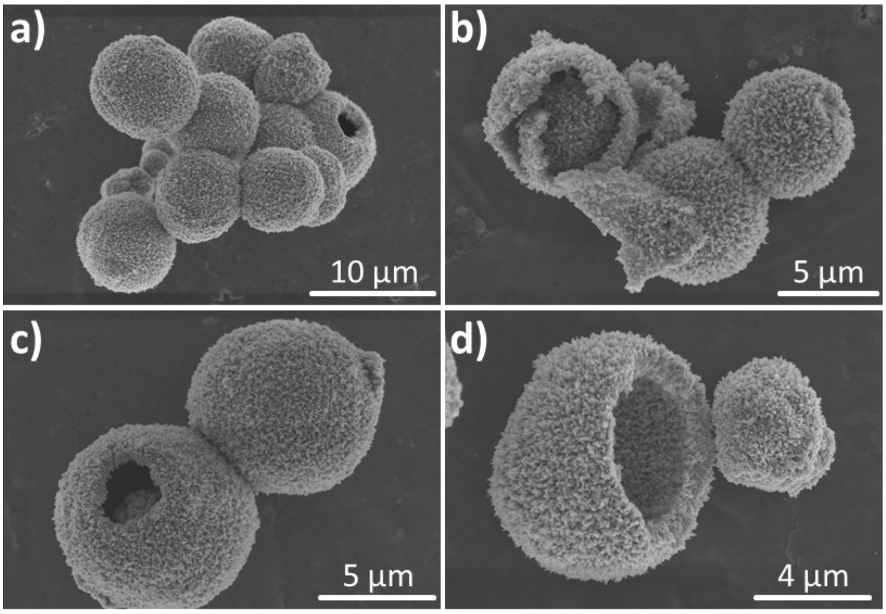

Fig. S2. SEM images of the as-prepared multilayer Co_3O_4/NiO/C hybrids.

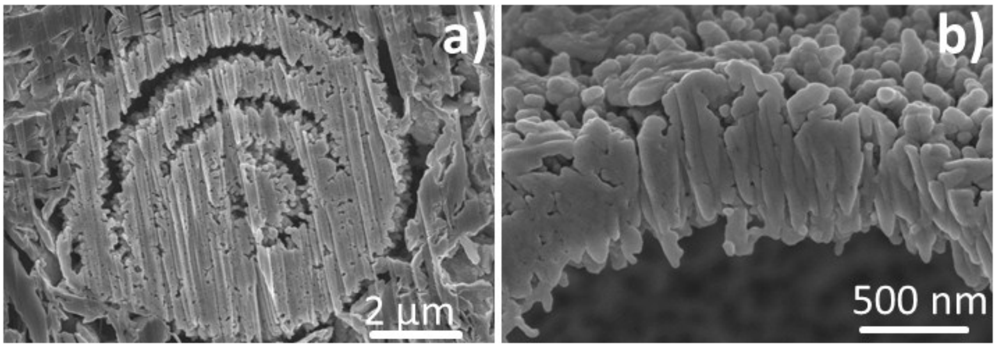

Fig. S3. Cross-section SEM images of the cross section of the multilayer Co_3O_4/NiO/C hybrids.

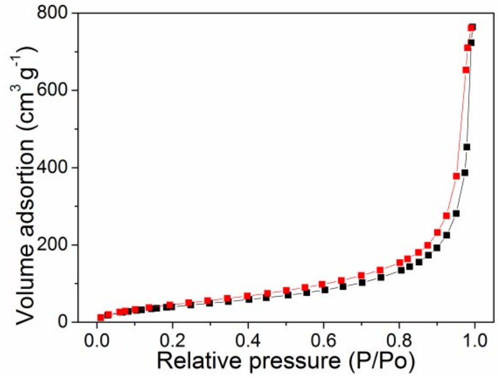

Fig. S4. BET nitrogen adsorption-desorption isotherms of the as-prepared multilayer Co_3O_4/NiO/C hybrids.

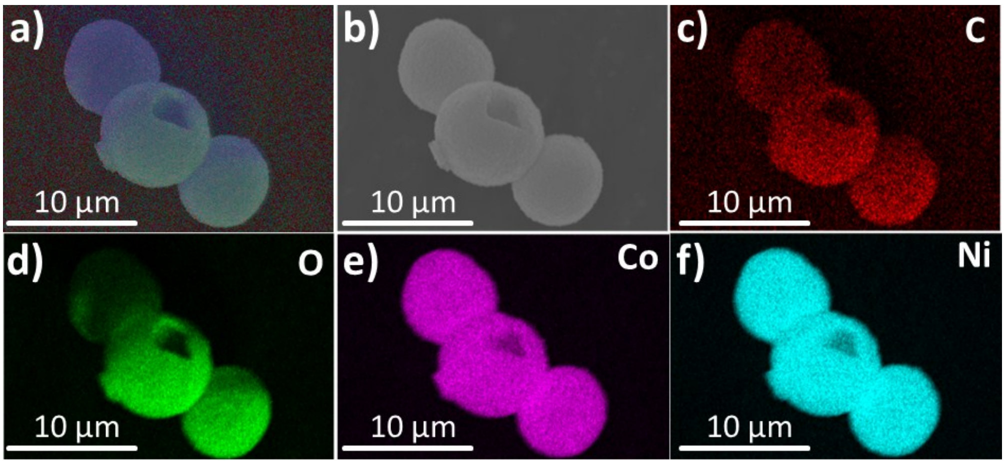

Fig. S5. STEM images of the as-prepared multilayer Co_3O_4/NiO/C hybrids.

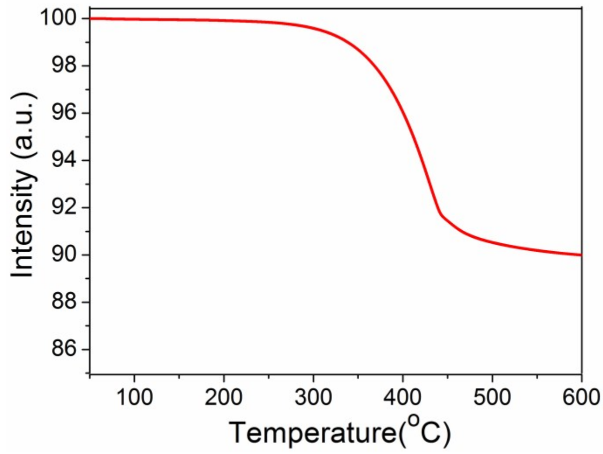

Fig. S6. Thermo-gravimetric analysis (TGA) of the multilayer Co_3O_4/NiO/C hybrids. The carbon content in the product was identified to be 10 % by weight.

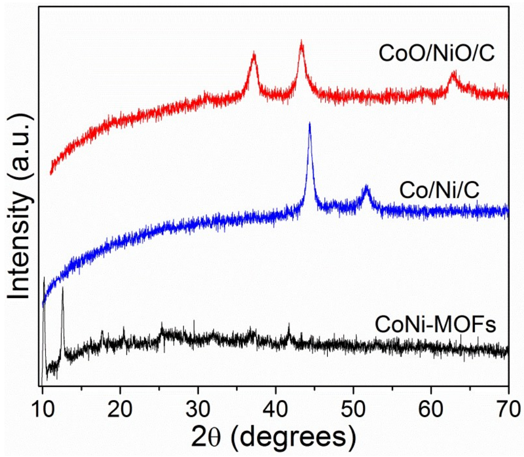

Fig. S7. XRD patterns of the CoO/NiO/C hybrids.

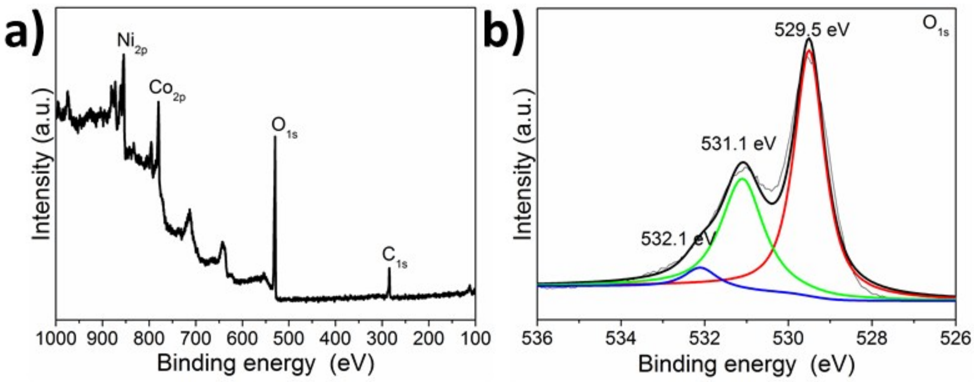

Fig. S8. XPS spectrum of a) the multilayer Co_3O_4/NiO/C hybrids and b) High-resolution O 1s XPS spectrum of the multilayer Co_3O_4/NiO/C hybrids.

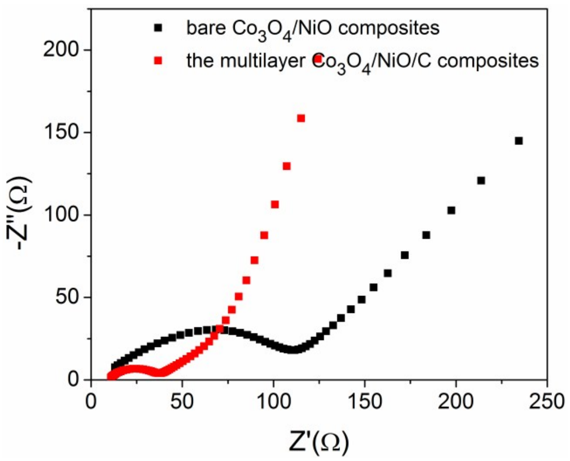

Fig. S9 Nyquist plots of the multilayer Co_3O_4/NiO/C and bare Co_3O_4/NiO electrodes.

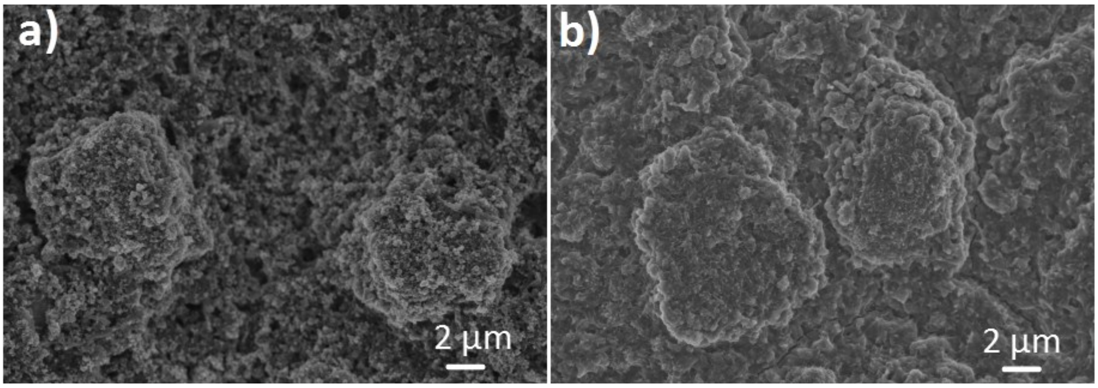

Fig. S10 The SEM image of the multilayer Co_3O_4/NiO/C lectrodes before and after cycling.

Table S1 Comparison of electrochemical performances of the Co_3O_4/NiO/C electrodes with previously reported Co_3O_4 and/or NiO electrodes.

Electrode materials	Synthetic method	Electrode formulation[a]	Cycling stability (A/B/n)[b]	Ref.
2D-PM NiO	Freeze-drying + annealing	80:10:10	544/200/50	S1
Co_3O_4-NCNF	Metal nitrate-assisted polymer-blowing	70:20:10	450/5000/500	S2
NiO-NCNF	Metal nitrate-assisted polymer-blowing	70:20:10	420/5000/500	S2
Carbon-doped Co_3O_4	Hydrothermal + annealing	80:10:10	1121/200/100	S3

hollow nanofibers				
hollow Co_3O_4/C	Impregnation-reduction	90:10	880/50/50	S4
Co_3O_4@CNT	Nanocasting process	85:10:5	700/100/100	S5
H2@Co_3O_4 composite	Hydrothermal + annealing	80:10:10	916/100/100	S6
Co_3O_4 nanosheets/graphene	Hydrothermal + annealing	80:10:10	350/2000/2000	S7
Co_3O_4/graphene	annealing	80:12:8	525/67/500	S8
Co_3O_4/rGO aerogel	annealing	60:30:10	935/50/30	S9
Hollow NiO/Ni/G	Hydrothermal + annealing	70:15:15	962/2000/1000	S10
Ni/NiO hybrid	Physical deposition + chemical etching + thermal oxidation	80:10:10	743/1800/900	S11
NiO-S microspheres	chemical solution Method + annealing	80:10:10	739/50/5	S12
NiO/NF	Self-assembly	-:-:-	710/1000/1000	S13
yolk-shell-structured NiO powders	Spray pyrolysis	-:-:-	824/1000/50	S14
the multilayer Co_3O_4/NiO/C composites	Hydrothermal + annealing	70:20:10	776/1000/1000	This work

a Weight ratio of the active material, carbon and binder. PVDF was used as binder if not mentioned. Other values used were specified.

b A/B/n means the capacity of A (mAh g^{-1}) remained after n cycles at the certain currentdensity of B (mA g^{-1}).

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