

Electronic Supplementary Information (ESI)

Facile Solvothermal Synthesis and Superior Lithium Storage Capability of Co₃O₄ Nanoflowers with Multi-scale Dimensions

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Fig. S1: Typical FE-SEM images of Co_3O_4 -MF precursors synthesized with 8 mL NH_3 in solvothermal synthesis

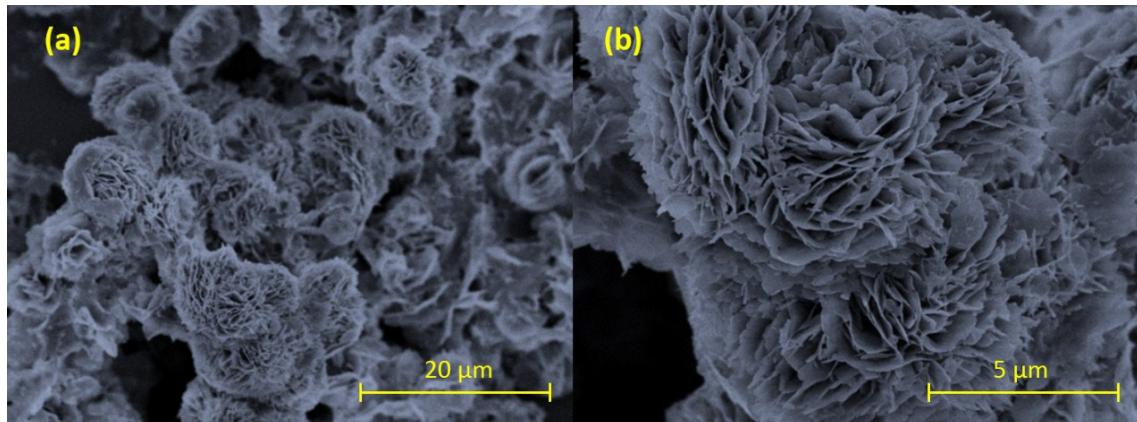


Fig. S2: Typical FE-SEM images of precursors synthesized with NH_3 of 12 mL and 2 mL in solvothermal synthesis (a,b) 12 mL NH_3 ; (c,d) 2 mL NH_3

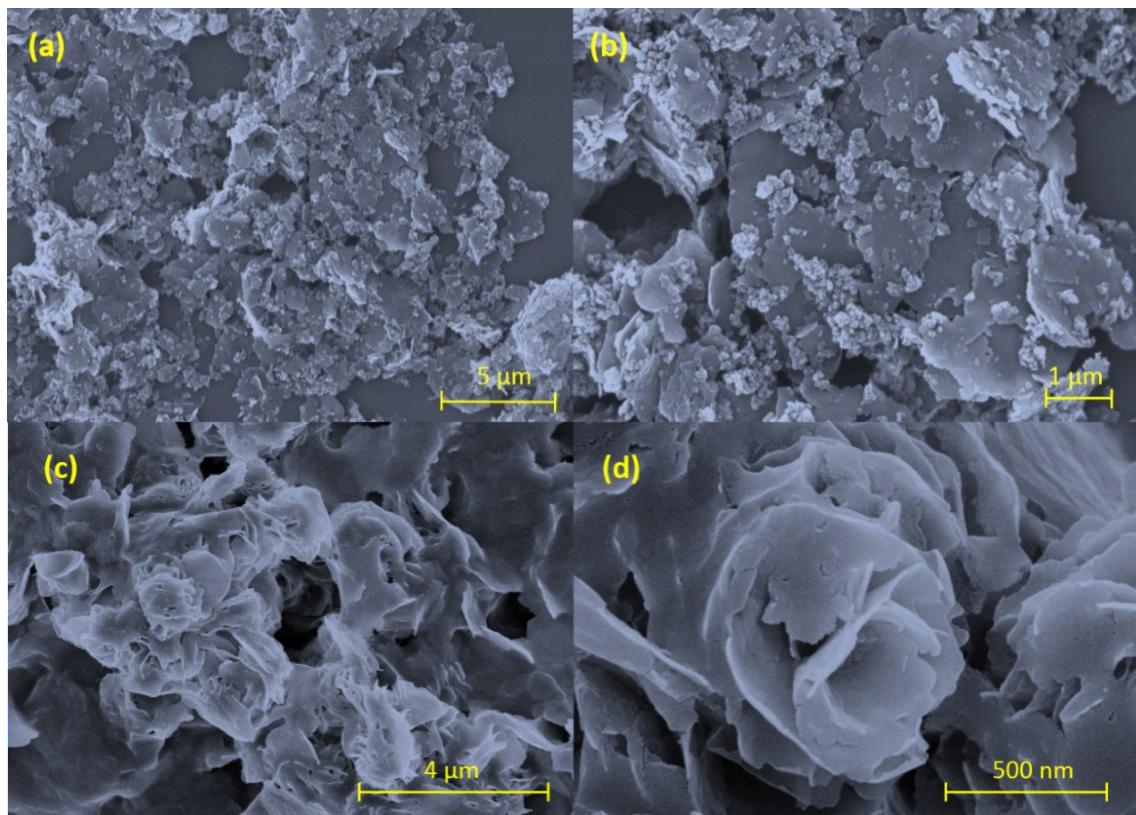


Fig. S3: pH values of reactant solution as a function of added ammonia before and after solvothermal treatment

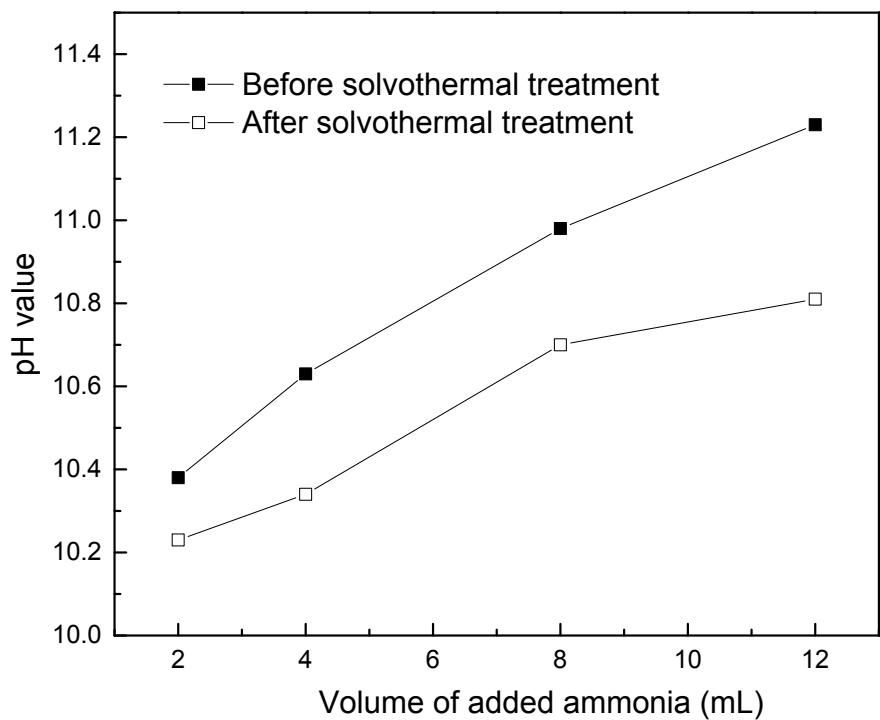


Fig. S4: XRD patterns of flower-like precursors (Co_3O_4 -NF and Co_3O_4 -MF)

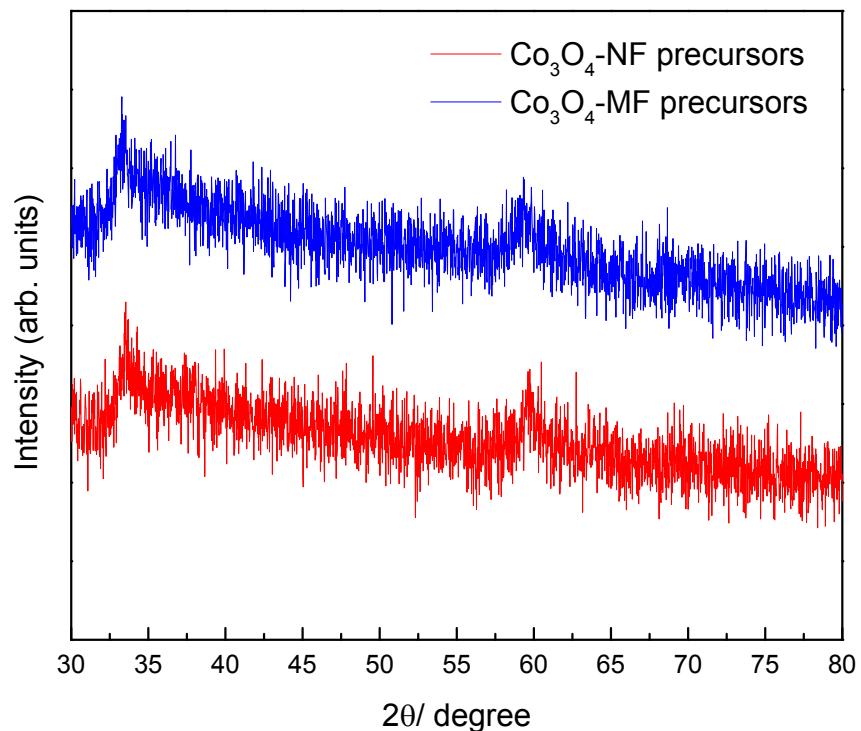


Fig. S5: TGA curve of Co_3O_4 -NF products tested with a heating rate of $10^\circ\text{C min}^{-1}$

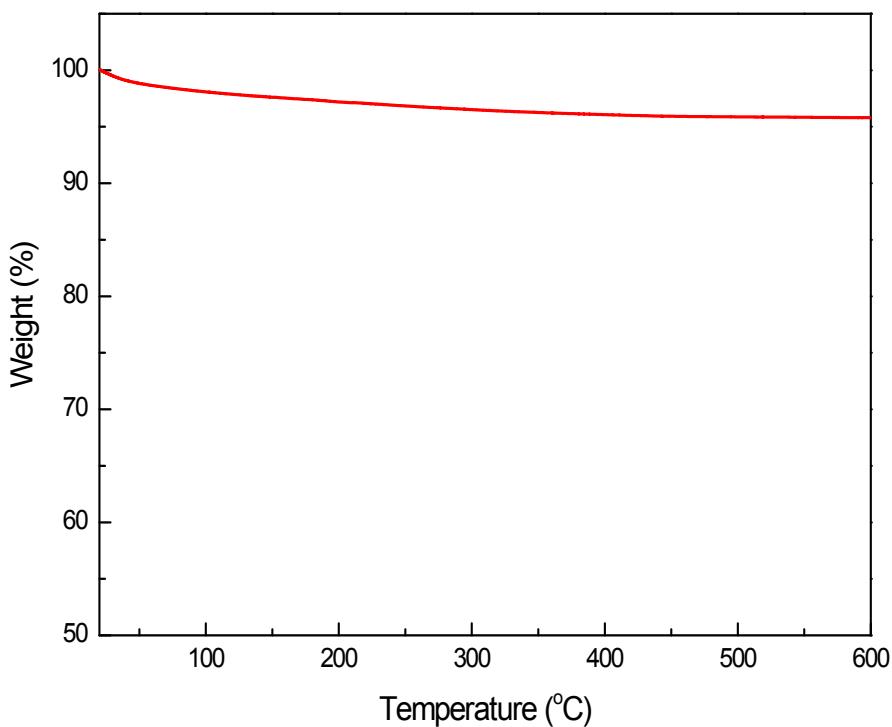


Fig. S6: High resolution N1s spectra of Co_3O_4 -NF precursors and products

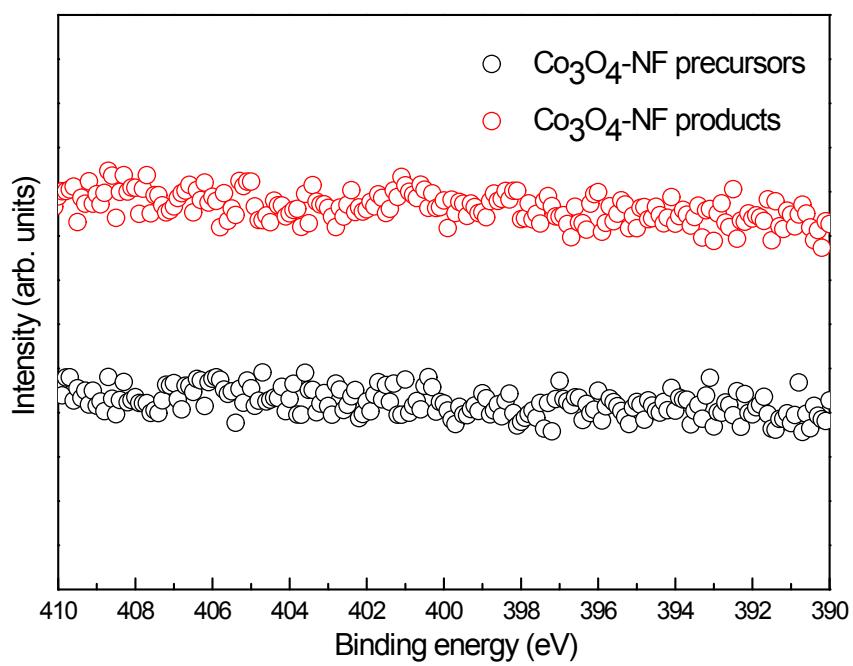


Fig. S7: FE-SEM image of commercial Co₃O₄ micro-/nanoparticles (Co₃O₄-NP)

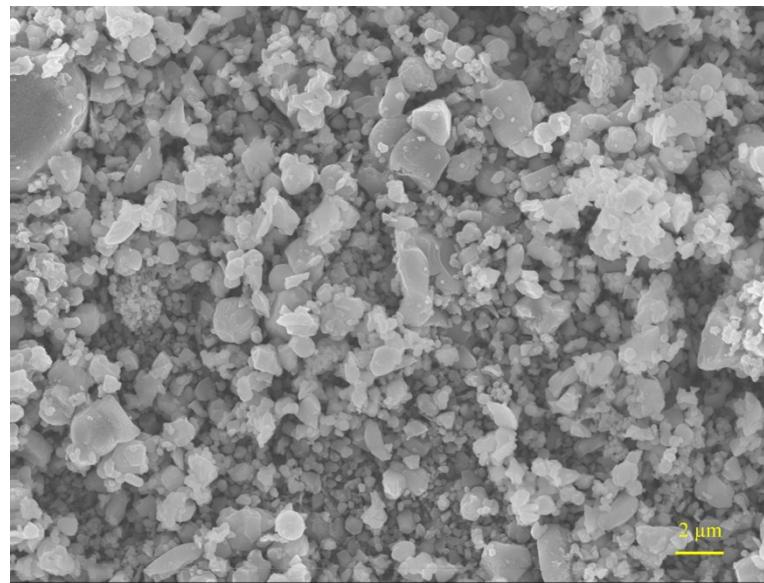


Fig. S8: Typical FE-SEM images of Co₃O₄-NF after electrochemical measurement at a current density of 500 mAh g⁻¹ for 100 cycles

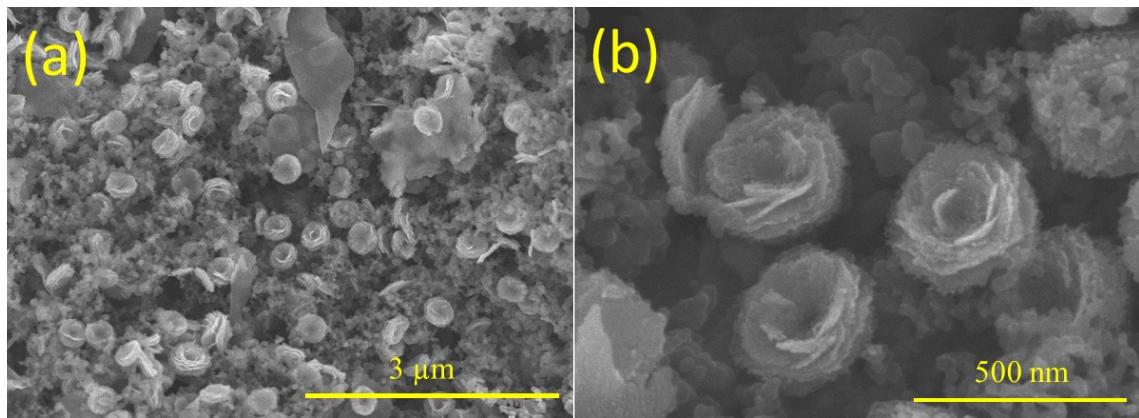


Fig. S9: C-rate performance of commercial Co₃O₄ with micro-/nanoparticles (Co₃O₄-NP) under different current densities

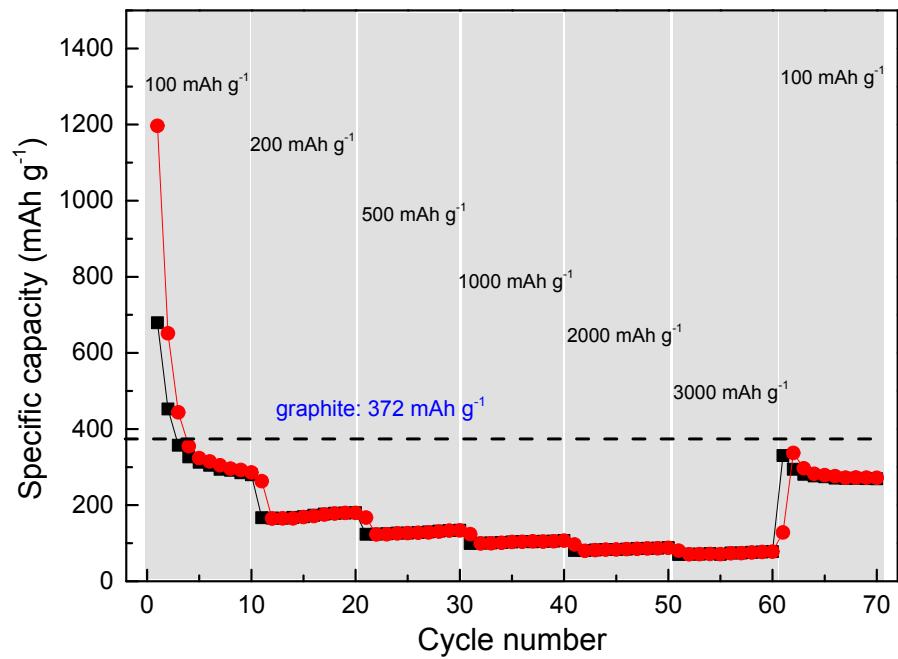


Table S1: Specific surface areas, pore size distributions and pore sizes of Co₃O₄-NF and Co₃O₄-MF

| Sample name | Specific surface area (m ² g ⁻¹) | Pore volume (cm ³ g ⁻¹) | Average pore size (nm) |
|------------------------------------|--|---|---------------------------|
| Co ₃ O ₄ -NF | 103.9 | 0.587 | 22.6 |
| Co ₃ O ₄ -MF | 83.6 | 0.308 | N.A. |

Table S2: Comparison of material characteristics and electrochemical performances with various structured Co₃O₄ materials

| Co ₃ O ₄ material morphologies | Specific surface area (m ² g ⁻¹) | Average pore size (nm) | Current density (mA g ⁻¹) | First discharge/charge capacity (mAh g ⁻¹) | Coulombic efficiency | Cycling number | Discharge capacity after cycling (mAh g ⁻¹) | Capacity retention | References |
|--|---|------------------------|---------------------------------------|--|----------------------|----------------|---|--------------------|------------|
| Nanoflowers | 103.9 | 22.6 | 500 | 1311.6 /992.3 | 75.6% | 100 | 1323 | ~100% | This work |
| Microflowers | 83.6 | N.A. | 500 | 1160.9 /876.6 | 75.5% | 100 | 1281 | ~110% | This work |
| Nanoflowers | 51.2 | 12.6 | 50 | 1849/1196 | 64.7% | 30 | ~980 | 53% | [1] |
| Flower-like spheres | 72.5 | 4.6 | 50 | 1316.7/899.1 | 68.3% | 20 | ~250 | ~19% | [2] |
| Nanobundles | 26.4 | 22.0 | 100 | 1670.8/1341 | 80.3% | 60 | 1667.6 | 99.8% | [3] |
| Nanocages | 110.6 | 10 | 500 | 975/786 | 80.6% | 100 | 810 | 83% | [4] |
| Nanowire arrays | 20.2 | 8 | 100 | 1732/1081 | 62.4% | 70 | ~550 | ~69% | [5] |
| Microdisks | 108.9 | 9.7 | 100 | 1032/776 | 75.2% | 30 | 765 | ~100% | [6] |
| Mesoporous octahedra | 48.5 | 9 | 200 | 1567/~1176 | ~75% | 60 | 1178 | ~75% | [7] |
| Hollow microspheres | 12.8 | 5~7 | 178 | 1298/991.7 | 76.4% | 50 | 1441.1 | 111% | [8] |
| Pompon-like spheres | 29.5 | 17 | 50 | 1552/1169 | 75% | 30 | ~1000 | ~64% | [9] |
| Nanobelts | 36.5 | 29.2 | 100 | 1204/N.A. | N.A. | 60 | 980 | ~81% | [10] |

References

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