Supporting Information

Morphology-Dependent Charge Storage Performance of Co_3O_4 Nanostructures in All-Solid-State Flexible Supercapacitor

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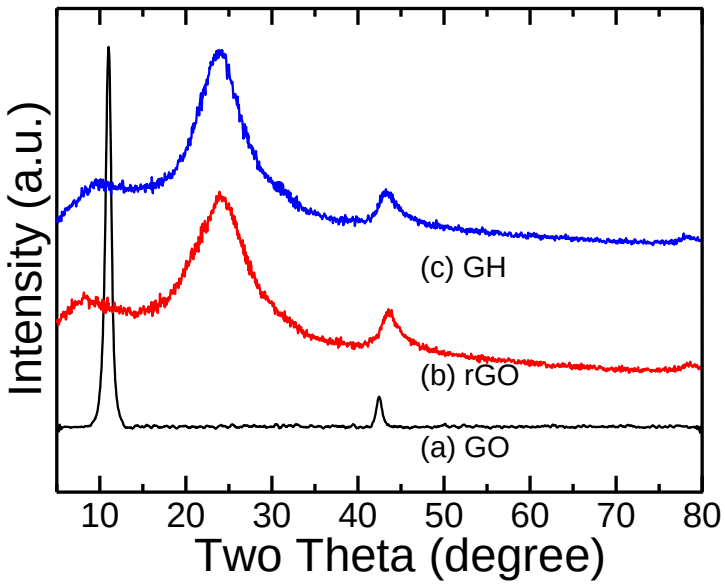

Fig. S1. Powder XRD patterns of (a) GO, (b) rGO, and (c) GH. The rGO and GH was obtained by hydrothermal treatment of GO in aqueous solution at 120 and 150 ^{o}C for 12 h, respectively.

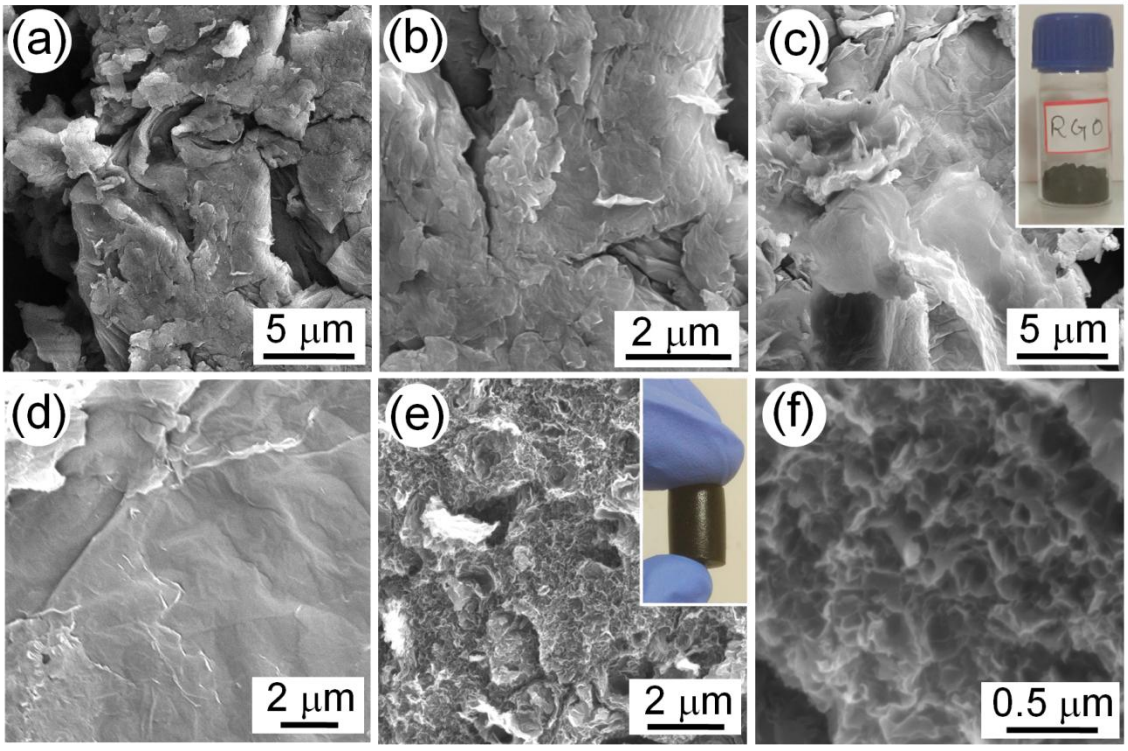

Fig. S2. FESEM images of the as-synthesized (a,b) GO, (c,d) rGO, and (e,f) GH. Insets of (c) and (e) show photographs of the corresponding product.

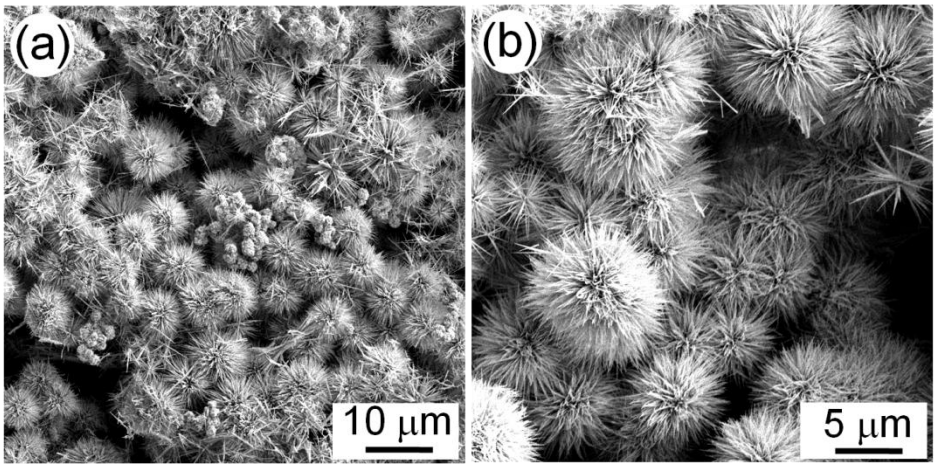

Fig. S3. FESEM images of the as-synthesized product at low magnifications obtained by microwave-assisted hydrothermal method at 120 °C.

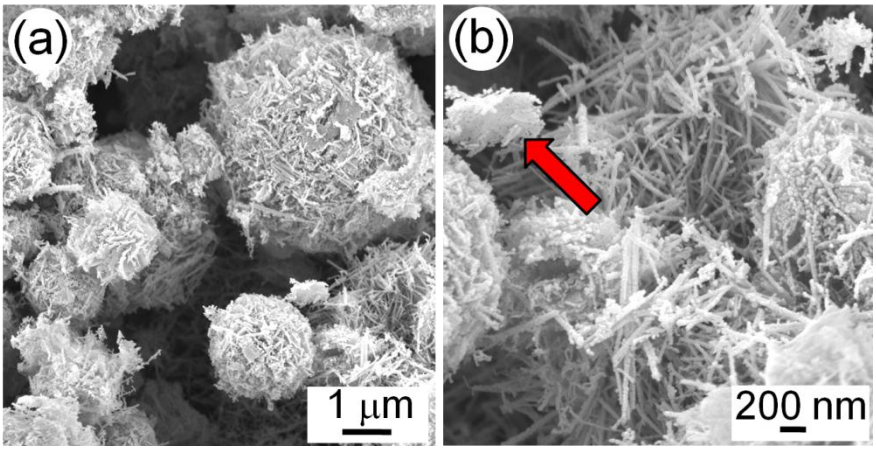

Fig. S4. FESEM images of the as-synthesized product obtained by microwave-assisted hydrothermal method at 150 °C. The red color arrow mark in (b) indicates 2D flake-like structure.

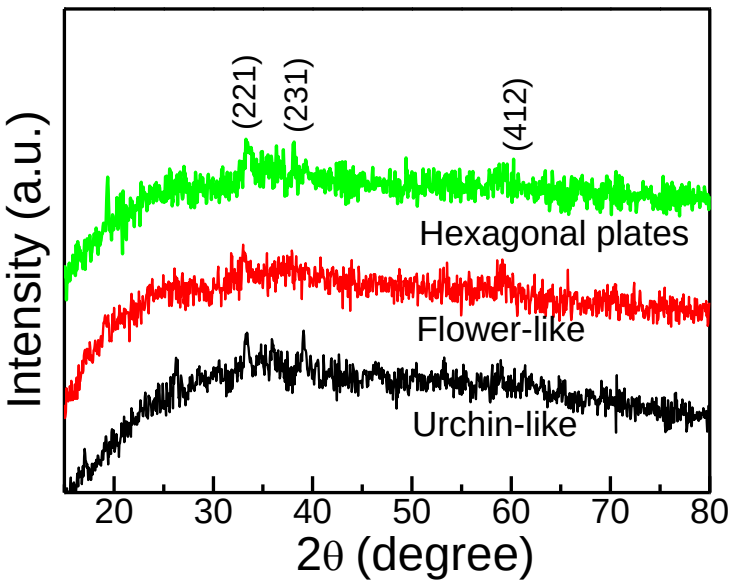

Fig. S5. Powder XRD patterns of the as-synthesized products obtained by varying the reaction temperature to form different shapes such as urchin-like (120 °C), flower-like (180 °C) and hexagonal plates (200 °C) with other reaction parameters fixed, i.e., 250 W for 30 min and cobalt and urea molar concentration at 0.1 M. The XRD pattern is matched with JCPDS file 48-0083 for cobalt carbonate hydroxide hydrate [$Co(CO_3)_{0.5}(OH)\cdot 0.11H_2O$]

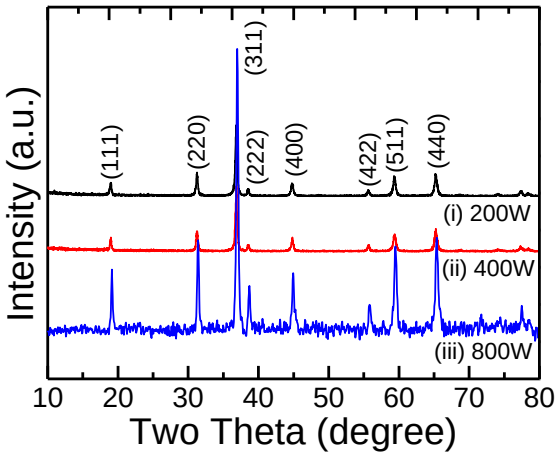

Fig. S6. Powder XRD patterns of the products obtained by varying the microwave power and then annealed at 500 °C under air for 3 h.

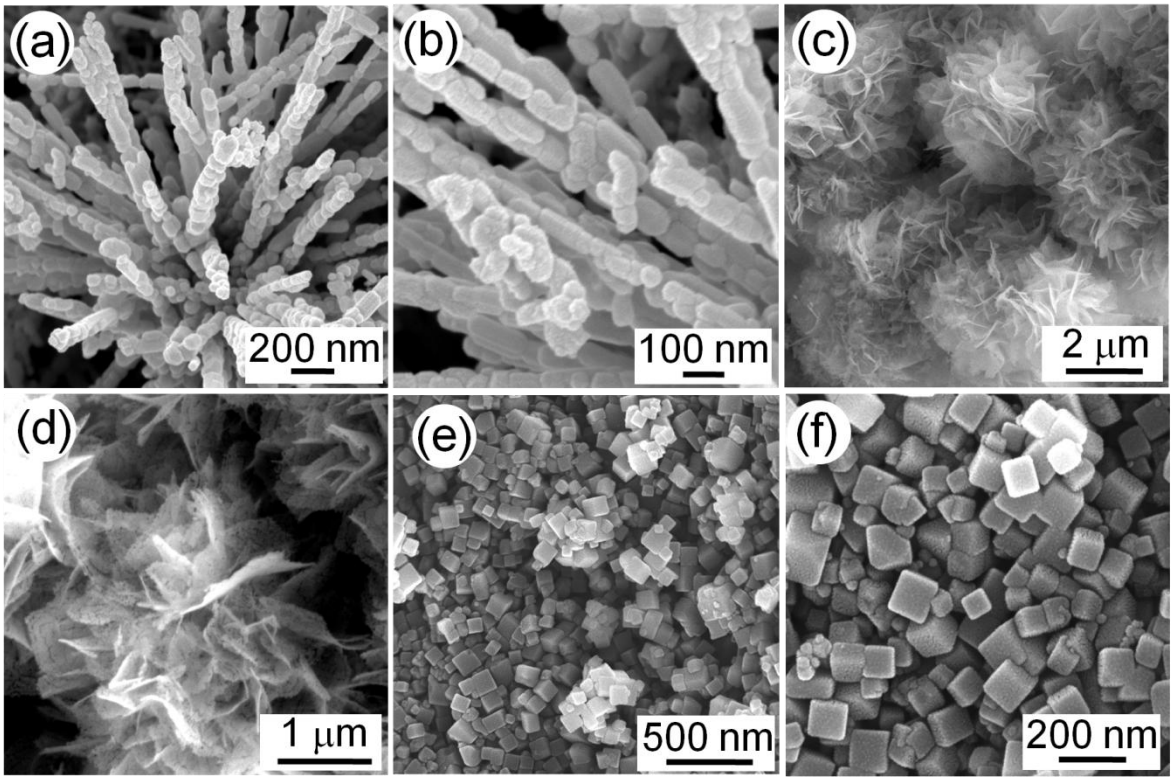

Fig. S7. FESEM images of the samples annealed at 500 °C for 3 h. These samples were synthesized by microwave-assisted hydrothermal method by varying the reaction temperature (a,b) 120 °C and (c,d) 180 °C (0.1 M precursors, 400 W 30 min). The images shown in (e,f) were synthesized at 0.01 M precursors at 400 W and 180 °C for 30 min.

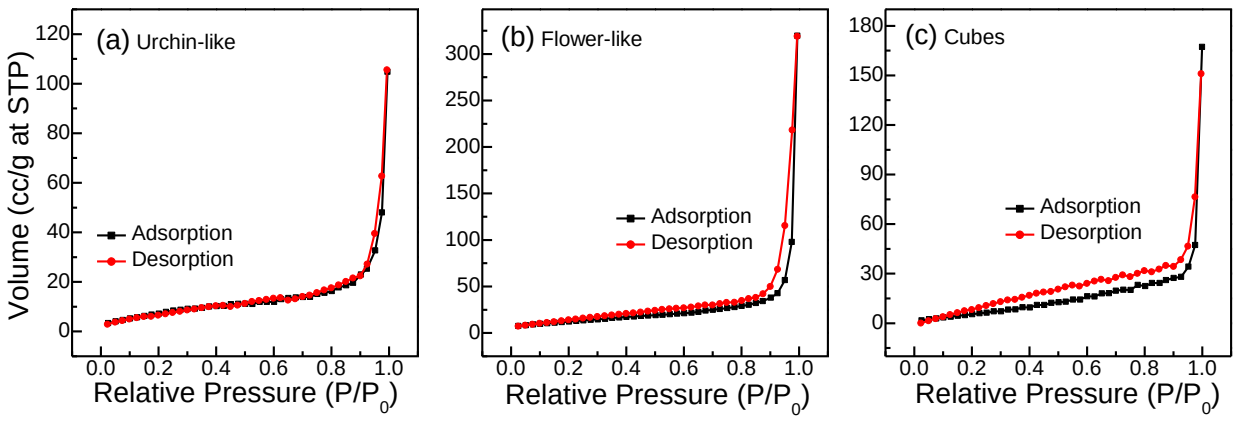

Fig. S8. The N_2 adsorption-desorption isotherms of (a) urchin-like, (b) flower-like, and (c) cube morphology of Co_3O_4.

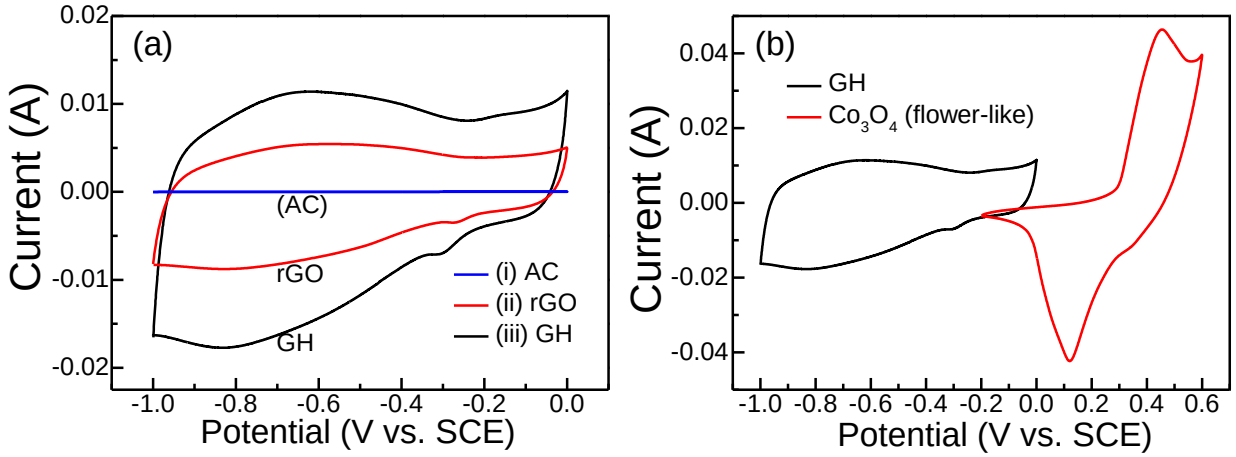

Fig. S9. (a) Cyclic voltammograms of (i) AC, (ii) rGO, and (iii) GH at 10 mV s^{-1}. (b) Cyclic voltammograms of GH and flower-like Co_3O_4 in different potential windows.

Fig. S10. Photographs on powering small devices using the fabricated Co_3O_4//GH ASC device.

Table S1. Comparison on the Supercapacitor Performance of the Reported Co_3O_4 based Materials

Electrode Material	*Synthesis Process*	*Electro lyte*	*C_s from CV*	*C_s from GCD*	*Energy Density*	*Power Density*	*Ref*
Co_3O_4	Microwave Hydrothermal	2 M KOH	782.5 F g^{-1} at 5 mV s^{-1}	341 5 F g^{-1} (1 A g^{-1})	29 Wh kg^{-1}	916 W kg^{-1}	This work
CoO/ Co_3O_4	Hydrothermal	3 M KOH	436 F g^{-1} at 5 mV s^{-1}	451 F g^{-1} at 1 A g^{-1}	10.52 Wh kg^{-1}	140 W g^{-1}	[1]
Co_3O_4	Laser ablation	0.5 M H_3PO_4	177 F g^{-1} at 1 mV s^{-1}	172 F g^{-1} at 0.9 A g^{-1}	3.01 Wh kg^{-1}	0.031 kW g^{-1}	[2]
rGO@Co_3O_4	Co-precipitation	6 M KOH		546 F g^{-1} at 1 A g^{-1}			[3]
CoO nanopillar	Hydrothermal	2 M KOH	510 F g^{-1} at 5 mV s^{-1}	354 F g^{-1} at 1 A g^{-1}	21.25 Wh kg^{-1}	225 W kg^{-1}	[4]
Co_3O_4–rGO	Electrodepostion	1 M KOH		406 F g^{-1} at 1 A g^{-1}	23.3Wh kg^{-1}	2.3 kW kg^{-1}	[5]
AuNP/nano-Co_3O_4	In situ reduction	2 M KOH		681 F g^{-1} at 0.5 A g^{-1}	25Wh kg^{-1}		[6]
Co_3O_4–n-rGO	Hydrothermal	6 M KOH			3.5Wh kg^{-1}	7 kW kg^{-1}	[7]
Co_3O_4@NrGO	Hydrothermal	2 M KOH		450 F g^{-1} at 1A g^{-1}			[8]

References

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