Free-Standing Cobalt Hydroxide Nanoplatelet Array Formed by Growth of Preferential-Orientation on Graphene Nanosheets as Anode Material for Lithium-Ion Batteries

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1. Supporting Data

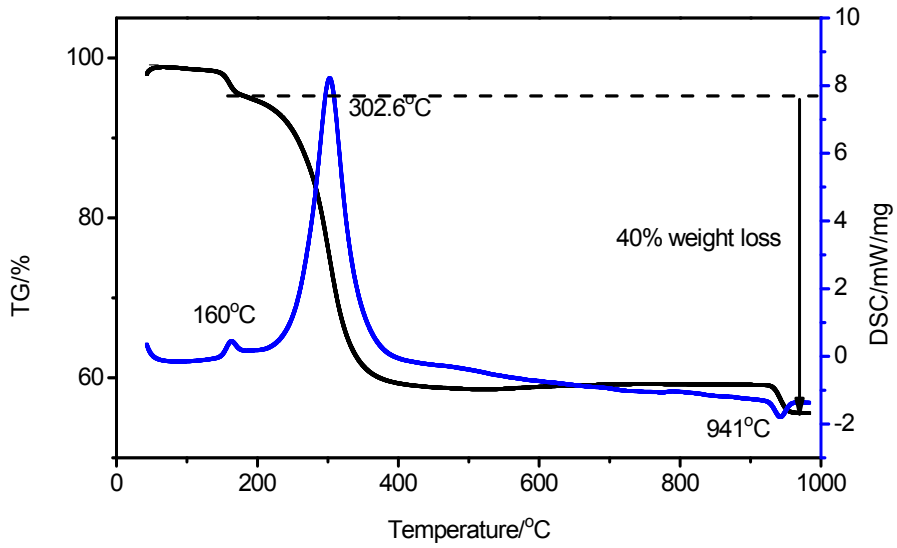

Figure 1. TG and DSC curves of the $Co(OH)_2$array/GNSs composites measured at a heating rate of 5 ºC min^{-1} in a flowing air.

The content of GNSs of the composites was determined by TGA and DSC technique carried out in the oxygen atmosphere, as shown in Fig. S1. A small endothermic peak on the DSC curve and a clear weight loss about 200 ºC, assigning to the decomposition of $Co(OH)_2$ to CoO. The weight change from 200 ºC to 400 ºC owing to the complete combustion of graphene and the oxidation of CoO. In addition, there exists a endothermic peak at 940 ºC because Co_3O_4 can be reduced into CoO nanoparticles over 900 ºC. As a

result, the weight percentages of $Co(OH)_2$ and GNSs are approximately 70% and 30% calculated from the weight loss.

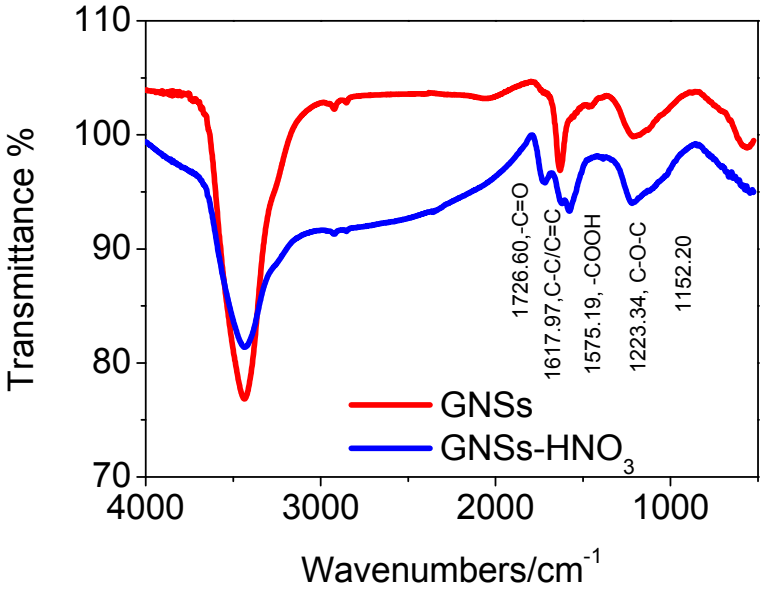

Figure S2 FTIR spectra of original GNSs and GNSs oxidized by HNO_3 at 80°C for 6 h.

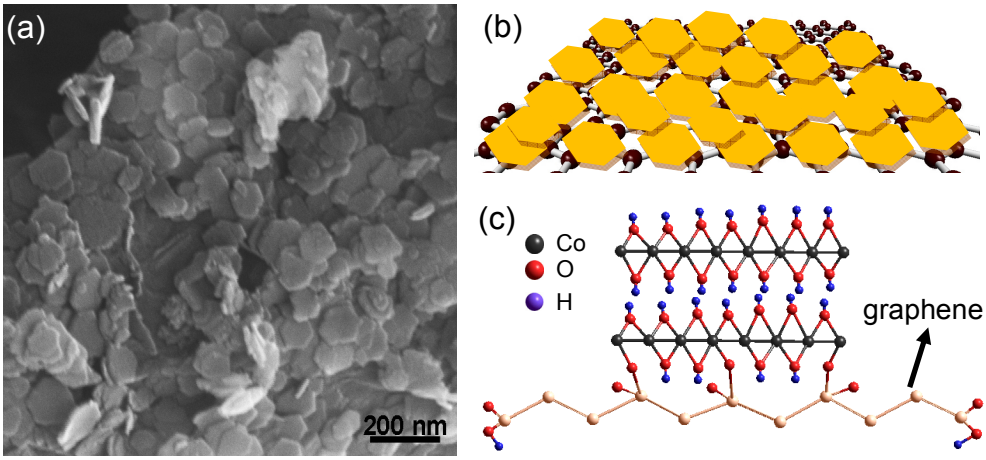

Figure S3 (a) SEM image of hexagonal $Co(OH)_2$ nanoplates on GNSs-HNO_3, (b) schematic illustration of $Co(OH)_2$ nanoplates laid flat on GNSs-HNO_3, and (c) model of interaction between $Co(OH)_2$ nanoplates and –COOH groups on GNSs-HNO_3.

Table S1 Data for Raman spectra

	Peak Center/cm^{-1}	Intensity	Peak Center/cm^{-1}	Intensity
D peak	1364	60.1	1364	47.5
G peak	1602	58.8	1602	49.0
I_D/I_G	1.02		0.97	

Table S2 Content of various carbon atoms in the spectra of C1s peaks of $Co(OH)_2$ array/GNSs and GNSs

Peak	Position	Content/(%)	
		$Co(OH)_2$ array/GNSs	GNSs
C-C/C=C	284.6	50.9	57.1
C-O	286.1	13.9	22.6
C=O	287.3	10.5	11.9
O-C=O	289.5	12.2	8.3
Co-C	283.1	12.5	--

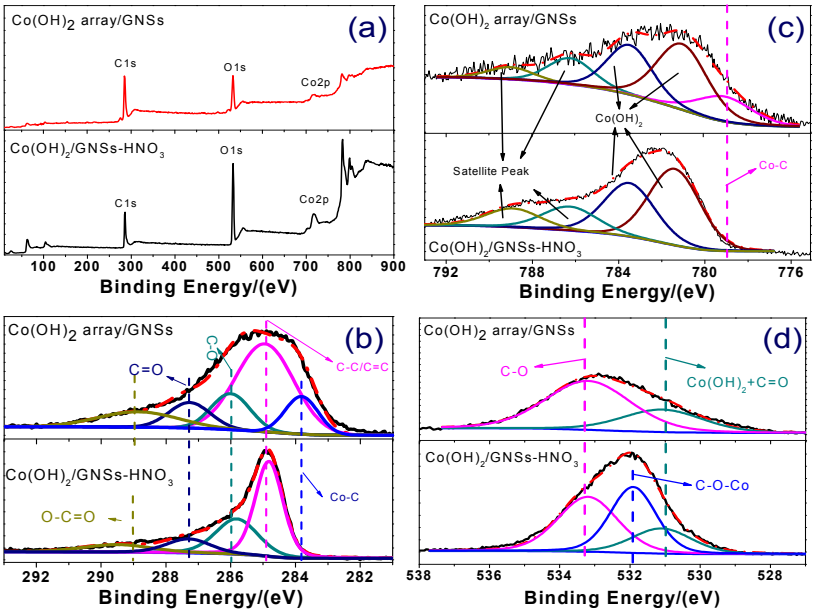

Figure S4. (a) XPS spectra of $Co(OH)_2$ array/GNSs and $Co(OH)_2$/GNSs-HNO_3, and their (b) C1s, (c) $Co2p_{3/2}$, and (d) O1s spectra.

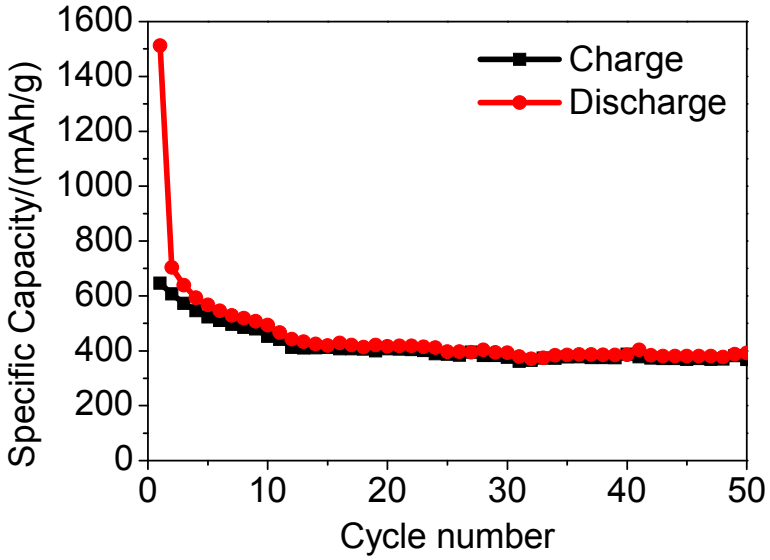

Figure S5. the cyclic performance of GNSs as anode material at 50 mAg^{-1}