Supporting Information

Synthesis of Ni/Co/Al-Layered Triple Hydroxide@Brominated Graphene hybrid on Nickel Foam as electrode material for High-Performance Supercapacitor

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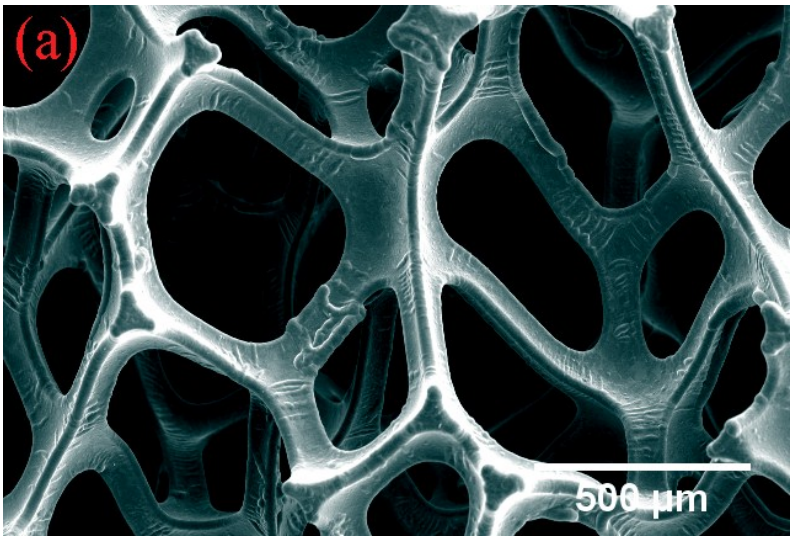


Figure S1. (a) SEM image of bare NF.

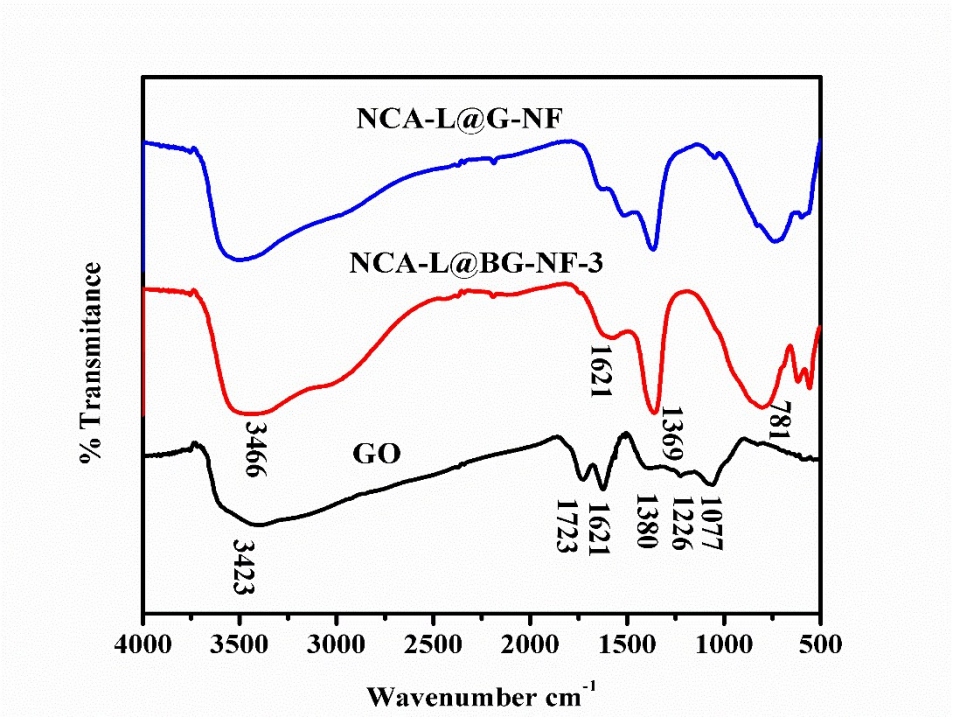


Figure S2.FTIR spectrum of GO, BG, NCA-L

As shown in Figure S2. For GO, the absorption around 1723 cm^{-1} is assigned to C=O stretching vibration of COOH groups, and the absorption around 1621 cm^{-1} is assigned to the stretching vibration of carbon backbone (C=C/C–C). Three absorption peaks around 1036, 1226 and 1398 cm^{-1} are interpreted as alkoxy (C–O), epoxy (C–O–C), and carboxyl (C–OH) stretching vibrations, respectively. Moreover, there is strong and broad absorption bands between 3423 cm^{-1} associated with hydroxyl group. The reduction of GO to BG only presents absorption peaks at 1621 cm^{-1} and a small absorption peak of alkoxy groups at 1036 cm^{-1}. However, as for NCA@BG-NF, the above characteristic absorption bands related to C=O and C–O stretching vibrations disappear because during hydrothermal reaction LTH is formed at the same time GO is reduced to BG and hybridized with LTH. In addition there are two intense peaks at around 781 and 1369cm^{-1} indicative of the existence of CO_3^{-2} anions of LTH.[1,2]

Table S1. XPS quantitative elemental composition analysis of prepared samples (At. %)

Samples	C1s	O1s	Ni2p	Co2p	Al2p	Br3d
NCA-L@G-NF	20.25	59.72	13.04	1.1	5.89	-
NCA-L@BG-NF-1	16.85	56.44	8.37	8.8	7.47	2.07
NCA-L@BG-NF-2	19.59	55.66	16.04	3.49	3.09	2.13
NCA-L@BG-NF-3	19.34	59.21	11.82	1.43	6	2.2

High resolution XPS spectrums Ni2p, Co2p, Al2p, Br3d in NCA-L@BG-NF-3

As shown in figure S3a, b high resolution Ni 2p spectrum displayed two distinct peaks at 857.4 eV and 874.9 which correspond to Ni 2p3/2 and Ni 2p1/2, signals of Ni2 with a spin-energy separation of 17. 5 eV, are assigned toNi^{2+} state in Ni(OH).On the other hand The peaks at and 782.6 eV and 798.4 eV corresponds to Co 2p3/2 and Co 2p1/2, respectively, indicating the Co^{+2} oxidation state and the spin orbit splitting energy value is almost 15.8eV in NCA-L@BG-NF-3.[3] As shown in figure S3c the peak corresponding to Al 2p at 74.1 eV confirming the presence of Al in NCA-L.[4] As shown in figure S3 d. In addition, the prominent Br 3d peak at 68.5 eV is assigned to ionic Br^-.[5]

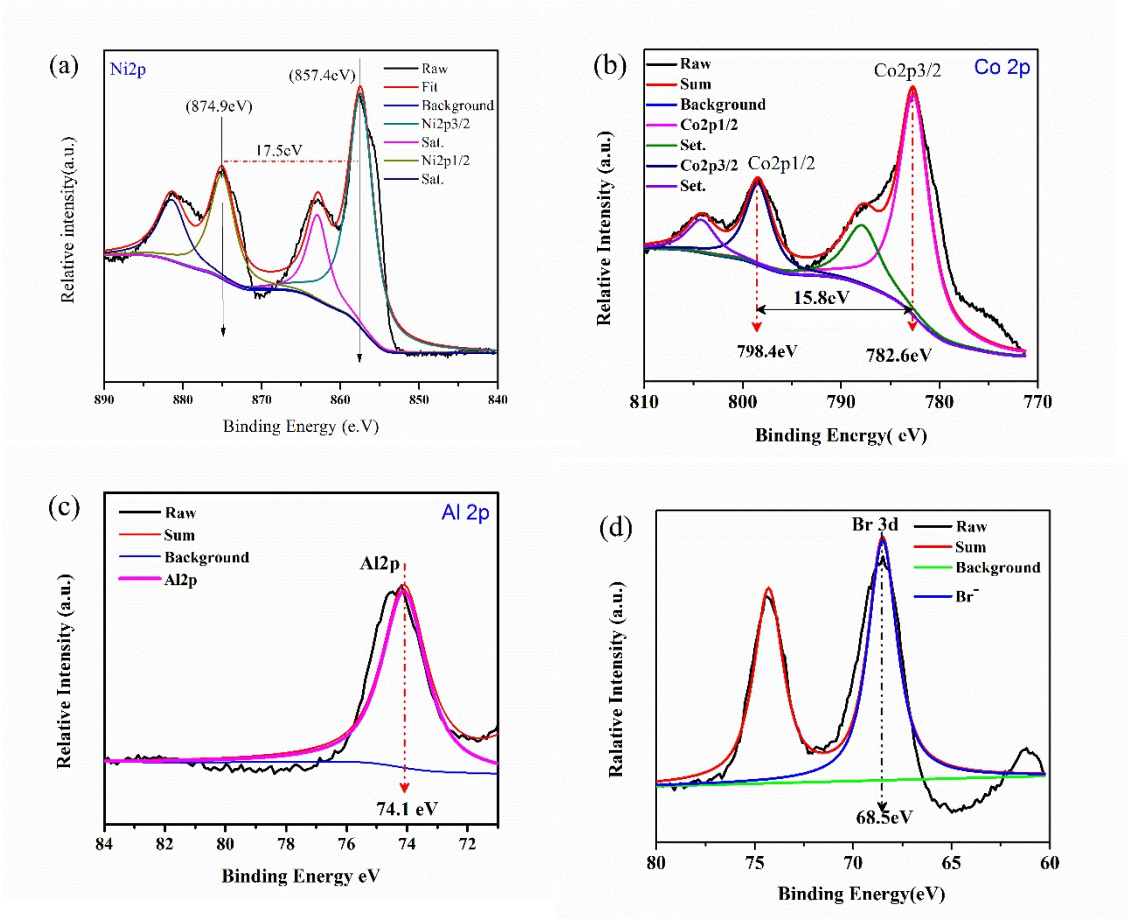
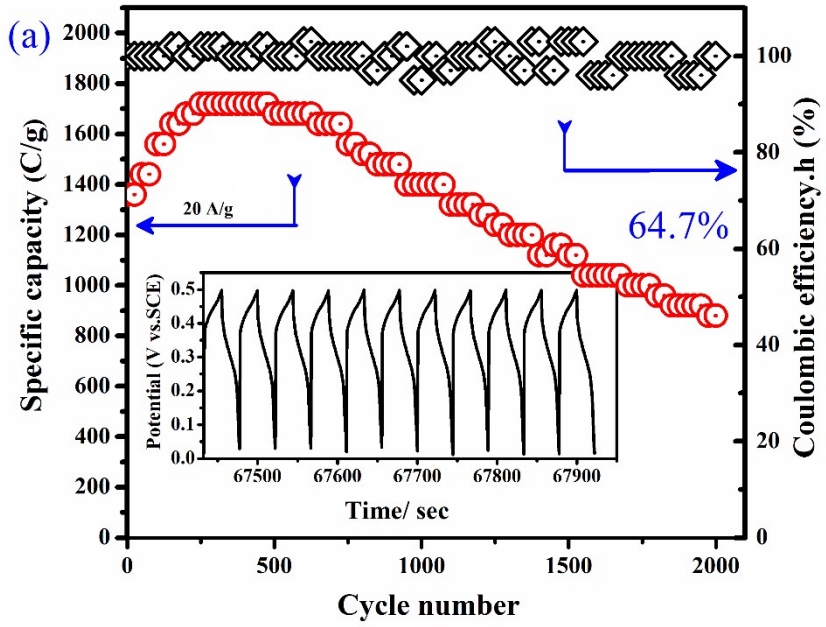
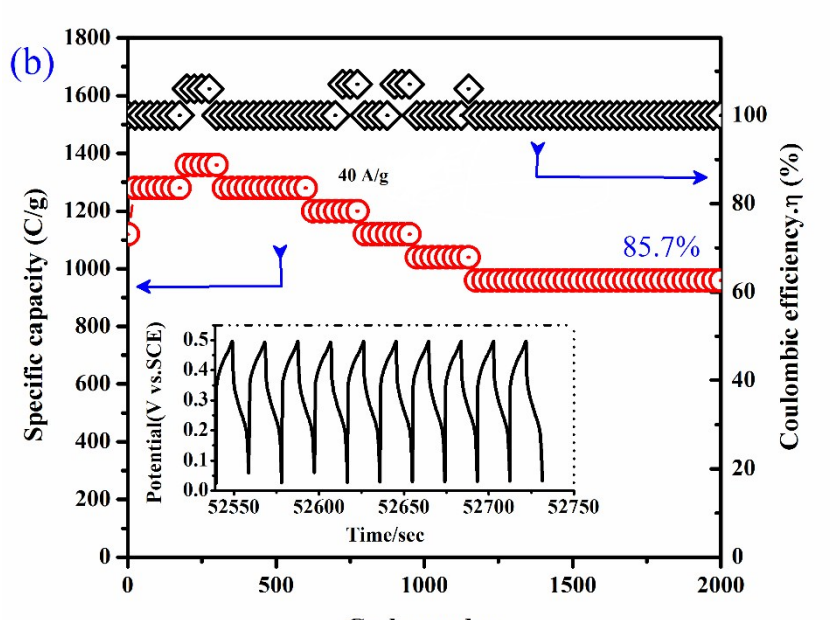


Figure S3. High resolution XPS spectrum (a) Ni2p, (b) Co2p, (c) Al2p and (d) Br3d of NCA-L@BG-NF-3


(a)
Specific capacity (C/g)
Coulombic efficiency.h (%)
Cycle number
20 A/g
64.7%
Potential (V vs.SCE)
Time/ sec


(b)
Specific capacity (C/g)
Coulombic efficiency.η (%)
40 A/g
85.7%
Potential(V vs.SCE)
Time/sec

Reference

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