Electronic Supplementary Information

Nanoneedles decorated NiCo-layered double hydroxide microspheres tuned as high-efficiency electrodes for pseudocapacitors

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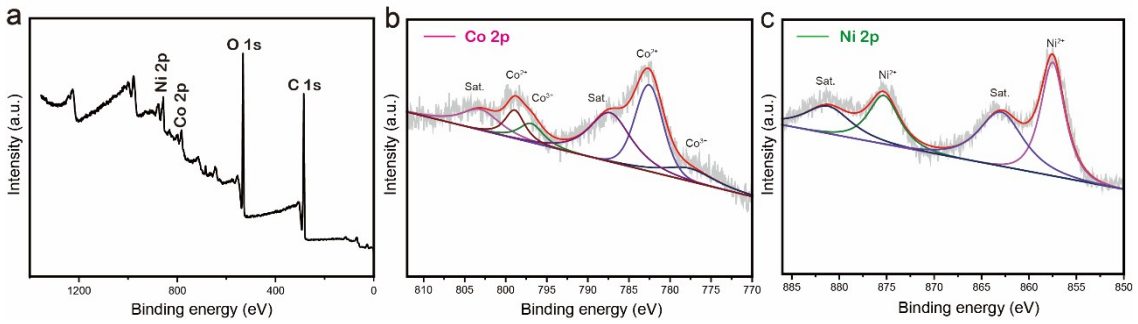

Fig. S1 XPS spectra of the NiCo-LDH-13 microspheres: (a) a full survey spectrum, (b) Co 2p, (c) Ni 2p.

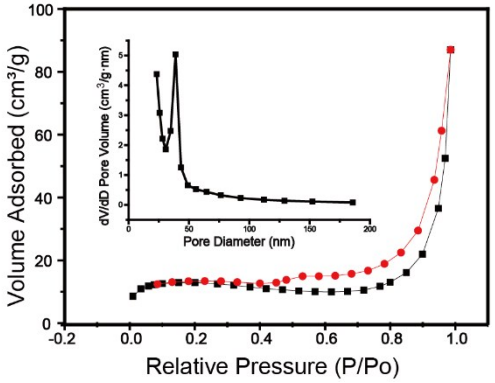

Fig. S2 N_2 adsorption-desorption isotherms of the NiCo-LDH-13 microspheres.

Table S1.

Comparison of specific surface area, pore size distribution, and pore volume between those four different microspheres.

Sample	S_{BET} (m^2 g^{-1})	Pore size distribution (nm)	Pore volume (cm^3 g^{-1})
NiCo-LDH-0	39.3	22.81	0.01385
NiCo-LDH-6.5	27.3	24.06	0.01328
NiCo-LDH-13	127.8	23.03	0.2624
NiCo-LDH-26	8.4	33.36	0.0204

Table S2.

Comparison of electrochemical performance between our NiCo-LDH-13 electrode and the NiCo-LDH electrodes reported previously.

Supercapacitor electrode materials	Specific capacitance ($F\ g^{-1}$)	Rate Capability	Cyclic Stability	References
NiCo-LDH nanoflakes	1372	67.8% from 1 to 30 A g^{-1}	94.3% after 2000 cycles at 2 A g^{-1}	[1]
α -$Ni_{0.5}Co_{0.5}$ hydroxide	1600	-	64% after 1000 cycles at 10 A g^{-1}	[2]
$Ni_{50}Co_{50}$-LDH ultrathin nanosheets	1537 (0.5 A g^{-1})	76.8% from 0.5 to 10 A g^{-1}	80.3% after 1000 cycles at 2 A g^{-1}	[3]
Urchin-Like $Ni_{1/3}Co_{2/3}(CO_3)_{1/2}(OH)\cdot 0.11H_2O$	1226.8	92.1% from 0.5 to 20 A g^{-1}	97.7% after 10000 cycles at 5 A g^{-1}	[4]
NiCo-LDH nanoflakes-CNTs	1151	60.9% from 1 to 70 A g^{-1}	77% after 10000 cycles at 10 A g^{-1}	[5]
NiCo-LDH derived from ZIF-67	1530	49.5% from 1 to 10 A g^{-1}	89.3% after 1000 cycles at 5 A g^{-1}	[6]
3D flower-like α -phase NiCo-LDH microsphere	1120	88.9% from 1 to 10 A g^{-1}	122.5% after 2000 cycles at 10 A g^{-1}	[7]
HCNs@NiCo-LDH	2558	74.9% from 1 to 20 A g^{-1}	-	[8]
NiCo-LDH/PANI/BC	1690	46% from 1 to 15 A g^{-1}	83.2% after 5000 cycles	[9]
Ultrathin NiCo-LDH-graphene nanosheets	1489	68% from 1 to 100 A g^{-1}	80% after 5000 cycles at 6 A g^{-1}	[10]
flower-on-sheet NiCo-LDH	1187.2	71% from 1 to 30 A g^{-1}	83% after 1000 cycles at 10 A g^{-1}	[11]
NiCo-LDH/CFC	1510	83.4% from 1 to 15 A g^{-1}	84.6% after 5000 cycles at 10 A g^{-1}	[12]
NiCo-LDH-13	1644	90.5% from 1 to 10 A g^{-1}	93% after 1000 cycles at 10 A g^{-1}	This work

References

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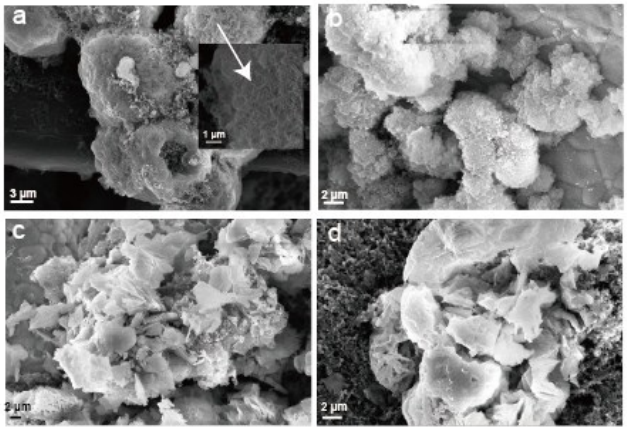

Fig. S3 SEM images of the (a) NiCo-LDH-13, (b) NiCo-LDH-0, (c) NiCo-LDH-6.5, (d) NiCo-LDH-26 after 1000 cycles at a current of 1 A g^{-1}.