

Electronic Supplementary Information

Cation exchange reaction derived amorphous bimetal hydroxides as advanced battery materials for hybrid supercapacitors

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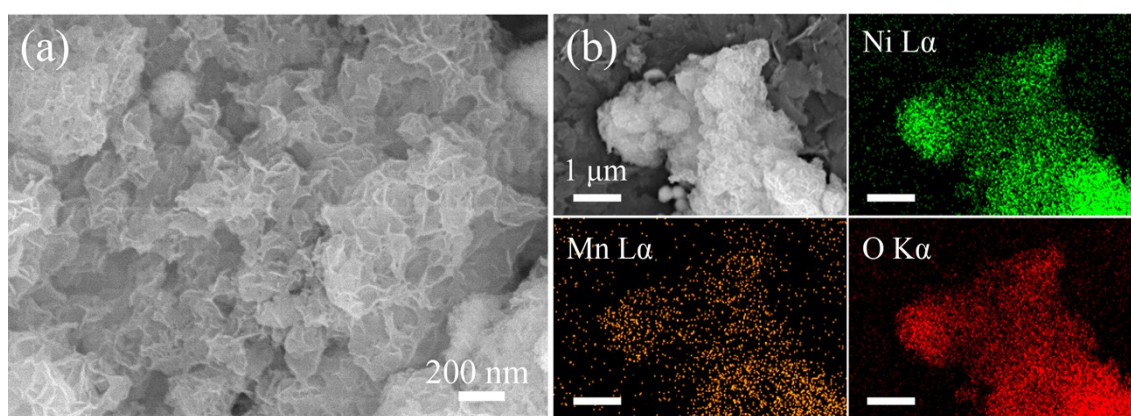


Fig. S1 (a) SEM and (b) EDS mapping images of Ni–Mn sample.

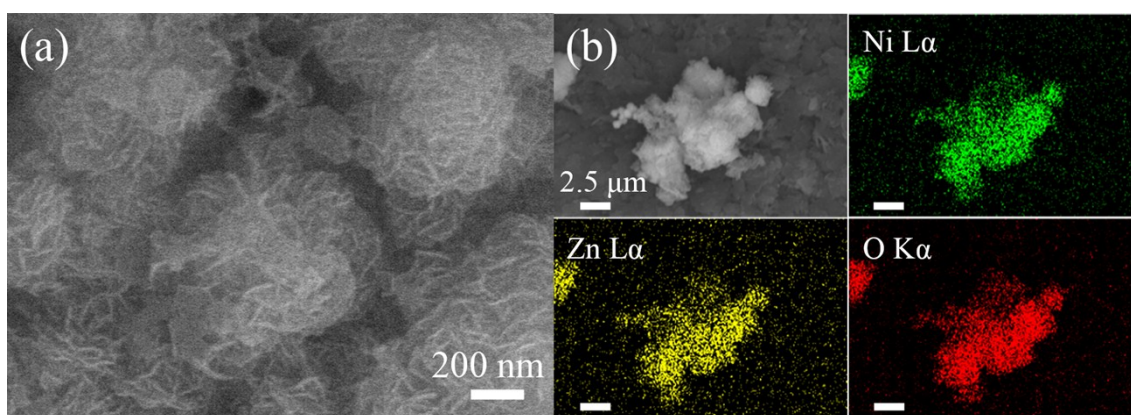


Fig. S2 (a) SEM and (b) EDS mapping images of Ni–Zn sample..

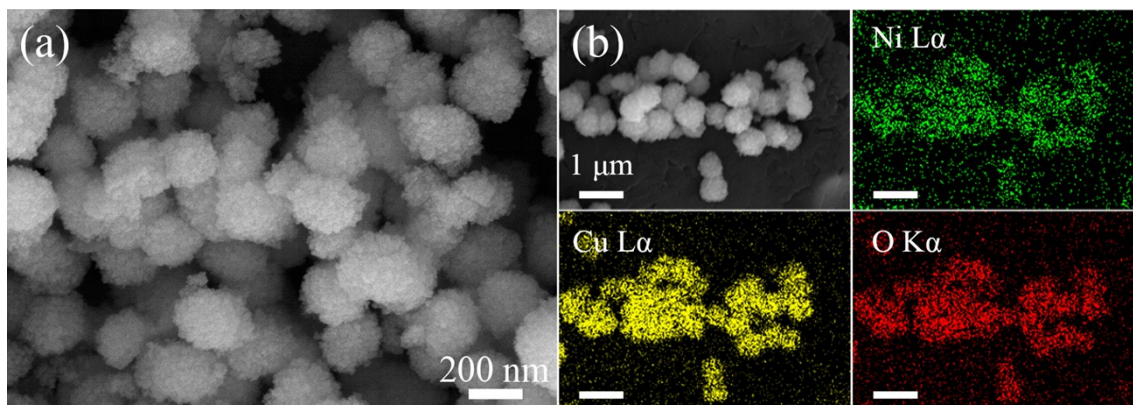


Fig. S3 (a) SEM and (b) EDS mapping images of Ni–Cu sample.

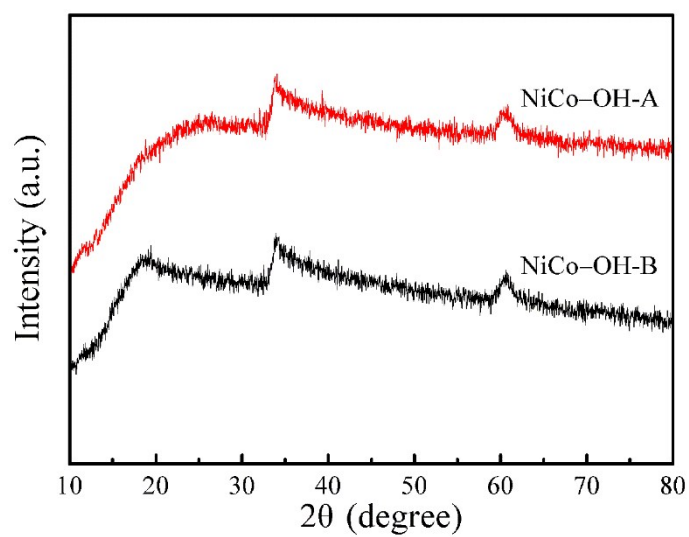


Fig. S4 XRD patterns of amorphous NiCo–OH-A and NiCo–OH-B.

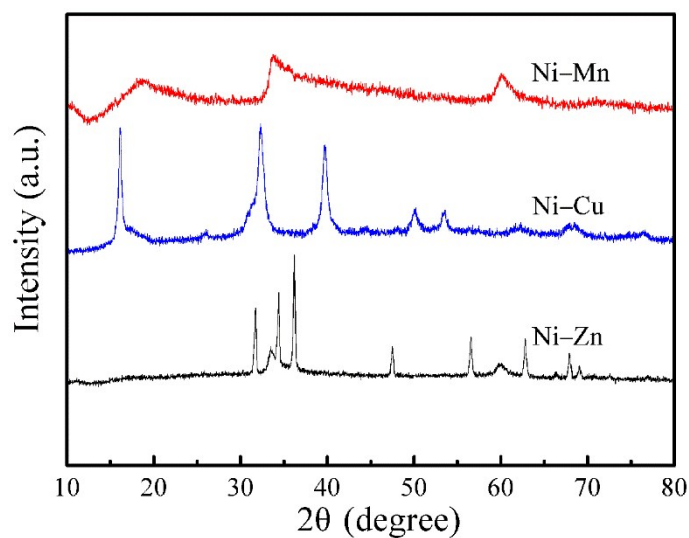


Fig. S5 XRD patterns of Ni–Mn, Ni–Zn and Ni–Cu samples.

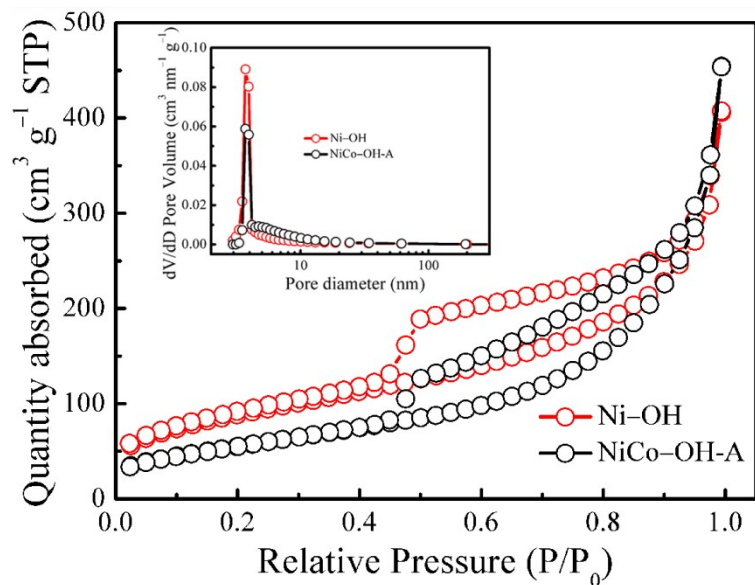


Fig. S6 Nitrogen adsorption-desorption isotherms and the corresponding pore size distribution curves (inset) of NiCo-OH-A and Ni-OH.

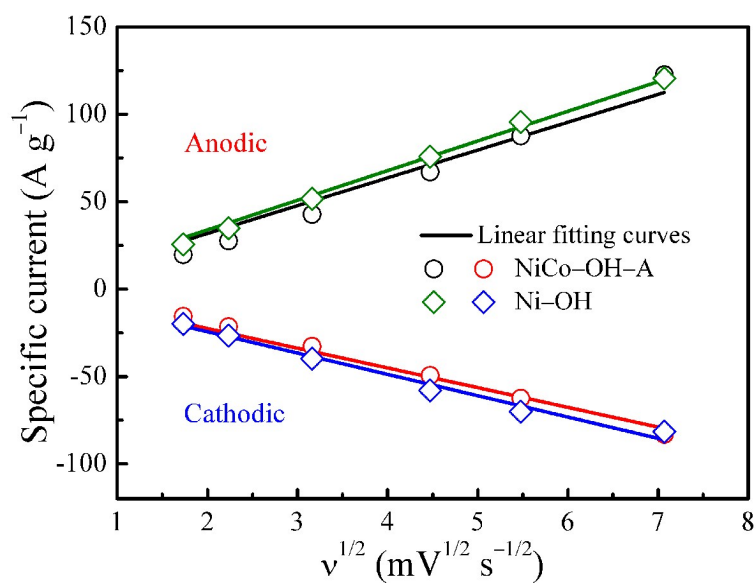


Fig. S7 Experimental and linear fitting results of the specific currents of CV redox peaks as a function of $v^{1/2}$ for the NiCo-OH-A and Ni-OH samples.

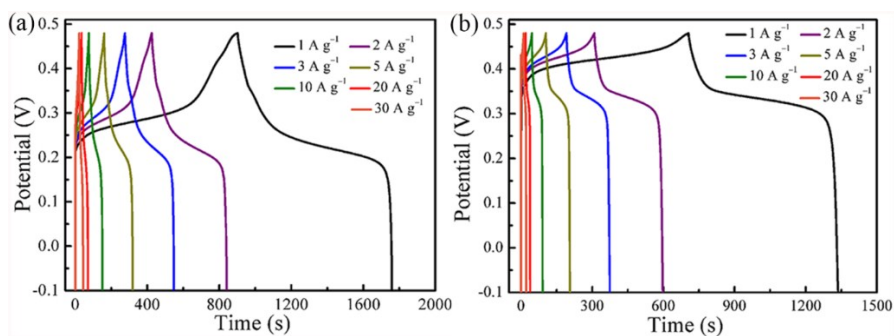


Fig. S8 GCD curves of the (a) NiCo-OH-B and (b) Ni-OH.

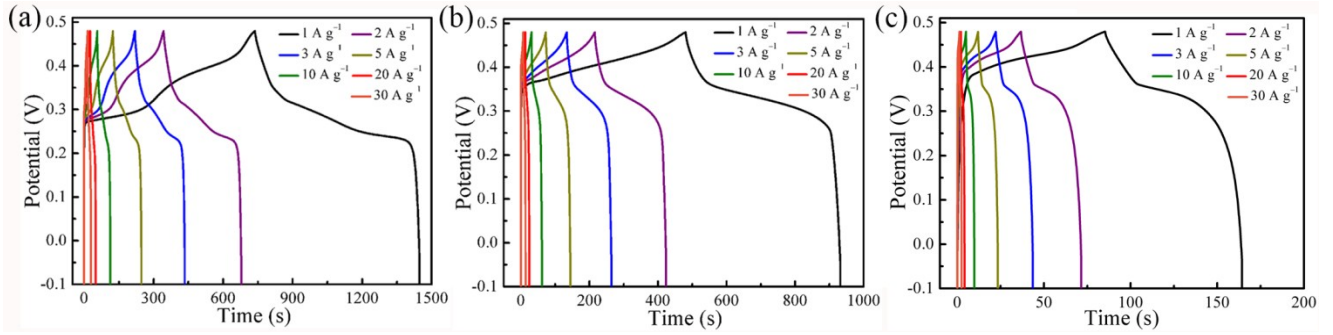


Fig. S9 GCD curves of the (a) Ni-Mn, (b) Ni-Zn and (c) Ni-Cu samples.

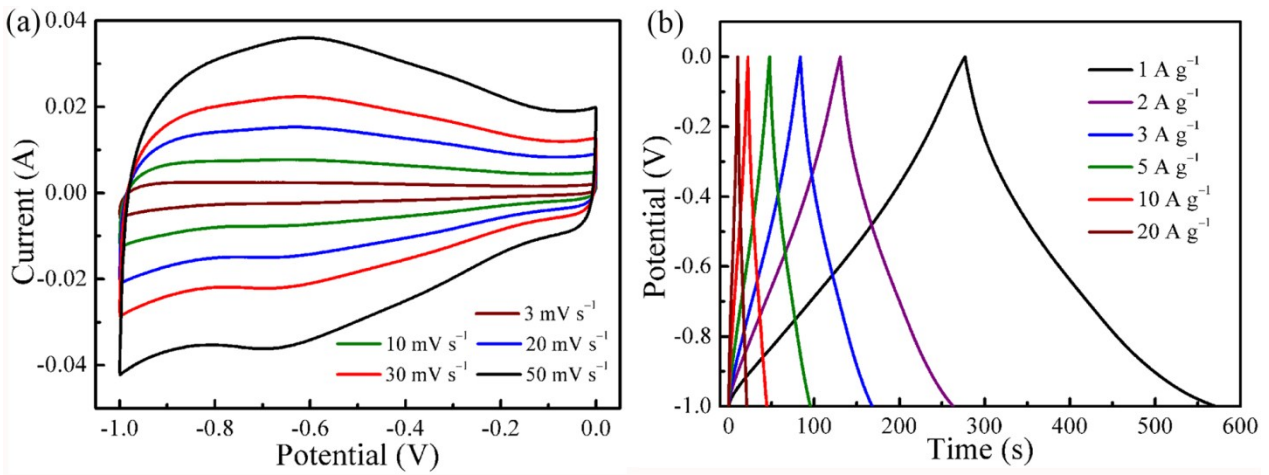


Fig. S10 (a) CV curves and (b) GCD curves of the RGO electrode.

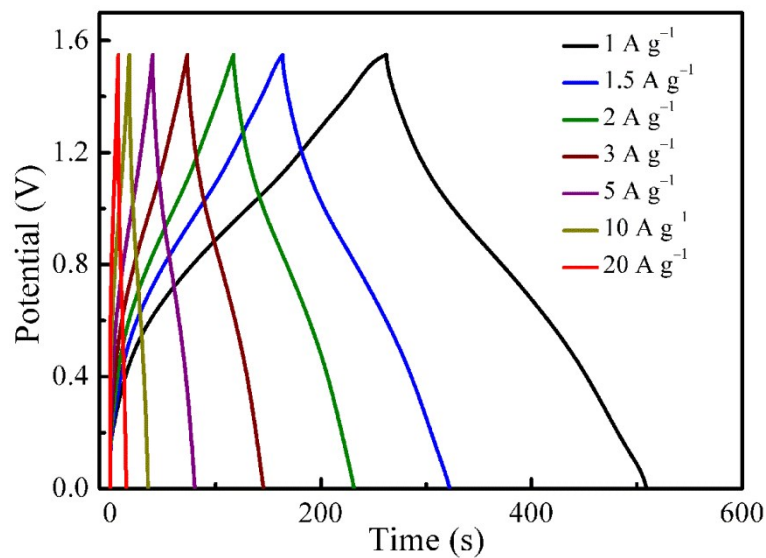


Fig. S11 GCD curves of the NiCo-OH-A/RGO HSC.

Table S1 The specific energy and specific power performances of the HSCs based on multi-metal hydroxides reported in references.

Types of HSC	Specific energy (Wh kg ⁻¹)	Reference
NiCo–OH-A//RGO	49.9 (727 W kg ⁻¹), 21.1 (17.51 Kw kg ⁻¹)	This work
α -NiCo hydroxide//AC	42.5 (400 W kg ⁻¹), 10.7 (6.4 Kw kg ⁻¹)	[49]
Ultrathin NiCo hydroxide sheets//AC	42.4 (823.2 W kg ⁻¹), 24.8 (10.17 Kw kg ⁻¹)	[50]
Co _{0.5} Ni _{0.5} (OH) ₂ /graphene/CNT//AC/CNT	41 (210 W kg ⁻¹), 29 (4.2 Kw kg ⁻¹)	[16]
α -(Ni/Co)(OH) ₂ /graphene//AC	41 (216 W kg ⁻¹), 29.3 (4.2 Kw kg ⁻¹)	[39]
NiCo LDH/carbon nanorods//AC	25.4 (749 W kg ⁻¹), 6.4 (7.4 Kw kg ⁻¹)	[40]
3D NiCo hydroxide/graphene/nickel foam//AC	33.75 (750 W kg ⁻¹), 20.84 (7.5 Kw kg ⁻¹)	[51]
N-doped carbonized bacterial cellulose (CBC-N)/NiCo LDH//CBC-N	36.3 (800.2 W kg ⁻¹), 22.7 (8.0 Kw kg ⁻¹)	[52]
Graphene-encapsulated carbon@NiAl LDH core-shell spheres//RGO	35.5 (670.7 W kg ⁻¹), 32.1 (5.58 Kw kg ⁻¹)	[43]
NiAl LDH hollow microspheres//AC nanofibers	20 (750 W kg ⁻¹), 6.6 (11.25 Kw kg ⁻¹)	[53]
CoAl LDH supported by dodecyl sulfate-graphene//graphene/AC	41.2 (185.4 W kg ⁻¹), 20.4 (9.3 Kw kg ⁻¹)	[54]
NiCoMn hydroxide nanoflakes on nickel foam//RGO	55.42 (750 W kg ⁻¹), 14.58 (3.75 Kw kg ⁻¹)	[55]
MnCo LDH@Ni(OH) ₂ heterostructures on Ni foam//AC	47.9 (750.7 W kg ⁻¹), 9.8 (5.02 Kw kg ⁻¹)	[56]