Electronic Supplementary Material (ESI) for CrystEngComm.

Supporting information

Optimizing crystallinity and porosity of hierarchical $Ni(OH)_2$ through conformal transformation of metal organic template for supercapacitor applications

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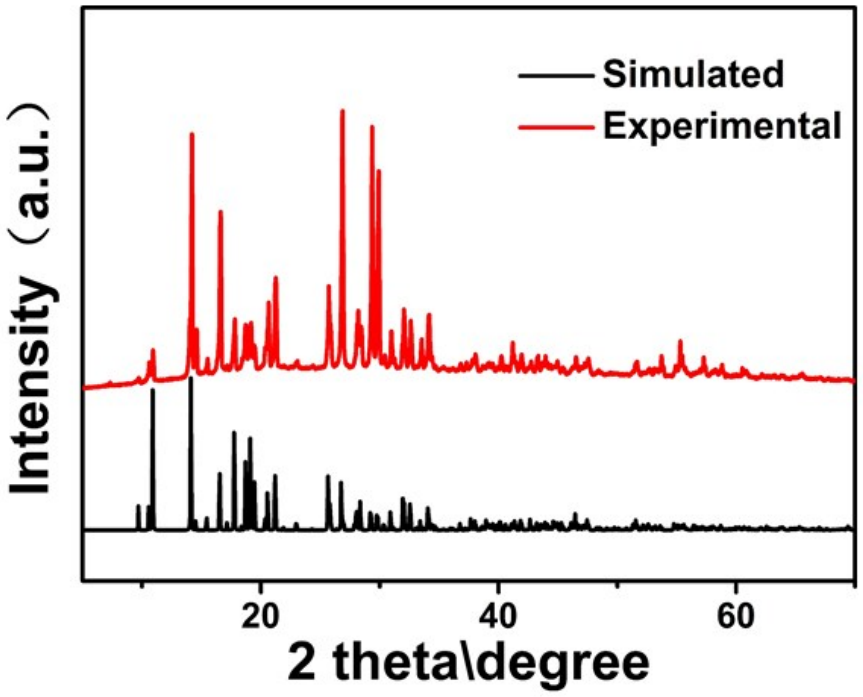

Figure S1 Experimental (red) and simulated (black) XRD patterns of the **Ni-MOF**

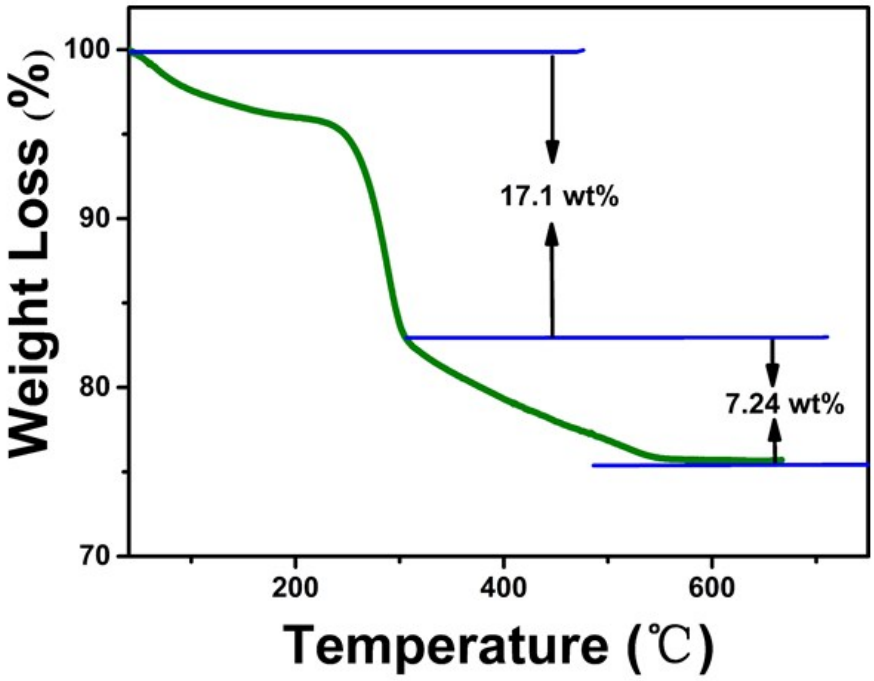

Figure S2 TG curve of **$Ni(OH)_2$-6M-6H** in nitrogen atmosphere.

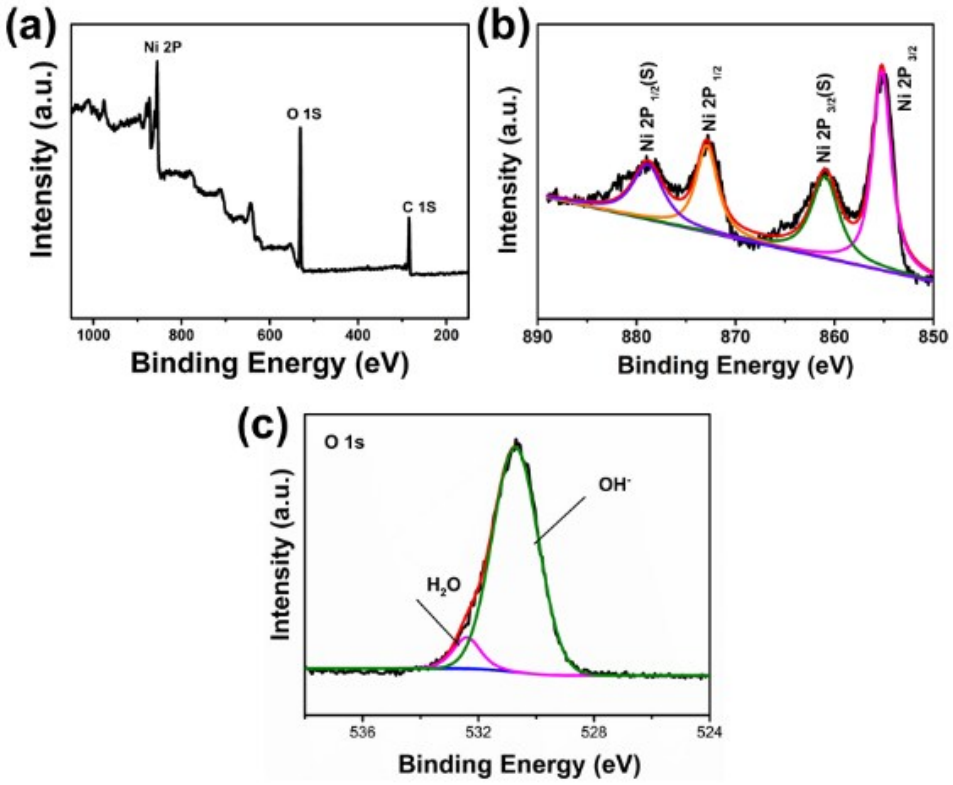

Figure S3 The Full XPS spectrum of the **Ni(OH)$_2$-6M-6H a)**, Elemental Ni 2p spectrum of the prepared **Ni(OH)$_2$-6M-6H**. **b),** Elemental O 1s spectrum of the prepared **Ni(OH)$_2$-6M-6H**. **c).**

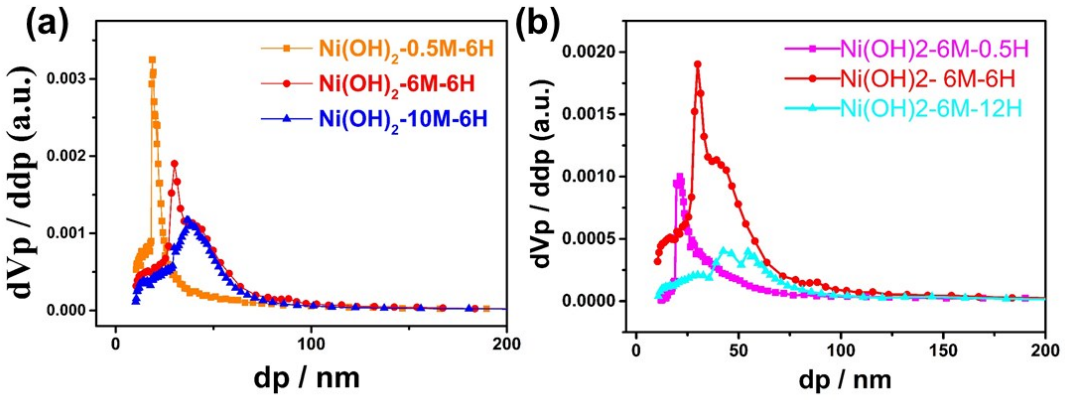

Figure S4 The pore size distribution of different alkaline hydrolyzing concentrations **Ni(OH)$_2$-0.5M-6H**, **Ni(OH)$_2$-6M-6H and Ni(OH)$_2$-10M-6H a),** The pore size distribution of different alkaline hydrolyzing time **Ni(OH)$_2$-6M-0.5H**, **Ni(OH)$_2$-6M-6H and Ni(OH)$_2$-6M-12H b).**

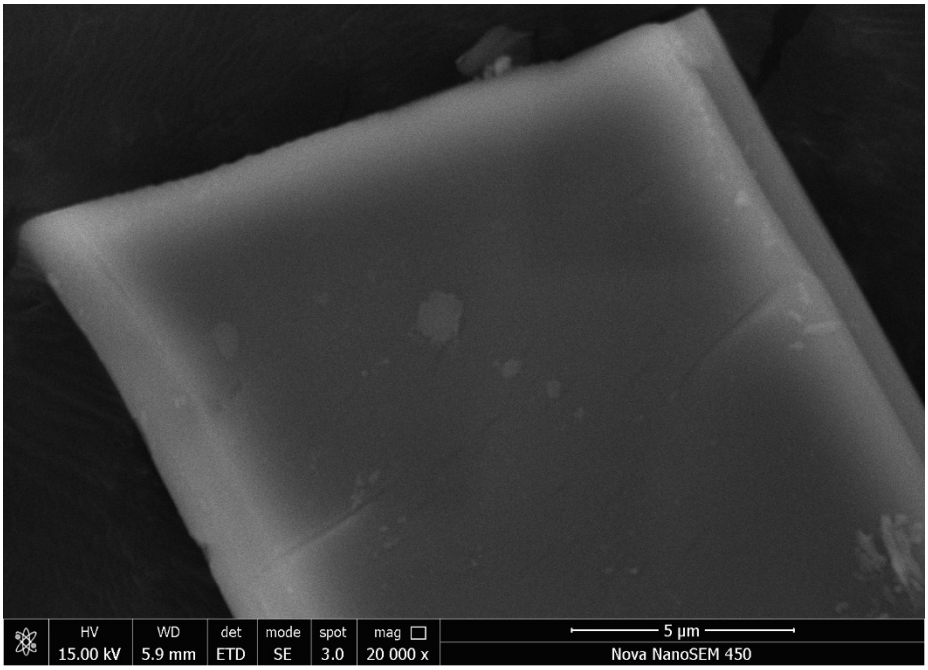

Figure S5 The SEM images of the **Ni MOF**.

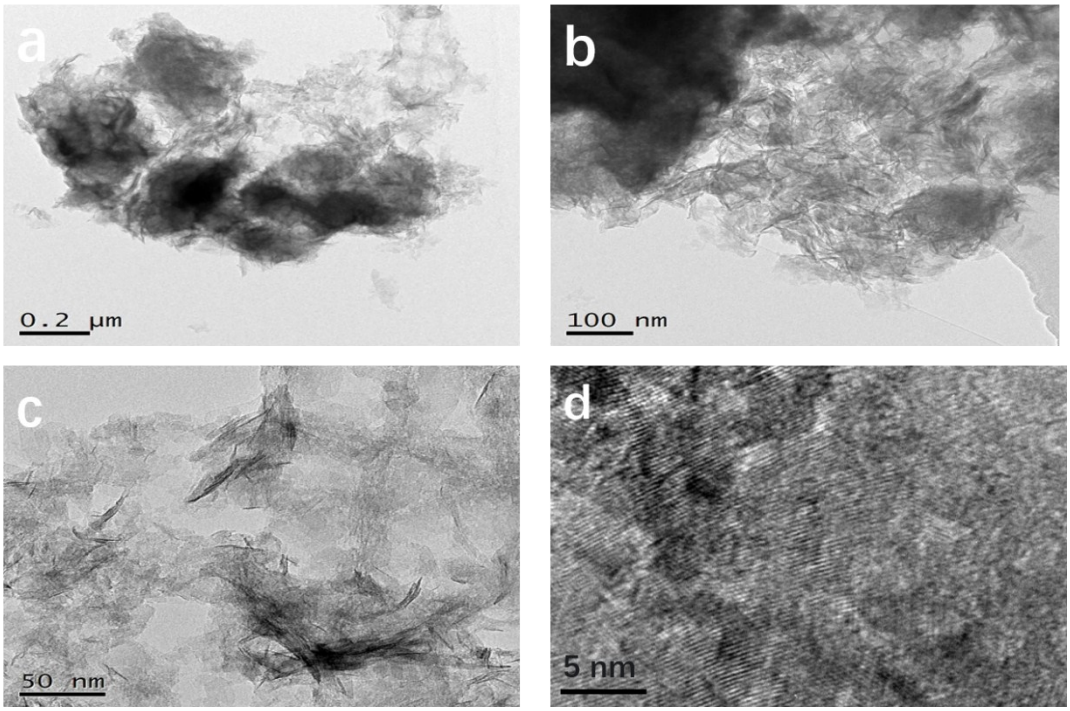

Figure S6 a-d) The TEM and HRTEM images of **$Ni(OH)_2$-10M-6H**.

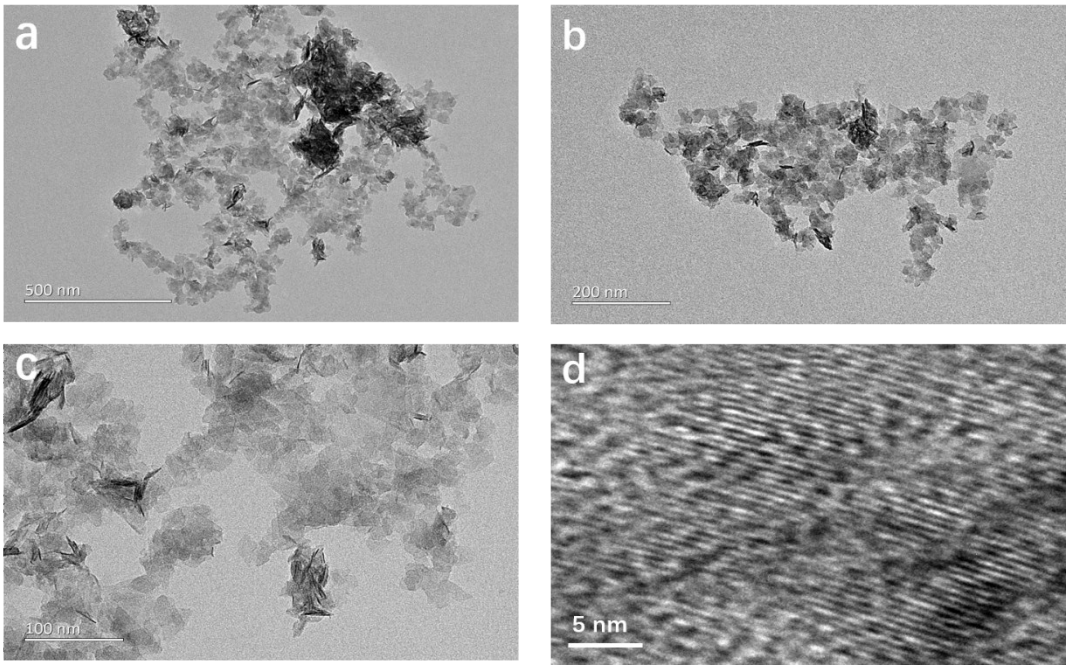

Figure S7 a-d) The TEM and HRTEM images of **$Ni(OH)_2$-6M-12H**.

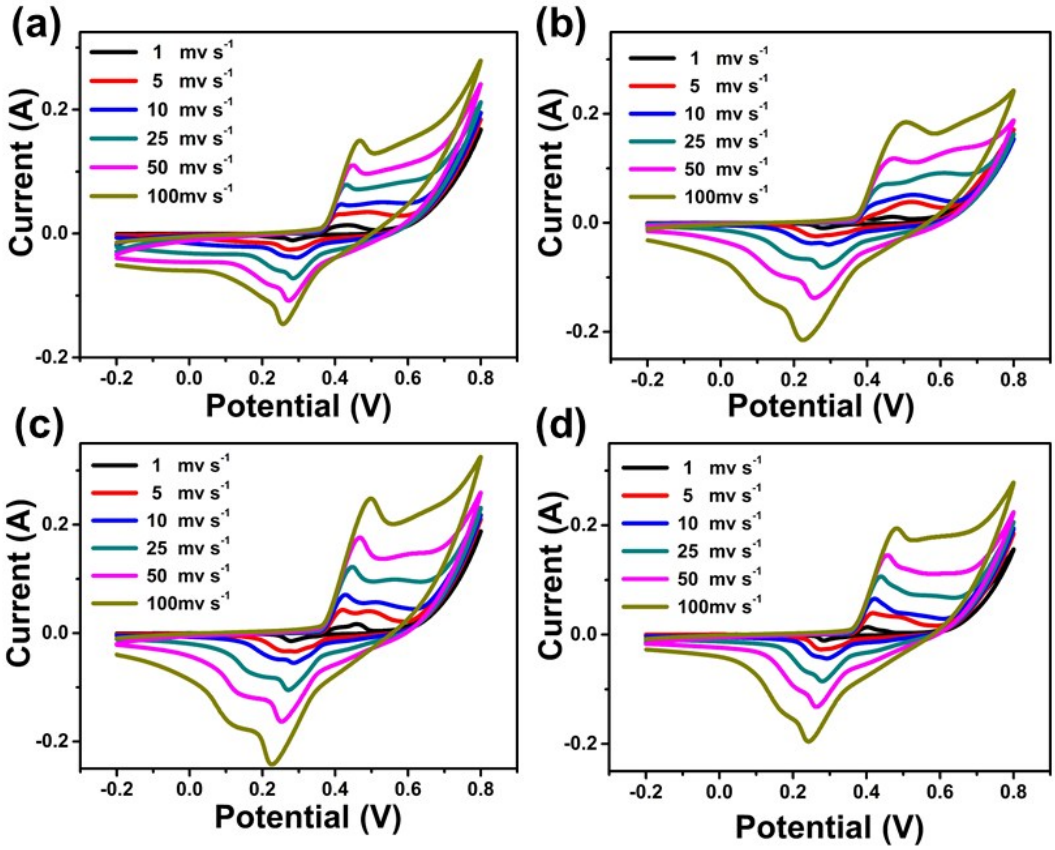

Figure S8 The CV curves of as-prepared **Ni-MOF** at different alkaline hydrolyzing concentrations **($Ni(OH)_2$-0.5M-6H**, **$Ni(OH)_2$-1M-6H**, **$Ni(OH)_2$-6M-6H** and **$Ni(OH)_2$-10M-6H)** at different scan rates, respectively.

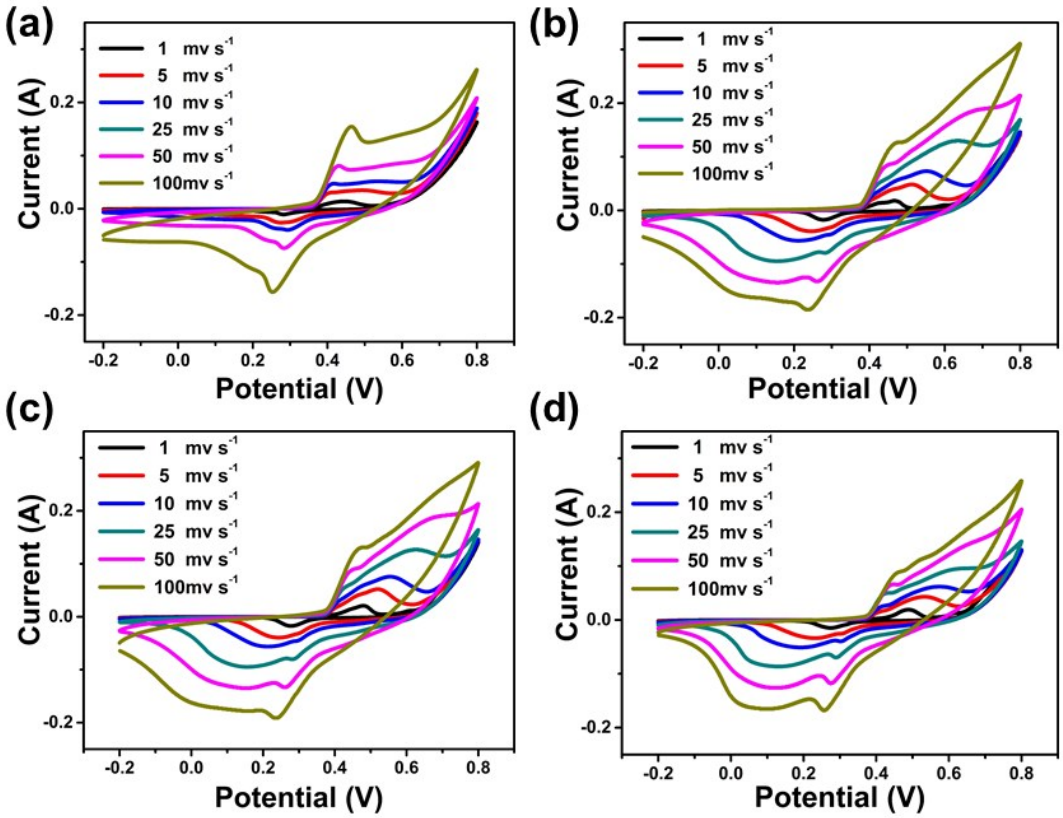

Figure S9 The CV curves of as-prepared **Ni-MOF** at different alkaline hydrolyzing time. **($Ni(OH)_2$-6M-0.5H**, **$Ni(OH)_2$-6M-1H**, **$Ni(OH)_2$-6M-2H** and **$Ni(OH)_2$-6M-12H)** at different scan rates, respectively.

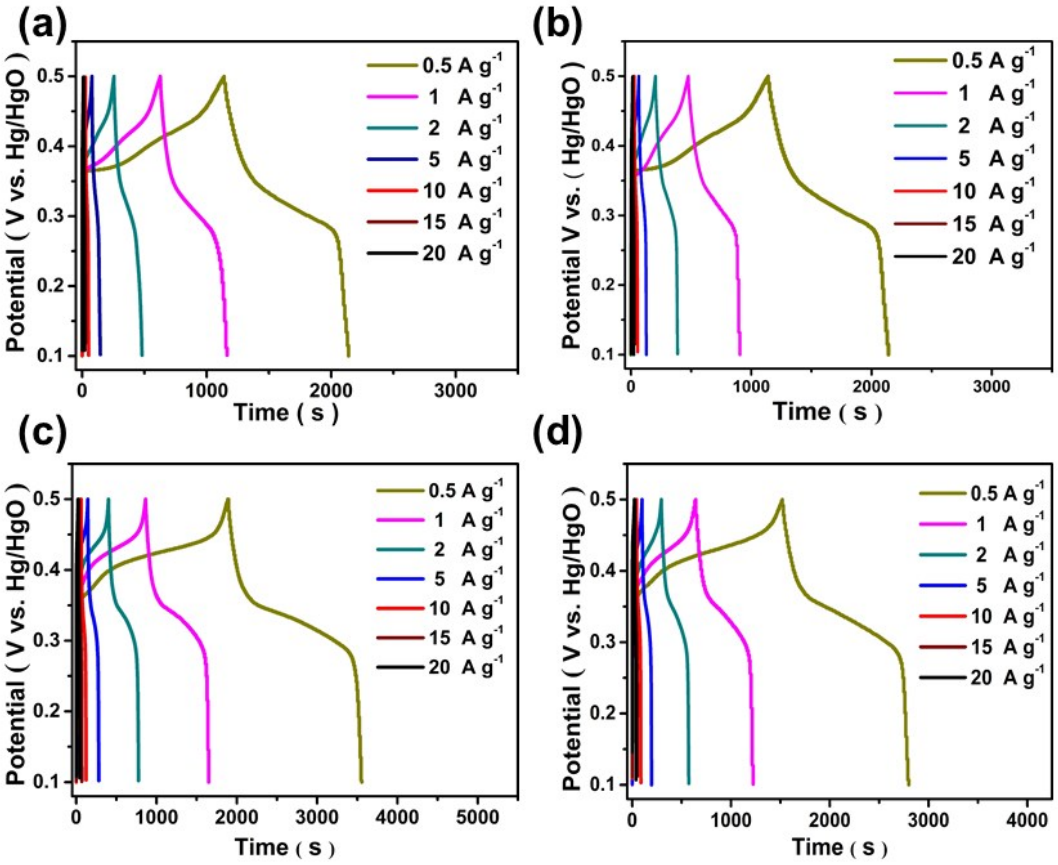

Figure S10 The Galvanostatic charge-discharge curves of as-prepared **Ni-MOF** at different alkaline hydrolyzing concentrations **($Ni(OH)_2$-0.5M-6H**, **$Ni(OH)_2$-1M-6H**, **$Ni(OH)_2$-6M-6H** and **$Ni(OH)_2$-10M-6H)** at different current densities, respectively.

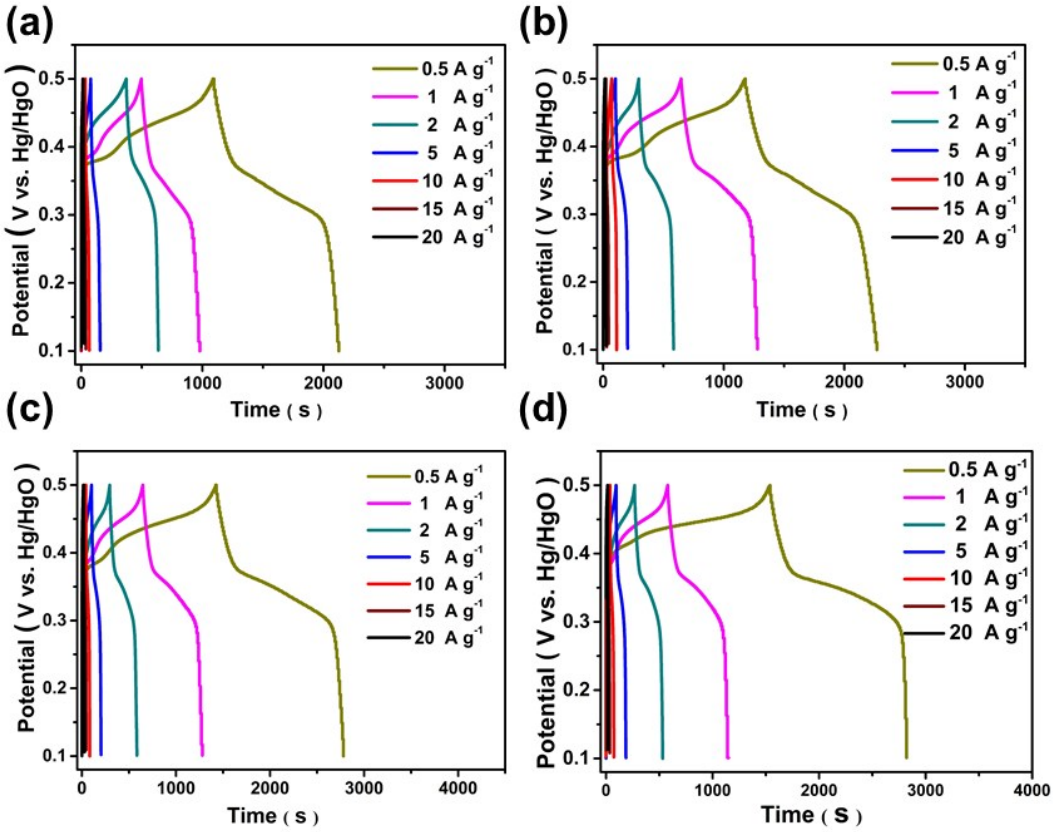

Figure S11 The Galvanostatic charge-discharge curves of as-prepared **Ni-MOF** at different alkaline hydrolyzing time. **($Ni(OH)_2$-6M-0.5H**, **$Ni(OH)_2$-6M-1H**, **$Ni(OH)_2$-6M-2H** and **$Ni(OH)_2$-6M-12H)** at different scan rates, respectively.

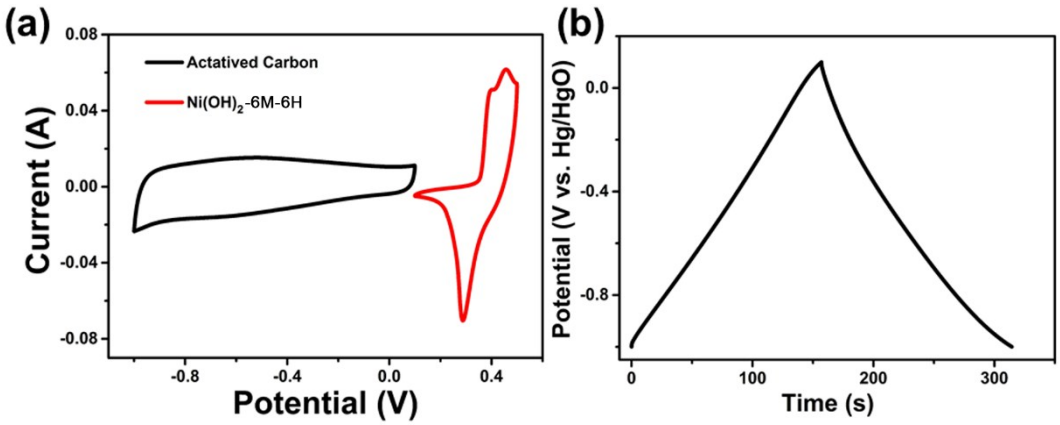

Figure S12 CV curves of AC and **$Ni(OH)_2$-6M-6H** at a scan rate of 1 $mv \cdot s^{-1}$ a), Galvanostatic charge/discharge curves of AC electrode obtained at the current of 1 $A \cdot g^{-1}$ b).

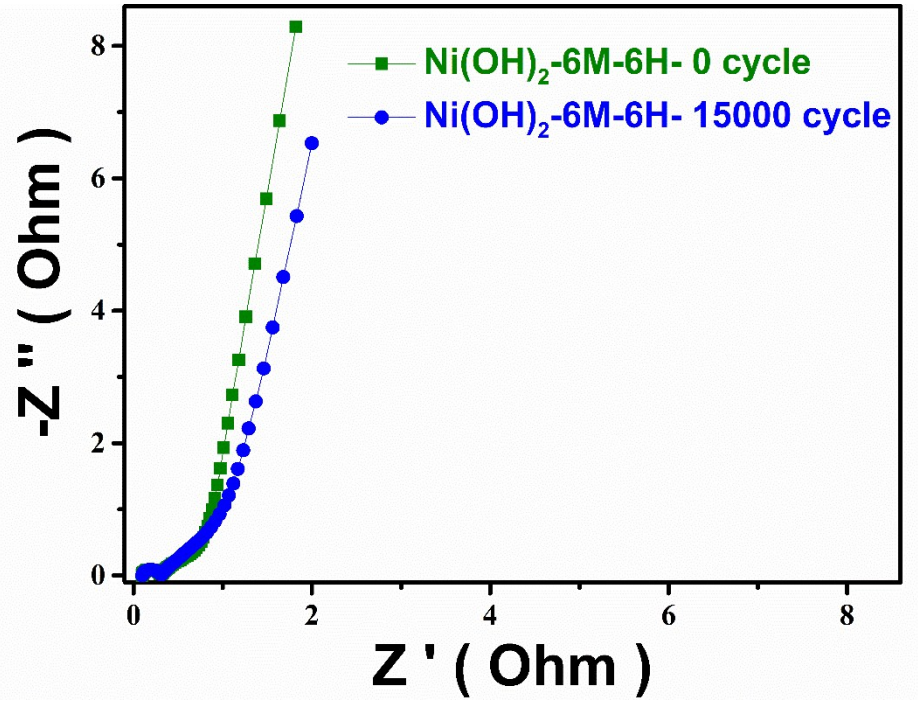

Figure S13 Nyquist plots of the as-prepared **$Ni(OH)_2$-6M-6H** electrode before and after 150000 cycles at 1 Ag^{-1}.

Sample name	Rs (Ω)	Rct (Ω)	CPE-T (F)	CPE-P	W-R (Ohm)	W-T	W-P
$Ni(OH)_2$-0.5M-6H	0.9616	0.39071	0.000808	0.78762	0.4674	0.08703	0.18546
$Ni(OH)_2$- 1M-6H	0.9728	0.195093	0.00075	0.79095	0.24603	0.0844	0.55665
$Ni(OH)_2$- 6M-6H	0.10517	0.16523	0.000257	1.005	0.20603	0.10681	0.54365
$Ni(OH)_2$-10M-6H	0.10218	0.17523	0.000246	0.9458	0.30603	0.0981	0.10367
$Ni(OH)_2$-6M-0.5H	0.0982	0.42681	0.001078	0.74301	0.32393	0.13525	0.28392
$Ni(OH)_2$-6M-1H	0.10488	0.20007	0.000377	0.96725	0.20694	0.12428	0.55516
$Ni(OH)_2$-6M-2H	0.098125	0.24063	0.000309	0.97808	0.24252	0.038224	0.40272
$Ni(OH)_2$-6M-12H	0.0982	0.22835	0.000581	0.88812	0.33609	0.03226	0.29862

Table S1 Parameters of the proposed equivalent circuit model.

Sample name	specific capacity at $1Ag^{-1}$ (Cg^{-1})	specific capacity at $20Ag^{-1}$ (Cg^{-1})
$Ni(OH)_2$-0.5M-6H	594.8	212
$Ni(OH)_2$- 1M-6H	671.3	236
$Ni(OH)_2$- 6M-6H	784.5	461.3
$Ni(OH)_2$-10M-6H	716.8	266
$Ni(OH)_2$-6M-0.5H	487	250
$Ni(OH)_2$-6M-1H	633	271.6
$Ni(OH)_2$-6M-2H	662	290.4
$Ni(OH)_2$-6M-12H	582	351.9

Table S2 The specific capacity of as-prepared **Ni-MOF** at different alkaline hydrolyzing condition.

Sample	Rs (Ω)	Rct (Ω)	CPE-T (F)	CPE-P	W-R (Ohm)	W-T	W-P
$Ni(OH)_2$-6M-6H-0cycle	0.10517	0.16523	0.000257	1.005	0.20603	0.10681	0.54365
$Ni(OH)_2$-6M-6H-15000 cycles	0.11651	0.15952	0.000265	0.9724	0.21208	0.10576	0.53257

Table S3 Parameters of the proposed equivalent circuit model.