

Electronic Supplementary Information

Highly Inter-connected Nanorods and Nanosheets Based on Hierarchically Layered MOF for Flexible, High-Performance Energy Storage Device

Chang Soo Lee^{a†}, Juyoung Moon^{b†}, Jung Tae Park^{b*} and Jong Hak Kim^{a*}

^a *Department of Chemical and Biomolecular Engineering, Yonsei University,*

50 Yonsei-ro, Seodaemun-gu, Seoul 03722, Republic of Korea

^b *Department of Chemical Engineering, Konkuk University,*

120 Neungdong-ro, Gwangjin-gu, Seoul 05029, Republic of Korea

[†]*These authors contributed equally*

*Corresponding Authors

Jung Tae Park

Tel: +82-2-450-3538, Fax: +82-2-450-3504

E-mail: jtpark25@konkuk.ac.kr

Jong Hak Kim

Tel: +82-2-2123-5757, Fax: +82-2-312-6401

E-mail: jonghak@yonsei.ac.kr

Number of Pages: 10

Number of Figures: 7

Number of Tables: 1

Table of Contents

1. Demagnified SEM images of hl-MOF, u-hl-MOF and u-hl-MOF/NRSs on Ni foam	S3
2. N ₂ sorption isotherm of u-hl-MSC/NRSs on Ni foam and bare Ni foam	S4
3. EDS spectrum and calculated element ratio table of u-hl-MSC section and NRs section.....	S5
4. TGA curves of hl-MOF, u-hl-MOF, u-hl-MOF/NRSs and NRSs (collected from the residue powder in autoclave container) under N ₂ atmosphere.....	S6
5. XPS spectra of survey scan and the deconvoluted spectra for specific elements of C 1s, N 1s and Ni 2p for hl-MSC, u-hl-MSC, and u-hl-MSC/NRSs on Ni foam	S7
6. Peak current density curve according to scan rate from cathodic reaction and anodic reaction to calculate the b value from equation	S8
7. SEM image and XRD spectrum of u-hl-MSCs electrode after 10000 cycles.....	S9
8. Surface atomic percent (%) component determined from X-ray photoelectron spectroscopy	S10

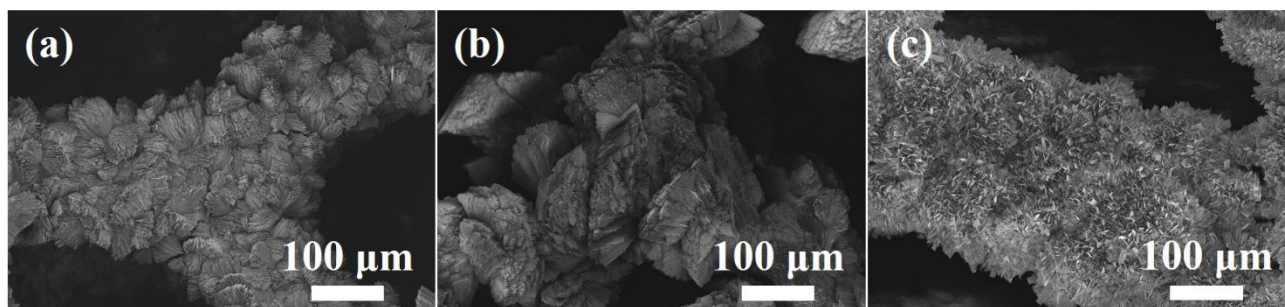


Figure S1. Demagnified SEM images of (a) hl-MOF, (b) u-hl-MOF and (c) u-hl-MOF/NRSs on Ni foam.

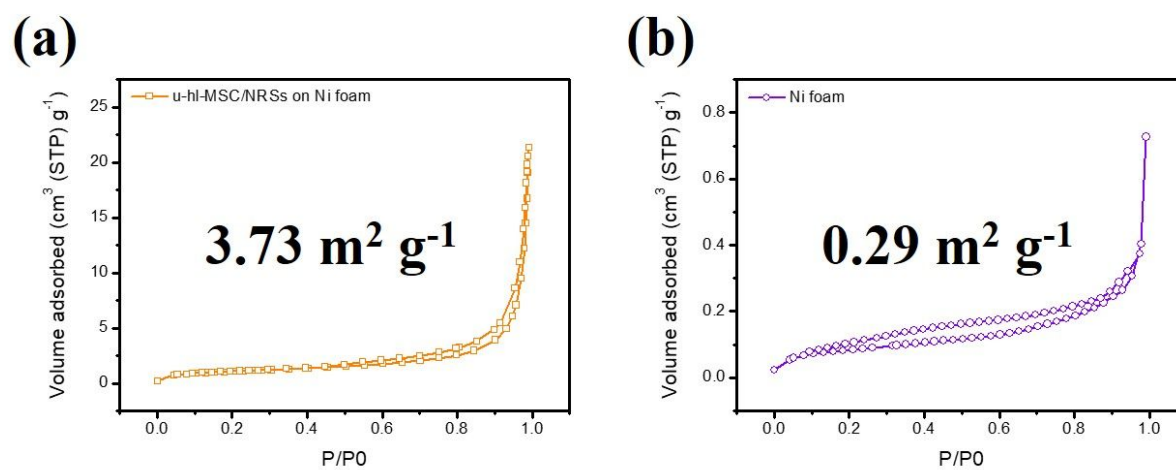


Figure S2. N_2 sorption isotherm of (a) u-hl-MSC/NRSs on Ni foam and (b) bare Ni foam.

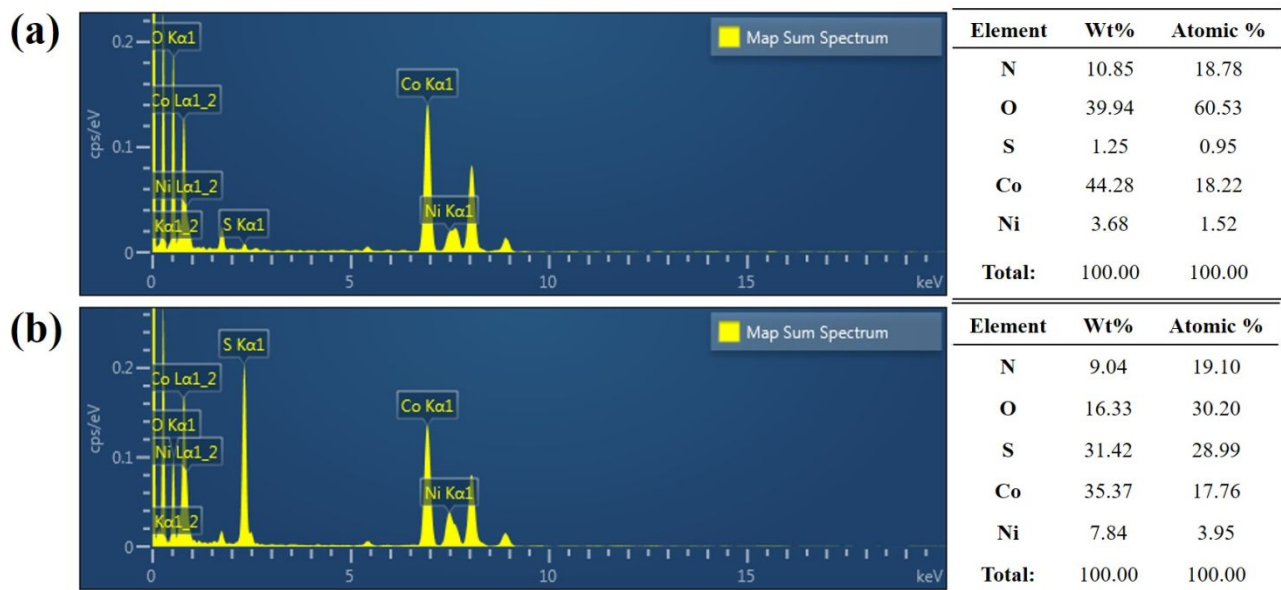


Figure S3. EDS spectrum and calculated element ratio table of (a) u-hl-MSC section and (b) NRs section.

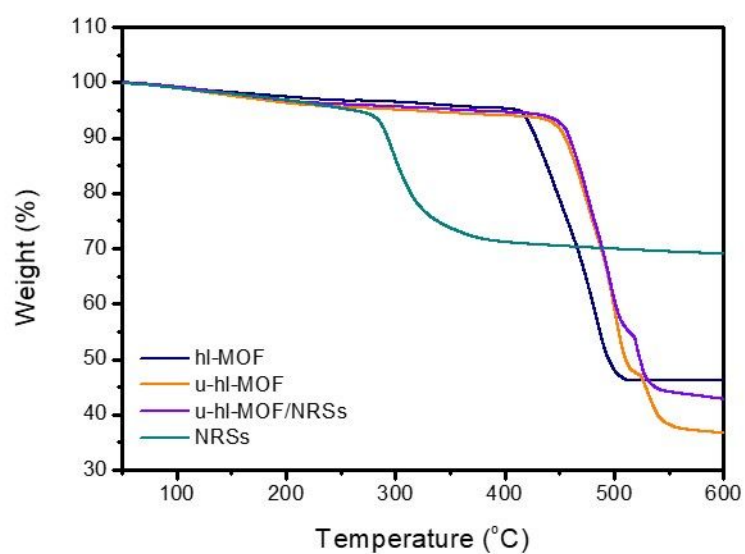


Figure S4. TGA curves of hl-MOF, u-hl-MOF, u-hl-MOF/NRSs and NRSs (collected from the residue powder in autoclave container) under N₂ atmosphere.

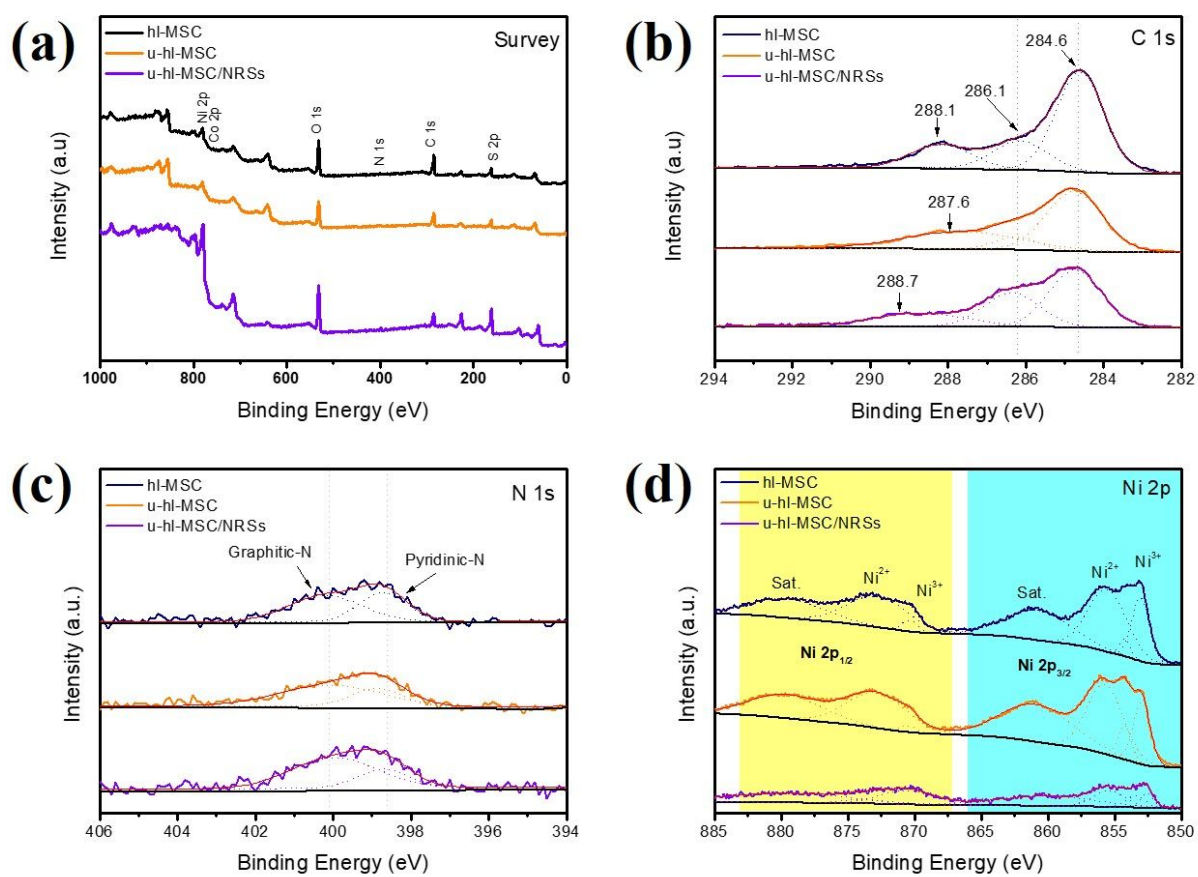


Figure S5. XPS spectra of (a) survey scan and the deconvoluted spectra for specific elements of (b) C 1s, (c) N 1s and (d) Ni 2p for hl-MSC, u-hl-MSC, and u-hl-MSC/NRSs on Ni foam.

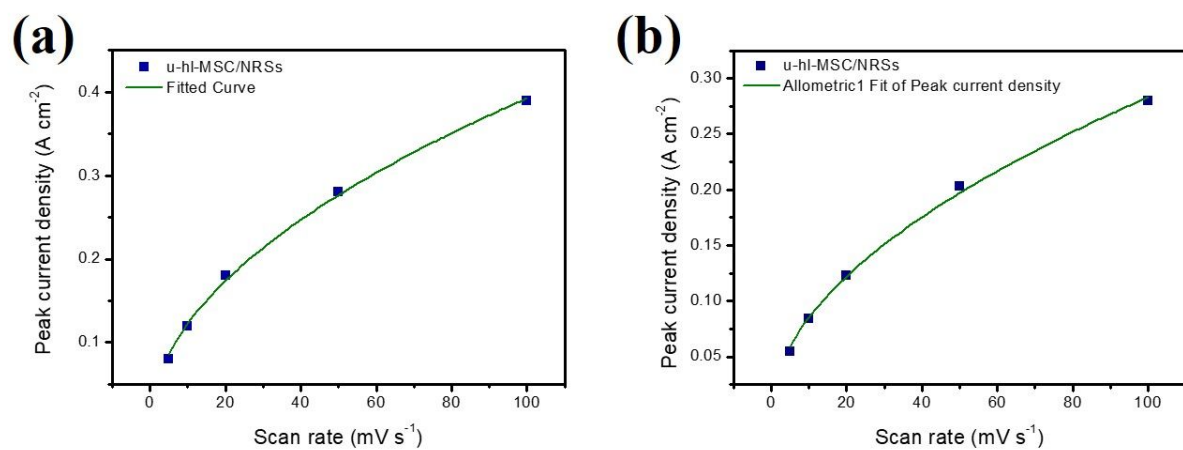


Figure S6. Peak current density curve according to scan rate from (a) cathodic reaction and (b) anodic reaction to calculate the b value from equation.

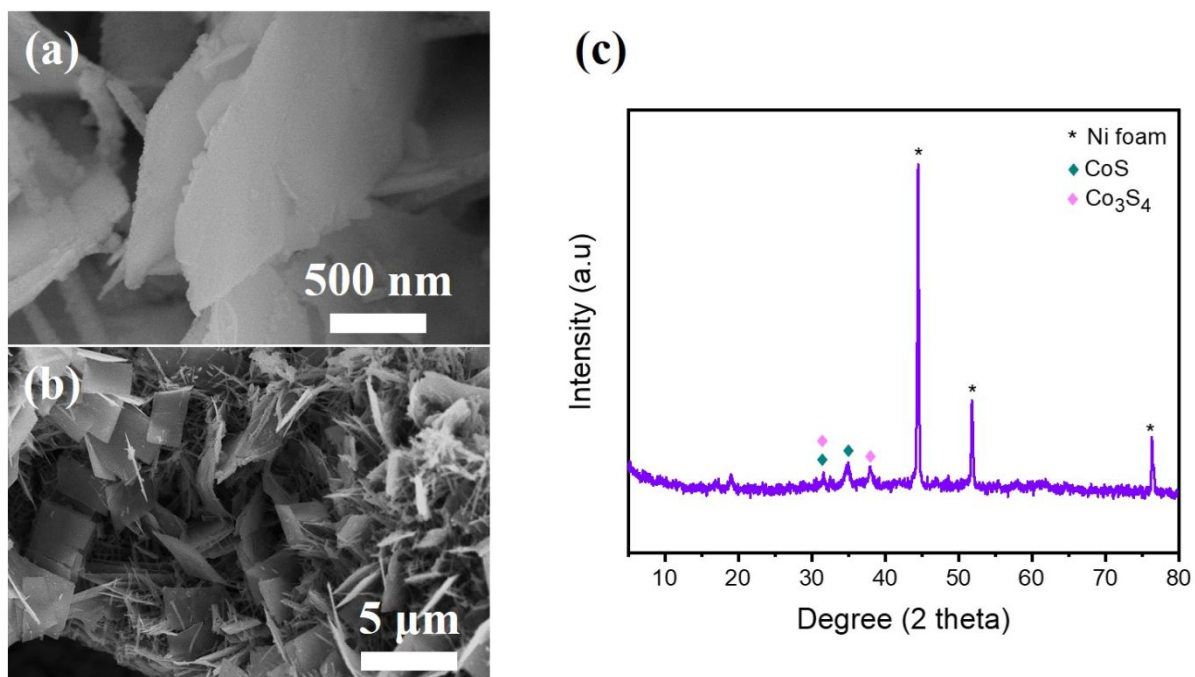


Figure S7. (a,b) SEM image and (c) XRD spectrum of u-hl-MSCs electrode after 10000 cycles.

Table S1. Surface atomic percent (%) component determined from X-ray photoelectron spectroscopy.

Sample	Concentration [atomic %]					
	C	Co	N	Ni	O	S
hl-MSC	44.29	4.15	2.21	10.62	27.89	10.84
u-hl-MSC	39.47	3.49	2.63	14.85	28.63	10.93
u-hl-MSC/NRSs	23.75	17.91	1.85	3.31	29.47	23.7