Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A
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Hierarchically Structured Layered-Double- Hydroxide@Zeolitic-Imidazolate-Framework Derivatives for High-Performance Electrochemical Energy Storage

Yibo Dou,[a,b] Jian Zhou,[a] Fan Yang,[a] Min-Jian Zhao,[a] Zuoren Nie,[b,]* and Jian-Rong Li[a,]*

[a] *Beijing Key Laboratory for Green Catalysis and Separation and Department of Chemistry and Chemical Engineering, College of Environmental and Energy Engineering, Beijing University of Technology, Beijing 100124, P. R. China.*
E-mail: jrli@bjut.edu.cn. Tel: +86-10-67392332

[b] *College of Materials Science and Engineering, Beijing University of Technology, Beijing 100124, P. R. China.*
E-mail: zrnie@bjut.edu.cn. Tel: +86-10-67391536

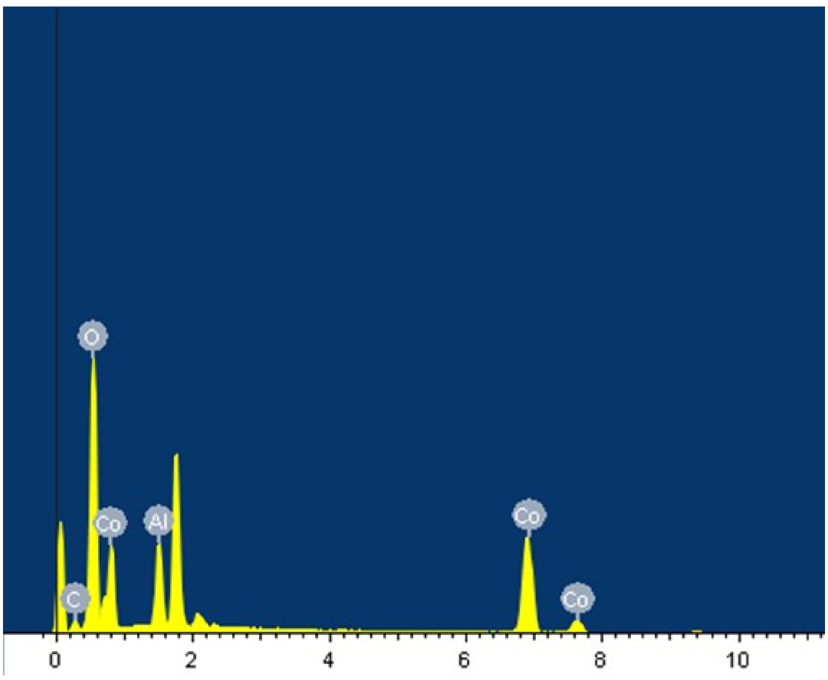

Figure S1. EDX spectrum of CoAl-LDH film.

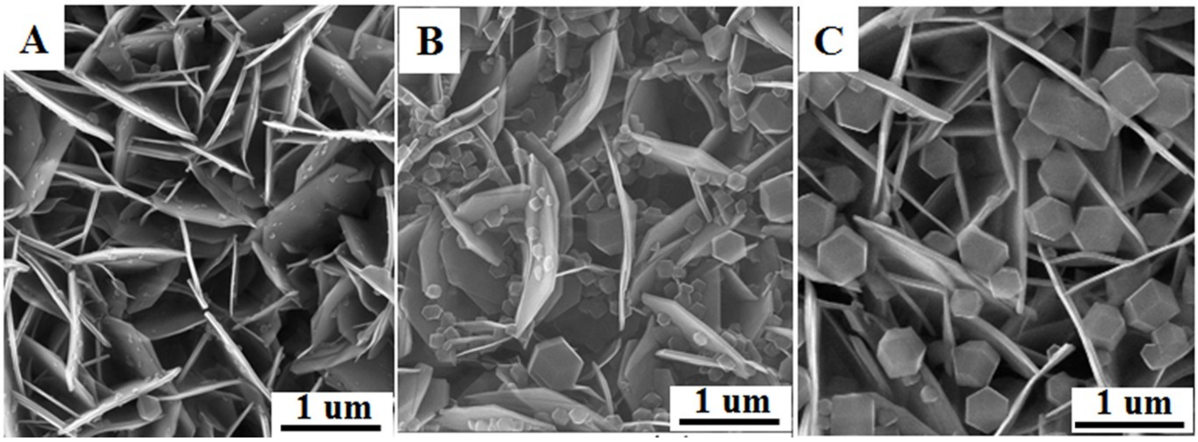

Figure S2. SEM images of the CoAl-LDH@ZIF-67 film as a function of reaction time (A) 10 h, (B) 18 h, and (C) 24 h.

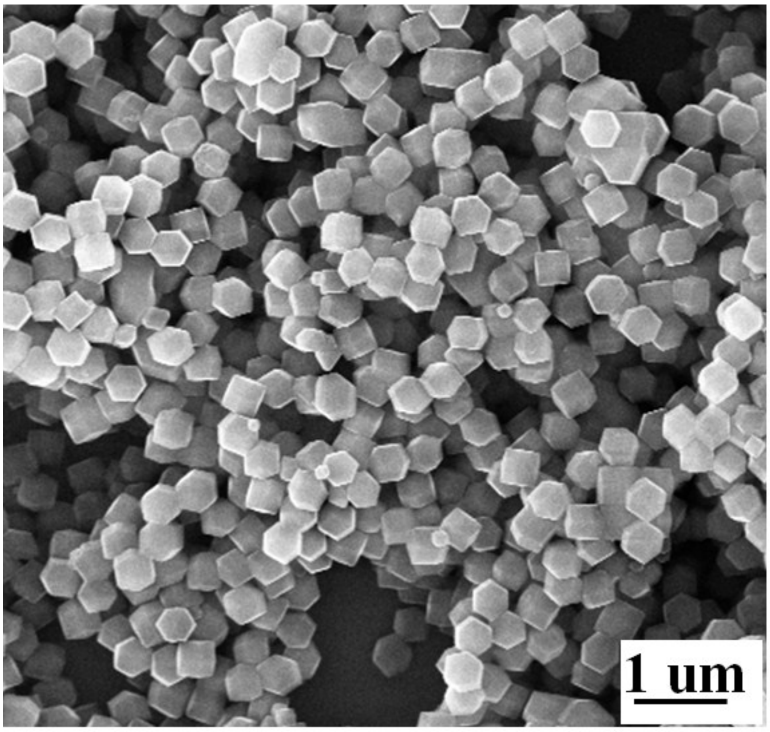

Figure S3. SEM image of ZIF-67.

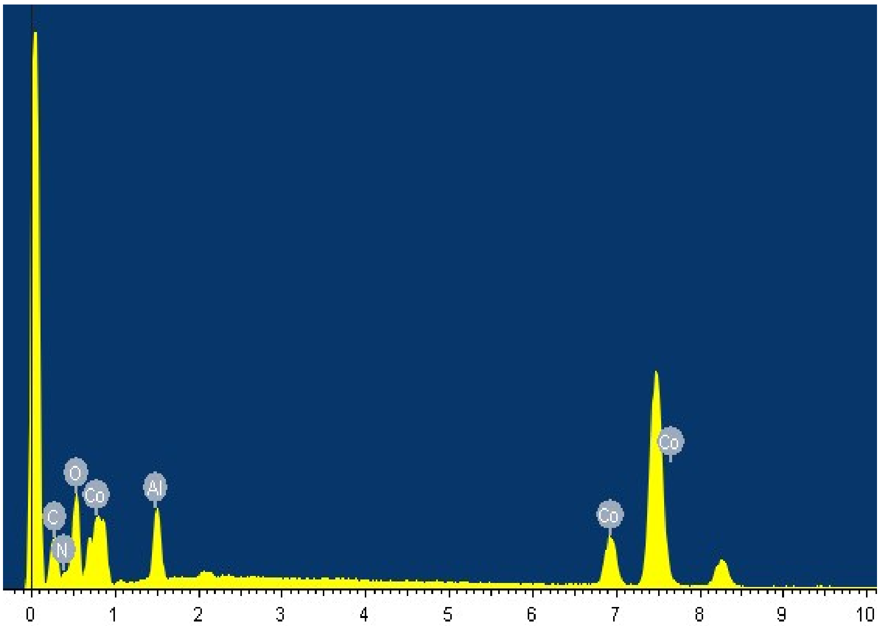

Figure S4. EDX spectrum of CoAl-LDH@ZIF-67 film.

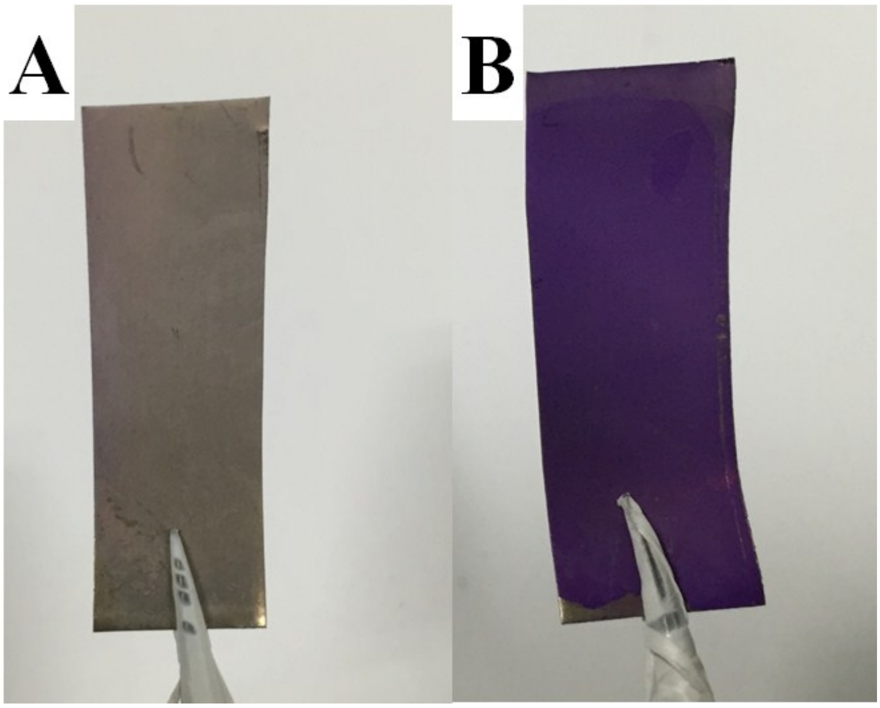

Figure S5. Digital photographs of (A) CoAl-LDH and (B) CoAl-LDH@ZIF-67 films.

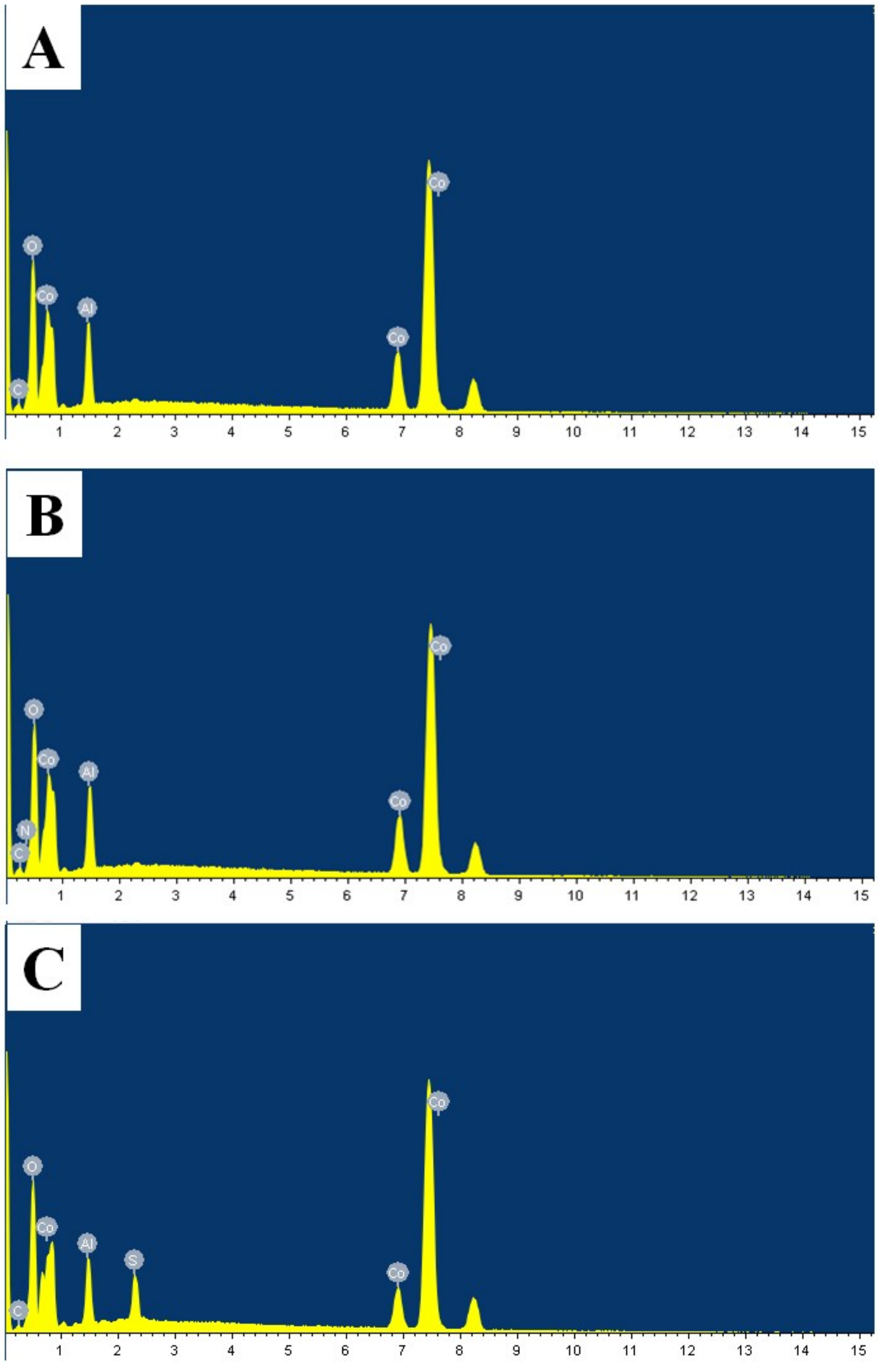

Figure S6. EDX spectrum of (A) MMO@Co_3O_4, (B) Spinelle@C, and (C) LDH@CoS, respectively.

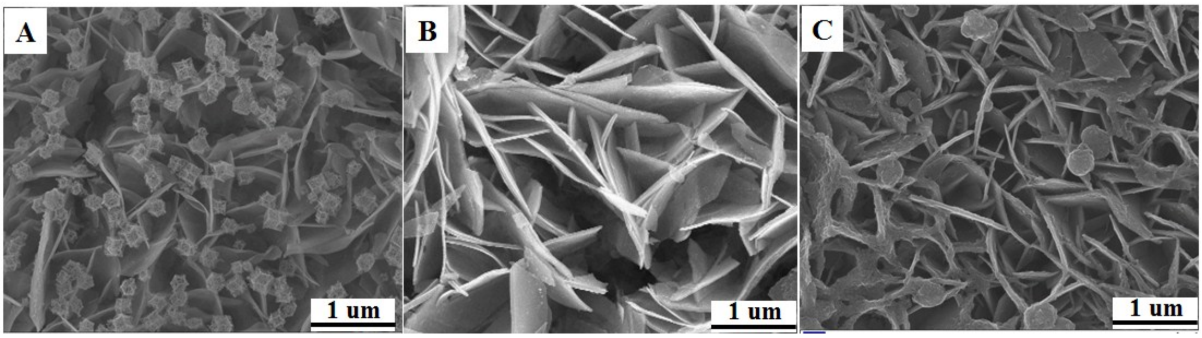

Figure S7. SEM images of (A) MMO@Co_3O_4, (B) Spinelle@C, and (C) LDH@CoS obtained by oxidation at 300 ^{o}C under air for 5 h, carbonization at 800 ^{o}C under N_2 for 5 h, and sulfurization with thioacetamide for 3 h, respectively.

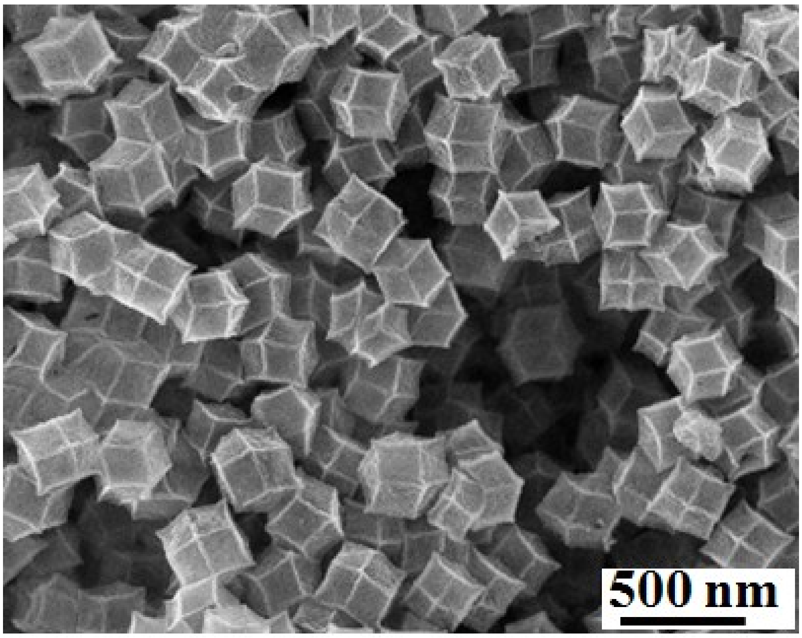

Figure S8. SEM image of Co_3O_4 powder derived from ZIF-67 powder.

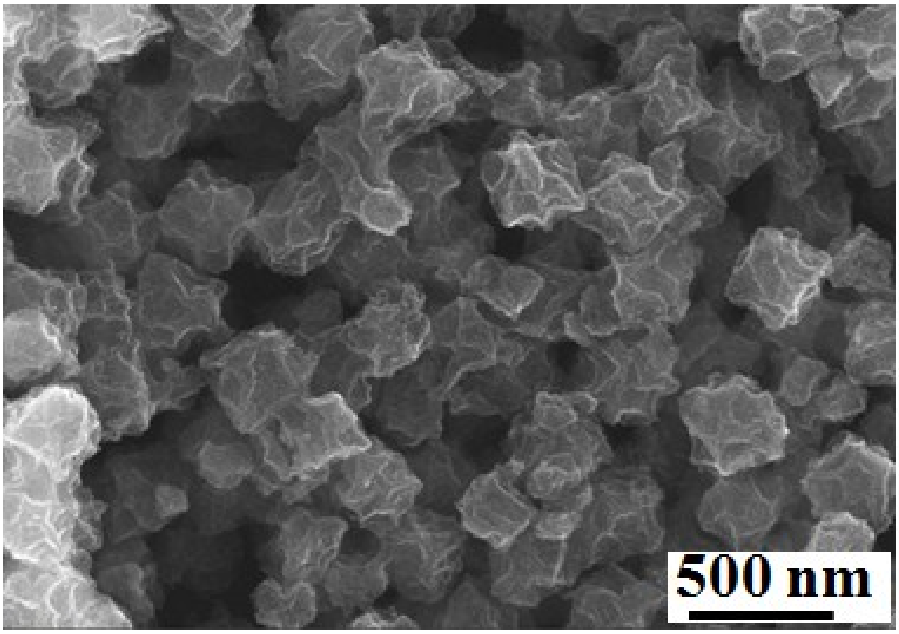

Figure S9. SEM image of nitrogen-doped carbon powder derived from ZIF-67 powder.

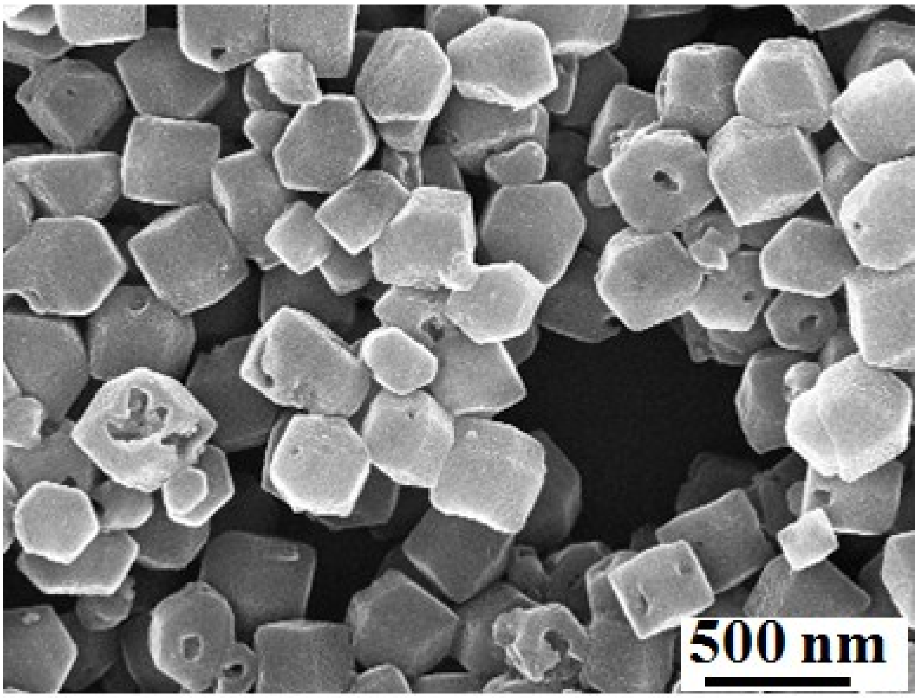

Figure S10. SEM image of CoS powder derived from ZIF-67 powder.

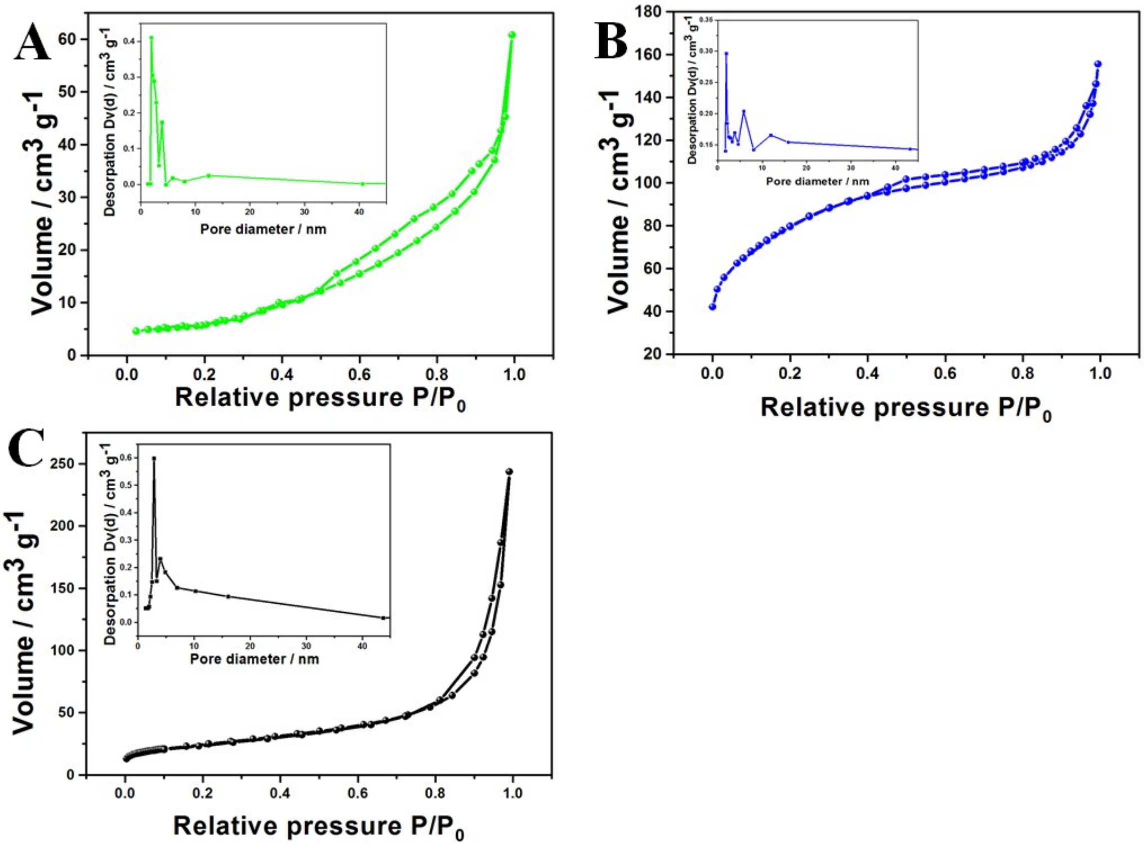

Figure S11. N_2 adsorption-desorption isotherms and pore size distributions (inset) of (A) MMO@Co_3O_4, (B) Spinelle@C, and (C) LDH@CoS, respectively.

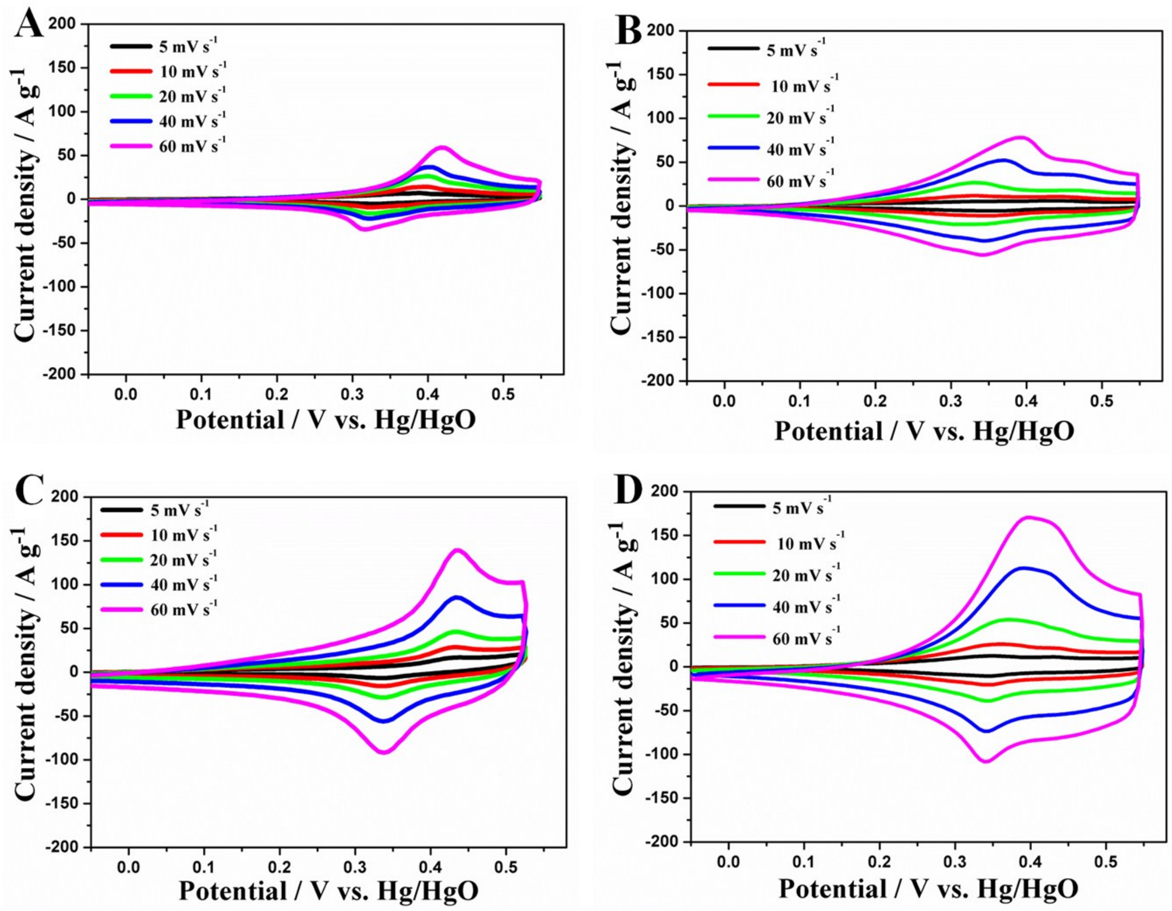

Figure S12. CV curves of (A) LDH, (B) MMO@Co_3O_4, (C) Spinelle@C, and (D) LDH@CoS at varied scan rates from 5 to 60 mV/s.

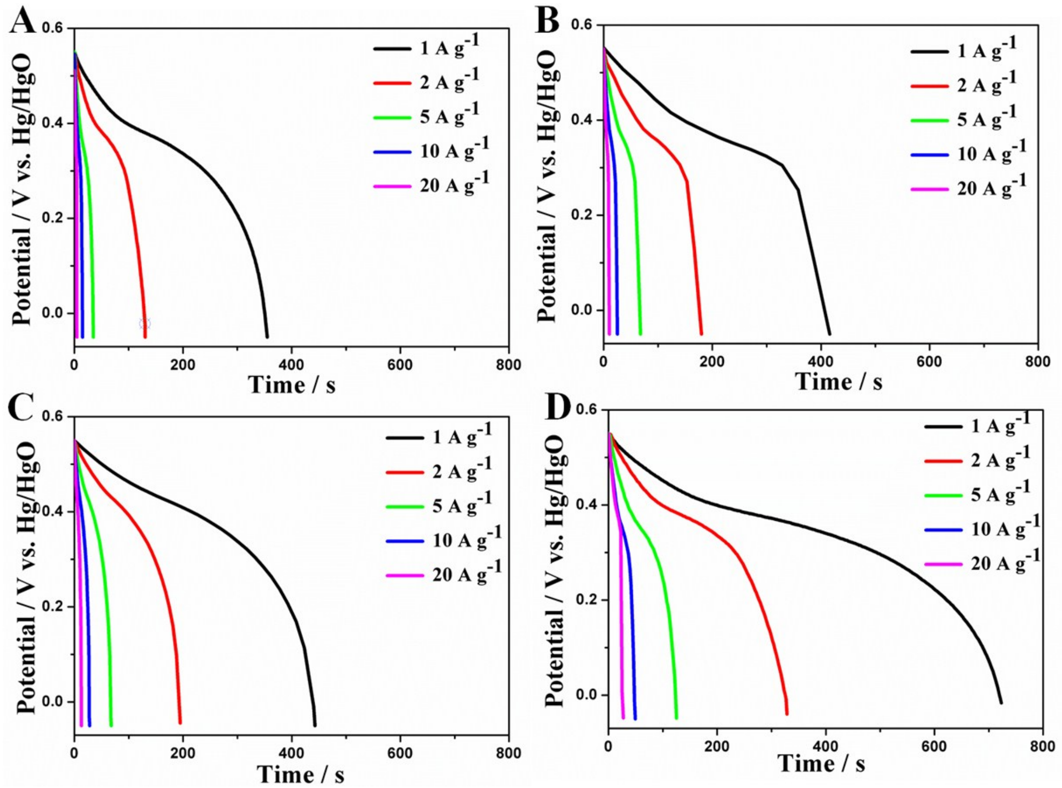

Figure S13. Galvanostatic discharge curves of (A) LDH, (B) MMO@Co_3O_4, (C) Spinelle@C, and (D) LDH@CoS at varied current densities from 1 to 20 A/g.

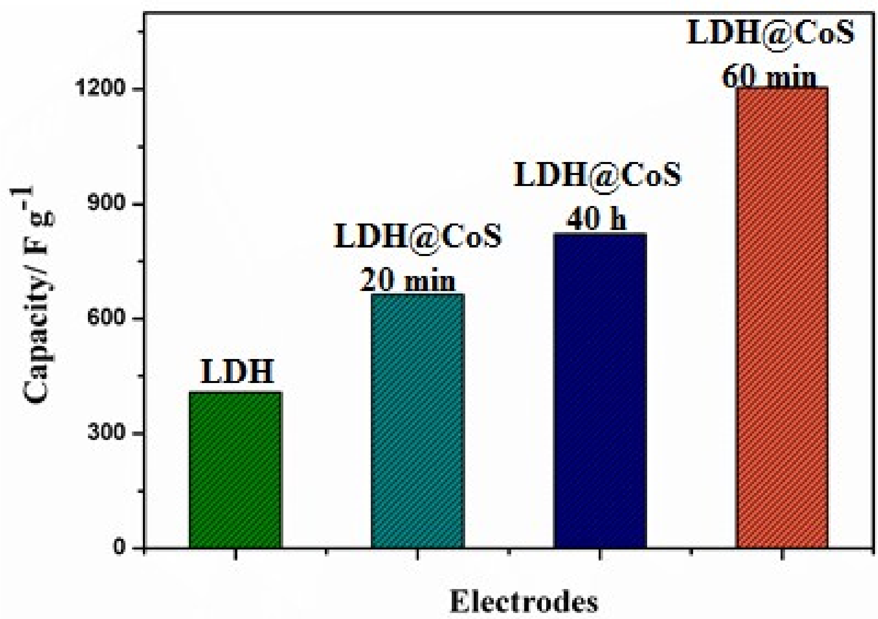

Figure S14. Specific capacity of LDH and LDH@CoS with varied amounts of CoS that derived based on different sulfurization time of 20, 40, and 60 min, respectively.

Table S1. Comparison study of LDH@ZIF-67 derivatives in this work and previously reported MOFs derivatives toward electrochemical energy storage.

MOFs	MOFs derivatives	Specific capacitance ($F\ g^{-1}$)	Current density ($A\ g^{-1}$)	Reference
MOF-5	NPC	258	0.25	1
Bi/MOF-5	HPCs	241	0.1	2
Al-PCP	Carbon	232.8	0.1	3
ZIF-11	Nitrogen-doped porous carbon	307	1	4
ZIF-8	PCPs	245	1	5
IRMOF-3	N doped Carbon	213	0.5	6
HKUST-1	$Cu_{1.96}S$–C	200	0.5	7
ZIF-67	Co_3O_4//C	101	2	8
Co-MOF	Co_3O_4	150	1	9
LDH@ZIF-67	MMO@Co_3O_4	692	1	This work
LDH@ZIF-67	Spinelle@C	781	1	This work
LDH@ZIF-67	LDH@CoS	1205	1	This work

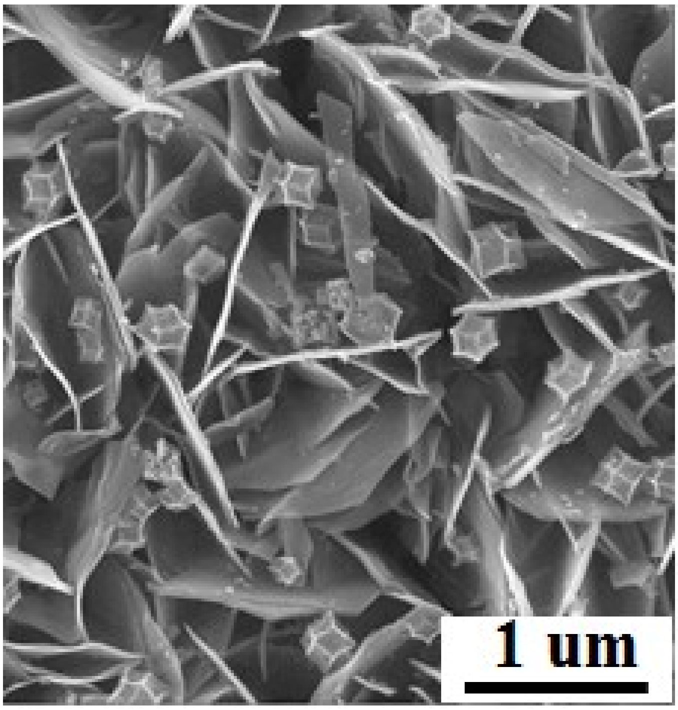

Figure S15. SEM image of MMO@Co_3O_4 after 2000 galvanostatic charge-discharge cycles.

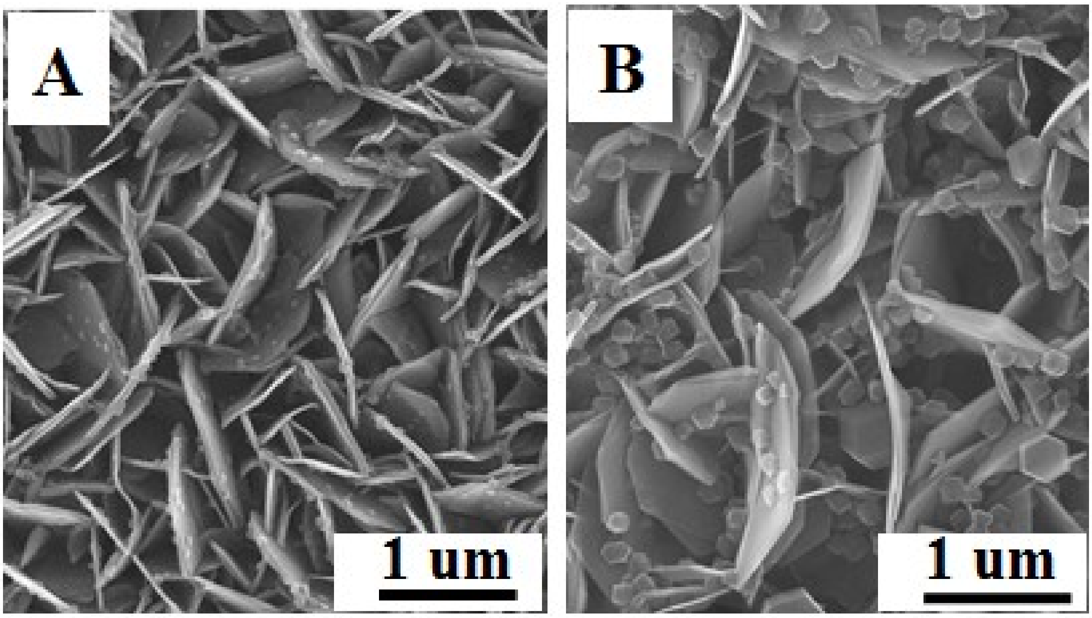

Figure S16. SEM images of (A) Spinelle@C and (B) LDH@CoS after 2000 galvanostatic charge-discharge cycles.

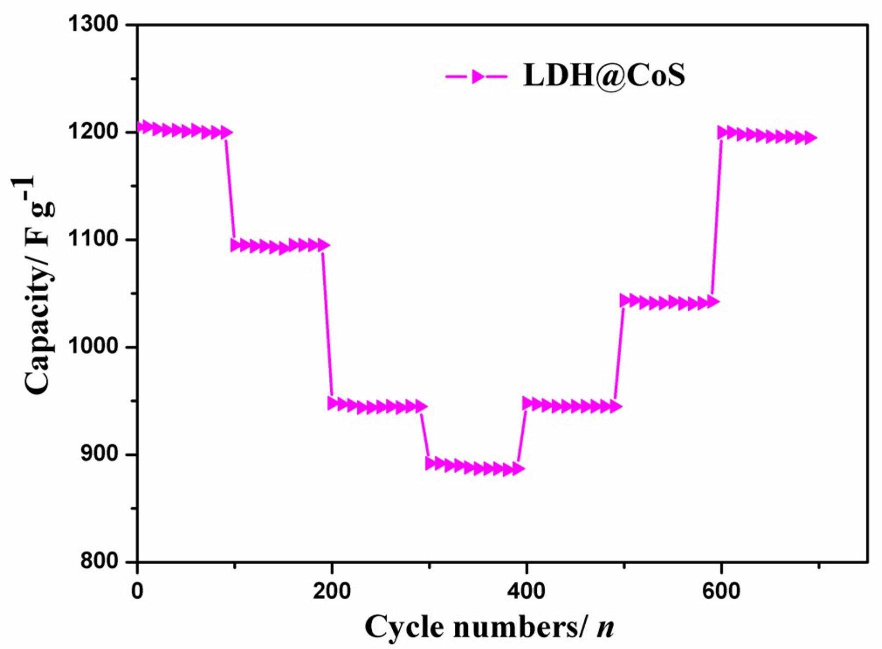

Figure S17. Cycling stability of the LDH@CoS at consecutively varied current densities.

Reference

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