Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

SUPPORTING INFORMATION

Nitrogen Doped Carbonized Metal Organic Framework for High Stability Room Temperature Sodium-Sulfur Battery

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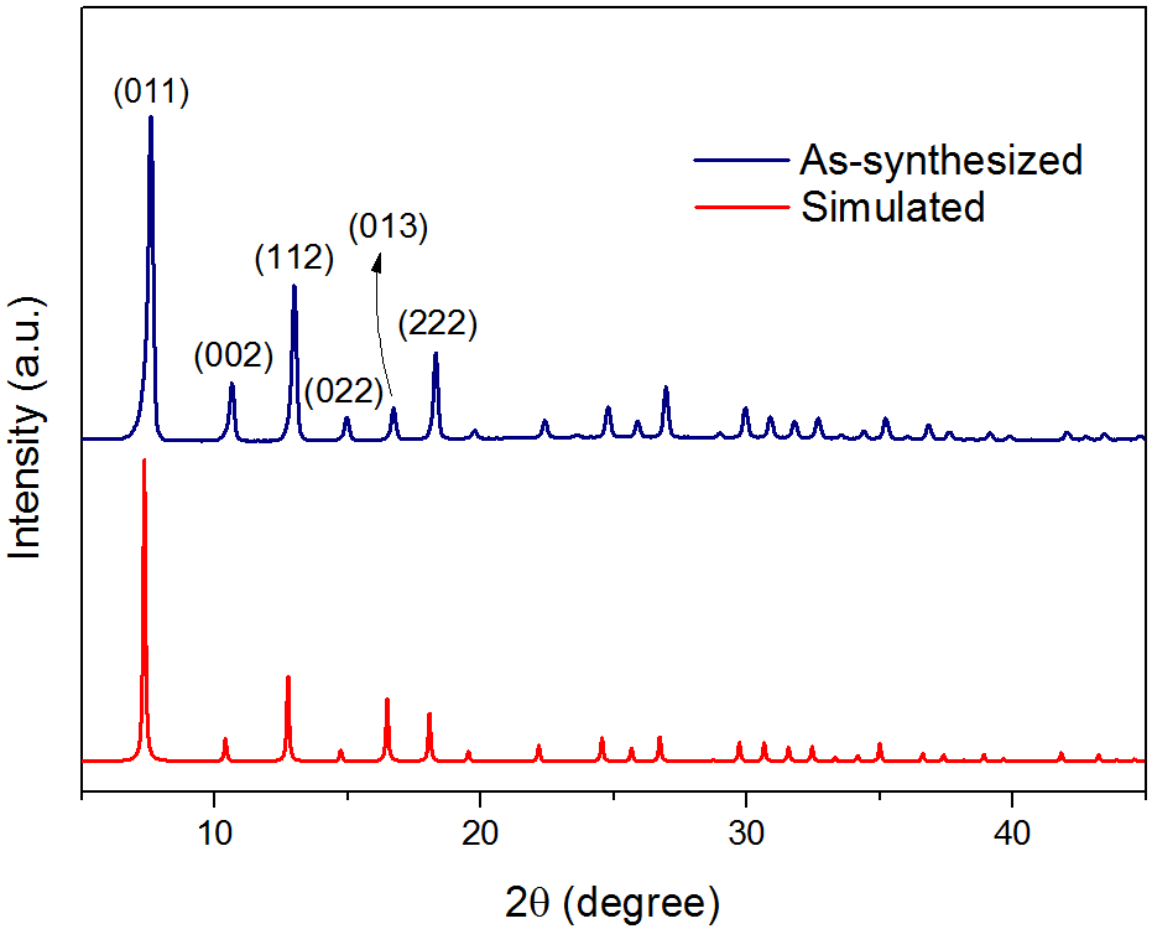

Fig. S1. XRD patterns of the simulated ZIF-8 and as synthesized ZIF-8 structures.

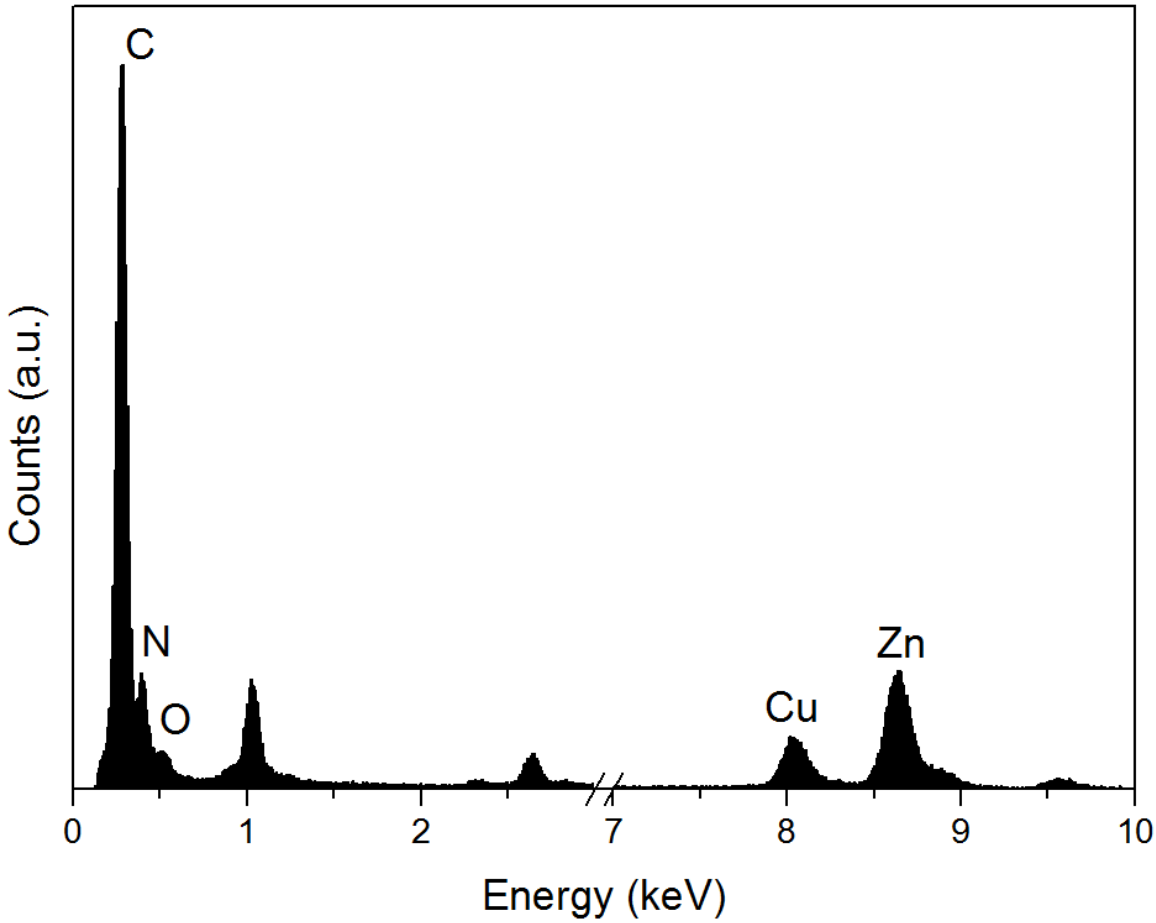

Fig. S2. HRTEM-EDS quantification results of existing elements. The weight percentage quantification of important elements are as following: C 68.18%, N 9.23%, O 1.34%.

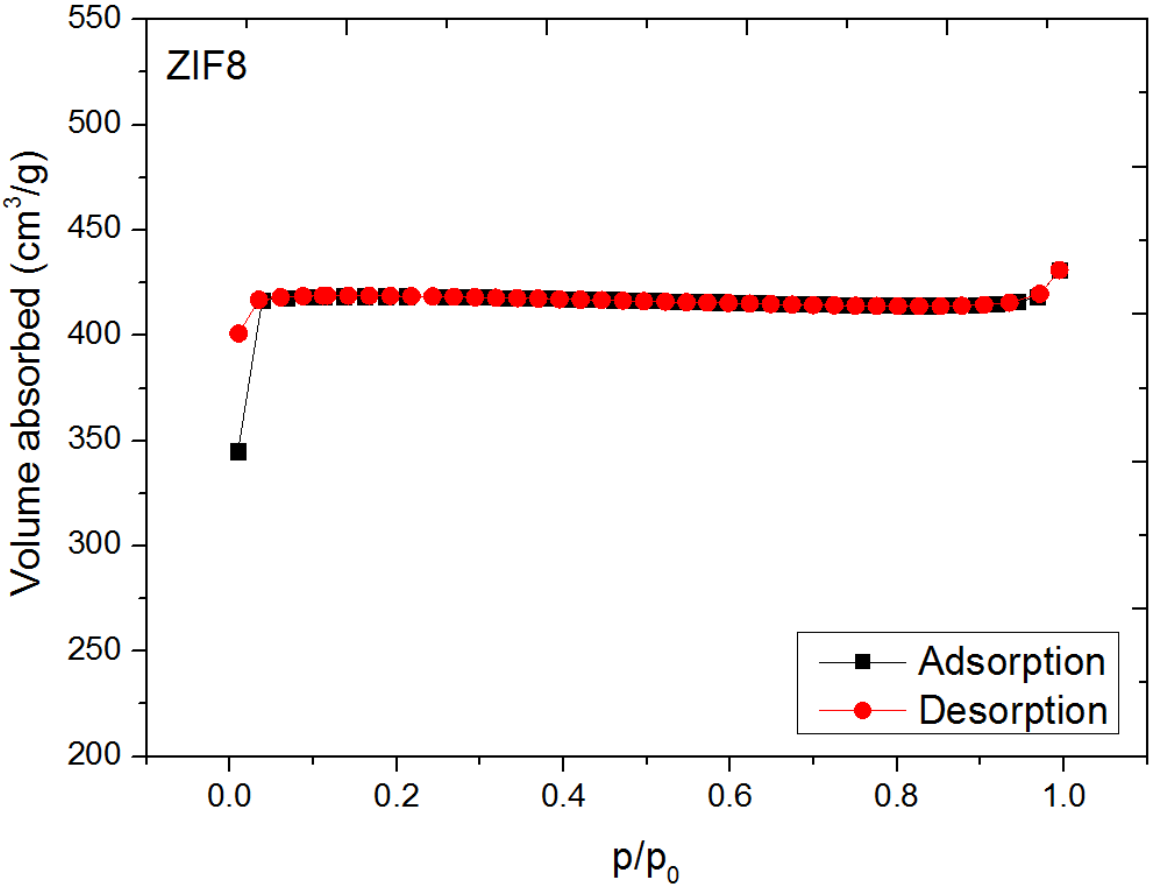

Fig. S3. ZIF-8 BET Data.

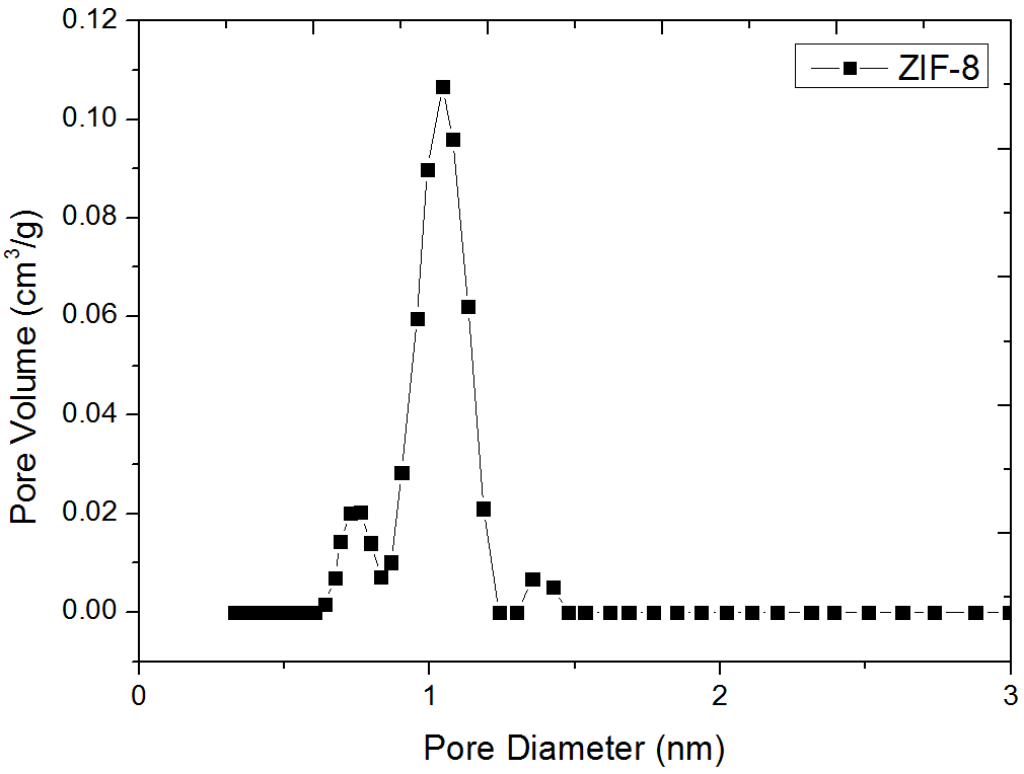

Fig. S4. ZIF-8 micropore analysis using CO_2. Pore size distribution was determined by using NLDFT model.

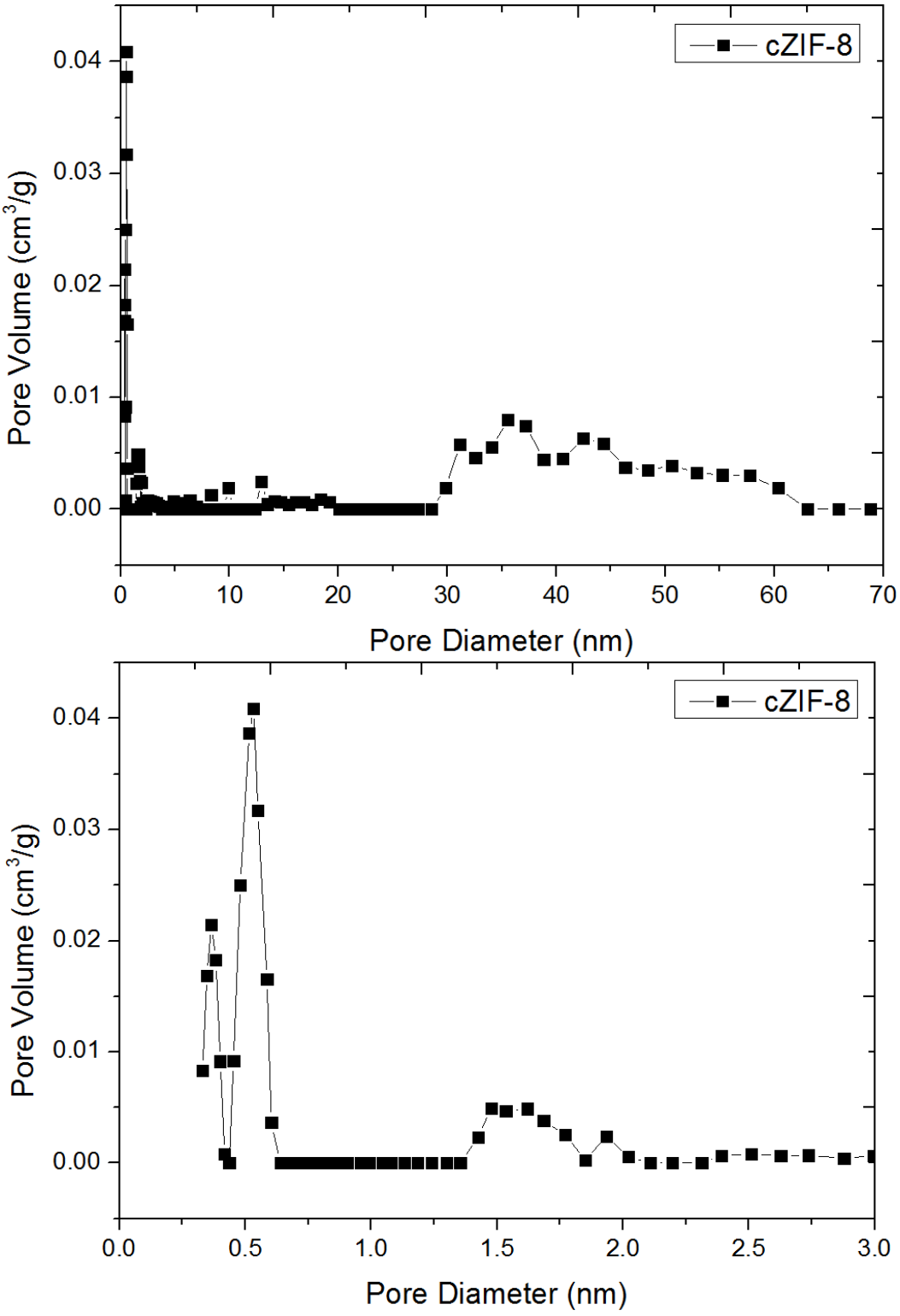

Fig. S5. cZIF-8 micropore analysis using CO_2. Pore size distribution was determined by using NLDFT model. (a) Overview of the pore distribution (b) enlargement from range 0-3nm.

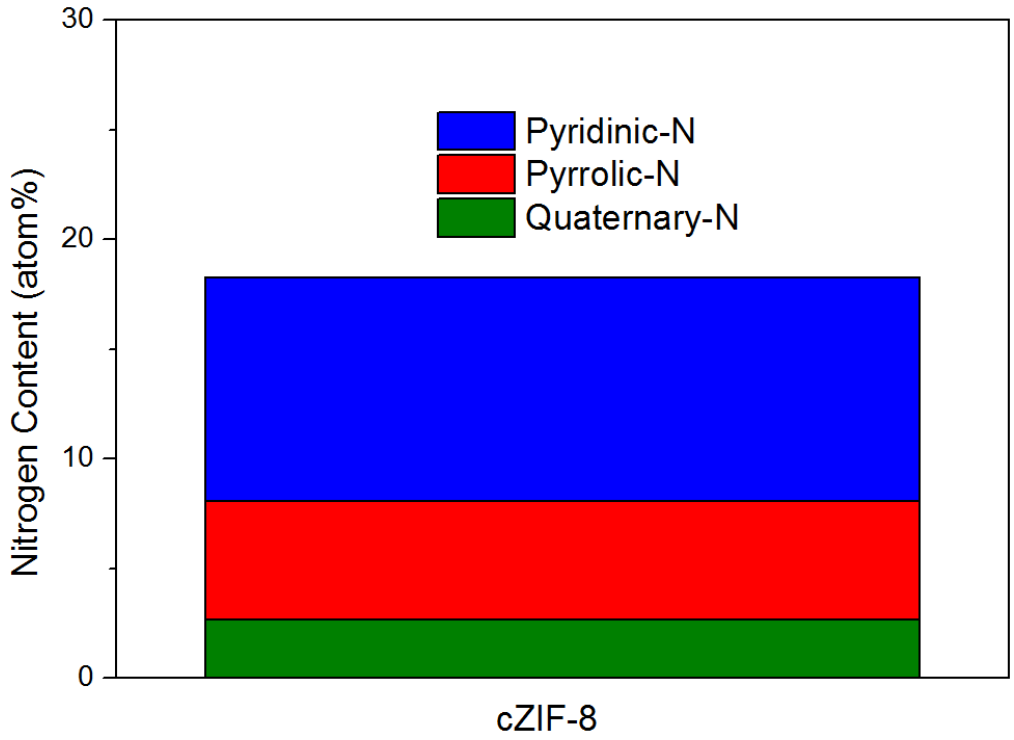

Fig. S6. Nitrogen contents were given as stacked columns, where the pyridinic-N, pyrrolic-N and quaternary-N gives a atomic ratio contribution of 10.2%, 5.4%, and 2.7%, respectively to the overall 18.3%.

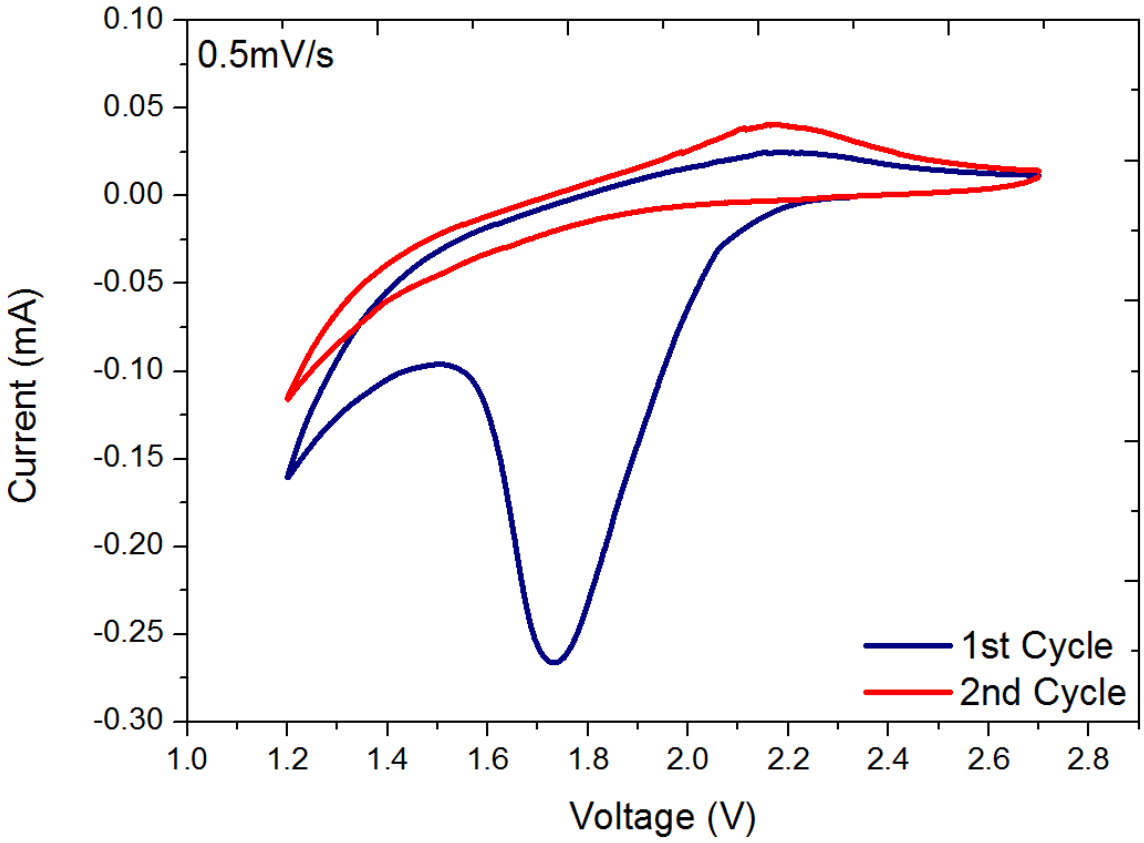

Fig. S7. Cyclic voltammetry (CV) for the Na-S battery, the CV was scanned at a rate of 0.5mV/s.

Table S1. Comparison of sodium-sulfur cell references and similar lithium-sulfur cell with cathode composition and their electrochemical performances.

Reference	Cathode Composition	Electrolyte	Rate	Capacity (mAh/g)	Cycles
Ryu et al.[1]	S:Carbon:PEO (60:20:20)	1M $NaCF_3SO_3$ in TEGDME	0.144 mA/cm^2	240	10
Yu et al.[2]	MWCNT fabric with Na_2S_6 catholyte	1.5M $NaClO_4$ and 0.3M $NaNO_3$ in TEGDME	0.1 C	~400	30
Yu et al.[3]	Na_2S/MWCNT (8:2)	1.5M $NaClO_4$ and 0.3M $NaNO_3$ in TEGDME	C/10 C/3	560 380	50 50
Yu et al.[4]	CNF/AC Composite/Na_2S_6	1.5M $NaClO_4$ and 0.2M $NaNO_3$ in TEGDME	C/5	~550	100
Xin et al.[5]	S/(CNT@MPC):Super P:PVDF (8:1:1)	1M $NaClO_4$ EC/PC (v:v = 1:1)	0.1 C 1 C 2 C	~1000 ~600 ~580	20 200 200
Wang et al.[6]	(S+carbonized PAN composite):acetylene black:PTFE (70:20:10)	1M $NaClO_4$ in EC/DMC (v:v = 2:1)	0.1 mA/cm^2	~500	18
Kim et al.[7]	S/C(Activated carbon):Super P:PVDF (6:2:2)	1M $NaCF_3SO_3$ in TEGDME	1/64 C	521	104
Kim et al.[8]	SPAN webs	1M $NaPF_6$ in EC/DEC (v:v = 1:1)	0.1 C	266 ($g_{electrode}$)	200
Hwang et al.[9]	c-PANS NFs:Super P:PVDF (70:15:15)	0.8M $NaClO_4$ in EC/DEC (v:v = 1:1)	0.22 A/g_{total}	219 ($g_{electrode}$)	>500
Yu et al.[10]	Na_2S/AC-CNF	1.5M $NaClO_4$ and 0.2M $NaNO_3$ in TEGDME	C/5	~600	100
Kim et al.[11]	S/C(Activated carbon):Super P:PVDF (6:2:2)	1M $NaCF_3SO_3$ in TEGDME	1/128 C	782	37
Bauer et al.[12]	S:Carbon:MWCNT:PTFE (42.5:42.5:12:3)	1M $NaClO_4$ in TEGDME	0.1 C	350	20
Zhang et al.[13] (Li-S)	DHCS-S:Super P:PVDF (7:2:1)	1M LiTFSI in TEGDME	0.1C	690	100
Wu et al.[14] (Li-S)	MPCP-S-I/S:Super P:PVDF (8:1:1)	1M $LiPF_6$ in EC/DEC	100 mA/g_{total}	210 ($g_{electrode}$)	100
This Work	cZIF-8/S:Super P:PVDF	1M $NaClO_4$ in TEGDME	0.1 C 0.2 C 0.2 C 0.2 C	1000 ~ 850 ~ 650 ~ 500	10 20 100 250

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