Supplementary Information (SI) for Journal of Materials Chemistry A.

Interfacial Integration of Ultra-Thin Flexible Electrochemical Capacitors via Vacuum Filtration based on Gelatinized Fibrous Membranes

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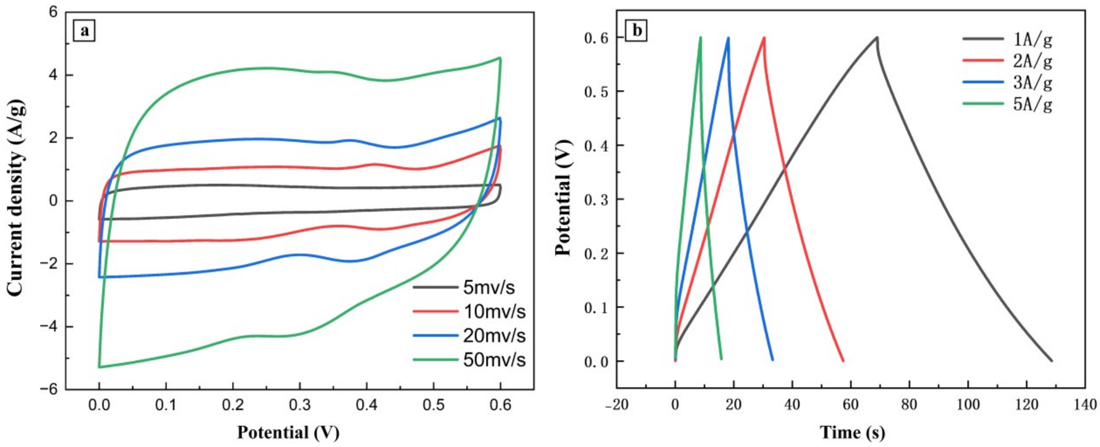

Figure S1. CV curves and GCD curves the MXene SSC based on PAN/PVA under 1-hour crosslinking.

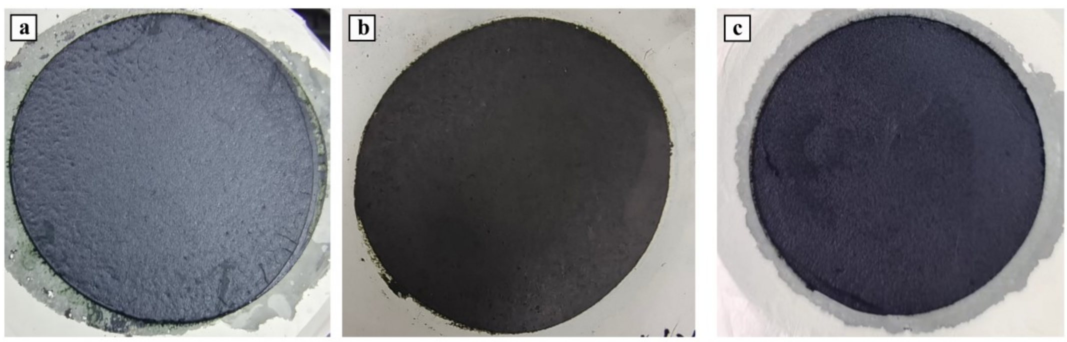

Figure S2. Optical photograph of the filtered electrode: (a) PANI/MXene; (b) NVO/MXene; (c) ZVO/MXene.

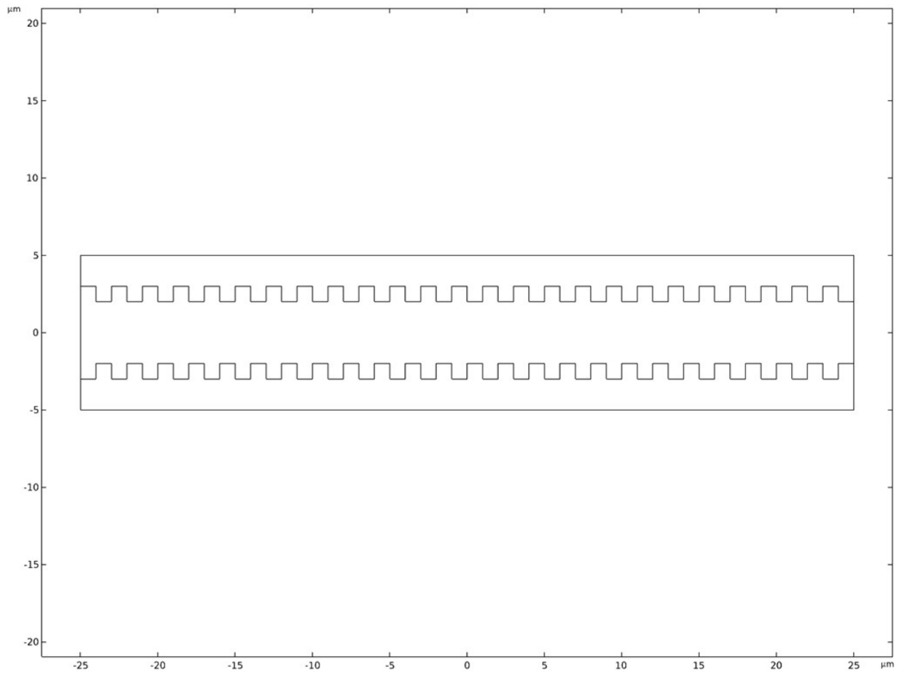

Figure S3. The cross-sectional schematic diagram of the device with porous all-in-one structure in the simulation and geometric parameters.

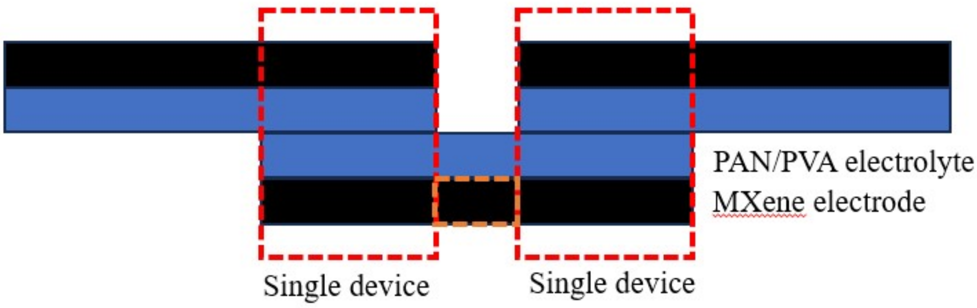

Figure S4. Schematic diagram of the integrated series-connected SSC.

Table S1. Swelling test results of PAN/PVA membranes under different cross-linking times.

Cross-linking Time (min)	Polymer density ρ_m (g cm^{-3})	Average molecular weight between crosslinking points m_c (g mol^{-1})	Cross-linking density ρ (mol cm^{-3})	Gel content W (%)
0	0.3931	134.8391	0.0029	45.7172
20	0.5596	126.7809	0.0044	52.9220
60	0.6628	114.4689	0.0058	66.1251
120	0.7607	95.6587	0.0080	75.4401
240	0.7213	60.8322	0.0119	89.5709

Table S2. Comparison of the capacitance and energy density of our all-in-one devices with recently reported electrochemical capacitors.

Electrode	Electrolyte	Maximum Power density （mW cm^{-3}）	Maximum Energy density （mWh cm^{-3}）	Reference
Fe_xO_y//MXene	PVA-KOH	303.8	0.8431	[1]
2D carbon	$EMIMBF_4$	470	8.4	[2]
BP/MnO_2	PVA-Na_2SO_4	58.6	0.59	[3]
LSG/VO_x	PVA-LiCl	1000	7.7	[4]
MoS_2//graphene/CNT	Li_2SO_4	75	16.36	[5]
Graphene//GO	PVA-KOH	1260	4.78	[6]
CNT//MnO_2	Na_2SO_4	320	2.12	[7]
Ni@CNT	PVA-KOH	440	1.39	[8]
MnO_2//V_2O_5	PVA-Na_2SO_4	100	10.18	[9]
Ti_3C_2-Cu	H_2SO_4	8	0.1033	[10]
$Mn(OH)_2$//Fe_2O_3	$LiNO_3$	123.57	5.125	[11]
Wood Carbon	KOH	2382	0.99	[12]
Si	EMI-TFSI	9312	7.65	[13]
$ZnCo_2O_4$//Fe_3O_4	PVA-KOH	166.7	2.32	[14]
SiC	PVA-KCl	2800	1.31	[15]
MXene/wood	PAM-H_2SO_4	337	3	[16]
PANI-CNT	PVA-H_2SO_4	609.7	11.4	[17]
CP@NCOH/NF//GH/FNP/NF	PVA-KOH	750	4.1	[18]
PUCNT/RGO	PVA-H_3PO_4	2031.2	8.63	[19]
Tungstate-PANI	Neutral electrolytes	440	37	[20]
MXene//PANI	**PAN/PVA-H_2SO_4**	**2873**	**7.1**	**This work**
PANI//$NH_4V_4O_{10}$	**PAN/PVA-$(NH_4)_2SO_4$**	**22.7**	**22.3**	**This work**
$NH_4V_4O_{10}$//$Zn_3V_3O_8$	**PAN/PVA-$Zn(OTf)_2$**	**31.8**	**41.8**	**This work**

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