Electronic Supplementary Material (ESI) for Nanoscale.

Supporting information

Novel 2D/2D 1T-MoS_2/$Ti_3C_2T_z$ Heterostructures for High-Voltage Symmetric Supercapacitors

Xiaodan Yin [1]†, Wei Zheng [2]*†, Haifeng Tang [1], Peigen Zhang [1]*, ZhengMing Sun [1]*

1 School of Materials Science and Engineering, Southeast University, Nanjing 211189, P. R. China.
2 School of Chemistry and Chemical Engineering, Southeast University, Nanjing 211189, P. R. China.

† These authors contributed equally.

E-mail: zhengwei22@seu.edu.cn (W.Z.); zhpeigen@seu.edu.cn (P.G.Z.); zmsun@seu.edu.cn (Z.M.S.)

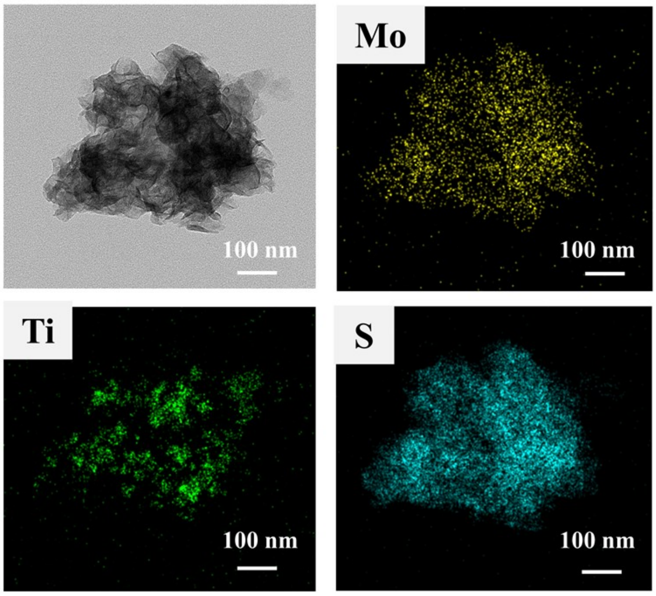

Figure S1 The elemental mapping images of Mo, Ti, and S elements of 1T-MoS_2/$Ti_3C_2T_Z$

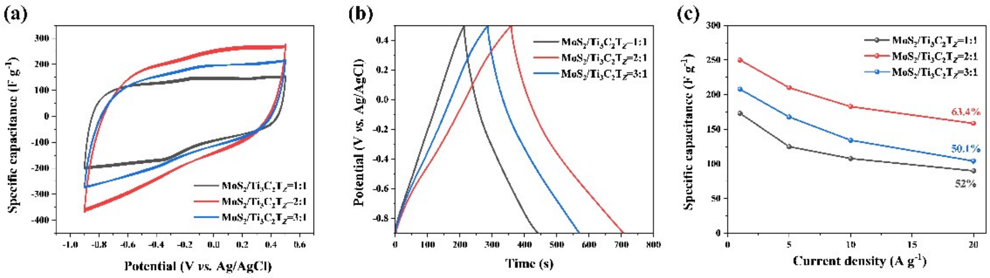

Figure S2 (a)-(b) The CV curves, GCD curves of the 1T-$MoS_2/Ti_3C_2T_z$-1:1, 1T-$MoS_2/Ti_3C_2T_z$-2:1 and 1T-$MoS_2/Ti_3C_2T_z$-3:1; (c) The C_g of the 1T-$MoS_2/Ti_3C_2T_z$-1:1, 1T-$MoS_2/Ti_3C_2T_z$-2:1 and 1T-$MoS_2/Ti_3C_2T_z$-3:1 electrodes plotted as a function of current densities.

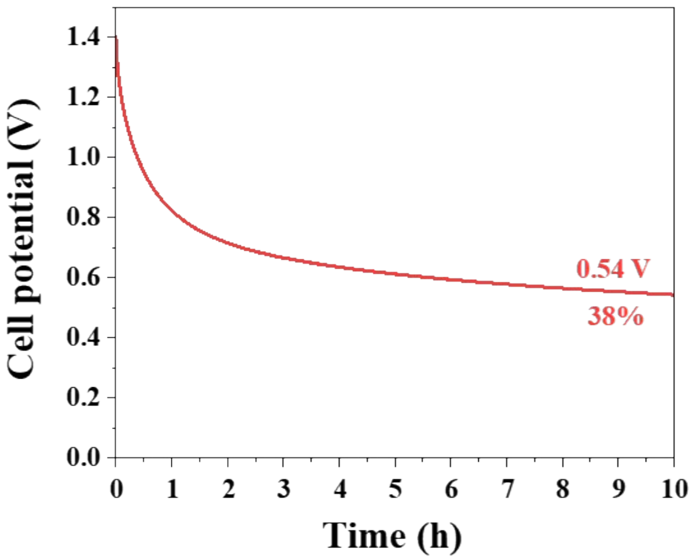

Figure S3 Self-discharge curves of SSCs.

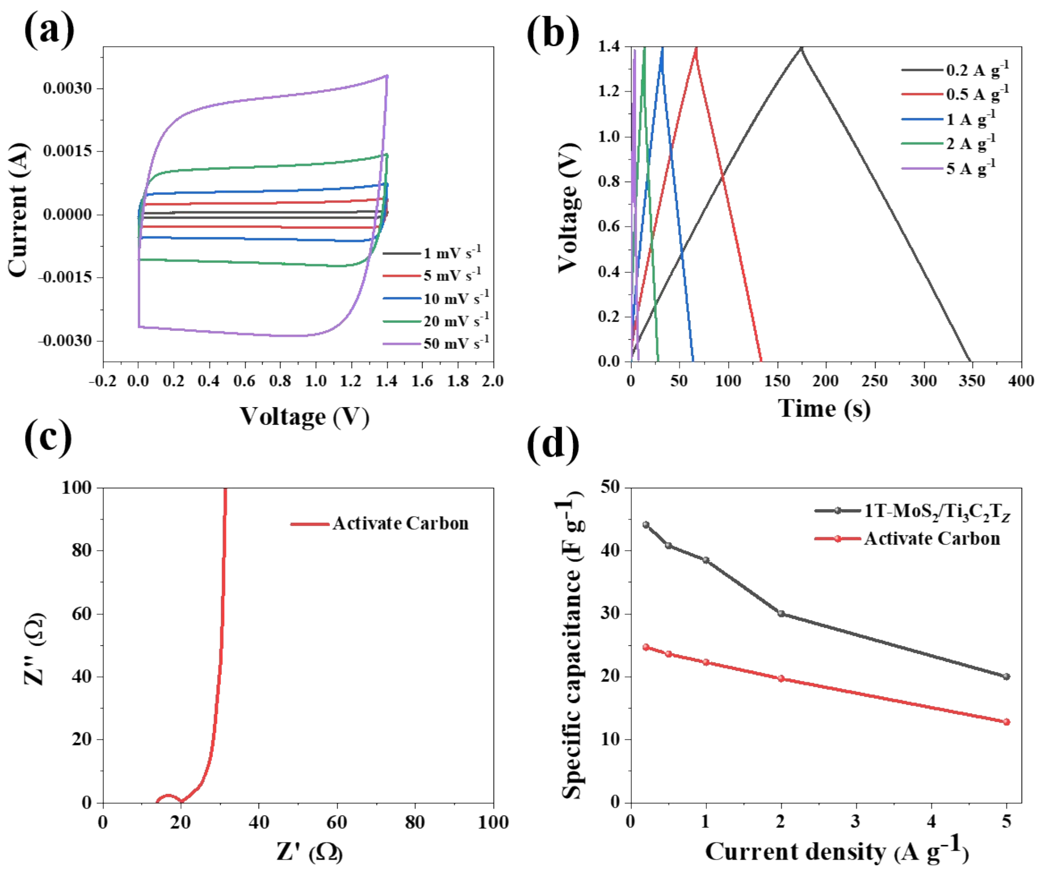

Figure S4 Electrochemical performance of AC SSCs: (a) CV curves at different scan rates from 1 to 50 mV s^{-1}. (b) GCD curves at different current densities from 0.2 to 5 A g^{-1}. (c) Nyquist plots of the AC SSCs. (d) The gravimetric capacitance (C_g) of the 1T-MoS_2/$Ti_3C_2T_z$ and AC electrodes plotted as a function of current densities.

Table S1. Comparison of R_s, R_{ct}, CPE-T, and CPE-P element values in equivalent circuits for $Ti_3C_2T_Z$, 1T-MoS_2, and 1T-MoS_2/$Ti_3C_2T_Z$ EIS data.

	R_S (ohm cm^{-2})	R_{ct} (ohm cm^{-2})	CPE-T (F $s^{(a-1)}$)	CPE-P (F $s^{(a-1)}$)
$Ti_3C_2T_Z$	0.84	4.01	6.57×10^{-7}	1.06
1T-MoS_2	1.27	4.53	1.26×10^{-6}	1.03
1T-MoS_2/$Ti_3C_2T_Z$	0.90	3.94	7.27×10^{-7}	1.04

Table S2. Comparative study of MoS_2-based electrode materials for specific capacitance.

Electrode material	Electrolyte	Specific capacitance for single electrode	Cycle stability	Ref
1T-MoS_2/$Ti_3C_2T_z$	20 m LiCl	250 F g^{-1} at 1 A g^{-1}	82.3% for 5000 cycles	our work
MoS_2 film on Cu foil	0.5 M H_2SO_4	33 mF cm^{-2} at 25.47 mA cm^{-2}	97% for 5000 cycles	1
MoS_2	1 M Na_2SO_4	138 F g^{-1} at 1Ag^{-1}	86% for 5000 cycles	2
1T/2H hybrid MoS_2	1 M KCl	259 F g^{-1} at 5 mV s^{-1}	104.7% for 1000 cycles	3
1T-MoS_2 hydrogel	1 M H_2SO_4	147 F g^{-1} at 0.1 A g^{-1}	90% for 5000 cycles	4
MoS_2/graphene	1 M Na_2SO_4	270 F g^{-1} at 0.1 A g^{-1}	89% for 1000 cycles	5
1T-MoS_2/Ti_3C_2 MXene	1 M Na_2SO_4	206 F g^{-1} at 1 A g^{-1}	94.4% for 10000 cycles	6
1T-MoS_2/Ti_3C_2	1 M H_2SO_4	303.8 F g^{-1} at 1 A g^{-1}	82% for 10000 cycles	7
MoS_2 @CNT/rGO	PVA/H_2SO_4	126.8 mF cm^{-2} at 0.1 mA cm^{-2}	94.6% for 10000 cycles	8
PPy/MoS_2	1 M KCl	384 F g^{-1} at 0.5 A g^{-1}	96.47% for 1000 cycles	9
MoS_2–Cu_3N	1 M Na_2SO_4	215.47 F g^{-1} at 0.5 A g^{-1}	90% for 2000 cycles	10
MoS_2/MoO_2@CNT	1 M KOH	228.4 F g^{-1} at 0.5 A g^{-1}	187.1% for 25000 cycles	11
Fe_2O_3/MoS_2	3 M KOH	266 F g^{-1} at 0.5 A g^{-1}	82% for 2000 cycles	12
MoS_2 nanosheets on Mo foil	1 M Na_2SO_4	192.7 F g^{-1} at 1 mA cm^{-2}	98% for 1000 cycles	13

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