Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary information

Effect of $Ti_3C_2T_x$ MXenes Etching at Elevated Temperatures using Concentrated Acid on Binder-free Supercapacitors

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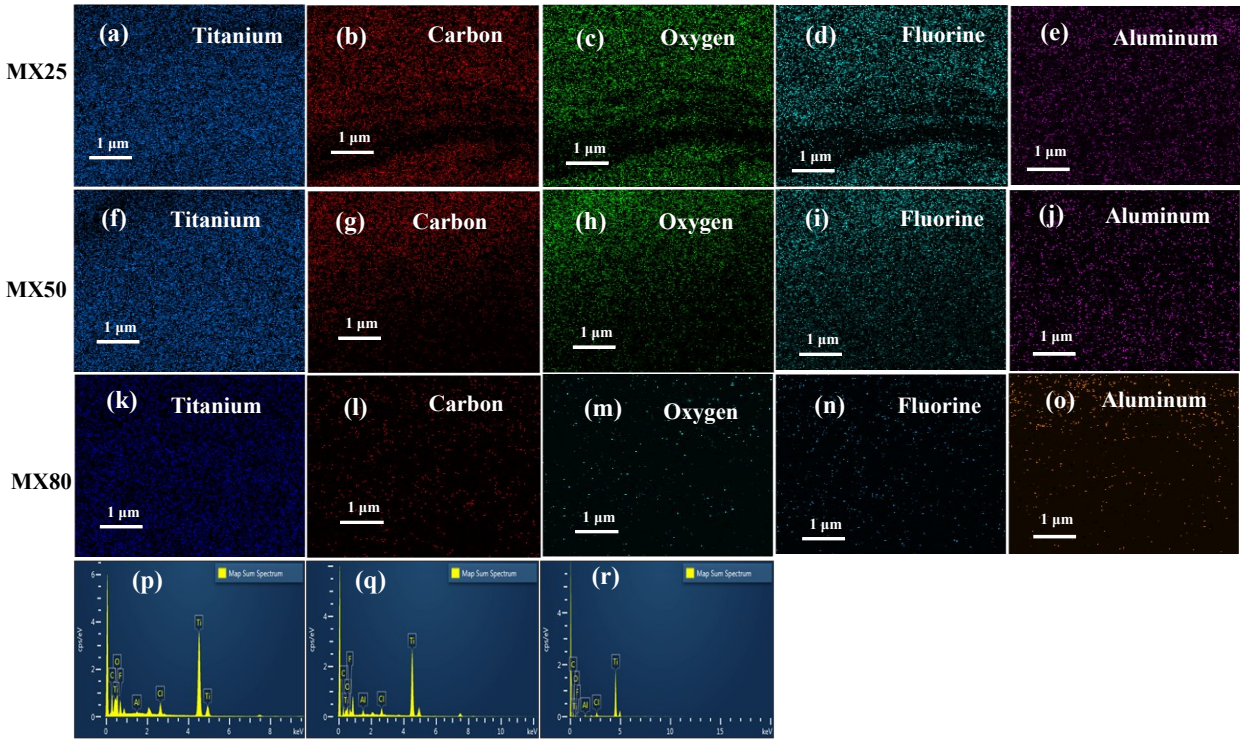

Figure S1. EDX maps of (a-e) Ti, C, O, F and Al in MX25, (f-j) Ti, C, O, F and Al in MX50, (k-o) Ti, C, O, F and Al in MX80, and (p-r) EDX spectra of MX25, MX50 and MX80 MXenes, respectively.

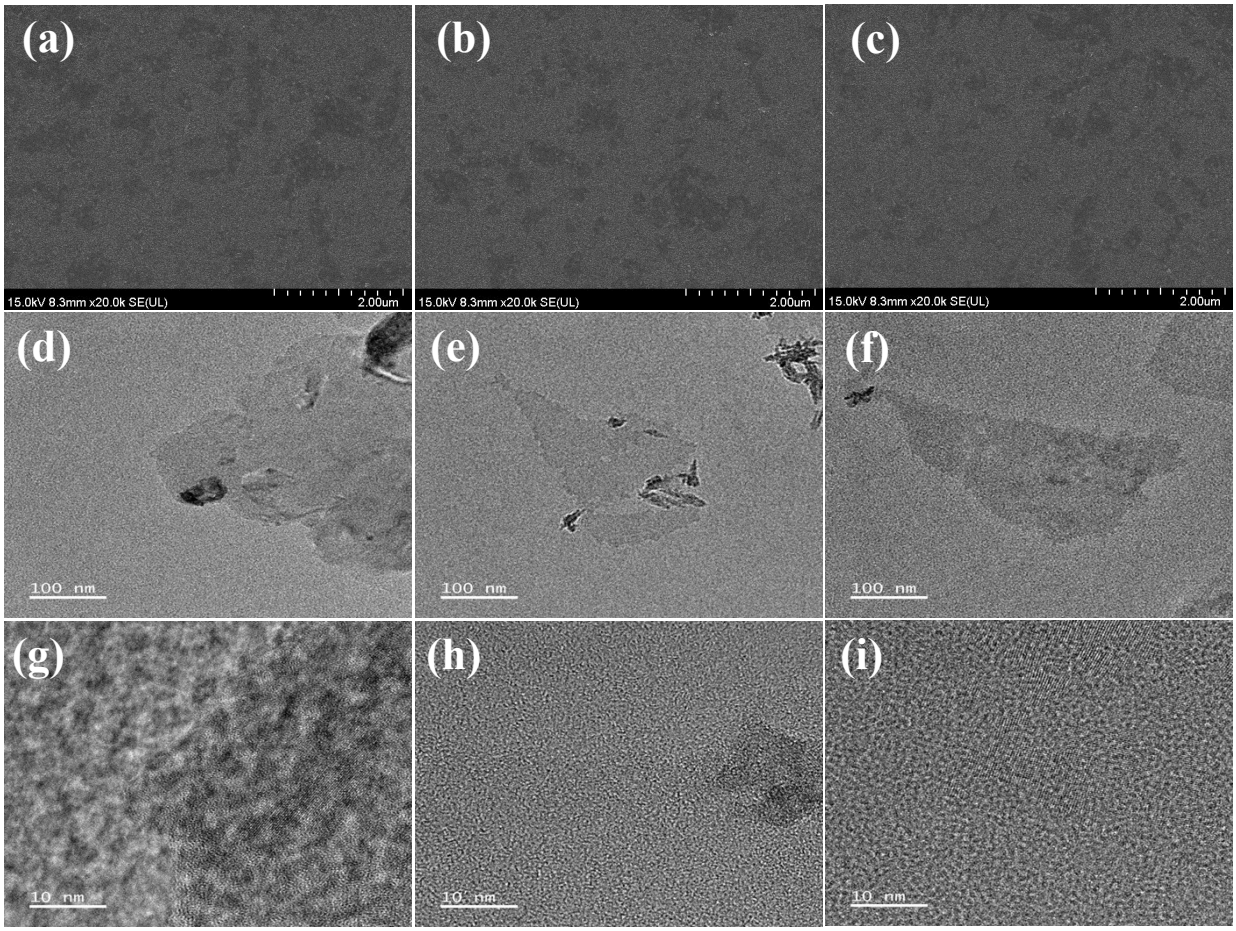

Figure S1A. (a-c) FESEM images, (d-f) Low magnification TEM images, and (g-i) HRTEM images of MX25, MX50, and MX80 MXenes, respectively.

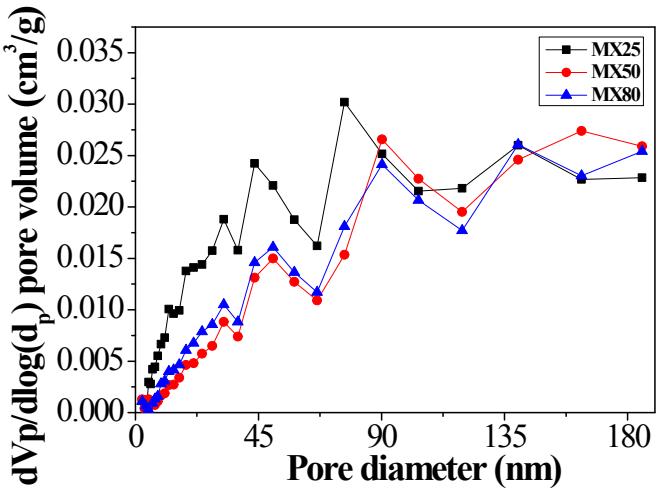

Figure S1B. Pore size distribution (BJH plots) of MX25, MX50, and MX80 MXenes.

Table S1. EDX elements in MX25, MX50, and MX80 MXenes

Element	MX25		MX50		MX80	
	Wt.%	**Atomic %**	**Wt.%**	**Atomic %**	**Wt.%**	**Atomic %**
Ti	51.95	43.58	48.06	31.32	34.34	13.96
C	25.59	37.67	21.97	34.29	25.25	40.95
O	12.09	12.86	15.79	18.81	24.18	29.44
F	6.76	2.68	11.51	13.43	14.06	14.42
Cl	2.57	2.10	1.93	1.20	1.96	1.07
Al	1.04	1.12	0.74	0.94	0.20	0.15
Total	100.00	100.00	100.00	100.00	100.00	100.00

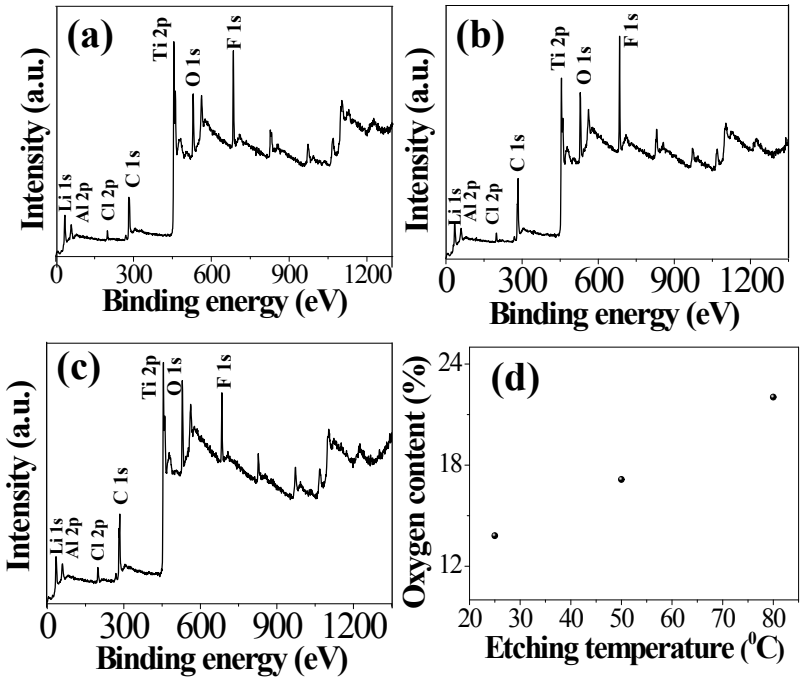

Figure S2. Complete XPS spectra of (a) MX25, (b) MX50, (c) MX80 MXenes, and (d) XPS based oxygen content in MXenes at different etching temperatures

Table S2. XPS elemental composition of MX25, MX50, and MX80 MXenes

Element	*MX25*	*MX50*	*MX80*
Ti 2p	28.94	29.26	29.60
C 1s	35.17	29.88	32.11
O 1s	13.81	17.15	22.03
F 1s	17.88	20.86	15.51
Li 1s	2.66	2.03	1.40
Cl 2p	0.76	0.55	0.95
Al 2p	0.78	0.27	0.20
Total	100.00	100.00	100.00

Electrode	R_s (Ω)	R_{ct} (Ω)	C_1 (F)	C_2 (F)	W (Ω)	Mass (mg)	C_1/g (F/g)

Table S3. Conductivity of MX25, MX50 and MX80 MXenes using van der Pauw Measurement System

MXene	MX25	MX50	MX80
Conductivity (S/m)	8.439×10^3	10.440×10^3	4.154×10^3

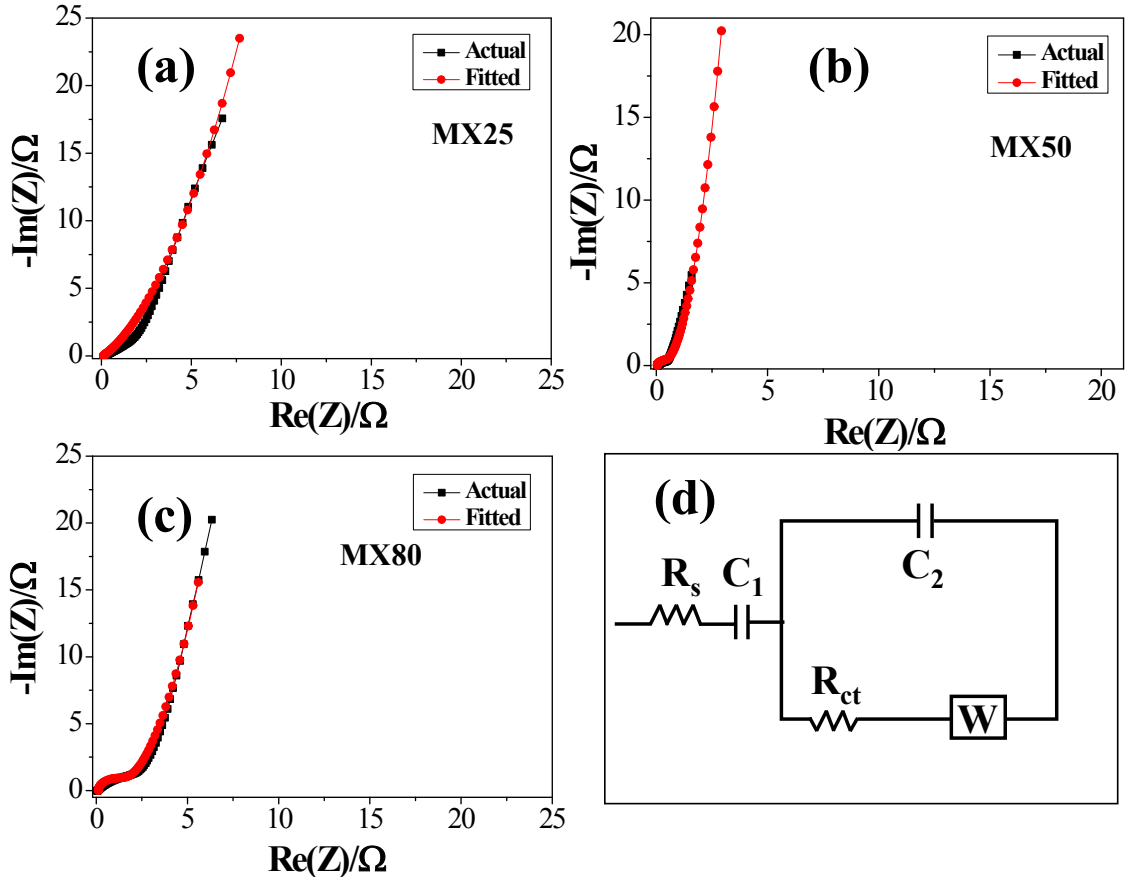

Figure S3. (a-c) Software fitted Nyquist plots of MX25, MX50, and MX80 MXenes, respectively, and (d) Randles equivalent circuit

MX25 MXene	0.11	0.45	0.98	0.0055	4.3	2.1	467
MX50 MXene	0.11	0.034	0.84	0.0065	1.75	1.4	600
MX80 MXene	0.12	1.4	0.62	0.0033	3.3	1.6	388

Table S4. Fitting results for the equivalent circuit to Nyquist plots based EIS parameters