

Supplementary Information

Facile preparation of a MXene-graphene oxide membrane and its voltage-gated ion transport behavior

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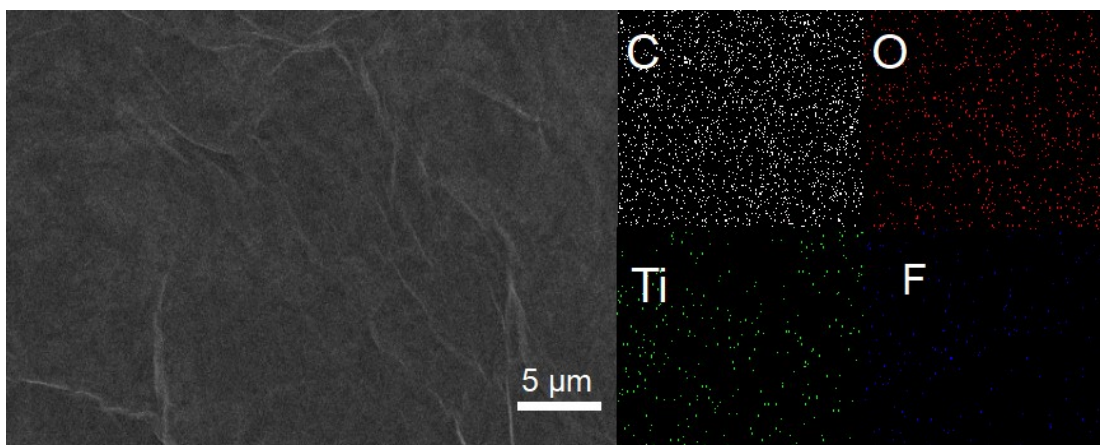


Fig. S1 SEM image of the **MGO-7** and its EDS elemental mapping.

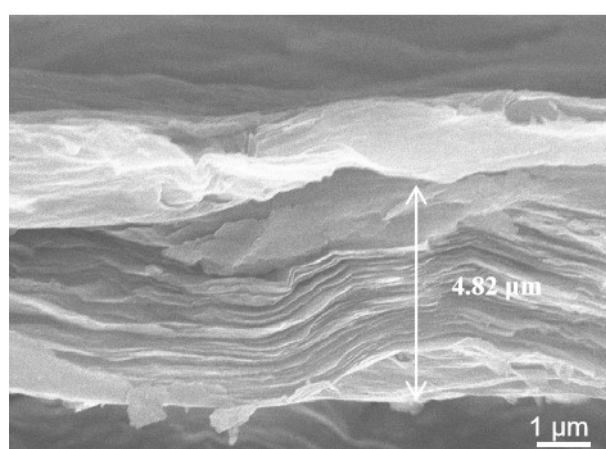


Fig. S2 Cross-section SEM image of the **MGO-7**.

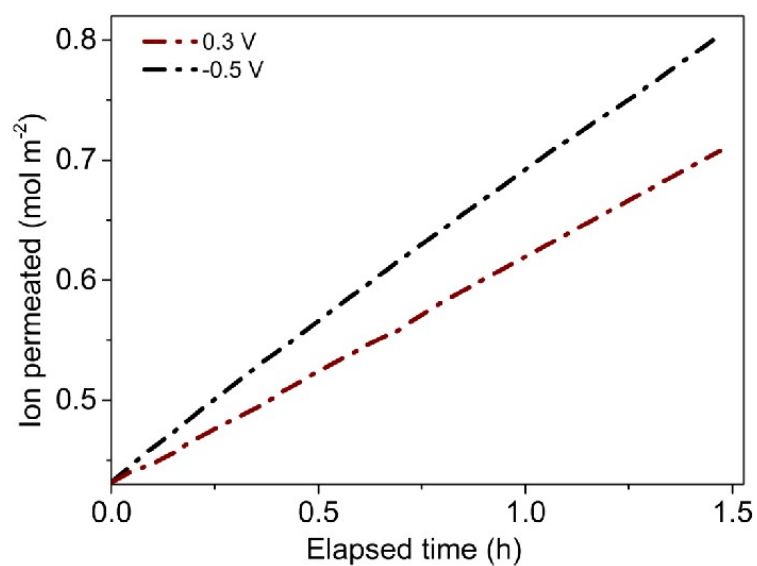


Fig. S3 The steady-state diffusion curves obtained under V_g of -0.5 and +0.3 V at MXene: GO = 7: 3.

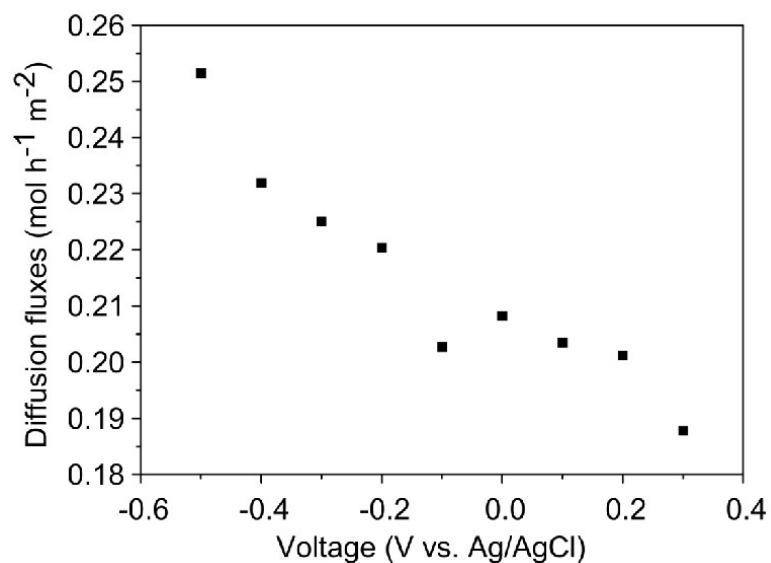


Fig. S4 Molar conductivity of MGO-7 at different potentials.

It can be observed that when V_g are -0.5, -0.4, -0.3, -0.2, -0.1, 0, 0.1, 0.2 and 0.3 V, the diffusion fluxes are 0.251, 0.232, 0.225, 0.220, 0.203, 0.208, 0.233, 0.211 and 0.188 mol h⁻¹ m⁻², respectively.

Table. S1 The charge transfer resistance (R_{ct}) and ohmic resistance (R_e) of **MGOm** at different modulation ratios.

MXene: GO	8: 2	7: 3	6: 4	5: 5	4: 6	10: 0
R_{ct} (Ω)	3.45	1.10	4.32	4.87	5.49	2.90
R_e (Ω)	48.88	70.72	82.52	152.20	160.90	46.64

The smaller the ohmic resistance (R_e), the higher the electrical conductivity. The smaller the charge transfer resistance (R_{ct}), the higher the charge transport rate, and the steeper the straight line at the low-frequency region indicates the higher ion diffusion rate.

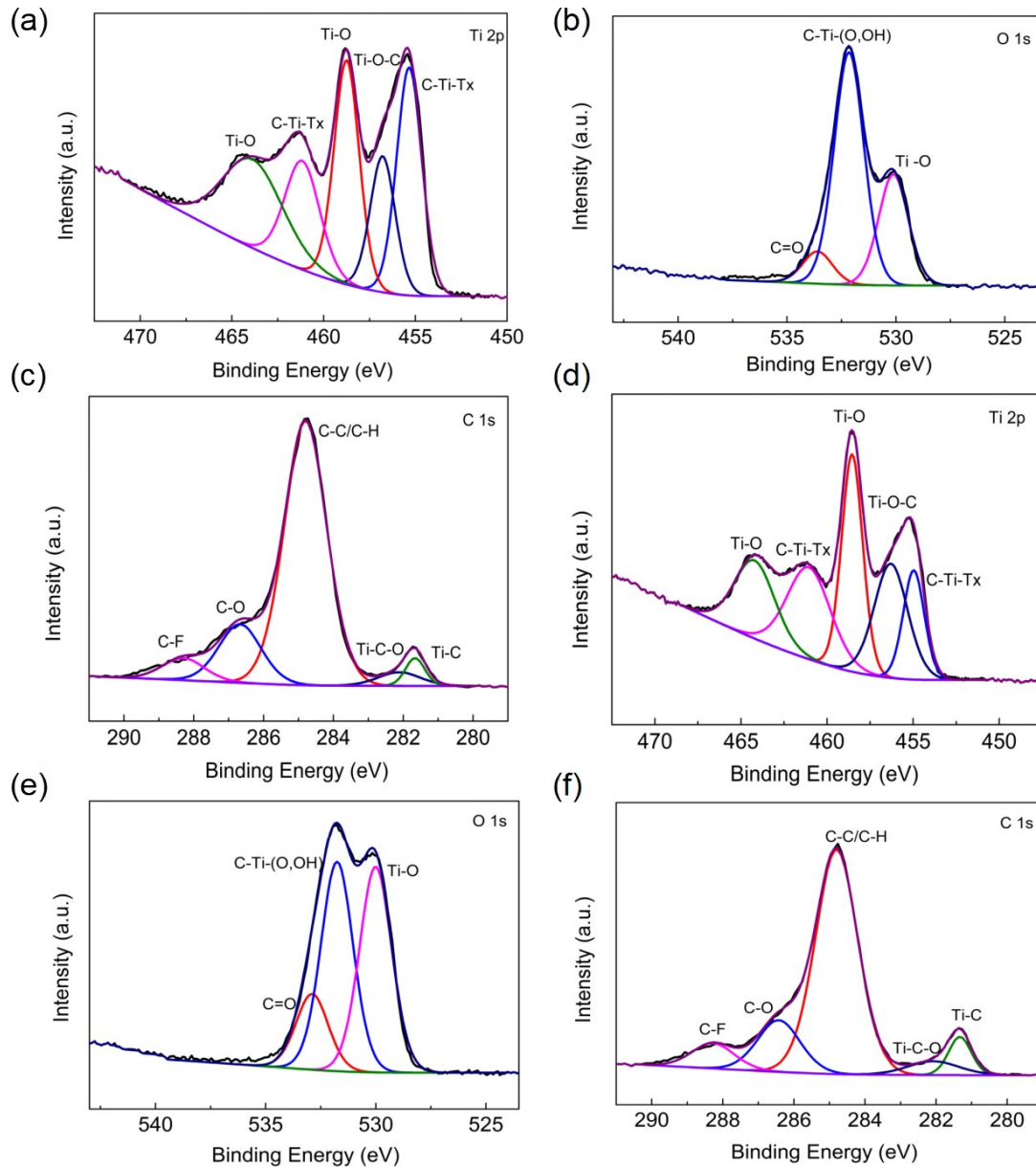


Fig. S5 XPS spectra of MXene phases in MGO-7 near the salt concentration side of pristine membranes (a-c) and the samples after test (d-f).

It can be concluded that no changes in the number and displacement of peaks occur, indicating that no new phases are generated before and after the test.