Supporting Information for

In-plane Thermoelectric Properties of MXene and poly(3,4-ethylenedioxythiophene)/poly 4-styrenesulfonate (PEDOT/PSS) Hybrid Films

Takao Ishida*, Mihoko Motoki, Atsushi Yamamoto,

Kazuki Imasato, Masanobu Miyata and Michihiro Ohta

Global Zero Emission Research Center, National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Ibaraki 305-8569, Japan.

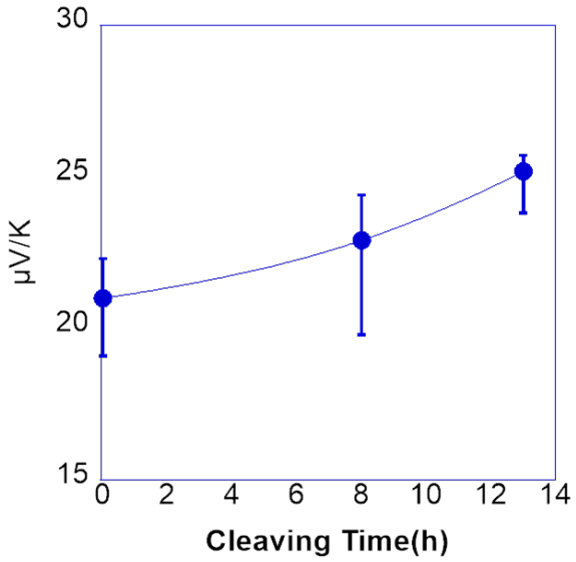

Fig.S1 Cleaving time dependence of Seebeck coefficients of MXene/PEDOT/PSS films with a mixing ratio before casting of 20%.

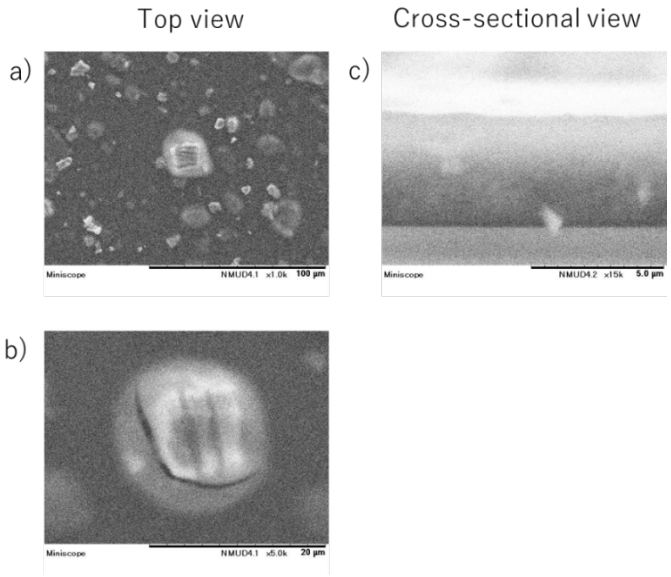

Fig. S2 SEM images (Top view) of (a) 10% un-cleaved MXene/PEDOT/PSS film; (b) Magnified image of (a); (c) Cross-sectional SEM image of 10% un-cleaved MXene/PEDOT/PSS film.

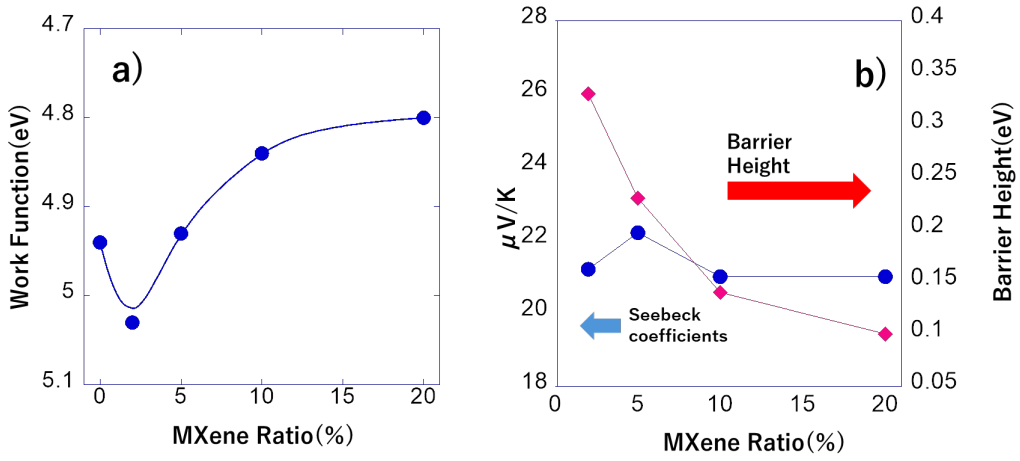

Fig. S3 (a) Work functions of PEDOT/PSS and hybrid films mixed with un-cleaved MXene with different MXene ratios; (b) Estimated energy barrier height (blue circles) and Seebeck coefficients (red diamonds) of hybrid films mixed with un-cleaved MXene with different MXene ratios.

Table S1. Summary of elemental ratios of hybrid films with cleaved MXene detected by EDX observed from the top view.

Sample type	C	Ti	O	S	Al
2%	64.5	0.36	26.1	9.06	0.07
5%	63.4	0.65	26.6	9.02	0.13
10%	60.1	2.13	29.1	8.49	0.23
20%	62.1	2.4	28.6	6.51	0.40

Table S2. Summary of elemental ratios of hybrid films with un-cleaved MXene detected by EDX observed from the top view.

Sample type	C	Ti	O	S	Al
2%	64.1	0.16	25.7	9.98	0.03
5%	63.4	0.56	26.0	9.89	0.08
10%	63.4	0.50	26.8	9.28	0.07
20%	59.4	2.61	29.2	8.44	0.28

Table S3. Summary of max in-plane *zT*s of PEDOT/PSS, and DMSO-rinsed MXene/PEDOT/PSS hybrid films, estimated using *PF and* $k_{//}$ as shown in Tables 1 and S3.

Sample type	Max zT@298K
PEDOT/PSS	0.010
13h rinsed 2%	0.016
13h rinsed 5%	0.019
13h rinsed 10%	0.014
13h rinsed 20%	0.014