Electronic Supplementary Information

Liquid thermoelectric converter composed of acetone-water mixed solution with reduced solution resistance

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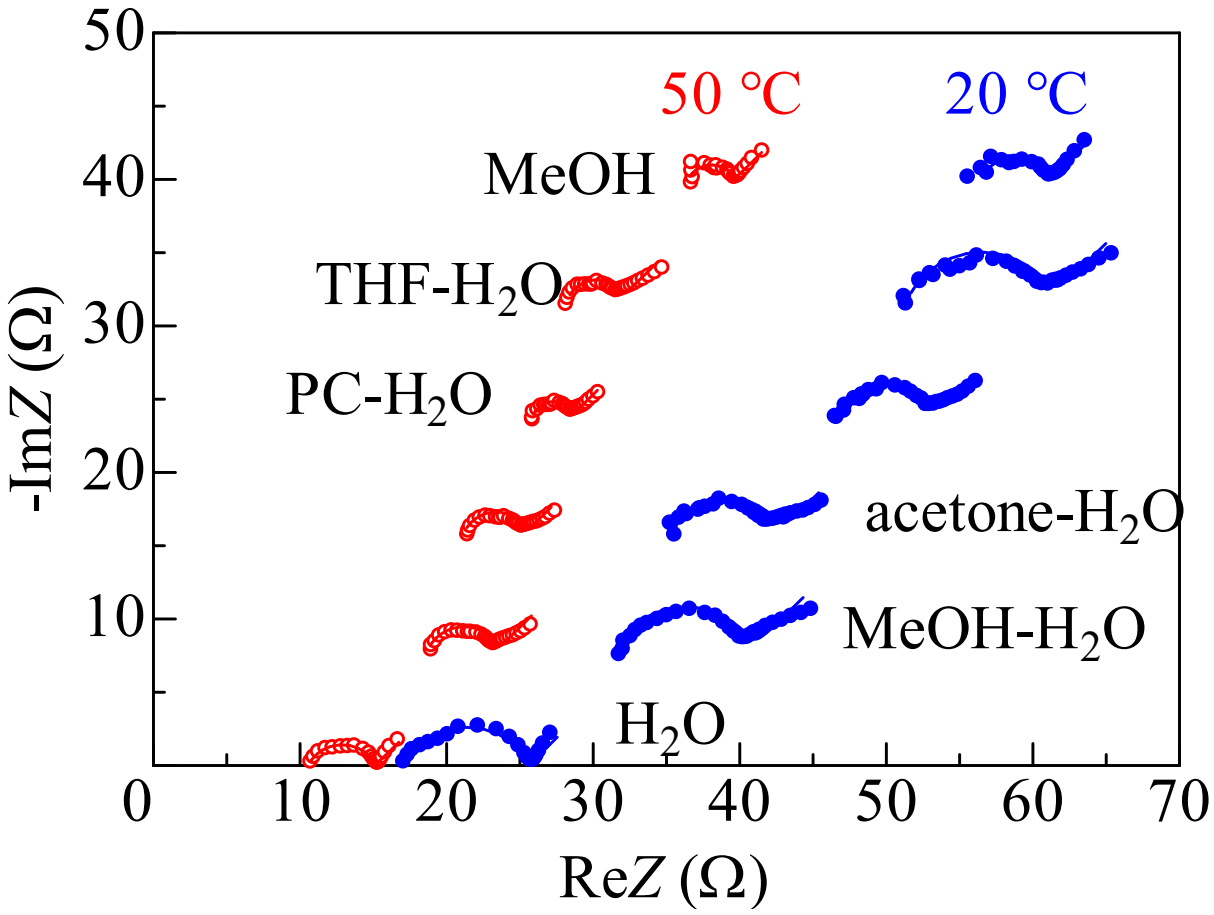

Fig. S1 Nyquist plots of complex impedance in pure and mixed electrolytes containing 0.8 M $Fe(ClO_4)_2/Fe(ClO_4)_3$. Filled and open circles stand for the data obtained at 20 and 50 C°, respectively Solid curved are the results of least-squares fits with a Randles equivalent circuit composed of R_s, R_{ct}, Q, and Z_W. Q is expressed as $Q = 1/Y_0(i\omega)^n$, where ω is angular velocity. Y_0 and n are frequency-independent constants. Q becomes pure capacitance at n = 1. The vertical axis is shifted for each plot

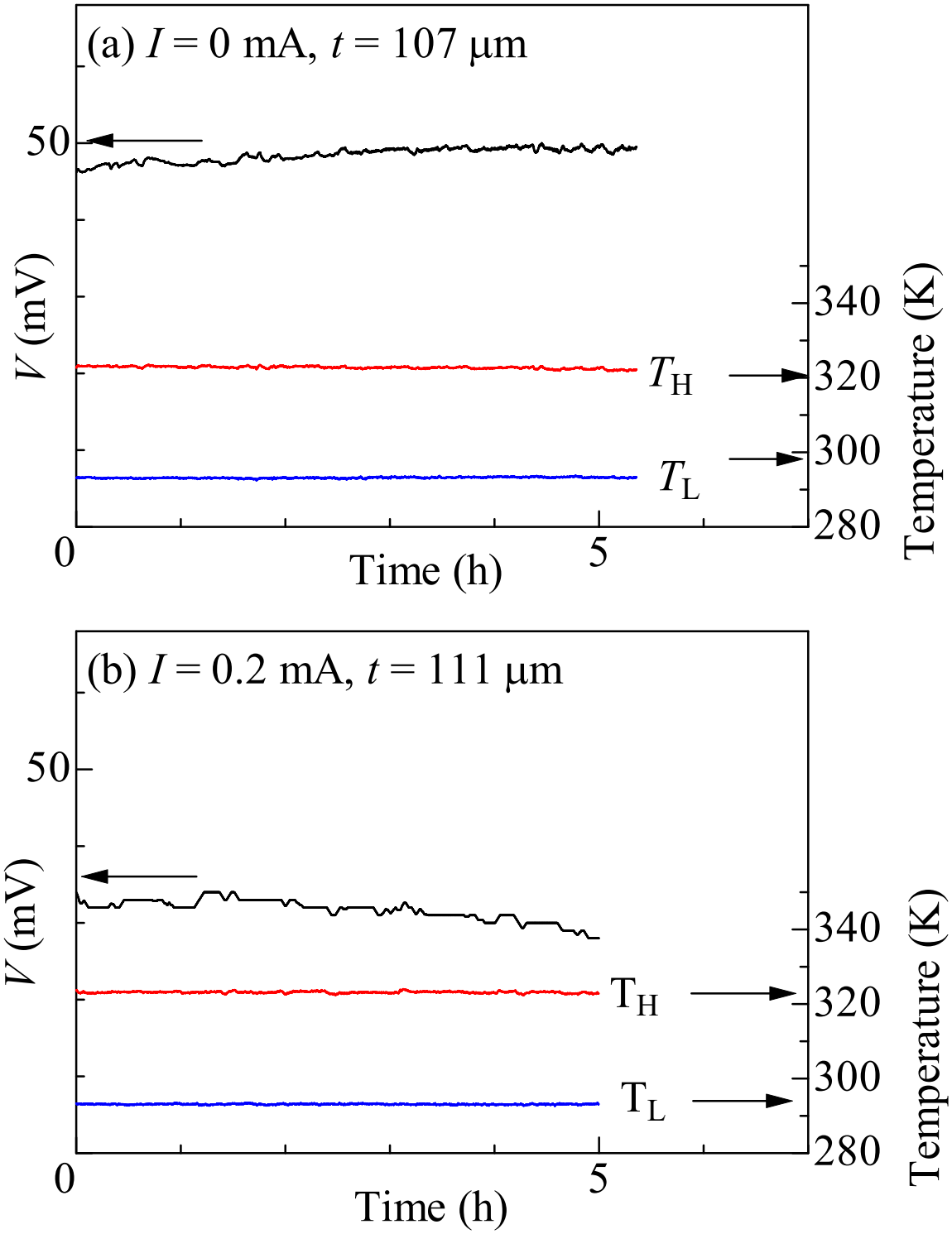

Fig. S2 Long-term stability of electromotive force V of acetone-H_2O LTE (1 : 1 in volume ratio) at (a) 0 mA and (b) 0.2 mA. The solute was 0.8 M $Fe(ClO_4)_2/Fe(ClO_4)_3$. s and d were 42 mm^2 and 10 mm, respectively. Electrode temperatures (T_H and T_L) are also shown.

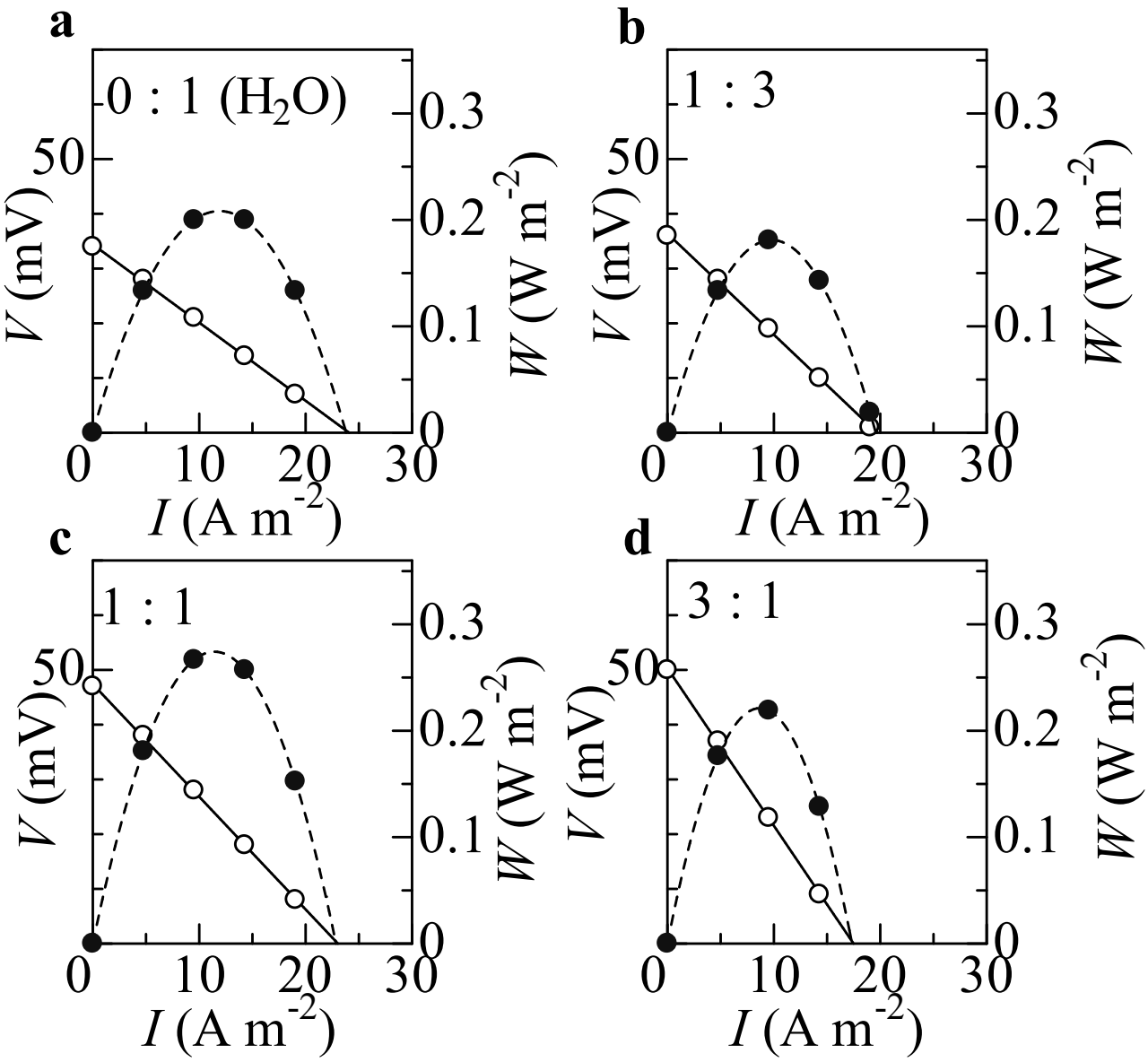

Fig. S3 Electromotive force V (open circles) and power density W (= IV/s; filled circles) per unit area of electrode against current density I in acetone-H_2O LTEs: (a) acetone : H_2O = 0 : 1 (t = 98 μm), (b) 1 : 3 (t = 98 μm), (c) 1 : 1 (t = 118 μm), and (d) 3 : 1 (t = 116 μm). The electrolyte contains 0.8 M $Fe(ClO_4)_2/Fe(ClO_4)_3$. s and d were 42 mm^2 and 10 mm, respectively. The low (T_L) and high (T_H) electrode were fixed at 20 and 50 C°, respectively. Solid straight lines are results of least-squares fits of the I - V plots. Broken curves are results of least-squares fits with quadratic function.

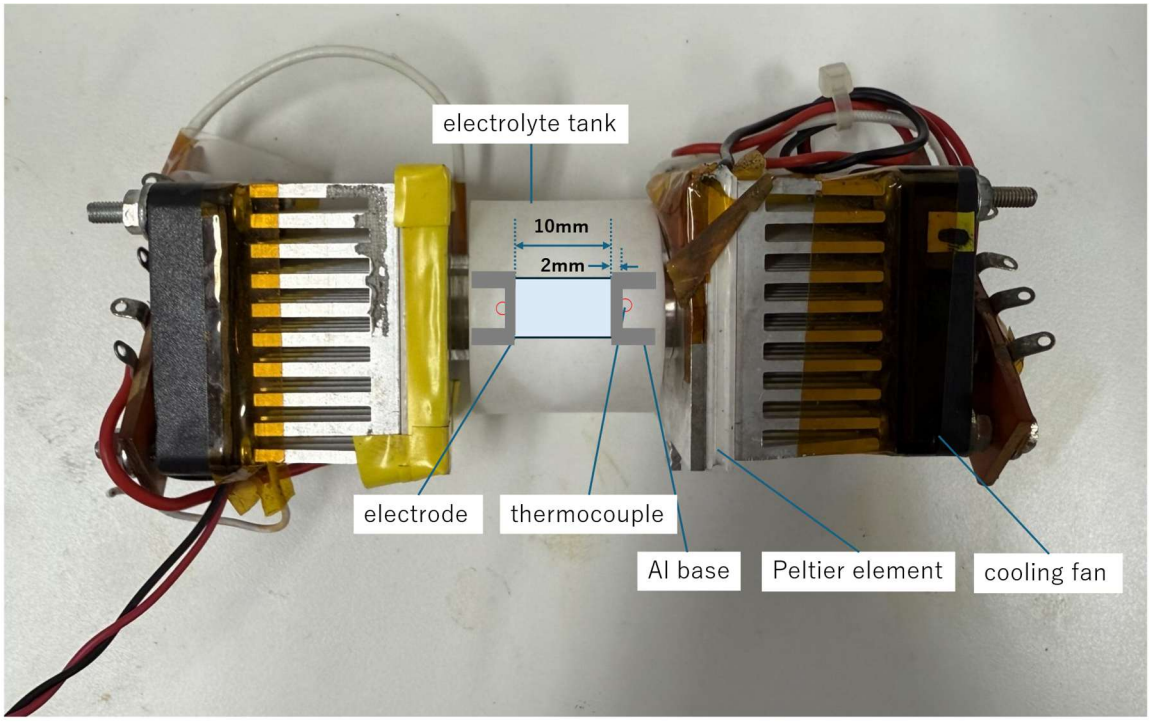

Fig. S4 Picture of LTE in the side configuration. The electrolyte tank was a 7.3 mmϕ polytetrafluoroethylene (PTFE) cylinder, which was sealed by Al bases. The inner surfaces of the bases are completely covered by graphite-dispersing coated electrodes (not seen). The temperature of the high (T_H) and low (T_L) electrodes were independently controlled with the Peltier element and cooling fan, which are attached outside the bases. The temperature of each electrode is monitored with a T-type thermocouple, which was attached to Al base 2 mm away from the electrode. The light blue rectangular and gray parts indicate the electrolyte and Al base inside the PTFE cylinder. The positions of the electrodes are indicated by red circles, respectively.

solvent	Temperature (K)	R (Ω)	r (mV^2)	s (mV)
H_2O	297	48.2	4.33	1.04
H_2O	327	29.4	3.16	0.89
MeOH	297	102.5	7.50	1.36
MeOH	327	65.2	2.97	0.86
MeOH- H_2O	297	72.7	2.47	0.78
MeOH- H_2O	327	48.2	2.20	0.74
acetone- H_2O	297	73.7	3.87	0.98
acetone- H_2O	327	44.0	1.80	0.67
THF- H_2O	297	100.8	5.17	1.14
THF- H_2O	327	55.2	2.97	0.86
PC- H_2O	297	87.0	4.20	1.03
PC- H_2O	327	49.0	1.80	0.67

Table S1 Resistance R, sum (r) of squares of residuals, and standard deviation (s) of r obtained by least-squares fit of the I-V plot. The fitting curve is V = IR, where R is a fitting parameter.

CPE model

solution	Temperature (C°)	R_s (Ω)	R_{ct} (Ω)	Y_0 (μs^n/Ω)	n	A_W (Ω/s$^{1/2}$)
H_2O	20	17.1(2)	8.5(3)	170(55)	0.7	0.34(3)
	50	10.6(1)	4.6(2)	143(57)	0.7	0.41(3)
MeOH	20	56.4(3)	4.8(4)	156(114)	0.7	0.26(2)
	50	36.5(2)	3.2(3)	176(143)	0.7	0.36(3)
MeOH-H_2O	20	31.7(4)	9.2(5)	144(67)	0.7	0.20(2)
	50	18.8(3)	4.8(3)	133(85)	0.7	0.31(3)
THF-H_2O	20	51.6(4)	9.8(5)	155(79)	0.7	0.19(2)
	50	28.4(2)	3.7(3)	338(267)	0.7	0.29(2)
PC-H_2O	20	46.8(2)	6.7(3)	262(122)	0.7	0.26(2)
	50	26.0(1)	2.7(2)	436(295)	0.7	0.43(3)
aceton-H_2O	20	35.3(3)	7.5(4)	231(125)	0.7	0.27(3)
	50	21.3(3)	4.3(3)	164(122)	0.7	0.42(5)

C_d model

solution	Temperature (C°)	R_s (Ω)	R_{ct} (Ω)	C_d (μF)	A_W (Ω/s$^{1/2}$)
H_2O	20	18.1(3)	7.0(4)	15.3(2.1)	0.30(5)
	50	11.1(2)	3.8(2)	8.0(1.2)	0.37(4)
MeOH	20	57.0(3)	3.8(3)	11.3(2.8)	0.24(2)
	50	36.8(2)	2.5(2)	6.5(1.5)	0.32(2)
MeOH-H_2O	20	32.9(3)	7.2(4)	11.9(1.9)	0.17(2)
	50	19.5(2)	3.6(2)	7.8(1.5)	0.30(3)
THF-H_2O	20	52.9(4)	7.6(5)	14.7(2.7)	0.17(2)
	50	28.9(2)	2.8(2)	29.2(4.0)	0.27(3)
PC-H_2O	20	47.7(2)	5.3(3)	23.7(4.0)	0.24(3)
	50	26.4(1)	2.1(2)	41.1(8.9)	0.40(4)
aceton-H_2O	20	36.3(3)	5.7(4)	20.6(3.9)	0.22(3)
	50	22.0(2)	3.1(2)	11.3(2.6)	0.35(4)

Table S2 (upper) Obtained parameters by least-squares fits with a Randles equivalent circuit composed of R_s, R_{ct}, Q, and Z_W (CPE model). Q is expressed as $Q = 1/ Y_0(i\omega)^n$, where n is fixed at 0.7. (lower) Obtained parameters by least-squares fits with a Randles equivalent circuit composed of R_s, R_{ct}, C_d, and Z_W (C_d model).

The data supporting this article

Voltage V against current I of aqueous, MeOH, MeOH-H_2O, acetone-H_2O, THF-H_2O, and PC-H_2O LTEs. The electrolyte contains 0.8 M $Fe(ClO_4)_2/Fe(ClO_4)_3$. s and d were 42 mm^2 and 10 mm, respectively.

#0.8 M aqueous

# I[mA]	V[mV], T[K]	
0	0	327
0.25	4.8	327
0.5	10.8	327
0.75	17.3	327
1	24.5	327
0	0	297
0.25	8.4	297
0.5	18.1	297
0.75	28.6	297
1	39.7	297

#0.8 M MeOH

# I[mA]	V[mV], T[K]	
0	0	327
0.25	12.0	327
0.5	25.0	327
0.75	39.0	327
1	53.0	327
0	0	297
0.25	19.0	297
0.5	39.0	297
0.75	62.0	297
1	83.0	297

#0.8 M MeOH-H_2O

# I[mA]	V[mV], T[K]	
0	0	327
0.25	9.0	327
0.5	18.0	327
0.75	29.0	327

1 39.0 327
0 0 297
0.25 15.0 297
0.5 28.0 297
0.75 43.0 297
1 59.0 297

#0.8 M acetone-H_2O
I[mA] V[mV], T[K]
0 0 327
0.25 8.0 327
0.5 17.0 327
0.75 26.0 327
1 36.0 327
0 0 297
0.25 14.0 297
0.5 28.0 297
0.75 44.0 297
1 60.0 297

#0.8 M THF-H_2O
I[mA] V[mV], T[K]
0 0 327
0.25 10.0 327
0.5 21.0 327
0.75 33.0 327
1 45.0 327
0 0 297
0.25 19.0 297
0.5 39.0 297
0.75 60.0 297
1 82.0 297

#0.8 M PC-H_2O
I[mA] V[mV], T[K]
0 0 327
0.25 9.0 327
0.5 19.0 327

0.75	29.0	327
1	40.0	327
0	0	297
0.25	17.0	297
0.5	34.0	297
0.75	51.0	297
1	71.0	297

EIS data of aqueous, MeOH, MeOH-H_2O, acetone-H_2O, THF-H_2O, and PC-H_2O LTEs. ReZ, ImZ are real and imaginary parts of impedance, respectively. The electrode area was 1.0 cm^2.

#aqueous
#At 20 C°
#index, frequency (Hz), ReZ (Ω), ImZ (Ω)

1	2.500000E+05	4.149923E+01	2.846929E+01
2	1.353191E+05	1.707790E+01	-2.600456E-01
3	7.324506E+04	1.737432E+01	-7.070072E-01
4	3.964583E+04	1.767046E+01	-1.078199E+00
5	2.145936E+04	1.822600E+01	-1.352670E+00
6	1.161544E+04	1.878704E+01	-1.563470E+00
7	6.287167E+03	1.944336E+01	-1.796907E+00
8	3.403096E+03	2.009163E+01	-2.102805E+00
9	1.842016E+03	2.083389E+01	-2.613021E+00
10	9.970398E+02	2.216110E+01	-2.700373E+00
11	5.396742E+02	2.343835E+01	-2.450177E+00
12	2.921130E+02	2.434026E+01	-1.921632E+00
13	1.581139E+02	2.493562E+01	-1.350419E+00
14	8.558333E+01	2.534705E+01	-8.145423E-01
15	4.632424E+01	2.552159E+01	-5.753205E-01
16	2.507422E+01	2.564569E+01	-4.399714E-01
17	1.357209E+01	2.574651E+01	-3.691514E-01
18	7.346252E+00	2.584377E+01	-3.648366E-01
19	3.976354E+00	2.594751E+01	-3.885279E-01
20	2.152307E+00	2.603949E+01	-4.812237E-01
21	1.164993E+00	2.614959E+01	-6.520967E-01
22	6.305834E-01	2.632937E+01	-9.770326E-01
23	3.413199E-01	2.661304E+01	-1.470636E+00
24	1.847485E-01	2.710647E+01	-2.199555E+00

#aqueous
#At 50 C°
#index, frequency (Hz), ReZ (Ω), ImZ (Ω)

1	2.500000E+05	1.059490E+01	2.625082E-01
2	1.353191E+05	1.074414E+01	-2.464975E-01
3	7.324506E+04	1.095410E+01	-5.666200E-01
4	3.964583E+04	1.126994E+01	-9.305558E-01

5	2.145936E+04	1.178208E+01	-1.157744E+00
6	1.161544E+04	1.226216E+01	-1.210634E+00
7	6.287167E+03	1.281882E+01	-1.275003E+00
8	3.403096E+03	1.328530E+01	-1.298729E+00
9	1.842016E+03	1.373728E+01	-1.329071E+00
10	9.970398E+02	1.433542E+01	-1.104410E+00
11	5.396742E+02	1.474219E+01	-8.352415E-01
12	2.921130E+02	1.493933E+01	-5.857740E-01
13	1.581139E+02	1.506817E+01	-3.912556E-01
14	8.558333E+01	1.519317E+01	-2.429947E-01
15	4.632424E+01	1.524596E+01	-1.951299E-01
16	2.507422E+01	1.529543E+01	-1.768723E-01
17	1.357209E+01	1.533793E+01	-1.809125E-01
18	7.346252E+00	1.538992E+01	-2.142227E-01
19	3.976354E+00	1.545585E+01	-2.731500E-01
20	2.152307E+00	1.551674E+01	-3.997574E-01
21	1.164993E+00	1.562610E+01	-5.719968E-01
22	6.305834E-01	1.582642E+01	-8.750865E-01
23	3.413199E-01	1.613725E+01	-1.297410E+00
24	1.847485E-01	1.669652E+01	-1.750268E+00

#MeOH
#At 20 C°
#index, frequency (Hz), ReZ (Ω), ImZ (Ω)

1	2.500000E+05	5.558725E+01	-1.612201E-01
2	1.353191E+05	5.648687E+01	-7.453317E-01
3	7.324506E+04	5.688333E+01	-4.345809E-01
4	3.964583E+04	5.718441E+01	-1.503183E+00
5	2.145936E+04	5.791928E+01	-1.280172E+00
6	1.161544E+04	5.842939E+01	-1.125596E+00
7	6.287167E+03	5.843886E+01	-1.083353E+00
8	3.403096E+03	5.877523E+01	-1.157763E+00
9	1.842016E+03	5.929820E+01	-1.315079E+00
10	9.970398E+02	5.998331E+01	-1.147185E+00
11	5.396742E+02	6.043878E+01	-9.748195E-01
12	2.921130E+02	6.058080E+01	-7.833373E-01
13	1.581139E+02	6.077678E+01	-5.718230E-01
14	8.558333E+01	6.108862E+01	-3.202061E-01

15	4.632424E+01	6.118715E+01	-3.320844E-01
16	2.507422E+01	6.132727E+01	-3.736135E-01
17	1.357209E+01	6.148068E+01	-4.022603E-01
18	7.346252E+00	6.162498E+01	-4.689428E-01
19	3.976354E+00	6.180081E+01	-5.943778E-01
20	2.152307E+00	6.191986E+01	-6.884495E-01
21	1.164993E+00	6.213583E+01	-9.457554E-01
22	6.305834E-01	6.239909E+01	-1.306163E+00
23	3.413199E-01	6.289434E+01	-1.888005E+00
24	1.847485E-01	6.357699E+01	-2.638130E+00

#MeOH
#At 50 C°
#index, frequency (Hz), ReZ (Ω), ImZ (Ω)

1	2.500000E+05	3.670420E+01	2.233946E-01
2	1.353191E+05	3.682240E+01	-1.210767E-01
3	7.324506E+04	3.673661E+01	-5.842093E-01
4	3.964583E+04	3.672153E+01	-1.154045E+00
5	2.145936E+04	3.763473E+01	-1.076228E+00
6	1.161544E+04	3.804336E+01	-9.180680E-01
7	6.287167E+03	3.829401E+01	-7.452682E-01
8	3.403096E+03	3.848507E+01	-7.257617E-01
9	1.842016E+03	3.842498E+01	-9.298294E-01
10	9.970398E+02	3.888783E+01	-7.649274E-01
11	5.396742E+02	3.919933E+01	-6.331990E-01
12	2.921130E+02	3.927725E+01	-4.884436E-01
13	1.581139E+02	3.939565E+01	-3.572971E-01
14	8.558333E+01	3.962421E+01	-1.564112E-01
15	4.632424E+01	3.968168E+01	-1.798107E-01
16	2.507422E+01	3.975707E+01	-1.982091E-01
17	1.357209E+01	3.983596E+01	-2.352169E-01
18	7.346252E+00	3.991769E+01	-2.767629E-01
19	3.976354E+00	4.001928E+01	-3.794038E-01
20	2.152307E+00	4.009838E+01	-5.204596E-01
21	1.164993E+00	4.032613E+01	-7.501327E-01
22	6.305834E-01	4.057586E+01	-1.025848E+00
23	3.413199E-01	4.086509E+01	-1.428984E+00
24	1.847485E-01	4.155481E+01	-1.941978E+00

#MeOH-H_2O

#At 20 C°

#index, frequency (Hz), ReZ (Ω), ImZ (Ω)

1	2.500000E+05	3.178760E+01	4.199740E-01
2	1.504250E+05	3.203960E+01	6.527830E-02
3	9.051130E+04	3.209660E+01	-4.875030E-01
4	5.446080E+04	3.257080E+01	-7.983190E-01
5	3.276920E+04	3.291100E+01	-1.213020E+00
6	1.971730E+04	3.329930E+01	-1.512100E+00
7	1.186390E+04	3.371430E+01	-1.688930E+00
8	7.138540E+03	3.441020E+01	-1.971280E+00
9	4.295280E+03	3.505650E+01	-2.225250E+00
10	2.584480E+03	3.572240E+01	-2.449940E+00
11	1.555080E+03	3.660840E+01	-2.662970E+00
12	9.356970E+02	3.767230E+01	-2.378180E+00
13	5.630110E+02	3.838120E+01	-2.187710E+00
14	3.387650E+02	3.889210E+01	-1.772980E+00
15	2.038350E+02	3.933130E+01	-1.382420E+00
16	1.226480E+02	3.964630E+01	-1.106280E+00
17	7.379760E+01	4.000080E+01	-7.730340E-01
18	4.440410E+01	4.021380E+01	-7.374610E-01
19	2.671810E+01	4.035530E+01	-7.398580E-01
20	1.607630E+01	4.054100E+01	-7.648570E-01
21	9.673140E+00	4.077520E+01	-9.059400E-01
22	5.820350E+00	4.100080E+01	-1.061370E+00
23	3.502110E+00	4.137540E+01	-1.224900E+00
24	2.107230E+00	4.179940E+01	-1.491160E+00
25	1.267920E+00	4.230590E+01	-1.709510E+00
26	7.629120E-01	4.289100E+01	-1.920860E+00
27	4.590460E-01	4.351420E+01	-2.174950E+00
28	2.762090E-01	4.423760E+01	-2.384600E+00
29	1.661950E-01	4.488970E+01	-2.666390E+00

#MeOH-H_2O

#At 50 C°

#index, frequency (Hz), ReZ (Ω), ImZ (Ω)

1	2.500000E+05	1.896440E+01	1.073160E-01

2	1.504250E+05	1.897500E+01	-2.011320E-01
3	9.051130E+04	1.922800E+01	-4.572340E-01
4	5.446080E+04	1.953250E+01	-8.469410E-01
5	3.276920E+04	1.993980E+01	-1.066780E+00
6	1.971730E+04	2.037020E+01	-1.182780E+00
7	1.186390E+04	2.076500E+01	-1.171550E+00
8	7.138540E+03	2.117630E+01	-1.130040E+00
9	4.295280E+03	2.148600E+01	-1.096350E+00
10	2.584480E+03	2.168020E+01	-1.090860E+00
11	1.555080E+03	2.206900E+01	-1.048000E+00
12	9.356970E+02	2.241570E+01	-9.107590E-01
13	5.630110E+02	2.267150E+01	-7.538050E-01
14	3.387650E+02	2.279440E+01	-6.192860E-01
15	2.038350E+02	2.292360E+01	-4.909790E-01
16	1.226480E+02	2.304410E+01	-4.151870E-01
17	7.379760E+01	2.320330E+01	-3.261360E-01
18	4.440410E+01	2.329740E+01	-3.675120E-01
19	2.671810E+01	2.340060E+01	-4.170610E-01
20	1.607630E+01	2.354090E+01	-4.741040E-01
21	9.673140E+00	2.369130E+01	-5.597090E-01
22	5.820350E+00	2.387770E+01	-6.361520E-01
23	3.502110E+00	2.409460E+01	-7.058330E-01
24	2.107230E+00	2.432200E+01	-7.880900E-01
25	1.267920E+00	2.455710E+01	-8.566490E-01
26	7.629120E-01	2.481220E+01	-9.814290E-01
27	4.590460E-01	2.509980E+01	-1.125930E+00
28	2.762090E-01	2.538440E+01	-1.329330E+00
29	1.661950E-01	2.575750E+01	-1.602240E+00

#acetone-H_2O

#At 20 C°

#index, frequency (Hz), ReZ (Ω), ImZ (Ω)

1	2.500000E+05	3.556400E+01	2.528190E-01
2	1.504250E+05	3.526790E+01	-5.344050E-01
3	9.051130E+04	3.536930E+01	-5.154940E-01
4	5.446080E+04	3.589000E+01	-8.902310E-01
5	3.276920E+04	3.626440E+01	-1.301270E+00
6	1.971730E+04	3.641090E+01	-1.122650E+00

7	1.186390E+04	3.729470E+01	-1.519000E+00
8	7.138540E+03	3.719950E+01	-1.428790E+00
9	4.295280E+03	3.767520E+01	-1.625580E+00
10	2.584480E+03	3.824680E+01	-1.789570E+00
11	1.555080E+03	3.862540E+01	-2.174760E+00
12	9.356970E+02	3.950920E+01	-1.956010E+00
13	5.630110E+02	4.019700E+01	-1.758140E+00
14	3.387650E+02	4.062130E+01	-1.508960E+00
15	2.038350E+02	4.102000E+01	-1.219760E+00
16	1.226480E+02	4.132250E+01	-1.008720E+00
17	7.379760E+01	4.166770E+01	-7.576370E-01
18	4.440410E+01	4.188110E+01	-7.487300E-01
19	2.671810E+01	4.209530E+01	-7.877690E-01
20	1.607630E+01	4.233210E+01	-8.190110E-01
21	9.673140E+00	4.259160E+01	-8.944760E-01
22	5.820350E+00	4.286790E+01	-9.935230E-01
23	3.502110E+00	4.316850E+01	-1.094380E+00
24	2.107230E+00	4.351880E+01	-1.180360E+00
25	1.267920E+00	4.395410E+01	-1.304990E+00
26	7.629120E-01	4.435340E+01	-1.377030E+00
27	4.590460E-01	4.473150E+01	-1.536120E+00
28	2.762090E-01	4.518640E+01	-1.758180E+00
29	1.661950E-01	4.561210E+01	-2.050910E+00

#acetone-H_2O

#At 50 C°

#index, frequency (Hz), ReZ (Ω), ImZ (Ω)

1	2.500000E+05	2.144960E+01	2.489320E-01
2	1.504250E+05	2.150870E+01	-8.866550E-03
3	9.051130E+04	2.164230E+01	-3.128830E-01
4	5.446080E+04	2.196270E+01	-6.840600E-01
5	3.276920E+04	2.230040E+01	-8.955590E-01
6	1.971730E+04	2.269050E+01	-1.026330E+00
7	1.186390E+04	2.302730E+01	-9.794610E-01
8	7.138540E+03	2.340700E+01	-9.174240E-01
9	4.295280E+03	2.361960E+01	-8.858360E-01
10	2.584480E+03	2.370930E+01	-8.820500E-01
11	1.555080E+03	2.395180E+01	-9.791640E-01

12	9.356970E+02	2.431520E+01	-8.080340E-01
13	5.630110E+02	2.456500E+01	-7.016190E-01
14	3.387650E+02	2.468300E+01	-6.094910E-01
15	2.038350E+02	2.481960E+01	-5.050360E-01
16	1.226480E+02	2.494430E+01	-4.566750E-01
17	7.379760E+01	2.511980E+01	-3.449760E-01
18	4.440410E+01	2.523370E+01	-3.807980E-01
19	2.671810E+01	2.536020E+01	-4.152060E-01
20	1.607630E+01	2.549930E+01	-4.468040E-01
21	9.673140E+00	2.564400E+01	-4.940790E-01
22	5.820350E+00	2.580430E+01	-5.396200E-01
23	3.502110E+00	2.596850E+01	-6.003310E-01
24	2.107230E+00	2.616340E+01	-6.246240E-01
25	1.267920E+00	2.636740E+01	-7.111940E-01
26	7.629120E-01	2.657830E+01	-8.081250E-01
27	4.590460E-01	2.679330E+01	-9.183640E-01
28	2.762090E-01	2.708590E+01	-1.157840E+00
29	1.661950E-01	2.742600E+01	-1.363190E+00

#THF-H_2O
#At 20 C°
#index, frequency (Hz), ReZ (Ω), ImZ (Ω)

1	2.500000E+05	5.122610E+01	-5.370020E-03
2	1.504250E+05	5.136670E+01	4.881280E-01
3	9.051130E+04	5.231920E+01	-1.033580E+00
4	5.446080E+04	5.229740E+01	-1.132760E+00
5	3.276920E+04	5.301230E+01	-1.564540E+00
6	1.971730E+04	5.325190E+01	-1.447820E+00
7	1.186390E+04	5.408180E+01	-2.092030E+00
8	7.138540E+03	5.440400E+01	-1.807270E+00
9	4.295280E+03	5.504680E+01	-2.045860E+00
10	2.584480E+03	5.574260E+01	-2.238560E+00
11	1.555080E+03	5.620650E+01	-2.773680E+00
12	9.356970E+02	5.732890E+01	-2.546720E+00
13	5.630110E+02	5.825600E+01	-2.351660E+00
14	3.387650E+02	5.883380E+01	-2.025000E+00
15	2.038350E+02	5.937130E+01	-1.664540E+00
16	1.226480E+02	5.985920E+01	-1.409530E+00

17	7.379760E+01	6.033590E+01	-9.855190E-01
18	4.440410E+01	6.062990E+01	-8.964350E-01
19	2.671810E+01	6.078870E+01	-9.220470E-01
20	1.607630E+01	6.105710E+01	-8.704840E-01
21	9.673140E+00	6.135290E+01	-1.056660E+00
22	5.820350E+00	6.159880E+01	-1.111560E+00
23	3.502110E+00	6.193680E+01	-1.210460E+00
24	2.107230E+00	6.232800E+01	-1.394630E+00
25	1.267920E+00	6.276420E+01	-1.610880E+00
26	7.629120E-01	6.331530E+01	-1.835550E+00
27	4.590460E-01	6.385070E+01	-2.131710E+00
28	2.762090E-01	6.456940E+01	-2.579640E+00
29	1.661950E-01	6.540200E+01	-2.925660E+00

#THF-H_2O
#At 50 C°
#index, frequency (Hz), ReZ (Ω), ImZ (Ω)

1	2.500000E+05	2.815520E+01	5.144030E-01
2	1.504250E+05	2.827520E+01	1.119670E-01
3	9.051130E+04	2.842440E+01	-2.531550E-01
4	5.446080E+04	2.864500E+01	-5.294260E-01
5	3.276920E+04	2.896600E+01	-7.851570E-01
6	1.971730E+04	2.920890E+01	-7.772610E-01
7	1.186390E+04	2.949660E+01	-8.041760E-01
8	7.138540E+03	2.977860E+01	-7.936370E-01
9	4.295280E+03	2.994740E+01	-8.018400E-01
10	2.584480E+03	3.002610E+01	-8.546380E-01
11	1.555080E+03	3.028870E+01	-1.040190E+00
12	9.356970E+02	3.066740E+01	-8.696240E-01
13	5.630110E+02	3.094930E+01	-7.722990E-01
14	3.387650E+02	3.106920E+01	-6.844440E-01
15	2.038350E+02	3.124630E+01	-5.665530E-01
16	1.226480E+02	3.137170E+01	-5.200500E-01
17	7.379760E+01	3.156770E+01	-4.152110E-01
18	4.440410E+01	3.169070E+01	-4.515320E-01
19	2.671810E+01	3.185530E+01	-4.932250E-01
20	1.607630E+01	3.201050E+01	-5.594330E-01
21	9.673140E+00	3.219920E+01	-6.097720E-01

22	5.820350E+00	3.236770E+01	-6.845130E-01
23	3.502110E+00	3.260170E+01	-7.718300E-01
24	2.107230E+00	3.284140E+01	-8.803840E-01
25	1.267920E+00	3.311050E+01	-1.039980E+00
26	7.629120E-01	3.342540E+01	-1.190110E+00
27	4.590460E-01	3.380980E+01	-1.404630E+00
28	2.762090E-01	3.423630E+01	-1.642380E+00
29	1.661950E-01	3.473400E+01	-1.953150E+00

#PC-H_2O

#At 20 C°

#index, frequency (Hz), ReZ (Ω), ImZ (Ω)

1	2.500000E+05	4.662550E+01	2.310390E-01
2	1.504250E+05	4.653070E+01	1.796430E-01
3	9.051130E+04	4.714710E+01	-1.949410E-01
4	5.446080E+04	4.720140E+01	-5.852590E-01
5	3.276920E+04	4.783920E+01	-1.029700E+00
6	1.971730E+04	4.822080E+01	-9.846890E-01
7	1.186390E+04	4.836530E+01	-1.298880E+00
8	7.138540E+03	4.847330E+01	-1.267510E+00
9	4.295280E+03	4.884160E+01	-1.591250E+00
10	2.584480E+03	4.938050E+01	-1.647120E+00
11	1.555080E+03	4.974850E+01	-2.073100E+00
12	9.356970E+02	5.064630E+01	-1.911000E+00
13	5.630110E+02	5.132020E+01	-1.718340E+00
14	3.387650E+02	5.170780E+01	-1.486670E+00
15	2.038350E+02	5.210860E+01	-1.192770E+00
16	1.226480E+02	5.243350E+01	-1.013670E+00
17	7.379760E+01	5.271750E+01	-6.454740E-01
18	4.440410E+01	5.291750E+01	-6.467960E-01
19	2.671810E+01	5.303850E+01	-6.819790E-01
20	1.607630E+01	5.324340E+01	-6.721780E-01
21	9.673140E+00	5.346650E+01	-7.716980E-01
22	5.820350E+00	5.368480E+01	-8.050380E-01
23	3.502110E+00	5.396220E+01	-9.044730E-01
24	2.107230E+00	5.424530E+01	-1.038920E+00
25	1.267920E+00	5.457750E+01	-1.153500E+00
26	7.629120E-01	5.489980E+01	-1.276670E+00

27	4.590460E-01	5.524500E+01	-1.488640E+00
28	2.762090E-01	5.565080E+01	-1.822080E+00
29	1.661950E-01	5.613060E+01	-2.211080E+00

#PC-H_2O

#At 50 C°

#index, frequency (Hz), ReZ (Ω), ImZ (Ω)

1	2.500000E+05	2.588970E+01	3.980880E-01
2	1.504250E+05	2.586100E+01	2.921580E-01
3	9.051130E+04	2.592300E+01	-1.544900E-01
4	5.446080E+04	2.622020E+01	-2.900020E-01
5	3.276920E+04	2.645980E+01	-5.309970E-01
6	1.971730E+04	2.669660E+01	-5.810850E-01
7	1.186390E+04	2.682480E+01	-5.805050E-01
8	7.138540E+03	2.704580E+01	-5.880890E-01
9	4.295280E+03	2.715980E+01	-6.121790E-01
10	2.584480E+03	2.719080E+01	-6.896060E-01
11	1.555080E+03	2.739940E+01	-8.483340E-01
12	9.356970E+02	2.774630E+01	-7.141820E-01
13	5.630110E+02	2.797470E+01	-6.262650E-01
14	3.387650E+02	2.807220E+01	-5.308710E-01
15	2.038350E+02	2.819740E+01	-4.357760E-01
16	1.226480E+02	2.830300E+01	-3.833420E-01
17	7.379760E+01	2.845780E+01	-2.568180E-01
18	4.440410E+01	2.855320E+01	-2.916120E-01
19	2.671810E+01	2.862850E+01	-3.144900E-01
20	1.607630E+01	2.873610E+01	-3.460480E-01
21	9.673140E+00	2.884250E+01	-3.855520E-01
22	5.820350E+00	2.896420E+01	-4.295470E-01
23	3.502110E+00	2.908610E+01	-4.742680E-01
24	2.107230E+00	2.922460E+01	-5.133130E-01
25	1.267920E+00	2.937710E+01	-6.013860E-01
26	7.629120E-01	2.954470E+01	-7.394380E-01
27	4.590460E-01	2.974040E+01	-9.361270E-01
28	2.762090E-01	3.005210E+01	-1.166300E+00
29	1.661950E-01	3.036680E+01	-1.449040E+00

Voltage V against current I of aqueous (t = 98 μm), MeOH-H_2O (109 μm), acetone-H_2O (118 μm), THF-H_2O (116 μm), PC-H_2O (94 μm), and MeOH (101 μm) LTEs at ΔT = 30 K. s and d were 42 mm^2 and 2 mm, respectively. The electrolytes contains 0.8 M $Fe(ClO_4)_2/Fe(ClO_4)_3$.

#aqueous
#side
I[mA], V[mV]
0 34
0.2 28
0.4 21
0.6 14
0.8 7

#MeOH-H_2O
#side
I[mA], V[mV]
0 36
0.2 28
0.4 19
0.6 9
0.8 -2

#acetone-H_2O
#side
I[mA], V[mV]
0 44
0.2 35
0.4 25
0.6 15
0.8 5

#THF-H_2O
#side
I[mA], V[mV]
0 46
0.2 33
0.4 20
0.6 6

#PC-H_2O
#side
I[mA], V[mV]
0 40
0.2 30
0.4 18
0.6 6

#MeOH
#side
I[mA], V[mV]
0 55
0.2 42
0.4 27
0.6 11
0.8 -6