Electronic Supplementary Information

Enhancement of Interfacial Sodium Ion Transport Stability in Quasi-Solid-State Sodium-Ion Batteries Using Polyethylene Glycol

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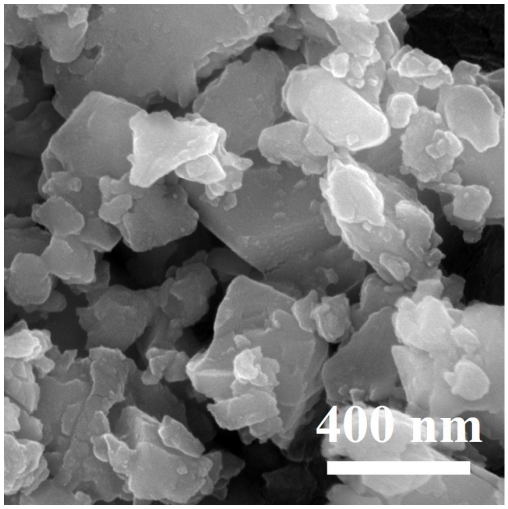

Fig. S1 SEM images of NASICON active filler.

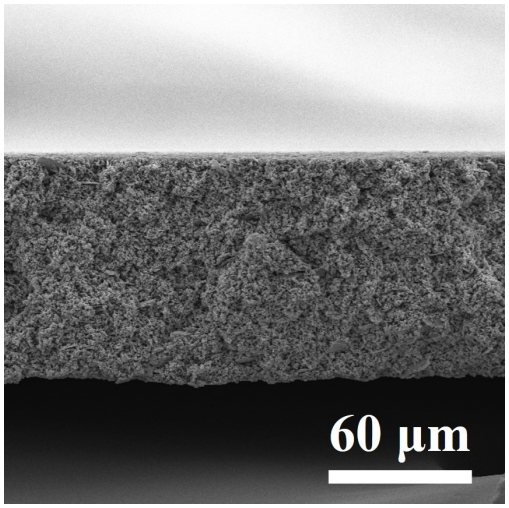

Fig. S2 SEM images of ASE-0% cross-section.

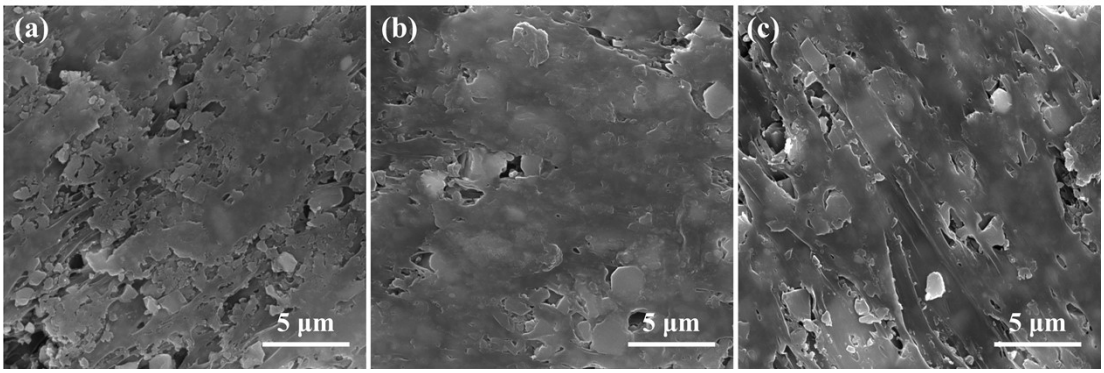

Fig. S3 The SEM images of the cross-section of (a) ASE-0%, (b) ASE-5%, and (c) ASE-10%.

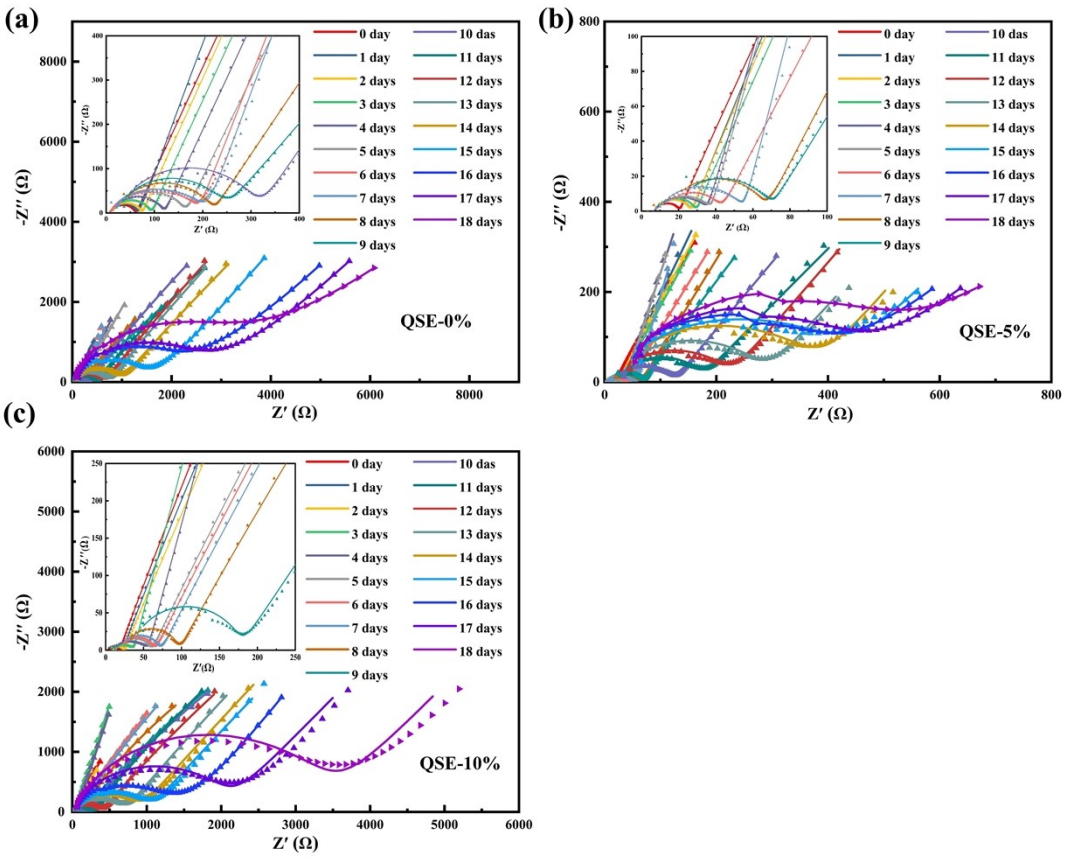

Fig. S4 The electrochemical impedance spectra of (a) QSE-0%, (b) QSE-5%, and (c) QSE-10%.

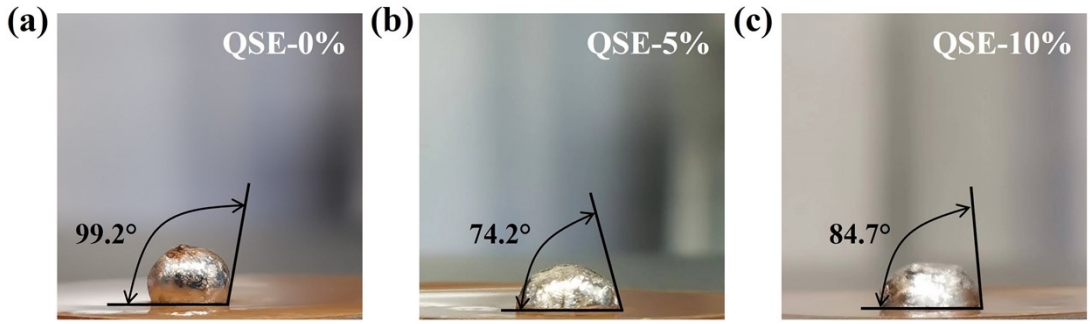

Fig. S5 Contact Angle test: (a) QSE-0%; (b) QSE-5%; (c) QSE-10%.

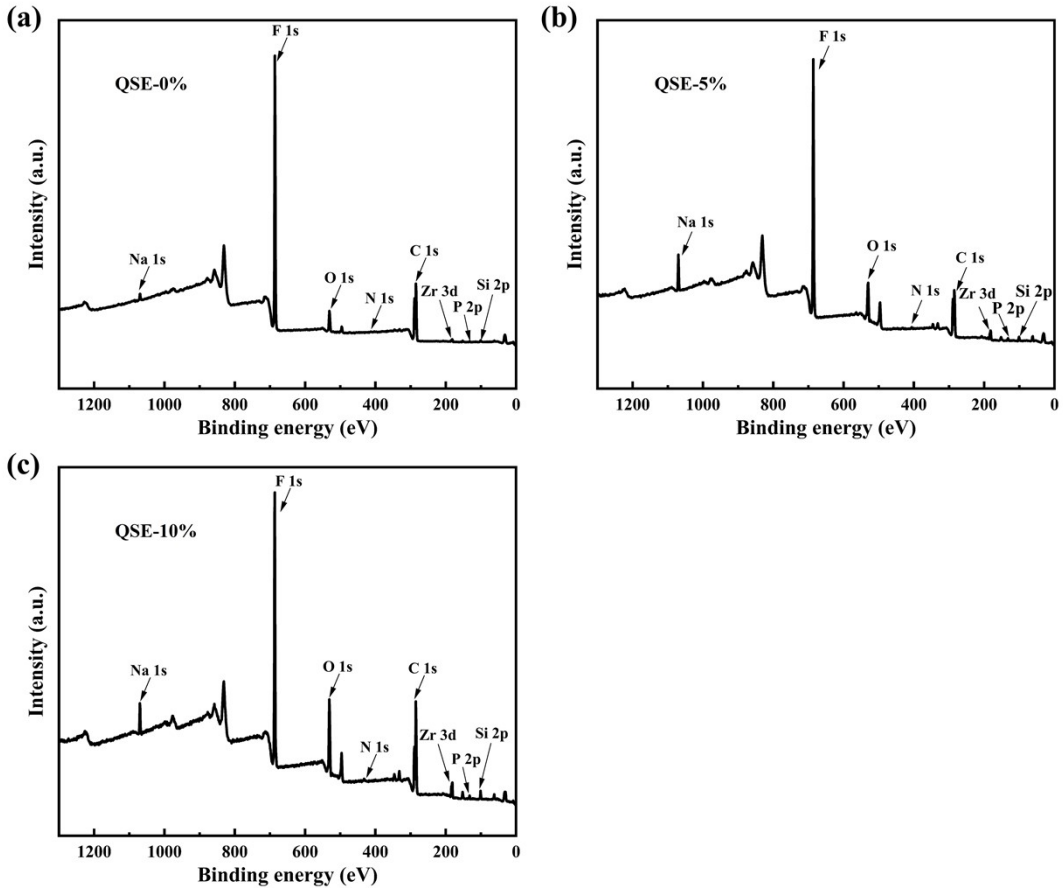

Fig. S6 XPS spectrum: (a) QSE-0%; (b) QSE-5%; (c) QSE-10%.

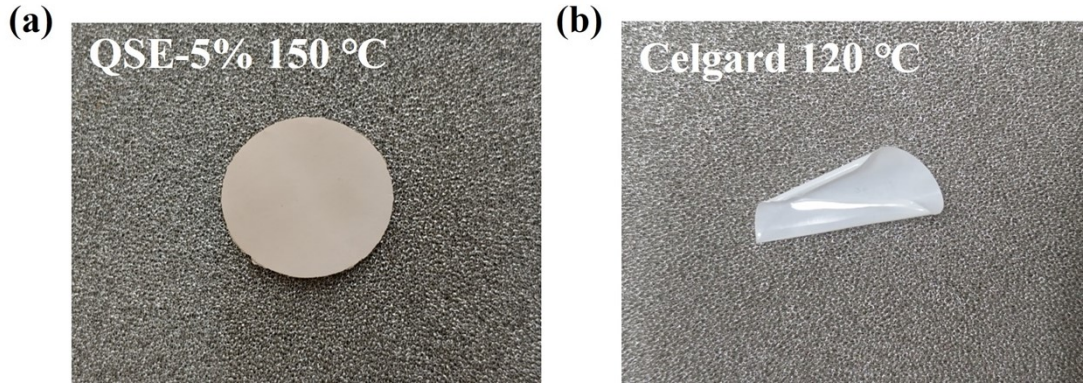

Fig. S7 Thermal stability test: (a) QSE-5%; (b) commercial electrolyte membrane (Celgard).

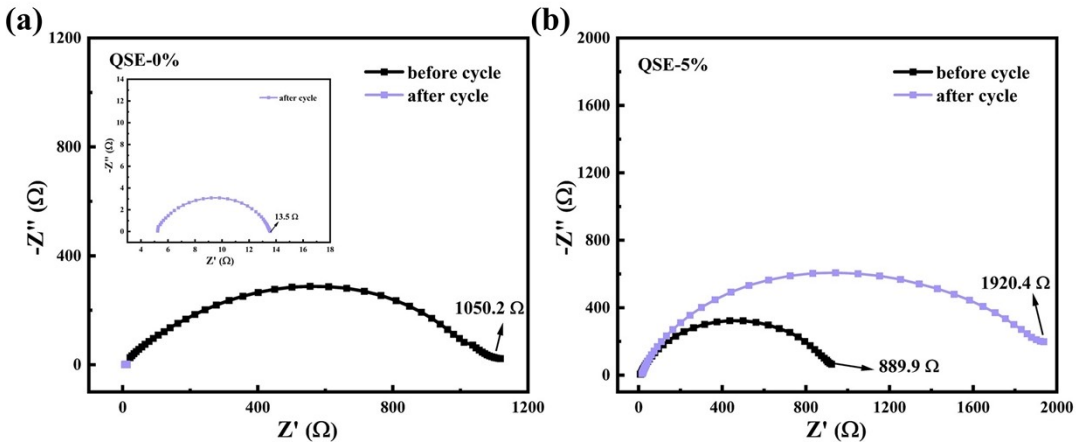

Fig. S8 Impedance test of symmetrical sodium battery before and after cycling: (a) Na | QSE-0% | Na battery; (b) Na | QSE-5% | Na battery.

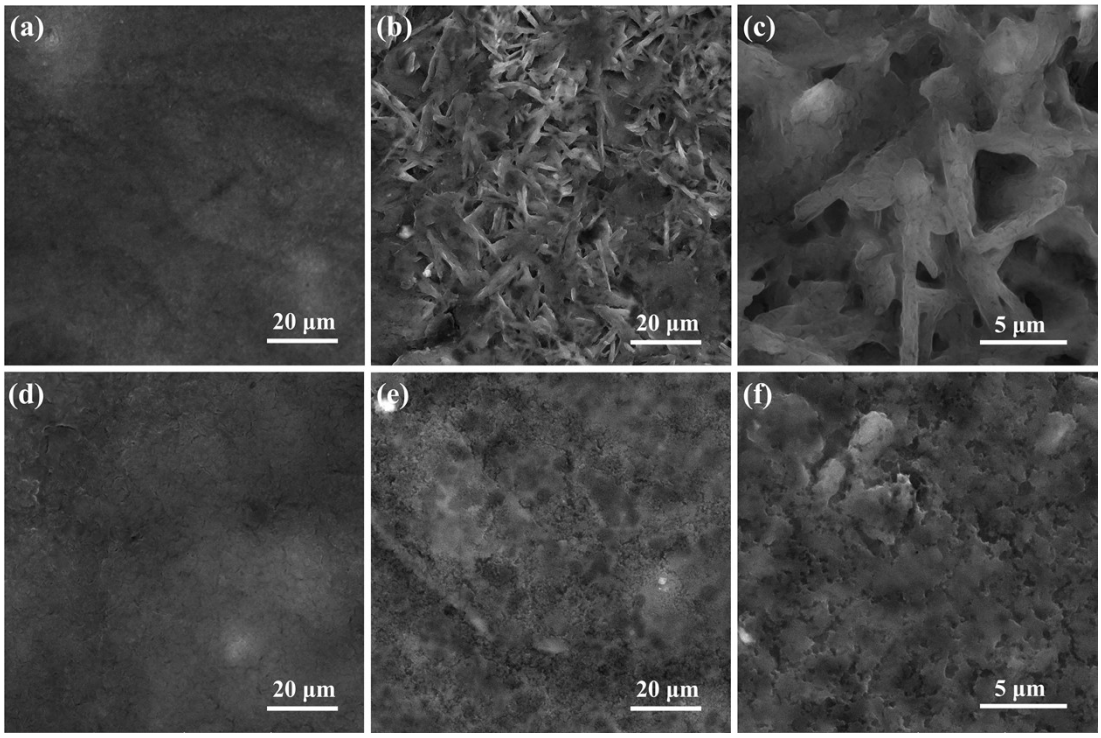

Fig. S9 SEM of sodium electrode of Na | QSE-0% | Na battery: (a) before cycle; (b) and (c) after 1080 cycles; SEM of sodium electrode of Na | QSE-5% | Na battery: (d) before cycle; (e) and (f) after 7500 cycles.

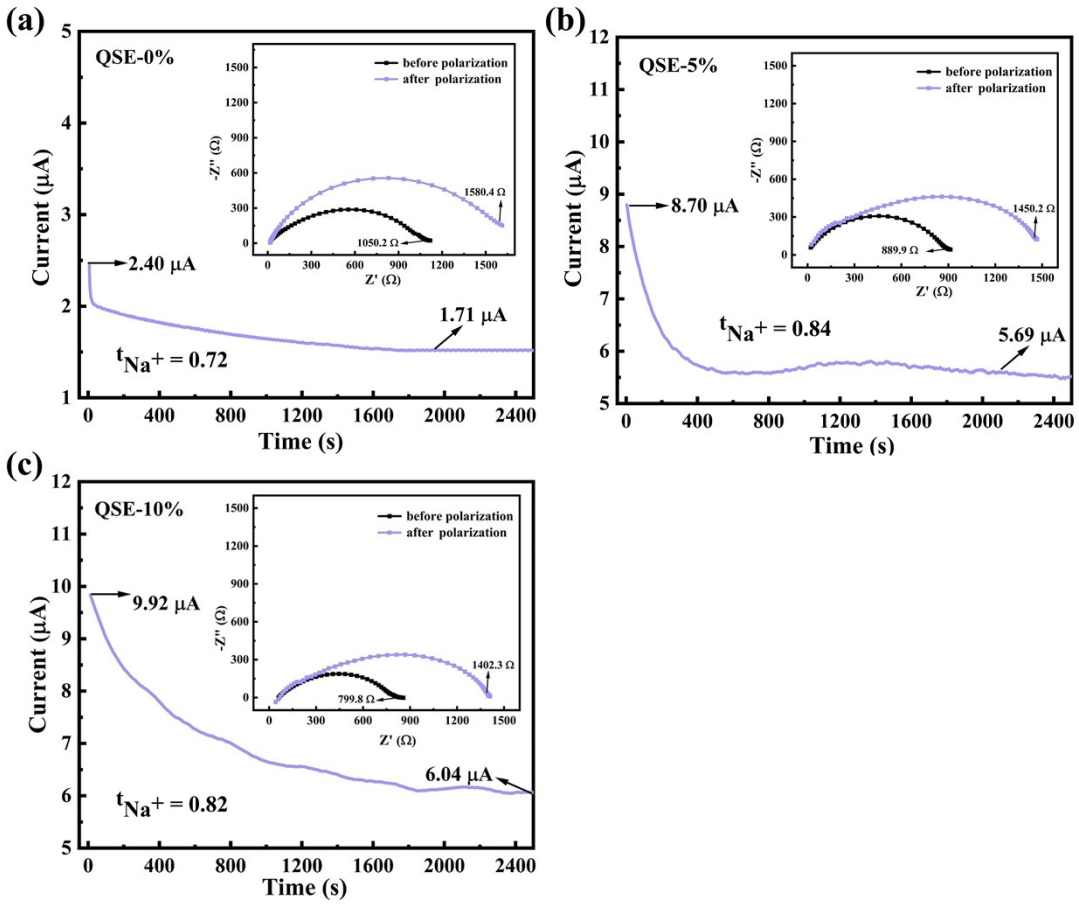

Fig. S10 The t_{Na^+} test of different QSE: (a) QSE-0%; (b) QSE-5%; (c) QSE-10%.

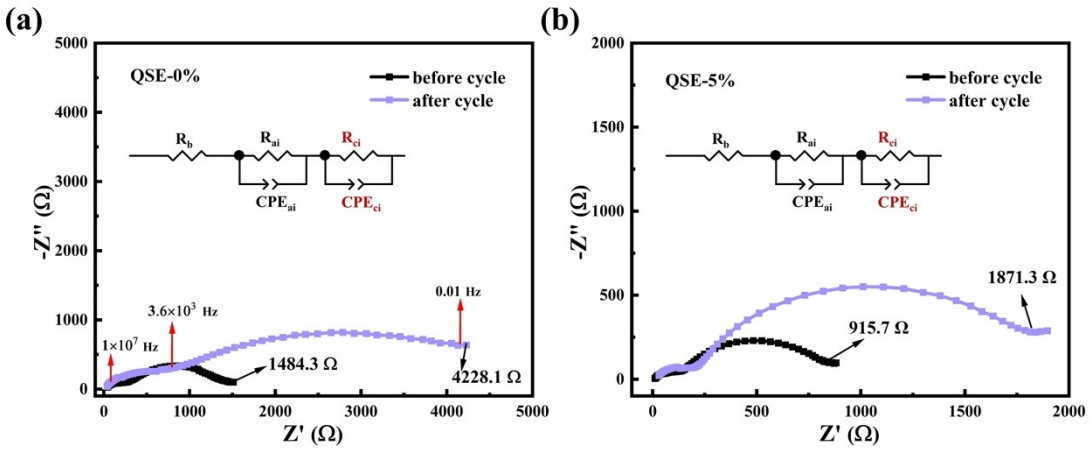

Fig. S11 Impedance test curves of quasi-solid-state sodium-ion batteries before and after cycling: (a) Na | QSE-0% | $Na_3V_2(PO_4)_3$; (b) Na | QSE-5% | $Na_3V_2(PO_4)_3$.

Table 1. EIS fitting parameters of QSE with different PEG contents.

	QSE-0%			QSE-5%			QSE-10%		
	$R_b\,(\Omega)$	$R_i\,(\Omega)$	$R_t\,(\Omega)$	$R_b\,(\Omega)$	$R_i\,(\Omega)$	$R_t\,(\Omega)$	$R_b\,(\Omega)$	$R_i\,(\Omega)$	$R_t\,(\Omega)$
0 day	28.0	46.3	74.3	7.8	12.1	19.9	9.3	9.2	18.5
1 day	28.5	51.2	79.7	8.6	17.8	26.4	10.8	11.7	22.5
2 days	28.8	56.4	85.2	9.0	18.2	27.2	10.9	13.3	24.2
3 days	29.6	62.5	92.1	9.9	20.4	30.3	13.2	21.9	35.1
4 days	31.3	88.0	119.3	10.2	25.6	35.8	14.5	37.7	52.2
5 days	33.0	129.8	162.8	11.0	26.9	37.9	24.8	35.6	60.4
6 days	36.7	154.8	191.5	12.6	30.2	42.8	26.2	38.0	64.2
7 days	38.9	156.1	195.0	14.9	39.0	53.9	29.3	43.2	72.5
8 days	33.4	189.0	222.4	19.6	47.3	66.9	36.6	61.9	98.5
9 days	40.3	211.8	252.1	21.3	49.2	70.5	47.2	135.5	182.7
10 days	42.6	275.2	317.8	35.4	89.8	125.2	54.3	156.3	210.6
11 days	54.3	445.4	499.7	44.9	135.2	180.1	55.2	220.9	276.1
12 days	60.4	584.5	644.9	48.2	179.3	227.5	62.2	335.3	397.5
13 days	68.3	664.4	732.7	53.2	227.8	281.0	71.3	632.3	703.6
14 days	72.4	921.1	993.5	55.4	312.1	367.5	81.0	825.1	906.1
15 days	77.6	1485.5	1563.1	58.2	334.2	392.4	87.7	995.8	1083.5
16 days	84.3	2278.1	2362.4	61.0	363.1	424.1	92.6	1417.4	1510.0
17 days	95.1	2876.2	2971.3	64.8	421.4	486.2	93.0	2138.4	2231.4
18 days	117.4	3556.8	3674.2	65.1	478.0	543.1	95.8	3229.5	3325.3