Supplementary Materials

Realizing Scalable Nano-SiO_2-Aerogel-Reinforced Composite Polymer Electrolytes with High Ionic Conductivity via Rheology Tuning UV Polymerization

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Table S1. The comparison for the electrochemical performance of polymer solid state electrolytes.

Polymer solid state electrolyte	**Fabrication method**	**Facile Scalable Yes(Y) or No(N)**	**Temp. (℃)**	**σ (mS cm^{-1})**	**Current density /cycle time (Li//Li symmetric cell)**	**Retention rate /Cycle number/ C rate (LiFePO$_4$//Li cell)**	**Ref.**
PEG/LiTFSI/SiO_2	In-situ polymerization-induced self-assembly	N	26	0.17	0.1 mA cm^{-2}/600 h	68.1%/300/0.2 C	[1]
PCL/LiTFSI/Al_2O_3	Solution casting	Y	60	0.05	0.1 mA cm^{-2}/500 h	81.3%/500/1.0 C	[2]
PEO/LiTFSI/MnO_2	Solution casting	Y	30	0.02	0.1 mA cm^{-2}/800 h	86.7%/300/0.5 C (60℃)	[3]
PEG/LiTFSI/PILs	In-situ thermal polymerization	N	25	0.10	0.1 mA cm^{-2}/2400 h	93.8%/150/0.2 C	[4]
PEO/LiTFSI/IL	Solution casting	Y	40	0.66	0.1 mA cm^{-2}/1000 h	99.3%/200/1 C	[5]
PEG/LiMTFSI/PC	In-situ thermal polymerization	N	25	0.1	not mentioned	98%/100/0.1 C	[6]
PEG/LiTFSI/LLZTO	Solution casting	Y	20	0.22	0.5 mA cm^{-2}/125 h	88%/150/0.1 C	[7]
PEG/LiTFSI/SiO_2	Rheology tunning UV polymerization	Y	27	0.68	0.1 mA cm^{-2}/1400 h	92.3%/250/0.5 C	This work

Table S2. Detailed information of RTS-*x*% SiO_2 QPE (*x*=0, 3, and 5)

Quasi-polymer electrolytes	PEGMEA (g)	TMU (g)	PEGDA (g)	651 (g)	LiTFSI (g)	SiO_2 (g)	LiTFSI (wt%)	SiO_2 (wt%)
RTS-0% SiO_2	0.4	0.75	0.24	0.01	0.5	0	26.32	0
RTS-3% SiO_2	0.4	0.75	0.24	0.01	0.5	0.06	25.51	3
RTS-5% SiO_2	0.4	0.75	0.24	0.01	0.5	0.1	25	5

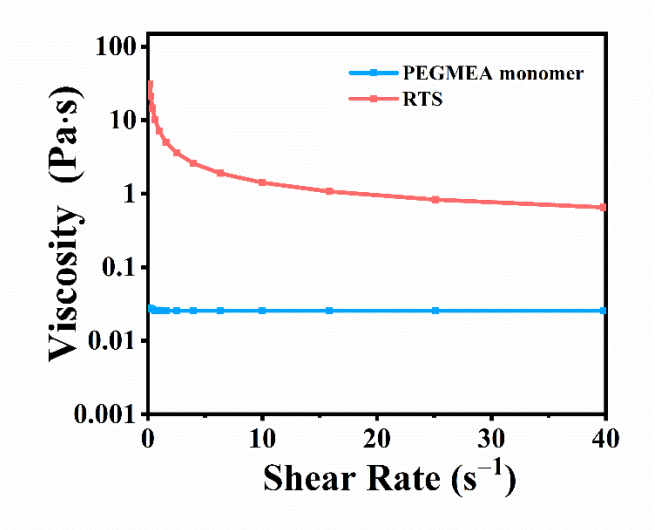

Figure S1. Viscosity curves of PEGMEA monomer and RTS.

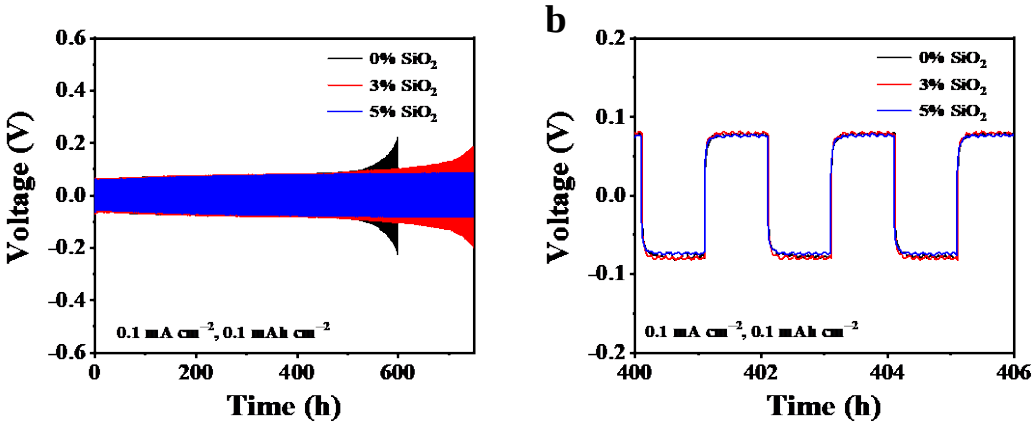

Figure S2. (**a**) Galvanostatic charge-discharge curves of Li//Li symmetric cells with RTS-*x*% SiO_2 QPE (*x*=0, 3, and 5) at 0.1 mA cm^{-2} and 0.1 mAh cm^{-2}; (**b**) Zoom-in curves of 400–406 hours.

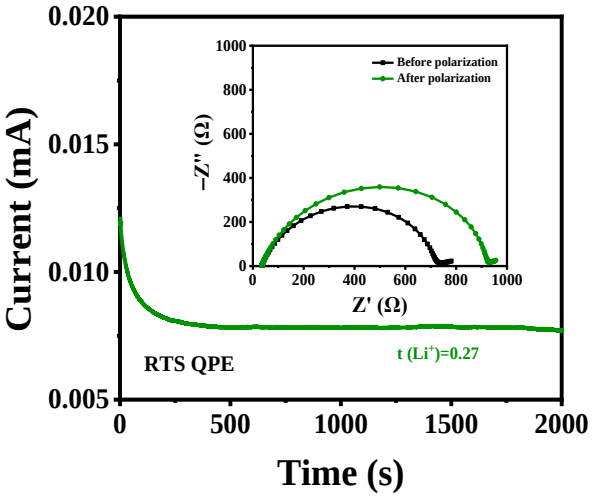

Figure S3. Chronoamperometry polarization curve as well as the impedance spectra before and after polarization of Li/RTS QPE/Li cell.

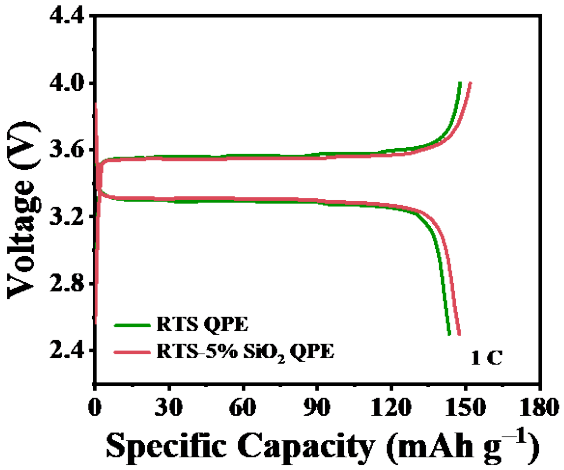

Figure S4. Initial galvanostatic charge/discharge curves of $LiFePO_4$//Li cells at 1 C.

References

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