Electronic Supplementary Information

Single lithium-ion conducting solid polymer electrolytes: advances and perspectives

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Table S1 The physicochemical properties of some representative electrolytes.

Electrolyte	Component [a]	σ [b] / S cm^{-1}	LTN [c]	σ_{Li^+} [d] / S cm^{-1}	Ref.
Liquid electrolytes					
	1 M $LiPF_6$-EC/EMC	1.5×10^{-2} (60 °C)	0.2 (60 °C)	3×10^{-3} (60 °C)	1, 2
	1 M $LiClO_4$-EC/EMC	1.0×10^{-2} (60 °C)	0.4 (60 °C)	4.0×10^{-3} (60 °C)	1, 2
	1 M LiTFSI-EC/EMC	1.2×10^{-2} (60 °C)	0.5 (60 °C)	6.0×10^{-3} (60 °C)	1, 2
	1 M LiFSI-EC/EMC	1.4×10^{-2} (60 °C)	0.5 (60 °C)	7.0×10^{-3} (60 °C)	1, 2
Gel polymer electrolytes					
	$LiClO_4$/PAN-EC/EMC	6.0×10^{-3} (60 °C)	0.5 (60 °C)	3.0×10^{-3} (60 °C)	3
	LiTFSI/PEO-MEEP	1.0×10^{-3} (60 °C)	0.5 (60 °C)	5.0×10^{-4} (60 °C)	4
	$LiClO_4$/PMMA-PC	1.0×10^{-3} (60 °C)	0.4 (60 °C)	4.0×10^{-4} (60 °C)	5
	$LiPF_6$/PVdF-HFP-EC/DMC/EMC	5.0×10^{-3} (60 °C)	0.5 (60 °C)	2.5×10^{-4} (60 °C)	6
Ceramic electrolytes					
	Amorphous LiPON	10^{-4}	1.0 (70 °C)	10^{-4} (70 °C)	7
	$Li_{0.34}La_{0.51}TiO_{2.94}$	10^{-2} (80 °C)	1.0 (80 °C)	10^{-2} (80 °C)	8
	$Li_{6.55}La_3Zr_2Ga_{0.15}O_{12}$	10^{-2} (80 °C)	1.0 (80 °C)	10^{-2} (80 °C)	9
	$Li_{10}GeP_2S_{12}$	4×10^{-2} (65 °C)	1.0 (65 °C)	4×10^{-2} (65 °C)	10
Solid polymer electrolytes					
	$LiBF_4$/PEO	10^{-4} (70 °C)	0.32 (70 °C)	3.0×10^{-5} (70 °C)	11
	LiTFSI/PEO	1.1×10^{-3} (80 °C)	0.18 (80 °C)	2.0×10^{-4} (80 °C)	12
	LiBETI/PEO	6.1×10^{-4} (80 °C)	0.33 (80 °C)	2.0×10^{-4} (80 °C)	13
	LiFSI/PEO	1.4×10^{-3} (80 °C)	0.14 (80 °C)	2.2×10^{-4} (80 °C)	12
Single lithium-ion conducting solid polymer electrolytes					
	LiPSS/PEO	10^{-7} (70 °C)	0.9─1.0 (70 °C)	10^{-7} (70 °C)	14
	LiPSFSI/PEO	10^{-6} (70 °C)	0.9─1.0 (70 °C)	10^{-6} (70 °C)	15
	LiPSTFSI/PEO	10^{-5} (70 °C)	0.9─1.0 (70 °C)	10^{-5} (70 °C)	14
	LiPSsTFSI/PEO	10^{-4} (70 °C)	0.9─1.0 (70 °C)	10^{-4} (70 °C)	14

[a] Abbreviations: lithium hexafluorophosphate ($LiPF_6$); ethylene carbonate (EC); ethyl-methyl-carbonate (EMC); lithium perchlorate ($LiClO_4$); lithium bis(trifluoromethylsulfonyl)imide ($[(CF_3SO_2)_2N]Li$, LiTFSI); lithium bis(fluorosulfonyl)imide ($[(FSO_2)_2N]Li$, LiFSI); poly(acrylonitrile) (PAN); poly(ethylene oxide) (PEO); poly[bis((methoxyethoxy)ethoxy)phosphazene] (MEEP); poly(methylmethacrylte) (PMMA); propylene carbonate (PC); poly(vinylidene fluoride-hexafluoro propylene) (PVdF-HFP); dimethylcarbonate (DMC); lithium phosphorus oxynitride (LiPON); lithium tetrafluoroborate ($LiBF_4$); lithium bis(trifluoromethanesulfonyl)imide ($[(C_2F_5SO_2)_2N]Li$, LiBETI); lithium poly(4-styrenesulfonate) (LiPSS); lithium poly[(4-styrenesulfonyl)(trifluorosulfonyl)imide] (LiPSFSI); poly[(4-styrenesulfonyl)(trifluoromethanesulfonyl)imide] (LiPSTFSI); lithium poly[(4-styrenesulfonyl)(trifluoromethane(*S*-trifluoromethanesulfonylimino)sulfonyl)imide] (LiPSsTFSI).

[b] Total ionic conductivity (σ).

[c] Li-ion transference number (LTN).

[d] Individual Li-ion conductivity ($\sigma_{Li^+} = \sigma \times$ LTN).

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