Supplementary Information

High-Performance Ionic Liquid-Based Nanocomposite Polymer Electrolytes with Anisotropic Ionic Conductivity Prepared by Coupling Liquid Crystal Self-Templating with Unidirectional Freezing

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Samples	PVA(g)	HNTs (g)	$BMIMBF_4(g)$
PVA-0	0.60	0	2.42
PVA-1	0.54	0.06	3.05
PVA-2	0.48	0.12	3.82
PVA-3	0.42	0.16	4.77
PVA-4	0.36	0.24	5.98

 Table 1 Composition of the prepared ILs-based NCPEs



Figure S1. (a, c) SEM and TEM images of HNTs, (b, d) SEM and TEM images of HNTs coated with PVA.



Figure S2. FTIR patterns of neat PVA, BMIMBF₄, PVA/HNTs, and PVA/HNTs/BMIMBF₄.



Figure S3. Impedance spectra of (A) neat BMIMBF₄ at 30 °C, (B) PVA-4 parallel to freezing direction at 30 °C, (C) PVA-4 perpendicular to freezing direction at 30 °C, and (D) PVA-4 at different temperatures.



Figure S4. (a) Temperature dependencies of ionic conductivity for neat BMIMBF₄, PVA-2, and PVA-4; (b) Typical stress-strain slopes of compression for PVA-0, PVA-2, and PVA-4. All the results of NCPE samples are parallel to freezing direction.