Supporting Information

Nanostructured liquid-crystalline ion conductors based on linear carbonate moieties: effects of oligooxyethylene and alkylene spacers on self-assembled properties and ionic conductivities

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1. Liquid-crystalline (LC) properties

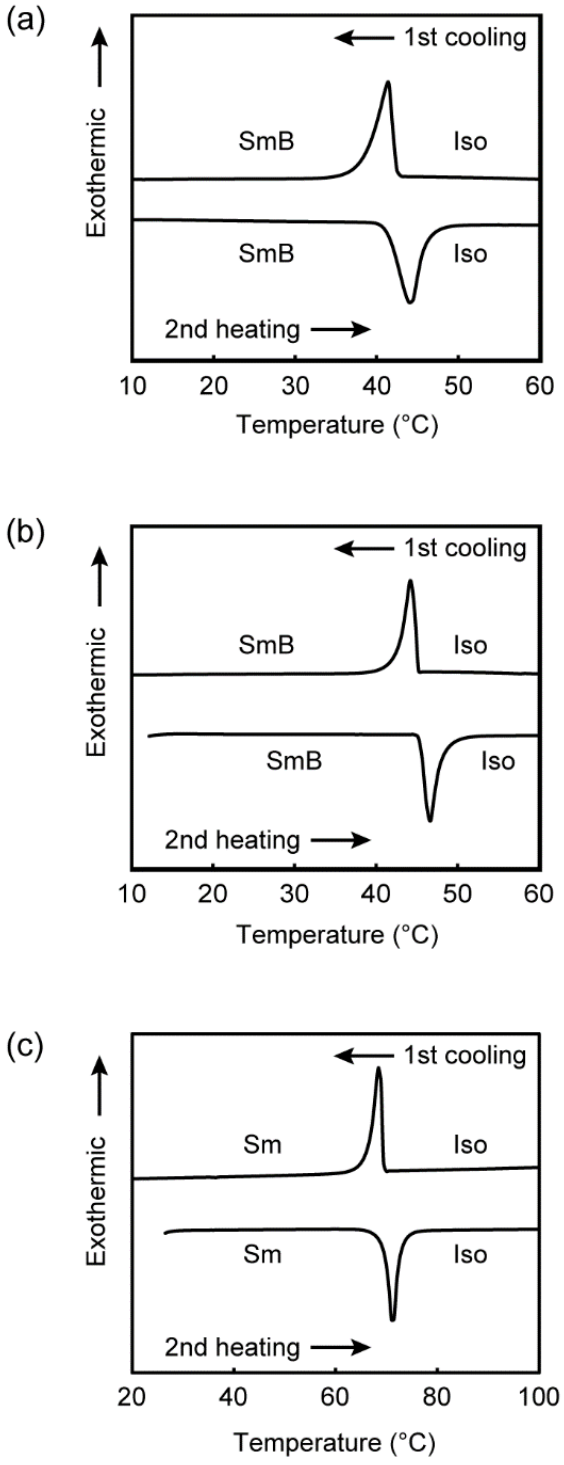

Fig. S1 Differential scanning calorimetry (DSC) thermograms of (a) compound **1**, (b) compound **2**, and (c) compound **3**.

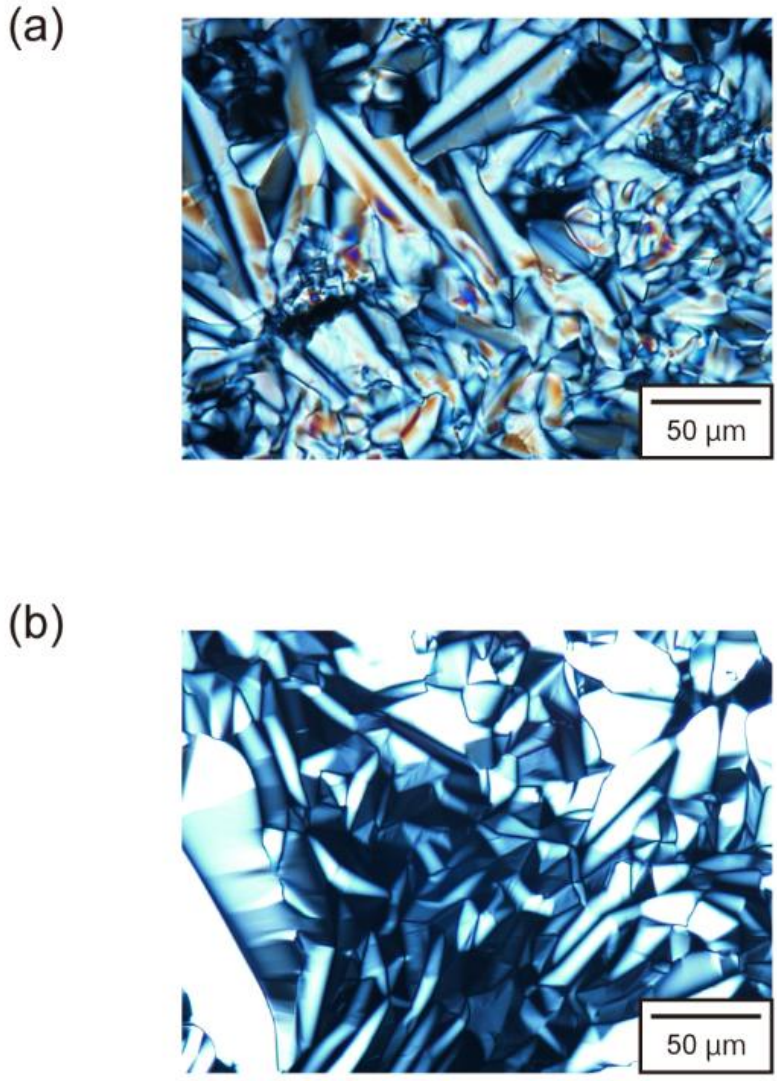

Fig. S2 Polarizing optical micrographs of (a) compound **1** and (b) compound **2** at 30 °C.

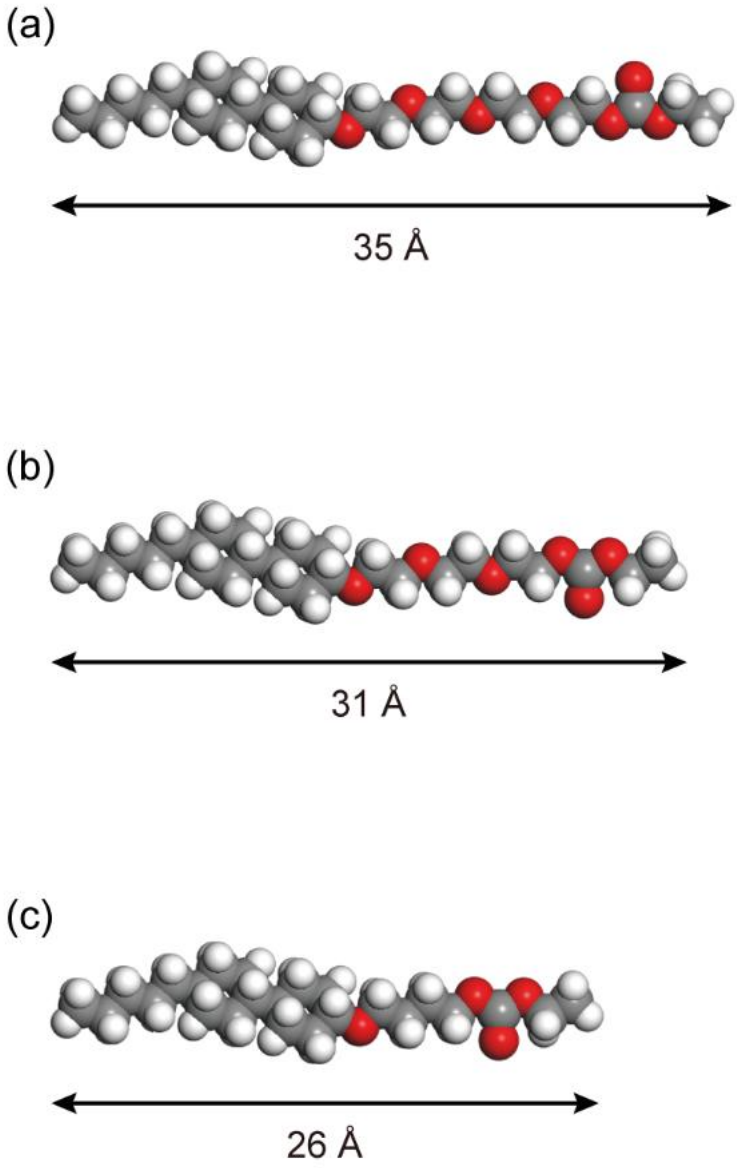

Fig. S3 Molecular models of (a) compound **1**, (b) compound **2**, and (c) compound **3** in the extended forms.

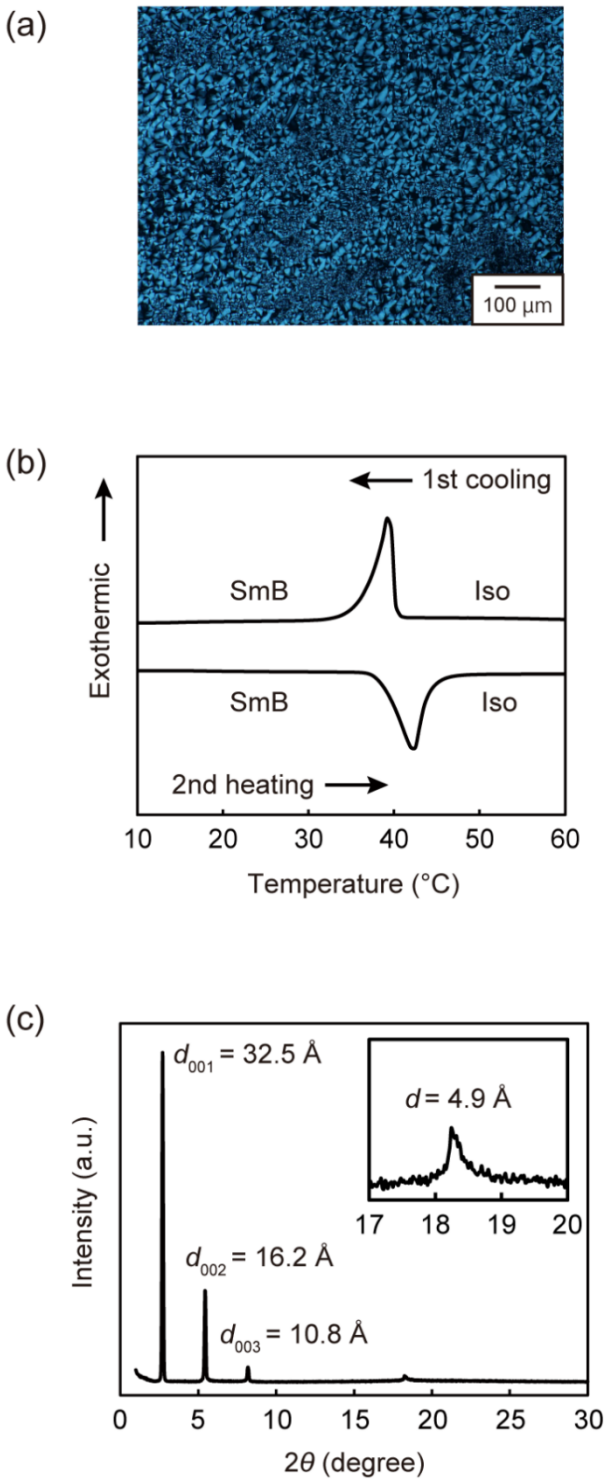

Fig. S4 LC properties of **1**/lithium bis(trifluoromethylsulfonyl)imide (LiTFSI) (9:1). (a) Polarizing optical micrograph at 30 °C. (b) DSC thermograms. (c) X-ray diffraction (XRD) pattern at 30 °C.

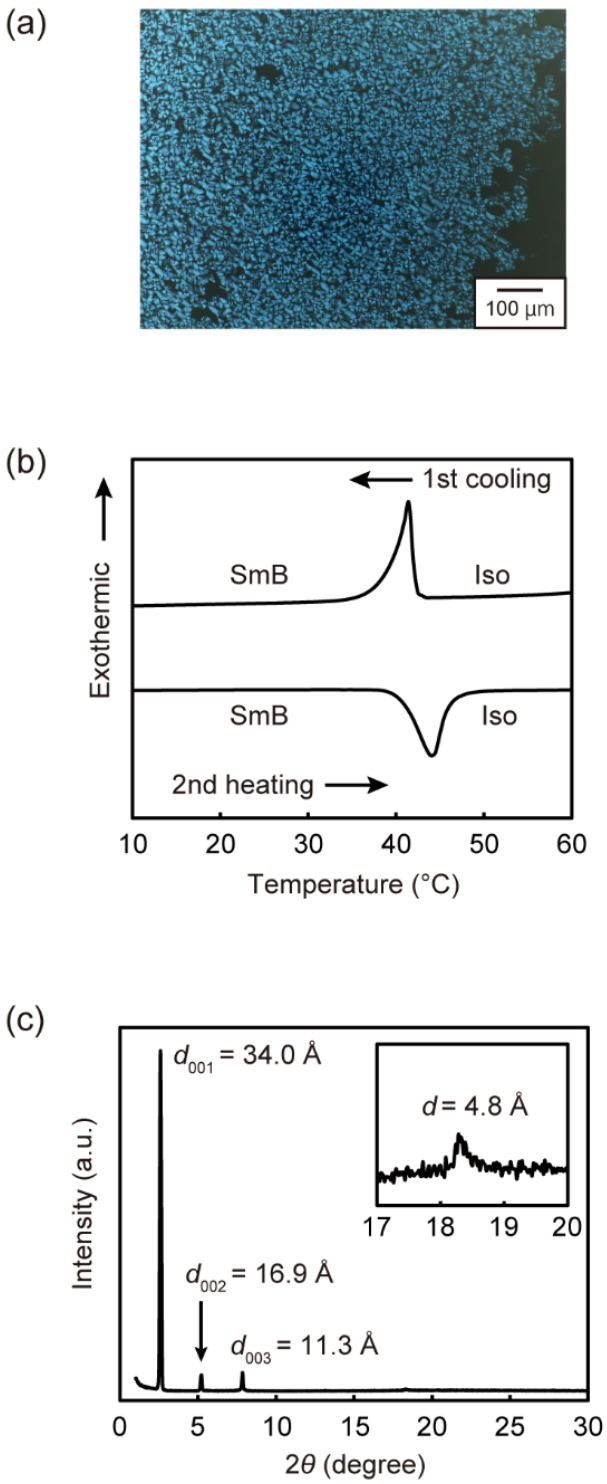

Fig. S5 LC properties of **1**/LiTFSI (8:2). (a) Polarizing optical micrograph at 30 °C. (b) DSC thermograms. (c) XRD pattern at 30 °C.

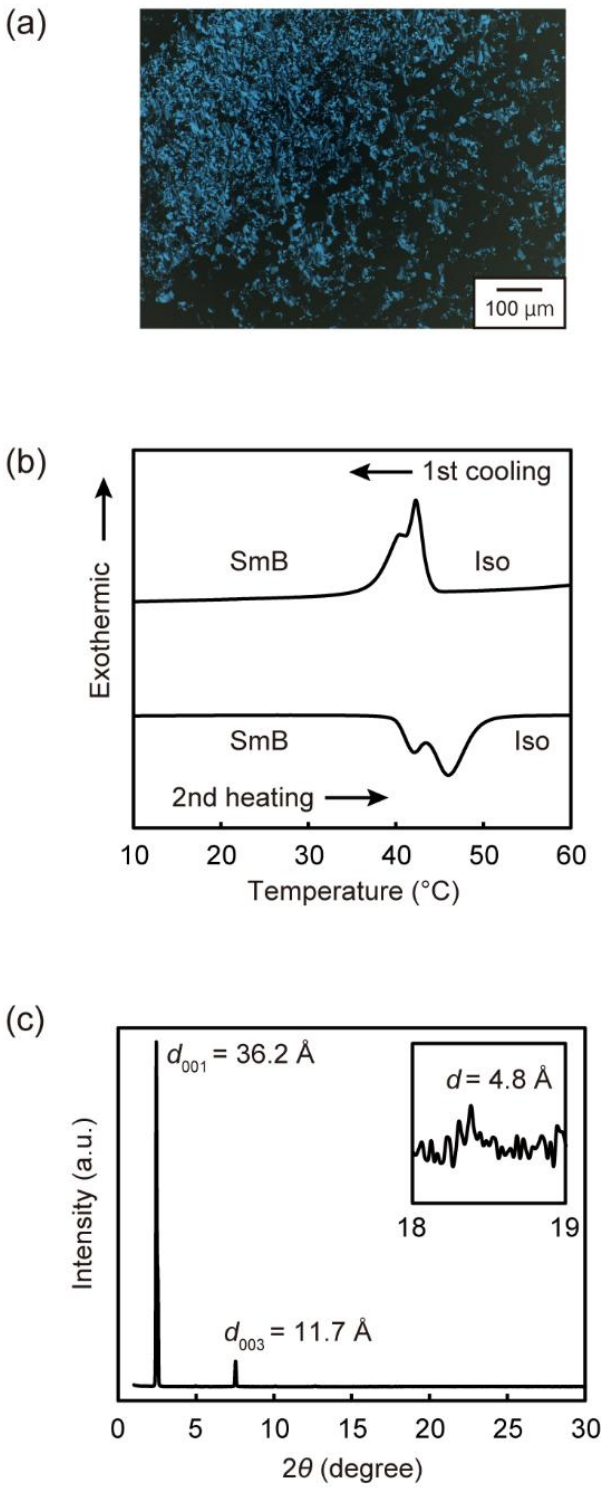

Fig. S6 LC properties of **1**/LiTFSI (7:3). (a) Polarizing optical micrograph at 30 °C. (b) DSC thermograms. (c) XRD pattern at 25 °C.

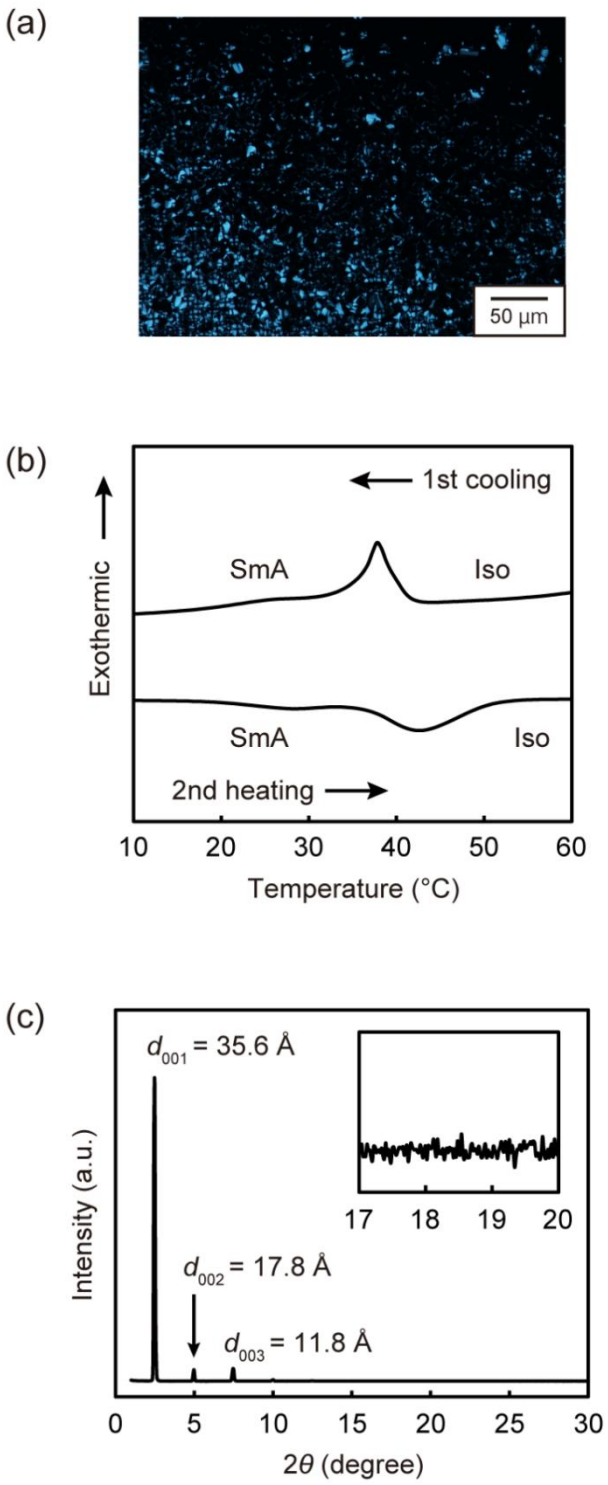

Fig. S7 LC properties of **1**/LiTFSI (6:4). (a) Polarizing optical micrograph at 25 °C. (b) DSC thermograms. (c) XRD pattern at 30 °C.

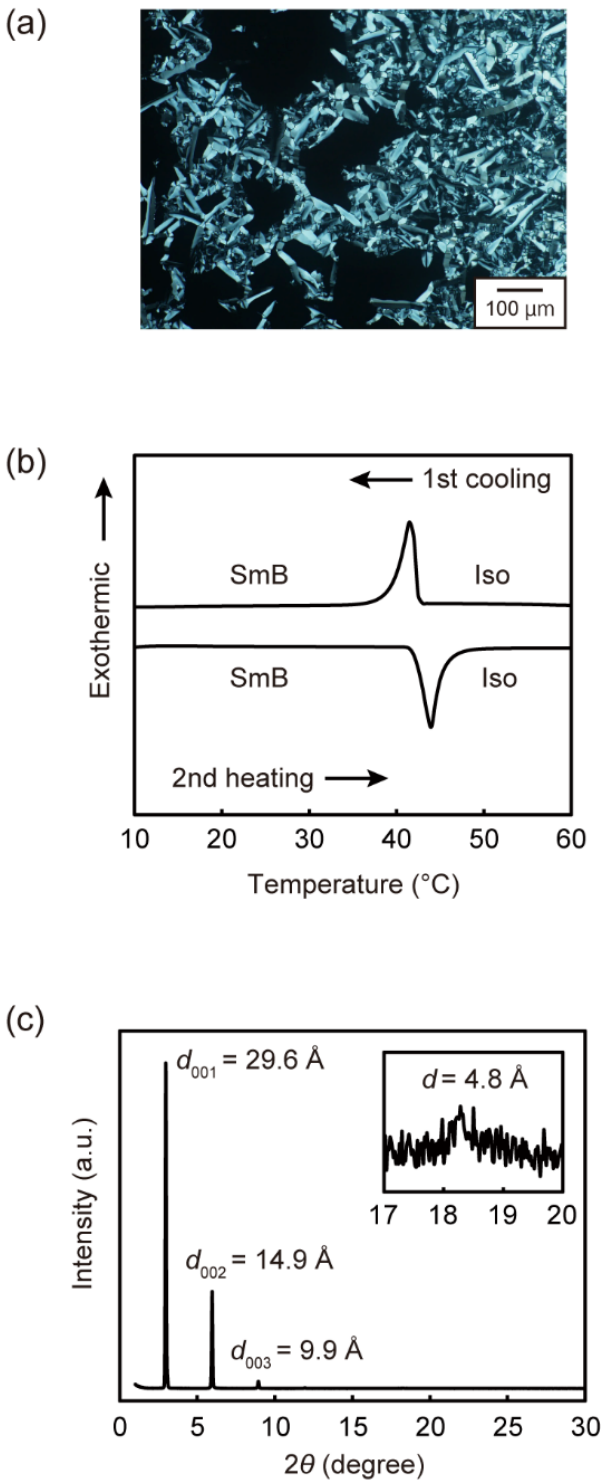

Fig. S8 LC properties of **2**/LiTFSI (9:1). (a) Polarizing optical micrograph at 30 °C. (b) DSC thermograms. (c) XRD pattern at 30 °C.

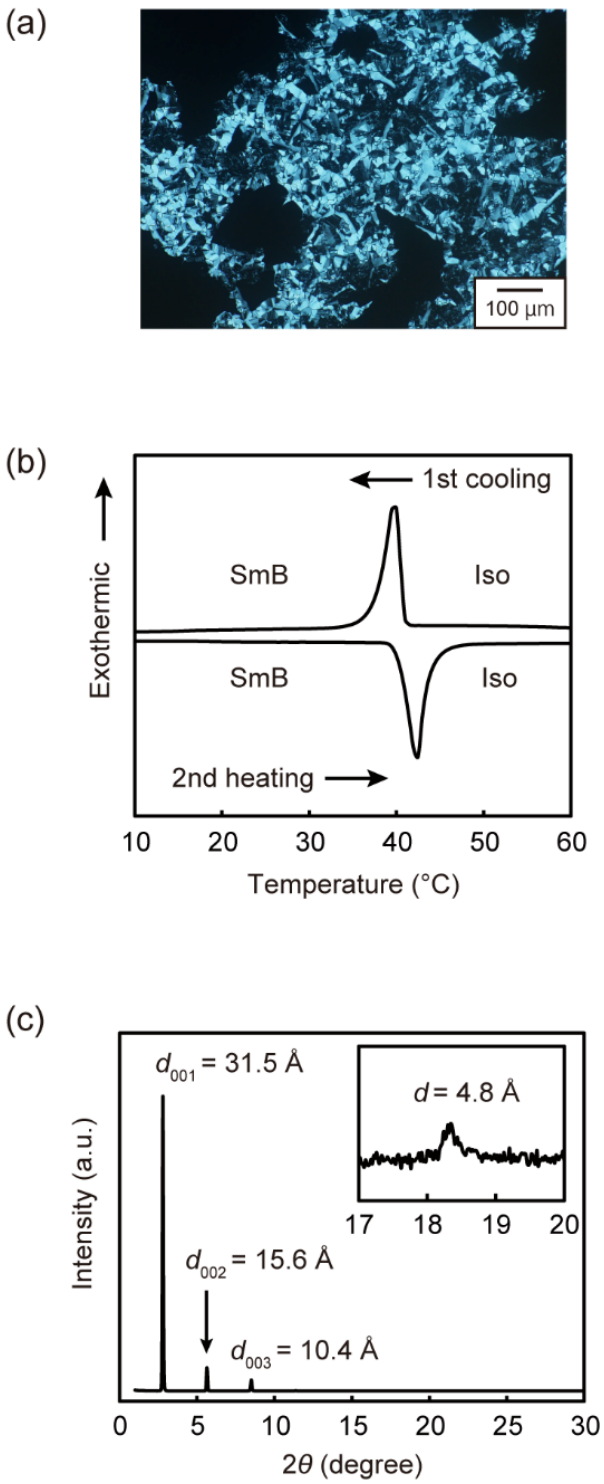

Fig. S9 LC properties of **2**/LiTFSI (8:2). (a) Polarizing optical micrograph at 30 °C. (b) DSC thermograms. (c) XRD pattern at 30 °C.

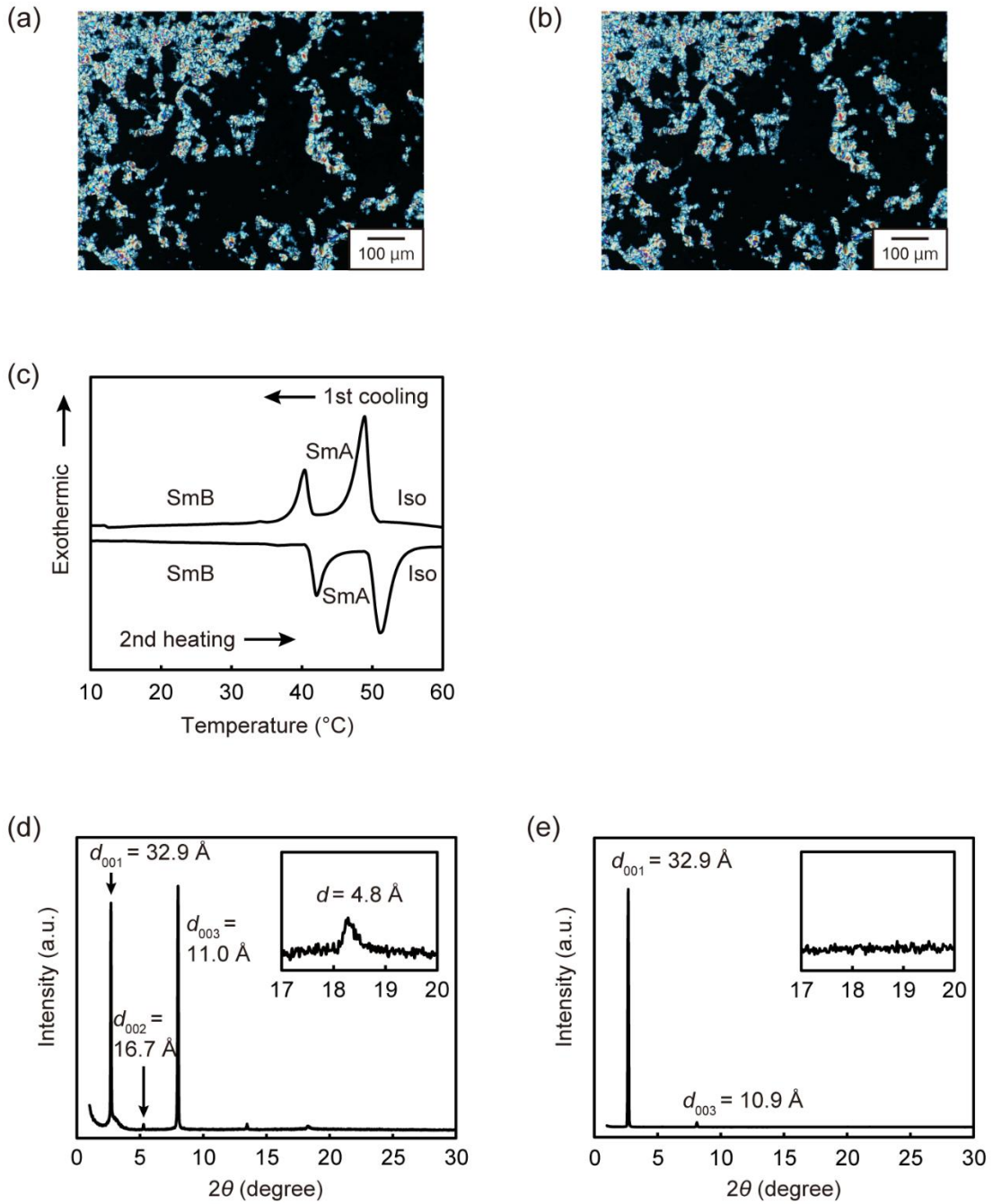

Fig. S10 LC properties of **2**/LiTFSI (7:3). (a,b) Polarizing optical micrographs at (a) 30 °C and (b) 41 °C. (c) DSC thermograms. (d,e) XRD patterns at (d) 30 °C and (e) 41 °C.

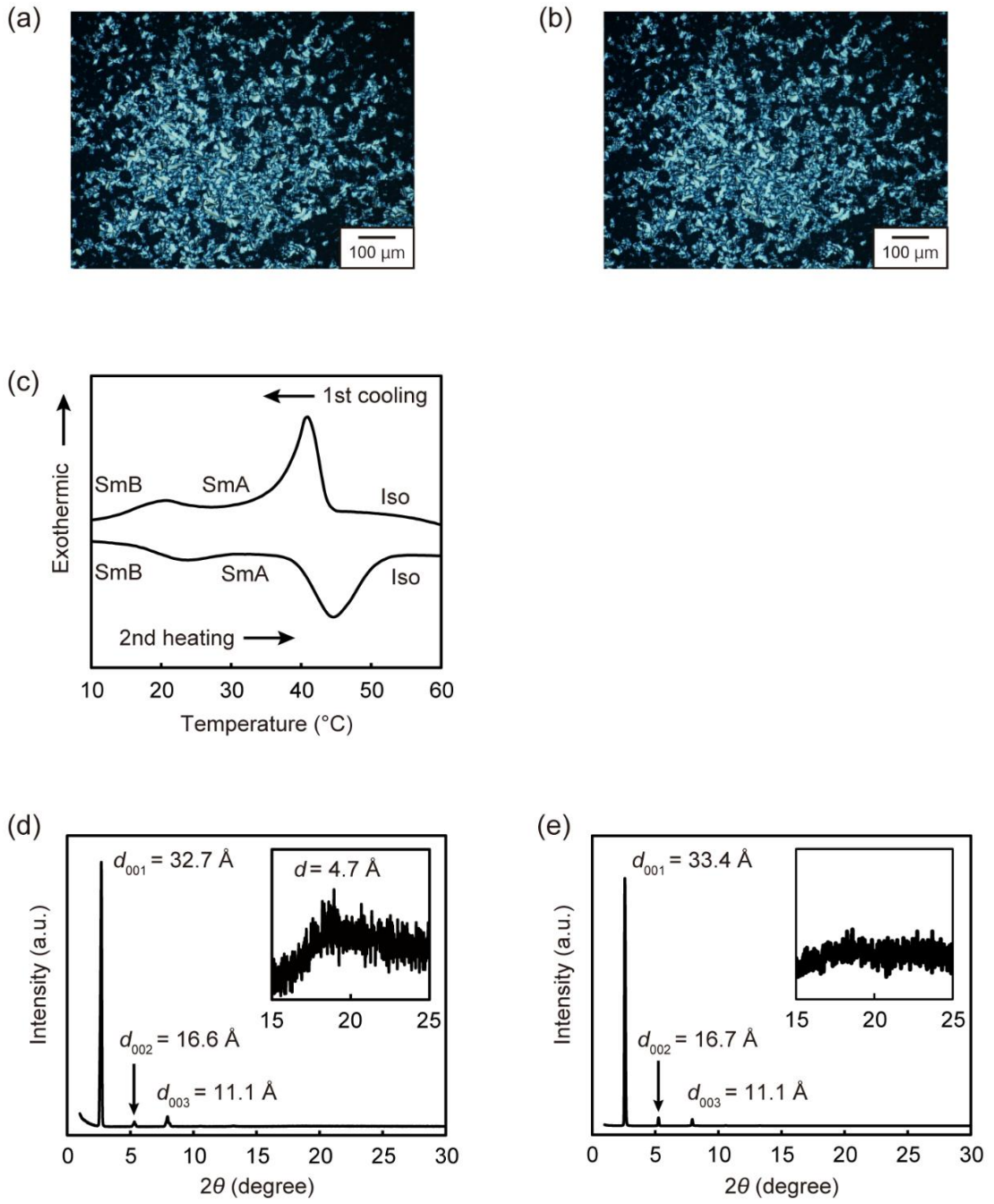

Fig. S11 LC properties of **2**/LiTFSI (6:4). (a,b) Polarizing optical micrographs at (a) 14 °C and (b) 30 °C. (c) DSC thermograms. (d,e) XRD patterns at (d) 14 °C and (e) 30 °C.

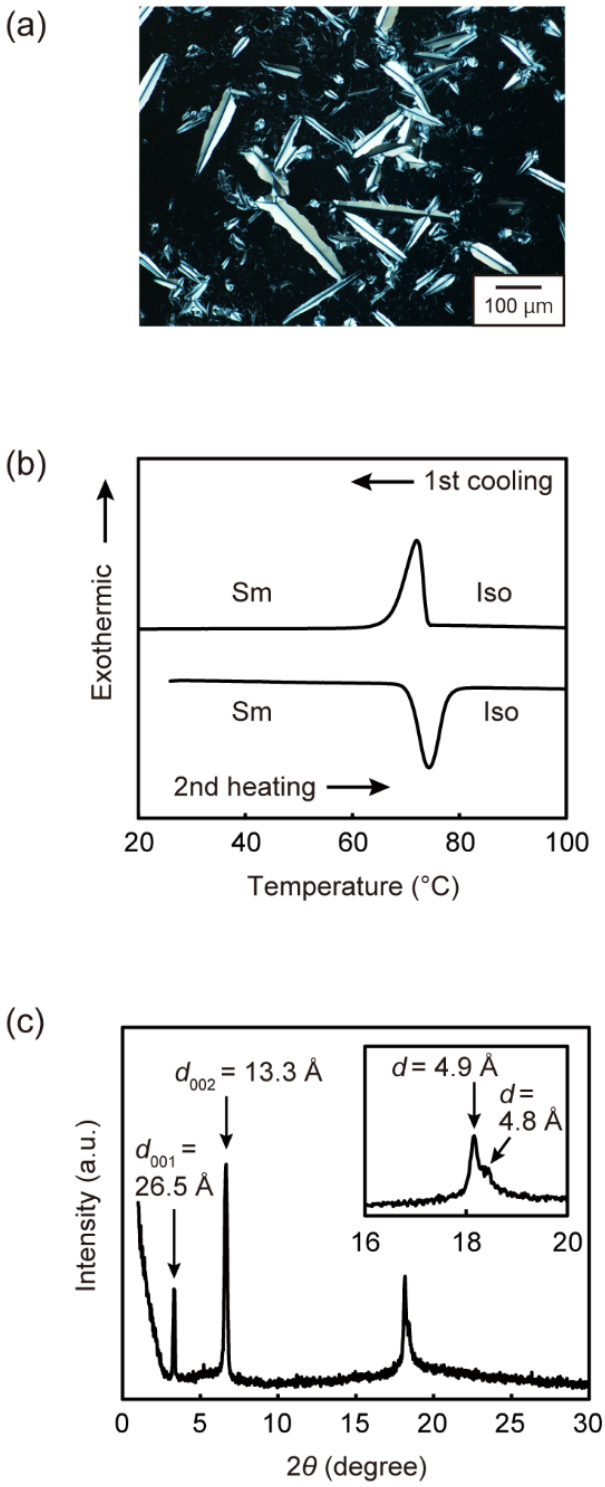

Fig. S12 LC properties of **3**/LiTFSI (9:1). (a) Polarizing optical micrograph at 30 °C. (b) DSC thermograms. (c) XRD pattern at 30 °C.

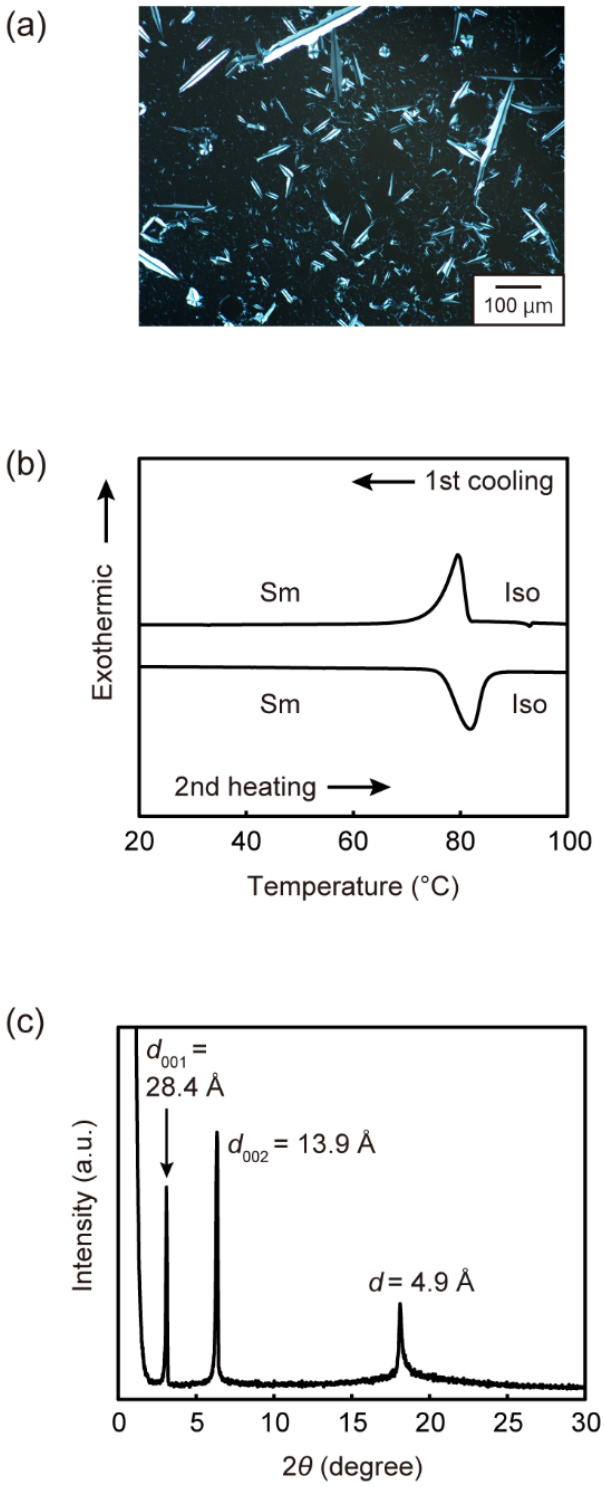

Fig. S13 LC properties of **3**/LiTFSI (8:2). (a) Polarizing optical micrograph at 30 °C. (b) DSC thermograms. (c) XRD pattern at 30 °C.

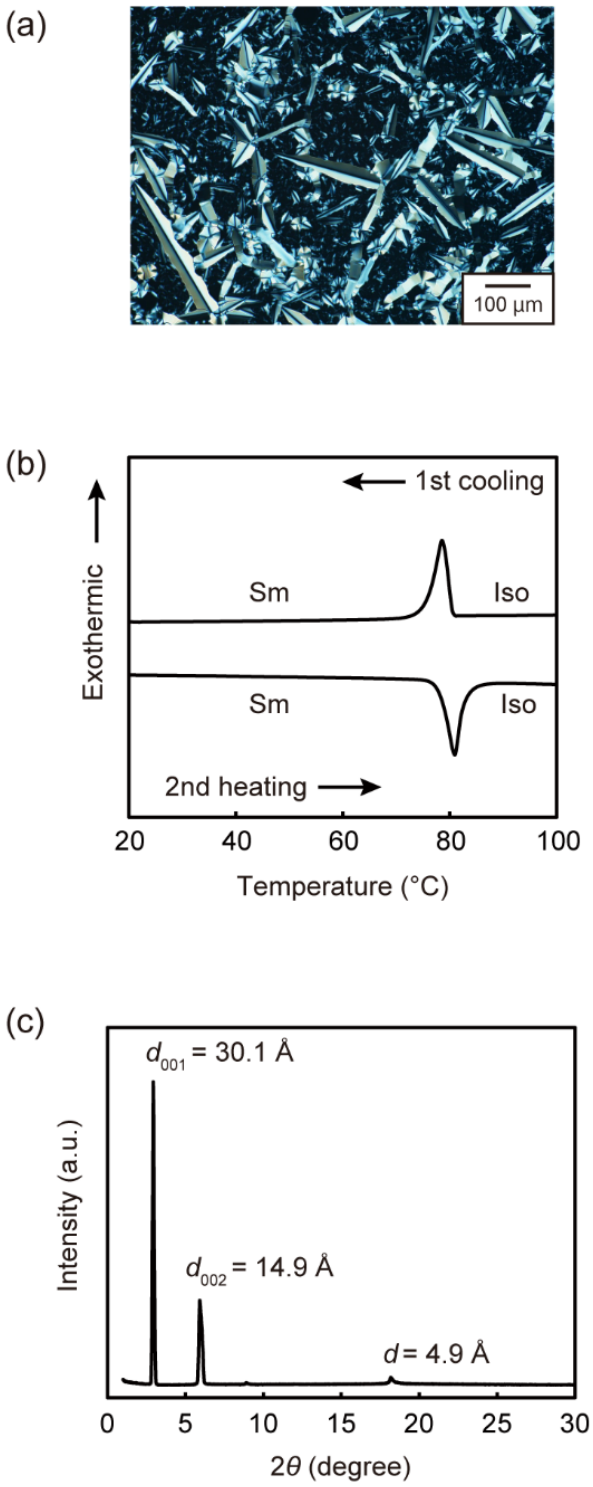

Fig. S14 LC properties of **3**/LiTFSI (7:3). (a) Polarizing optical micrograph at 30 °C. (b) DSC thermograms. (c) XRD pattern at 30 °C.

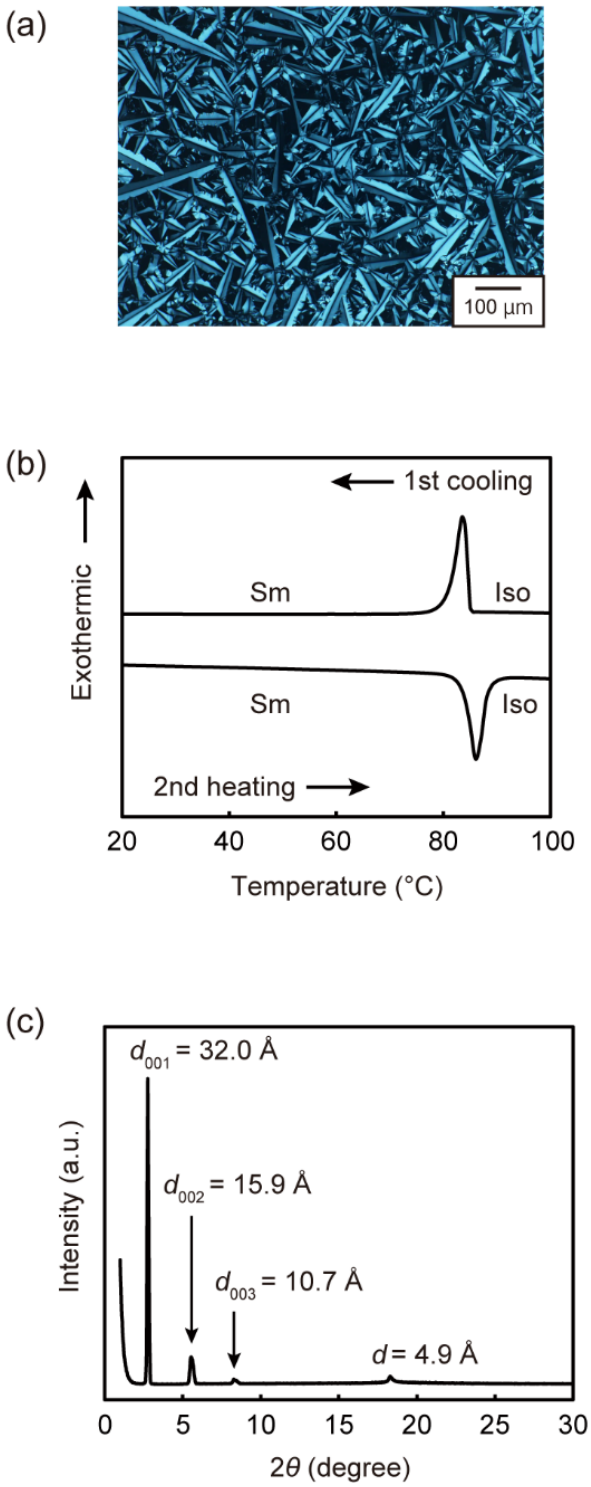

Fig. S15 LC properties of **3**/LiTFSI (6:4). (a) Polarizing optical micrograph at 30 °C. (b) DSC thermograms. (c) XRD pattern at 30 °C.

2. Fourier transform infrared (FT-IR) spectra

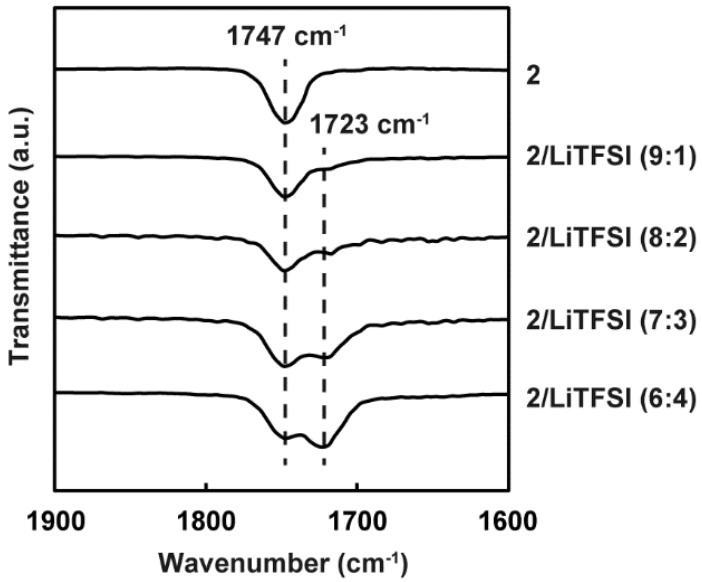

Fig. S16 FT-IR spectra of **2**/LiTFSI with different molar ratios of LiTFSI at 30 °C.

3. Ionic conductivities

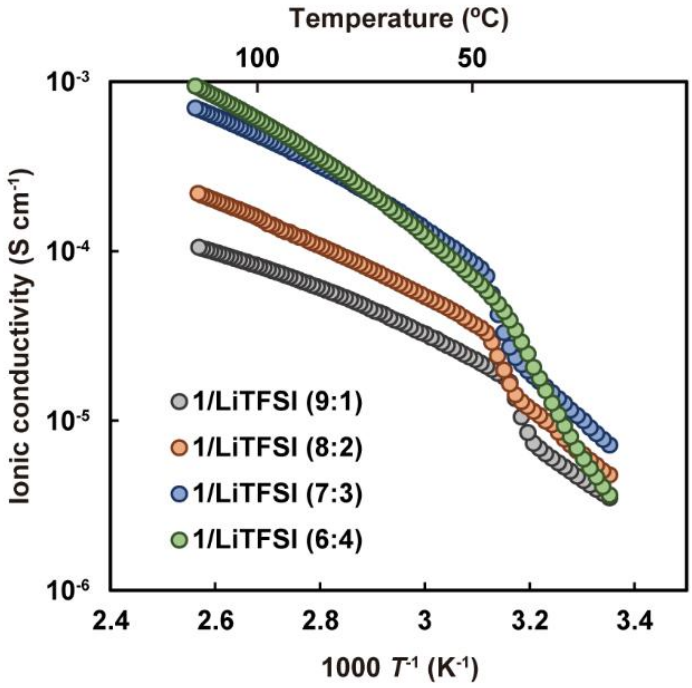

Fig. S17 Ionic conductivities of **1**/LiTFSI with different molar ratios of LiTFSI.

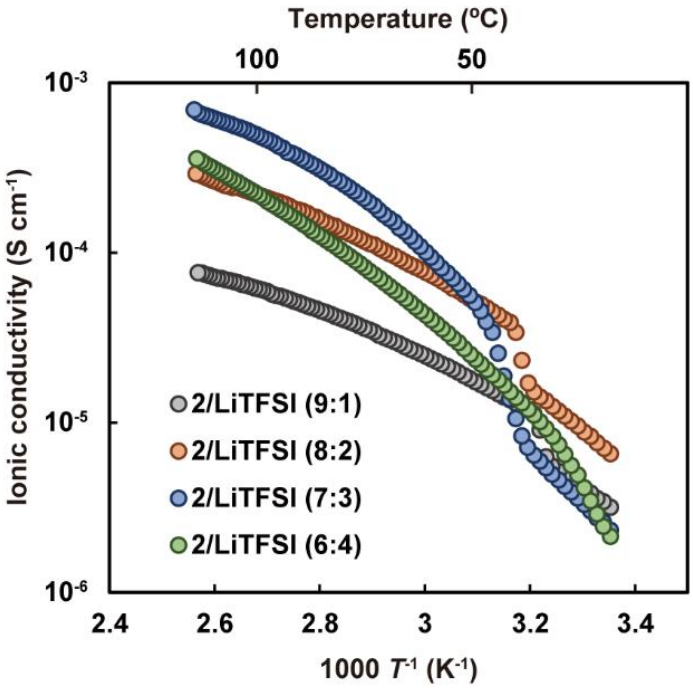

Fig. S18 Ionic conductivities of **2**/LiTFSI with different molar ratios of LiTFSI.

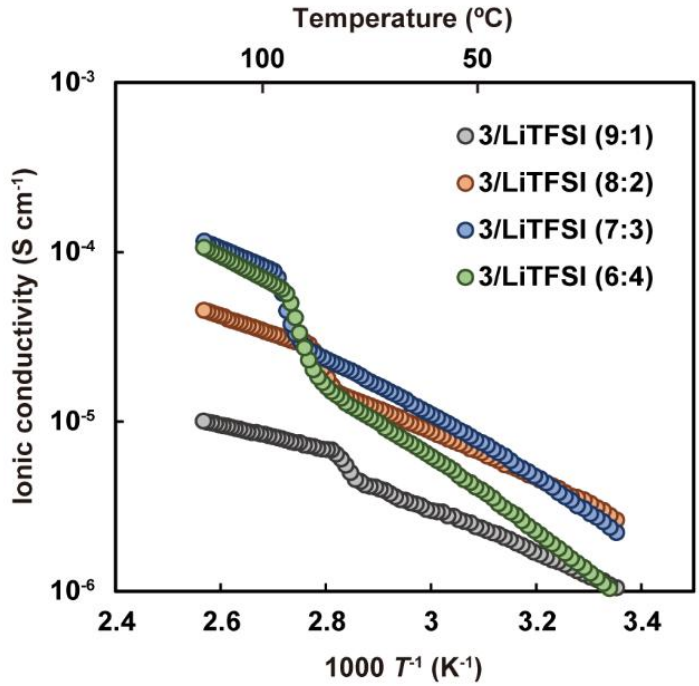

Fig. S19 Ionic conductivities of **3**/LiTFSI with different molar ratios of LiTFSI.

4. Molecular dynamics (MD) simulations

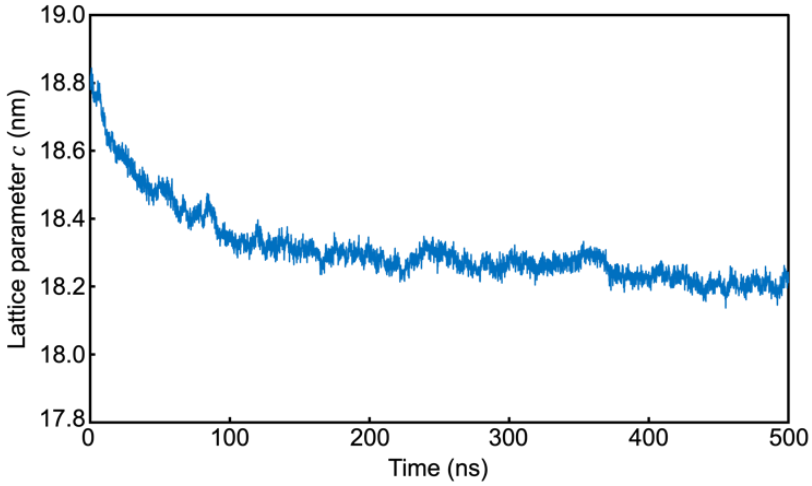

Fig. S20 Time dependence of lattice parameter *c* of MD simulation box for compound **1**.

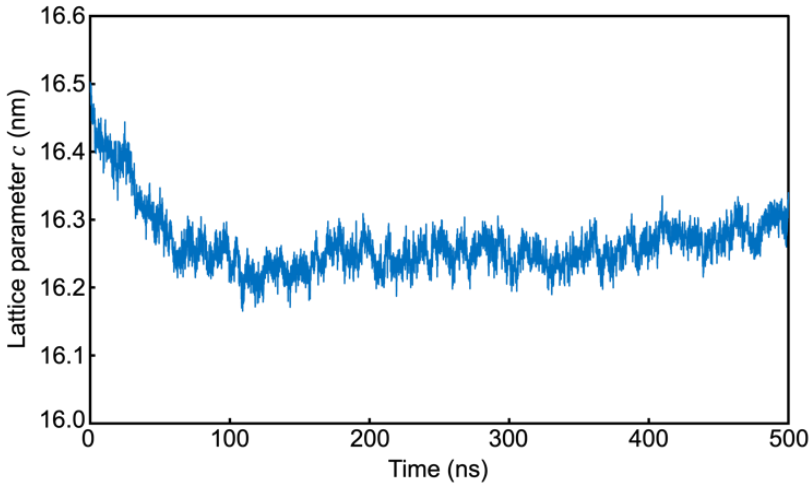

Fig. S21 Time dependence of lattice parameter *c* of MD simulation box for compound **2**.

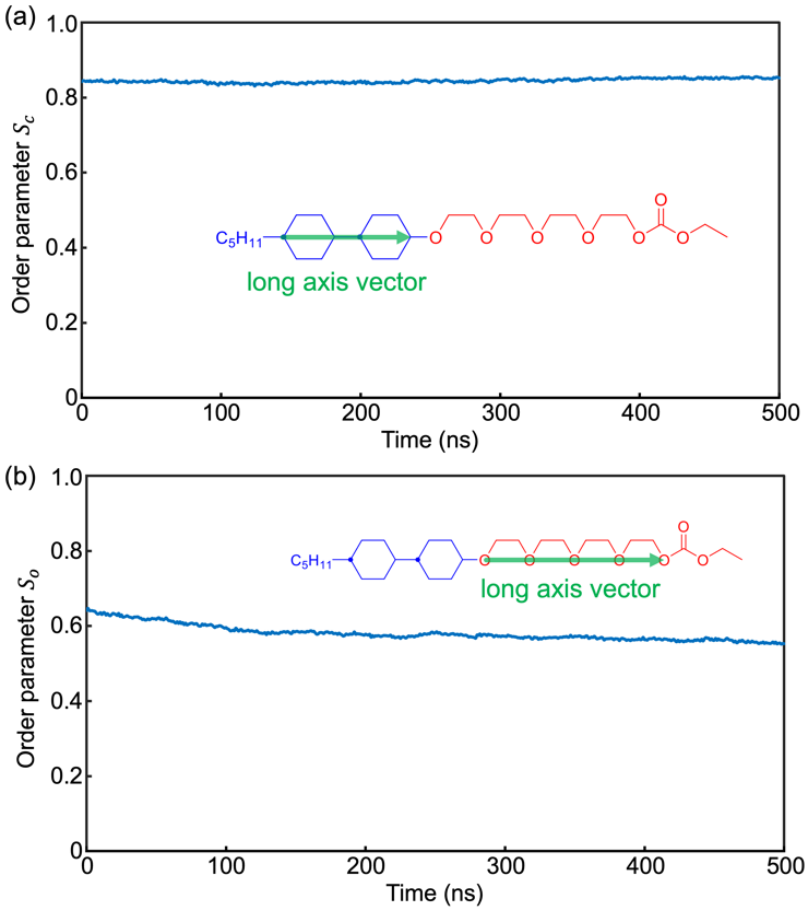

Fig. S22 Time dependencies of order parameters for compound **1**: (a) S_c and (b) S_o.

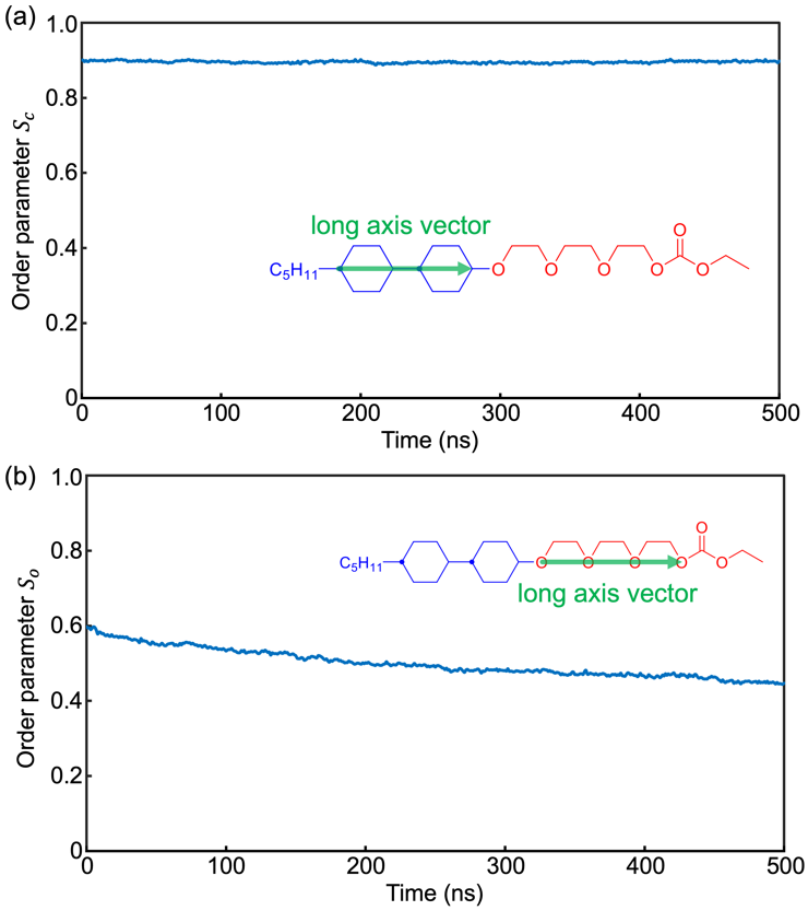

Fig. S23 Time dependencies of order parameters for compound **2**: (a) S_c and (b) S_o.