Supplementary Material

Temperature-driven and reversible assembly of homopolyelectrolytes derived from suitably-designed ionic liquids in water

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Fig. S1. $^1$H NMR chart of P-Cl in CD$_3$OD.
Fig. S2. $^1$H NMR chart of P-C4 in CD$_3$OD.

Fig. S3. $^1$H NMR chart of P-C5 in CD$_3$OD.
Fig. S4. $^1$H NMR chart of P-C6 in CD$_3$OD.

Fig. S5. $^1$H NMR chart of N-Cl in CD$_3$OD.
Fig. S6. $^1$H NMR chart of N-4 in CD$_3$OD.

Fig. S7. $^1$H NMR chart of N-5 in CD$_3$OD.
Fig. S8. $^1$H NMR chart of N-C6 in CD$_3$OD.

Fig. S9. GPC chart of phosphonium-based poly(IL)s.
**Fig. S10.** GPC curves of ammonium-based poly(IL)s.

**Fig. S11.** Temperature-dependent change in transmittance for P-C5 (3.0 wt%); (■): heating process, (▲): cooling process.
Fig. S12. Effect of poly(IL) species on transmittance change upon heating; (■): N-C6, (●): P-C5, (▲): N-C5. Polymer concentration was set as 3.0 wt%.
Fig. S13. DLS profiles for P-C5 (3.0 wt%) upon increasing temperatures.
Fig. S14. Microscopic photographs for P-C5 (5.0 wt %) at 30 °C (above) and after heating at 40 °C (below) at a magnification of 400 times.