Electronic Supplementary Information

Phase Transition and Conductive Acceleration of Phosphonium-Cation Based Room-Temperature Ionic Liquid

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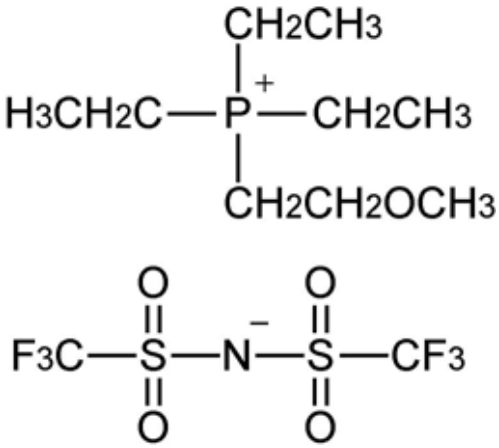

Figure ESI1: Chemical structure of TEMEP-TFSA.

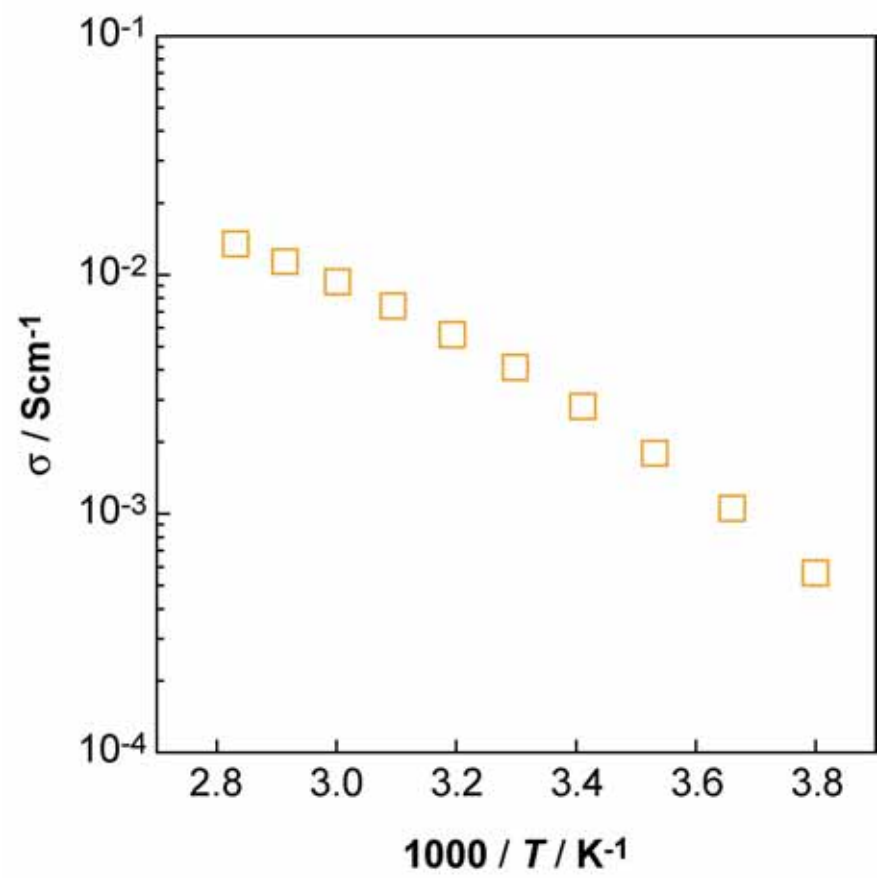

Figure ESI2: Arrhenius plots of the ionic conductivity (σ) for the TEMEP-TFSA.

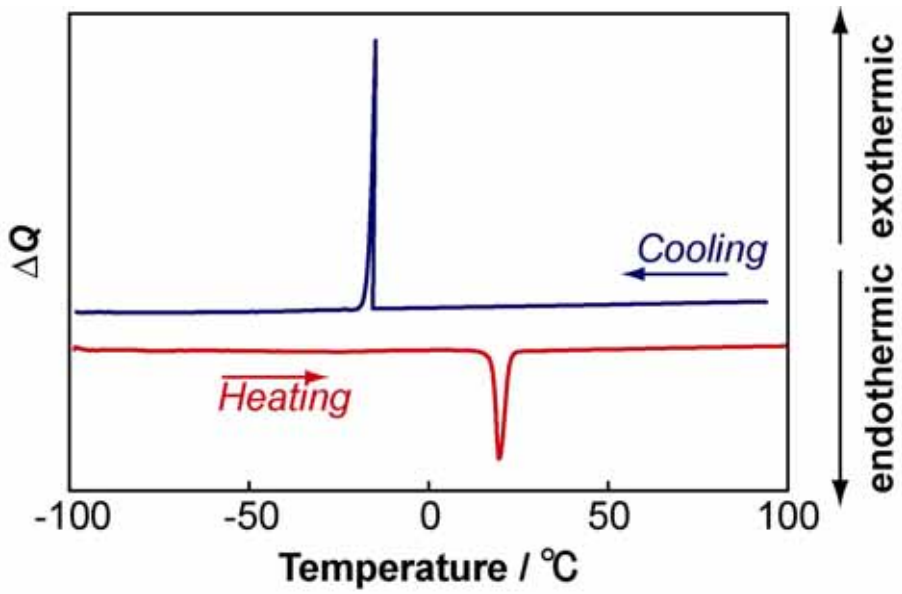

Figure ESI3: DSC thermogram of TEMEP-TFSA (Blue: cooling, Red: heating).

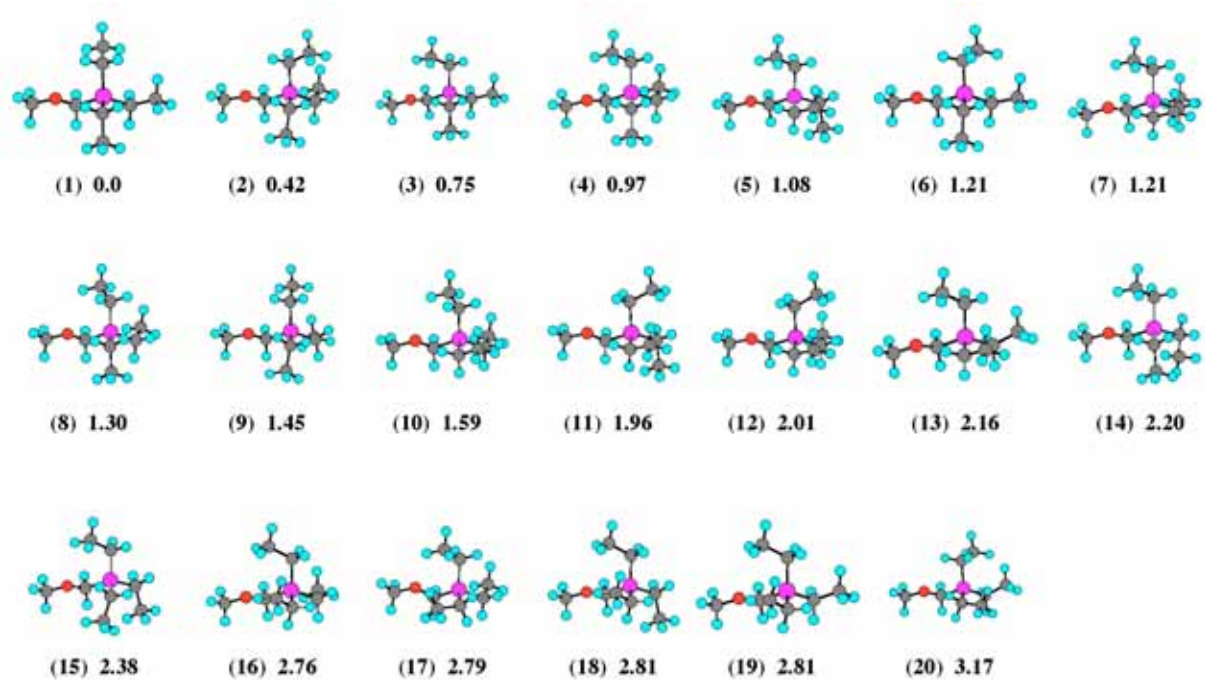

Figure ESI4: Calculated relative energies of rotamers at the MP2/6-311G**//HF/6-311G** level (kcal/mol) for the TEMMP-TFSA.

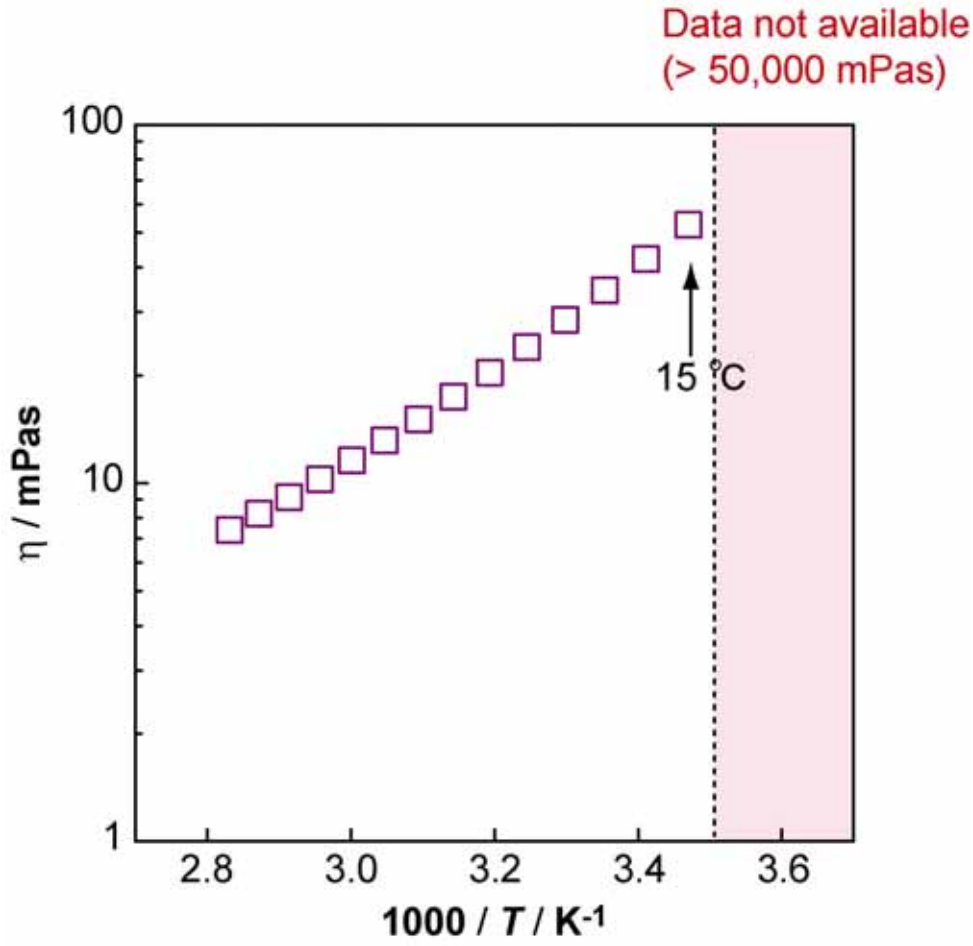

Figure ESI5: Arrhenius plots of the viscosity (η) for the TEMMP-TFSA.

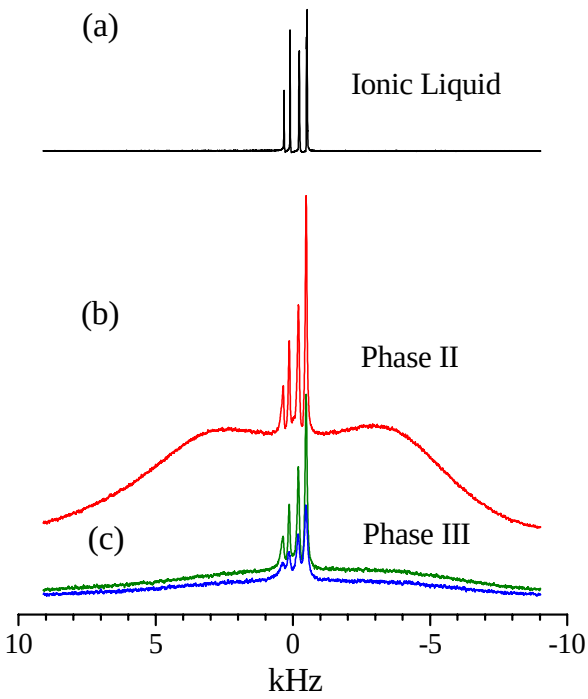

Figure ESI6: The ^{1}H NMR spectra for (a) ionic liquid (phase (I)), (b) phases (II) and (c) (III). The dependence of spectral patterns on temperature was only a little in the phases (I) and (II), while in the phase (III) the signal intensity decreased with the decrease of temperature and disappeared below -40 ^{o}C. The same measuring conditions were used in the phases (II) and (III), and the reduction in the phase (III) suggests partial freeze to solid.