Supplementary Information

SI 1 Thermoelectric characterization of different electrolytes

The Seebeck coefficient of the electrolytes were obtained the same way as we reported before. The open circuit thermal voltage between the cold and hot electrodes were monitored when a temperature difference was applied until reaching a stable value. Then the static thermovoltage was plotted with the corresponding applied temperature differences, as shown in Figure S1. The Seebeck coefficient of an electrolyte is given by the slope of the linear fitting.

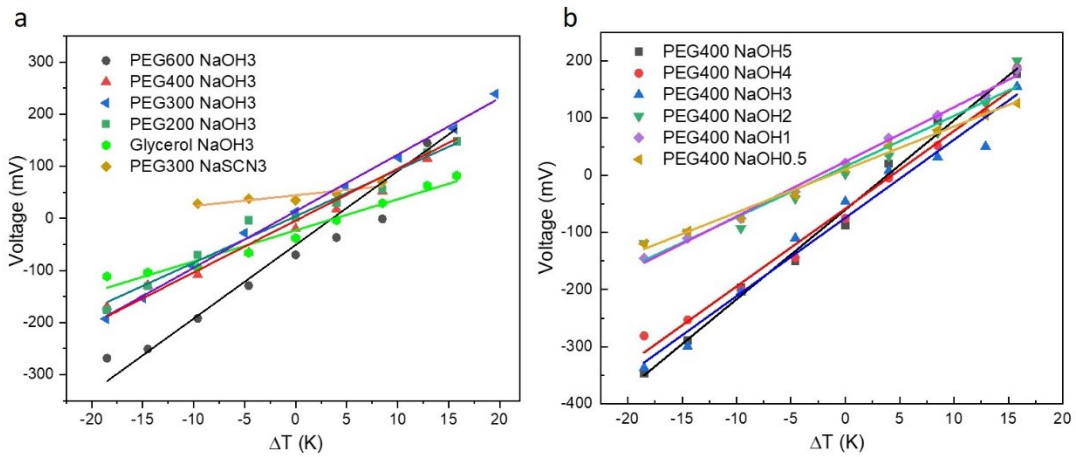

Figure S1. The Seebeck coefficient of (a) electrolytes with different composition and b) electrolytes with PEG400 and different concentration of NaOH.

SI 2. The H1-NMR spectroscopy of different electrolytes

Proton nuclear magnetic resonance ^{1}H spectra were recorded on Brucker (500 MHz) spectrometer. The deuterated solvent was used as internal standard for DMSO-d6 (1H, $\delta = 2.50$) was used as reference. All the samples were analyzed using 15% (w/w) solution of sample in DMSO-d6. For PEG samples, the region between 3.3 ppm and 3.51 ppm are related to hydrogen atoms that are belonging to the (-0-CH_2-CH_2-) polymer chains; while the region at 4.55ppm

belongs to hydrogen atom of the alcohol end groups. For glycerol, the region between 3.2 to 3.43 belongs to the hydrogen atoms from the backbone while region at 4.45 and 4.54 belongs to the alcohol hydrogen atoms.

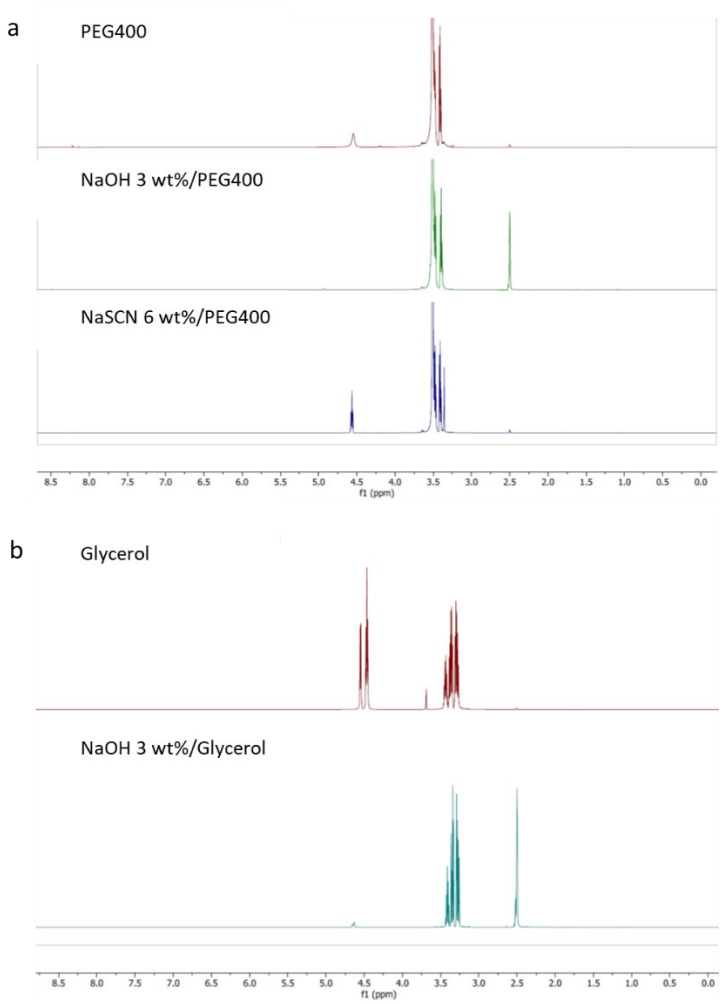

Figure S2. a) The 1H-NMR spectra of PEG400, PEG400 with 3 wt% of NaOH and 6 wt% of NaSCN. The characteristic downfield peak shift for the remaining PEG400-OH protons, moving from 4.54 ppm in pure PEG-OH to 4.92 in PEG-OH/NaOH due to PEG-O•••H•••O-PEG interactions. There was no chemical peak shift observed for PEG-OH / NaSCN sample due absence of alkoxide anion. b) The 1H-NMR spectra of glycerol and glycerol with 3 wt% of NaOH. The characteristic downfield peak shift for the remaining Glycerol-OH protons, moving from 4.47 and 4,54 ppm in pure glycerol to 4.63 in glycerol/NaOH due to Glycerol-O•••H•••O-Glycerol interactions.

SI 3. The infrared spectroscopy of PEG400 electrolytes of different amount of NaOH

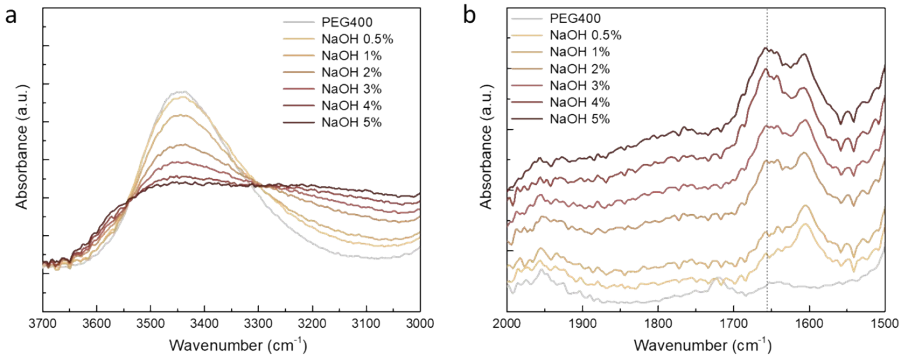

Figure S3. The FTIR characteristic peaks of PEG400/NaOH electrolytes. a) The O-H stretching absorption of the electrolytes and the solvent. b) The O-H bending absorption of the water in the electrolytes.

SI 4. The viscosity of different electrolytes.

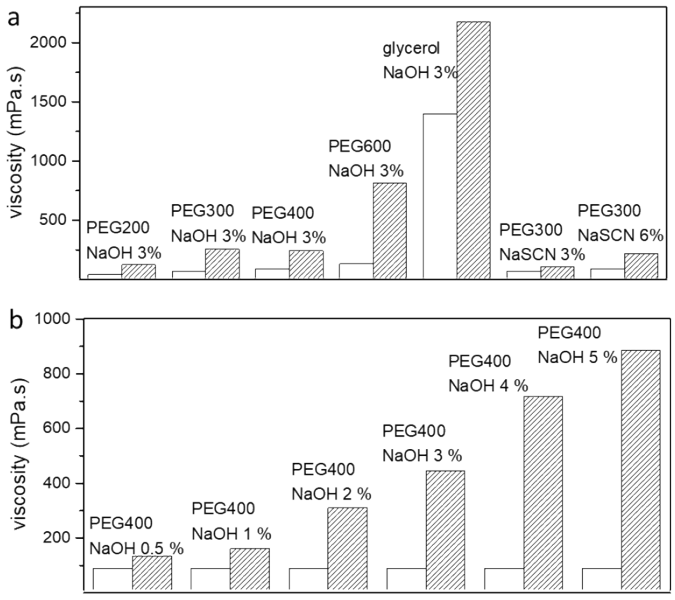

Figure S4. The viscosity of different electrolyte composition. (a) 3 wt% NaOH in PEG of different Mw, NaOH 3% in glycerol, NaSCN 3% in PEG300 and NaSCN 6% in PEG400. (b) 0.5 to 5 wt% of NaOH in PEG400,

SI 5. The impedance spectroscopy of different electrolytes.

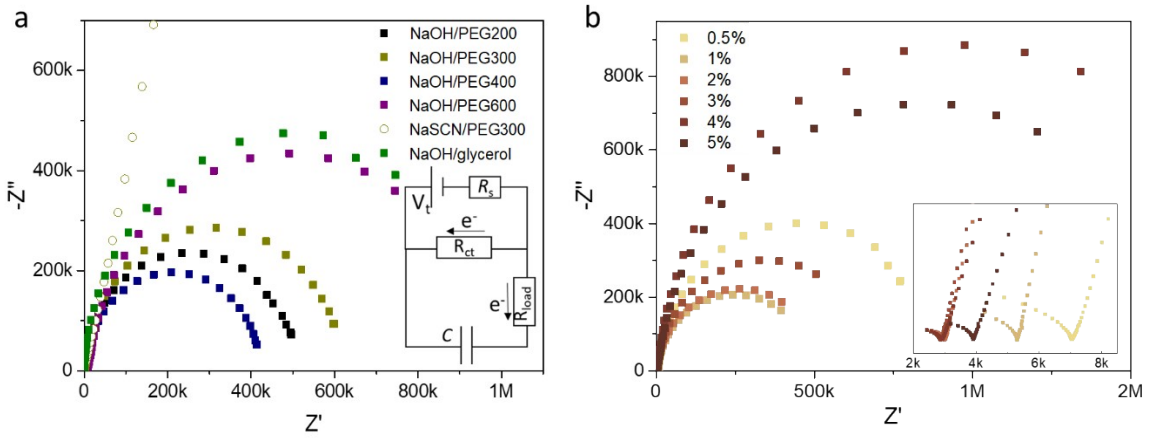

Figure S5. The Nyquist plot of the impedance spectroscopy of devices with different electrolyte composition. (a) 3 wt% NaOH in PEG of different Mw, inset figure shows the equivalent circuit used to simulate the ionic conductivity of the electroltyes. (b) 0.5 to 5 wt% of NaOH in PEG400, inset figure shows the enlarged data in low impedance range.

SI 6. The temperature dependent of the molar conductivity.

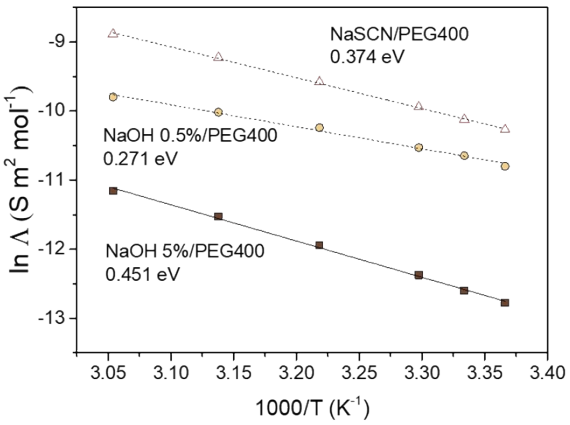

Figure S6. The molar conductivity of a few electrolytes at different temperature.