

***Electronic Supplementary Materials***

**Preparation and Evaluation of PVDF-HFP Based Gel  
Electrolyte for Ge-sensitized Thermal Cell**

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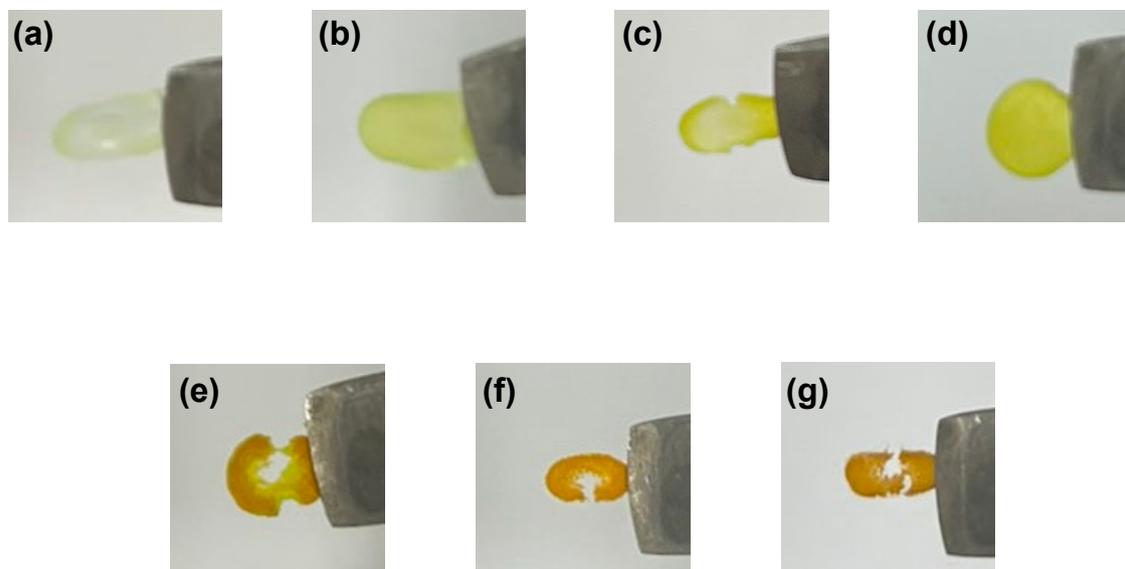
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## ***Experimental procedure S1***

The content rate of NMP in the prepared electrolyte was calculated through **Equation (S1)**, where the added weight of NMP, PVDF-HFP, CuCl and CuCl<sub>2</sub> were 4, 1, 0.16 and 0.21 g respectively.

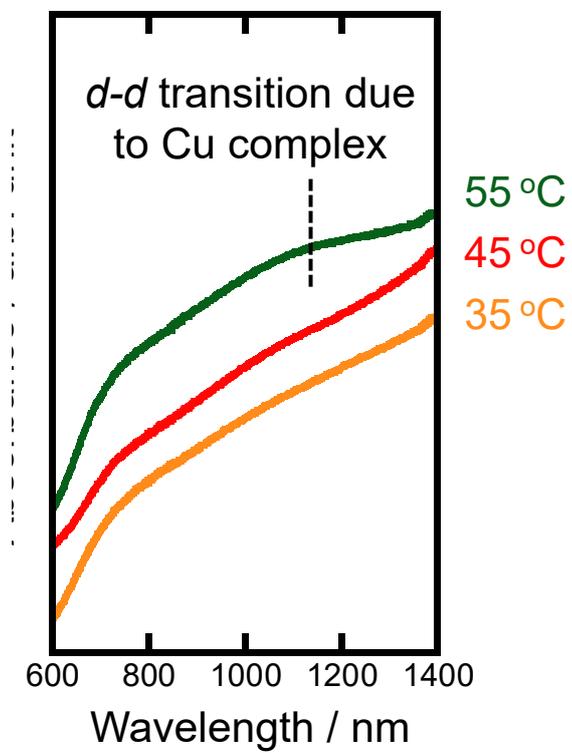
$$\frac{4}{4+1+0.16+0.21} \times 100\% = 74.5 \text{ wt}\% \quad (\text{S1})$$

**Figure S1**



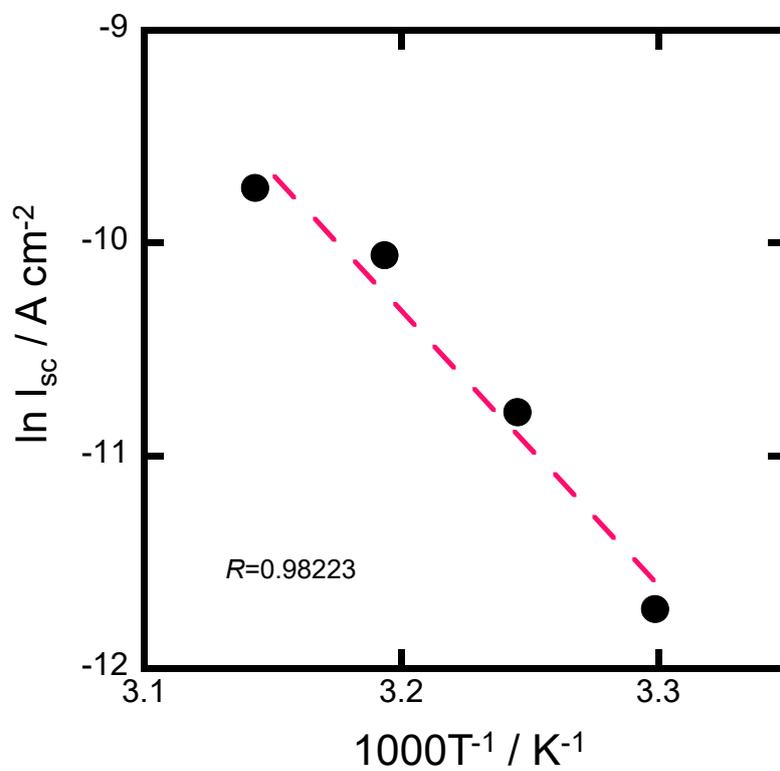
**Figure S1.** Digital camera images of the electrolytes at different gelation temperatures ((a) 30°C, (b) 35°C, (c) 40°C, (d) 45°C, (e) 50°C, (f) 55°C and (g) 60°C ).

**Figure S2**



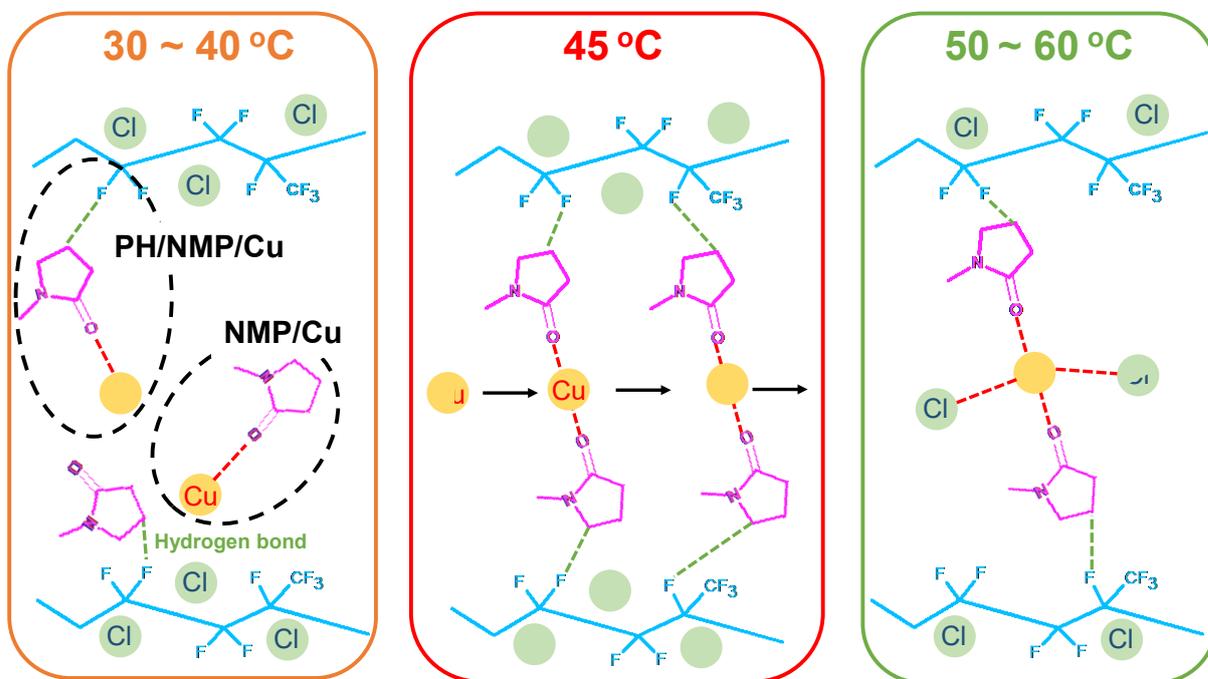
**Figure S2.** UV-vis absorption spectra of the electrolytes measured at 35 °C (orange line), 45 °C (red line) and 55 °C (green line).

**Figure S3**



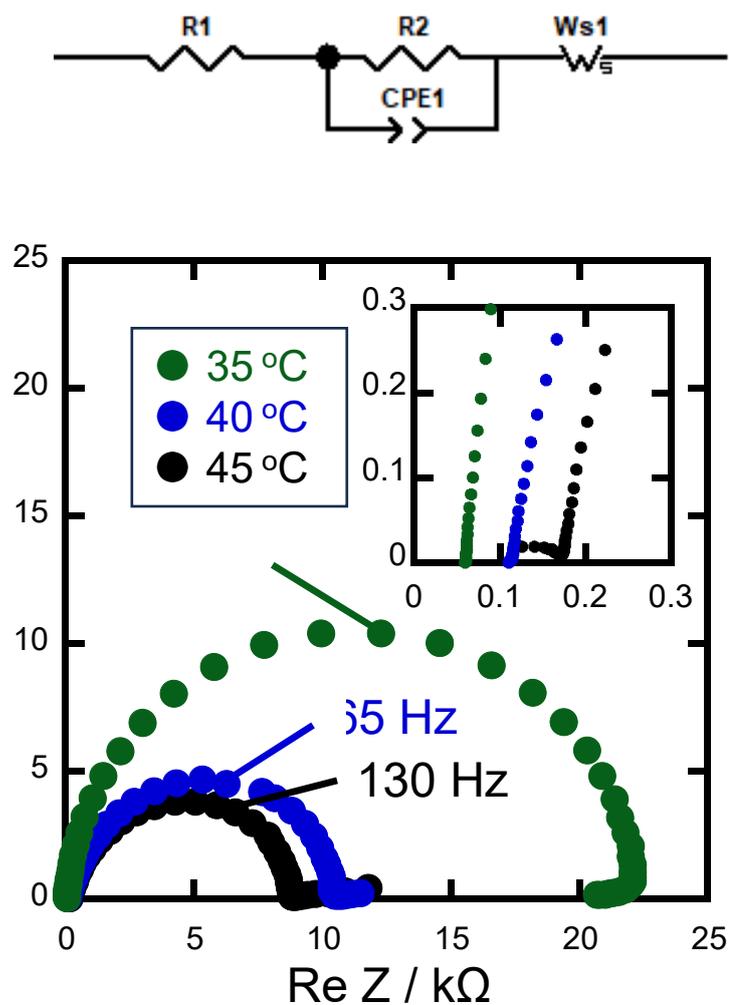
**Figure S3.** Temperature dependence of short circuit current density (Arrhenius plot) to calculate activation energy which was  $107 \text{ kJ mol}^{-1}$ .

**Figure S4**



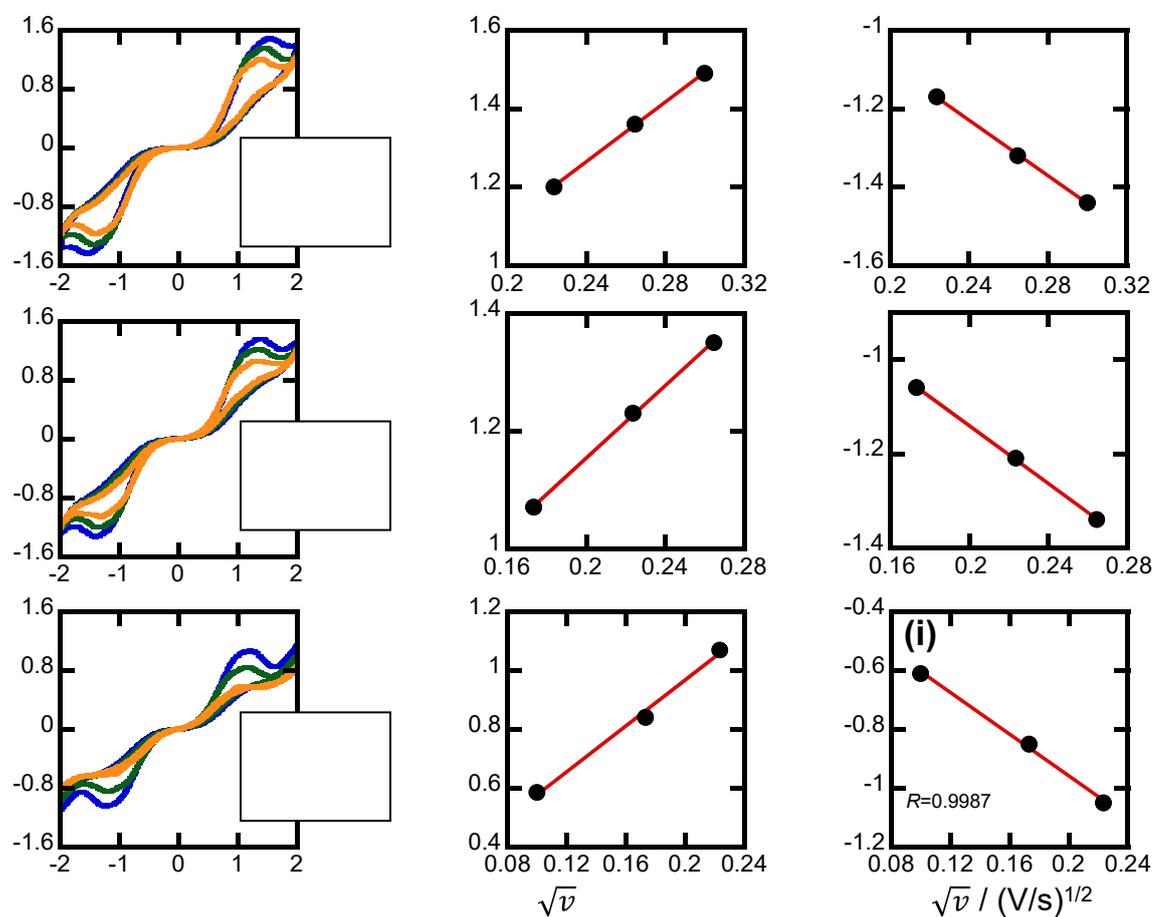
**Figure S4.** Graphic images of the possible states for the electrolytes gelled at different gelation temperatures.

**Figure S5**



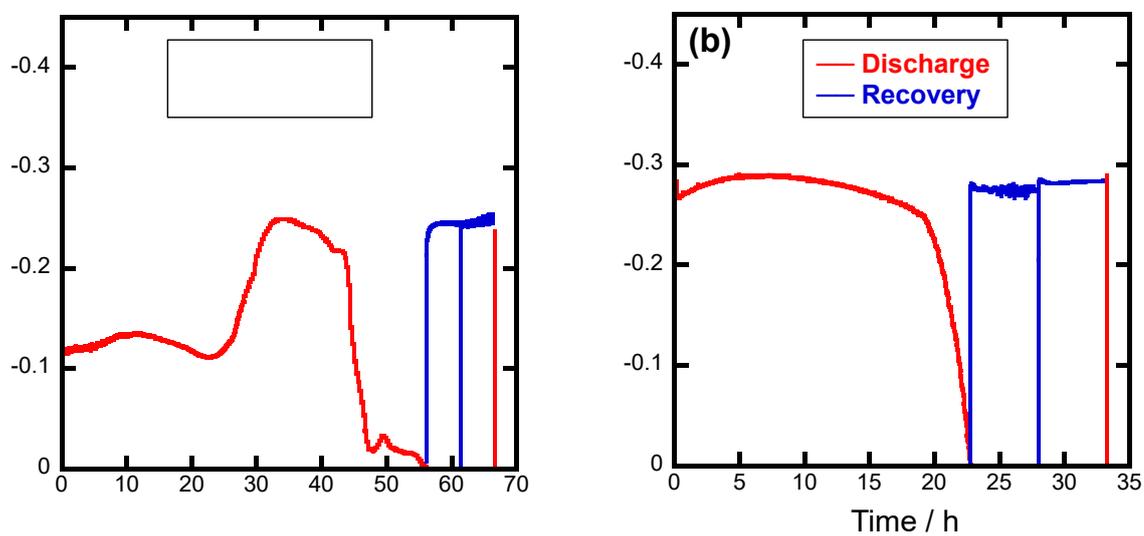
**Figure S5.** (a) Equivalent circuit using symmetric FTO/FTO cells. R1: internal electrolyte resistance; R2: charge transfer resistance at the FTO/electrolyte interface; CPE1: electric double layer at the FTO/electrolyte interface and Ws1: Warburg element representative of ion diffusion, and (b) PEIS measurement of the cells at 35 °C, 40 °C and 45 °C.

**Figure S6**



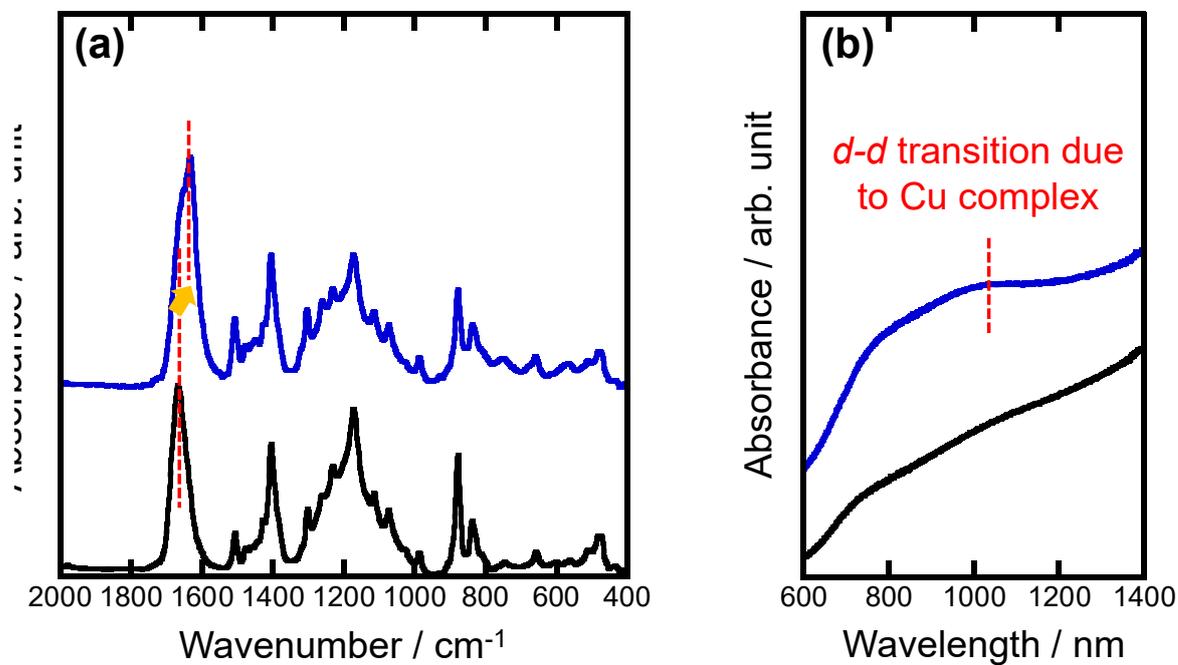
**Figure S6.** (a, d, g) Cyclic voltammetry, (b, e, h) oxidation and (c, f, i) reduction peak current of the cell at (a~b) 35 °C, (d~f) 40 °C and (g~i) 45 °C changing with scan rate.

**Figure S7**



**Figure S7.** Discharge (chronoamperometry) and recovery of the cells were measured at (a) 35 °C and (b) 45 °C which are equal to the gelation temperatures, where the discharge current is 200 nA, the recovery time was 5 h and the trial number of discharges was 3.

**Figure S8**



**Figure S8.** (a) FT-IR and (b) UV-vis absorption spectra of the cells before (indicated by black line) and after discharge (indicated by blue line) at 45 °C.