Supporting information

A Robust UV-curable Ion-liquid Gel Electrolyte for High-performance Polymer-based Electrochromic Devices

Guoqiang Kuang[1], Yuanzheng Mu[1], Hongbin Yin[1], Yijie Tao[1]*, Yafei Guo[2*], Shiguo Zhang[1]*

[1] College of Materials Science and Engineering, Hunan University, Changsha, China

[2] Systems Engineering Institute, AMS, PLA, Beijing, China

Corresponding author:

Yijie Tao: taoyijie@hnu.edu.cn

Yafei Guo: guoyafei1010@163.com

Shiguo Zhang: zhangsg@hnu.edu.cn

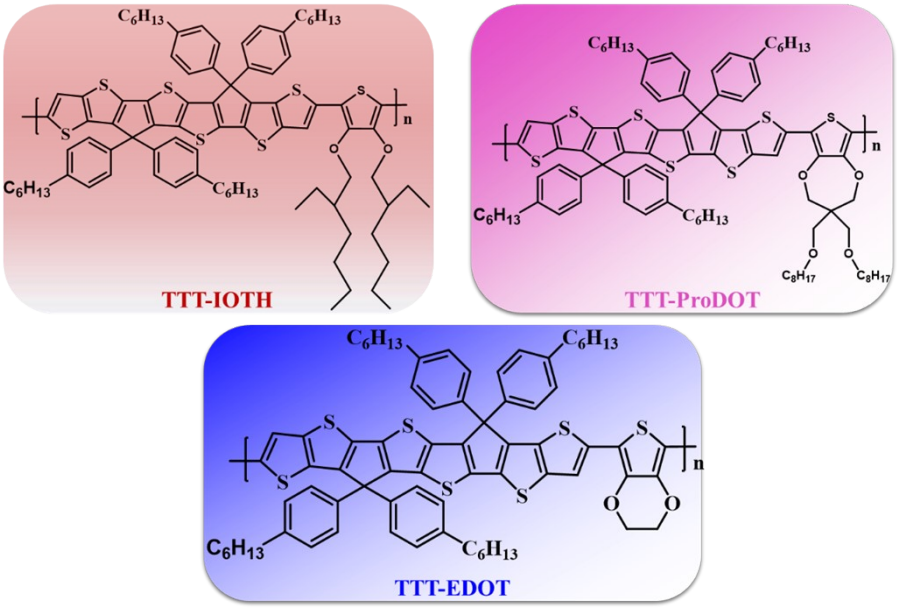

Fig.S1 Chemical structure of the synthesized polymers TTT-IOTH, TTT-ProDOT and TTT-EDOT.

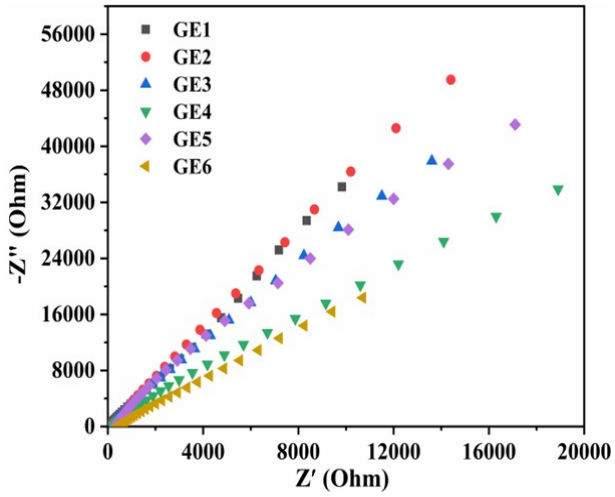

Fig.S2 EIS spectra of the electrolyte GE1-GE6.

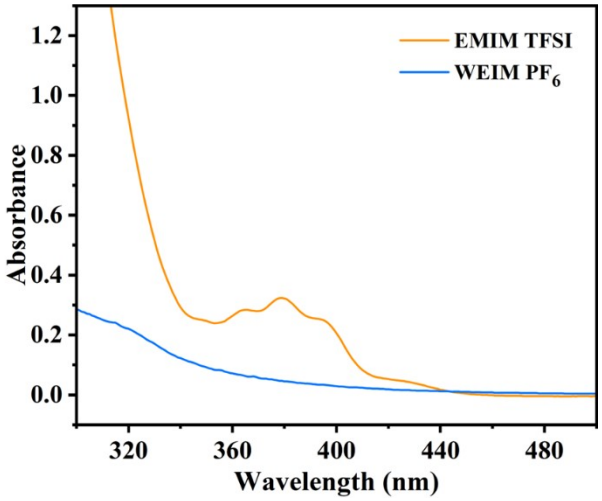

Fig.S3 UV-vis spectra of EMIM TFSI and VEIM PF_6.

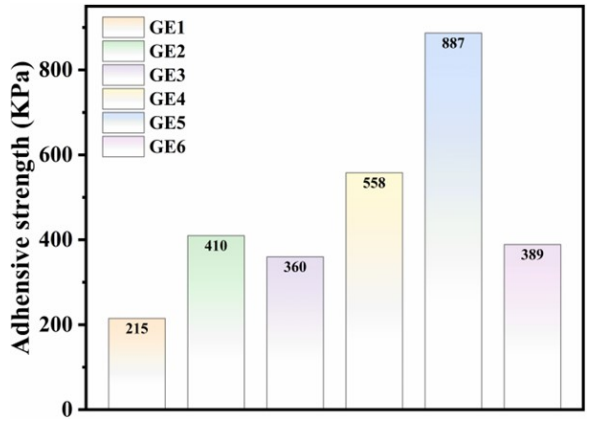

Fig.S4 adhesion strength of electrolytes GE1-GE6.

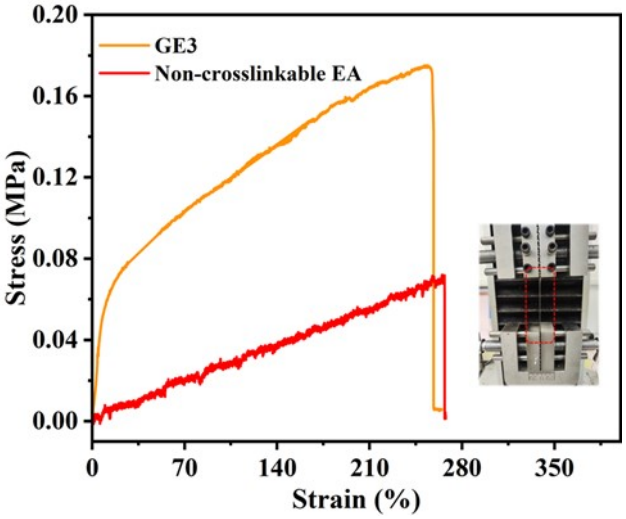

Fig. S5 Stress-strain curve of the reference sample

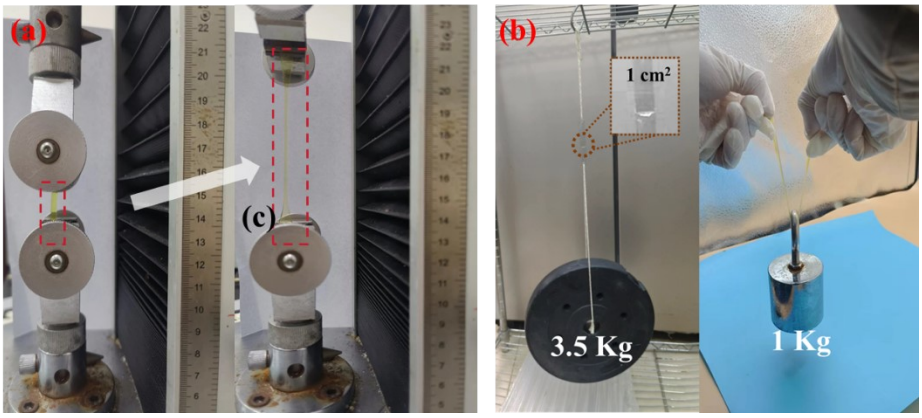

Fig.S6 The photographs of mechanical performance testing of the electrolyte with high strength

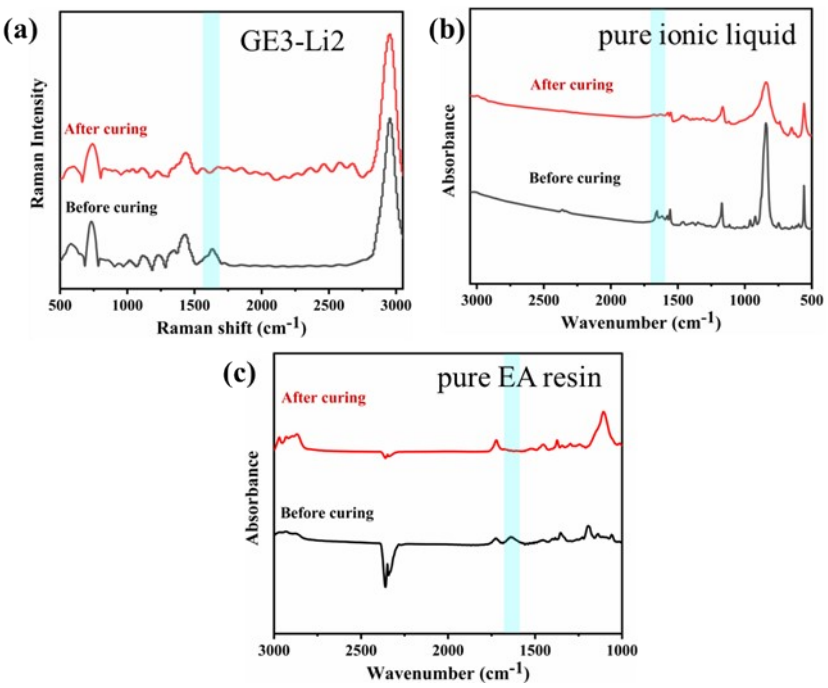

Fig.S7 (a) Raman spectra of GE3-Li2 before and after curing. (b) FTIR spectra of pure ionic liquid VEIMPF_6 and (c) pure EA resin before and after curing.

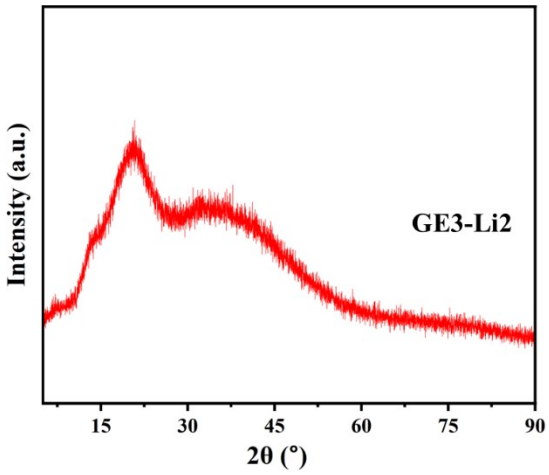

Fig.S8 XRD pattern of the GE3-Li2 film.

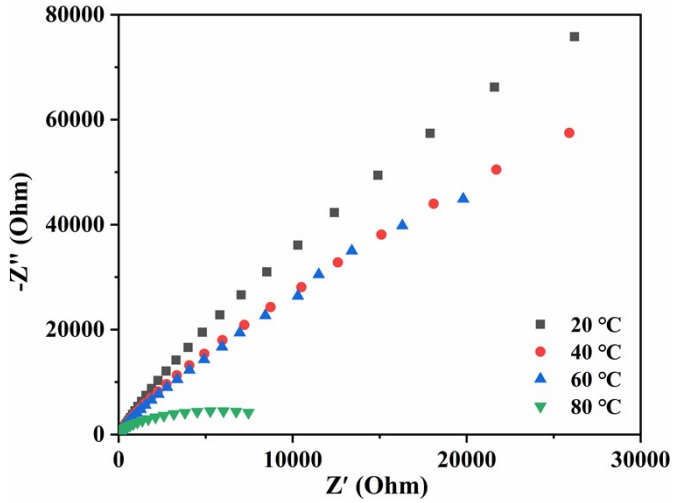

Fig.S9 EIS spectra of the electrolyte GE3-Li2 at different temperatures.

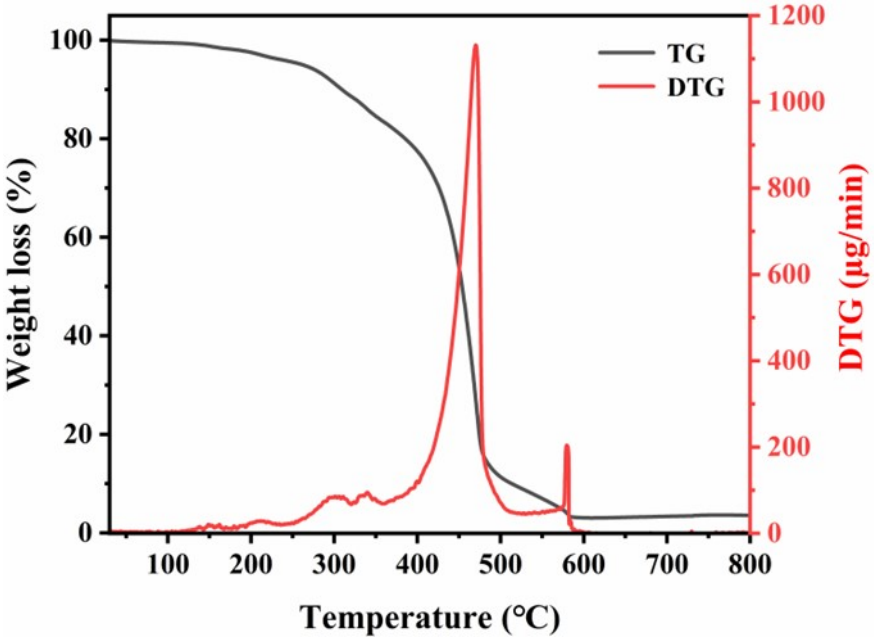

Fig.S10 Thermal stability curves of GE3-Li2.

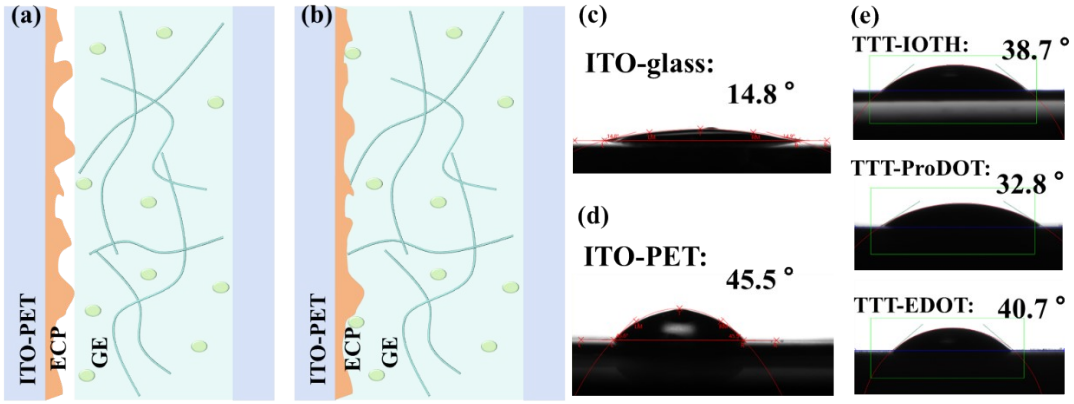

Fig.S11 Differences in the internal structure of (a) conventional spray coating and (b) UV curing devices. The contact angle of GE3-Li2 on the substrate of (c) ITO-glass, (d) ITO-PET and (e) ECP films.

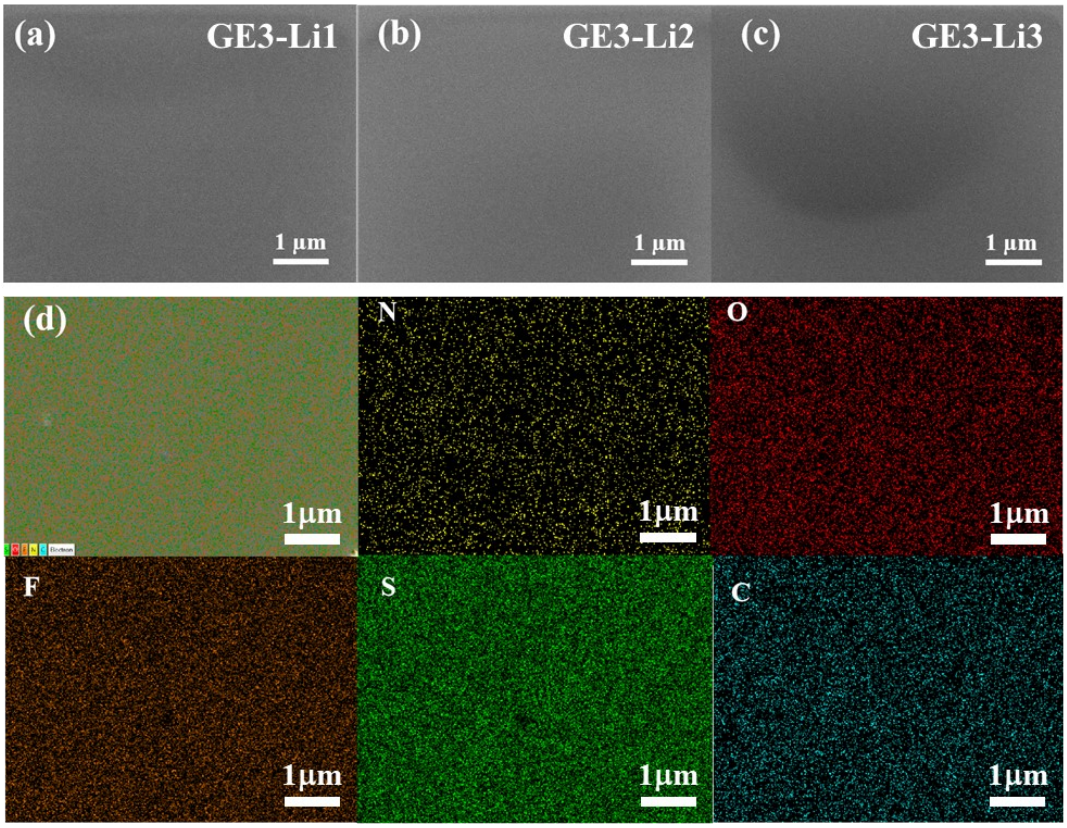

Fig.S12 (a) Scanning electron microscopic (SEM) image of the electrolyte films (a) GE3-Li1 (b) GE3-Li2 (c) GE3-Li3. (d) EDX spectra of GE3-Li2

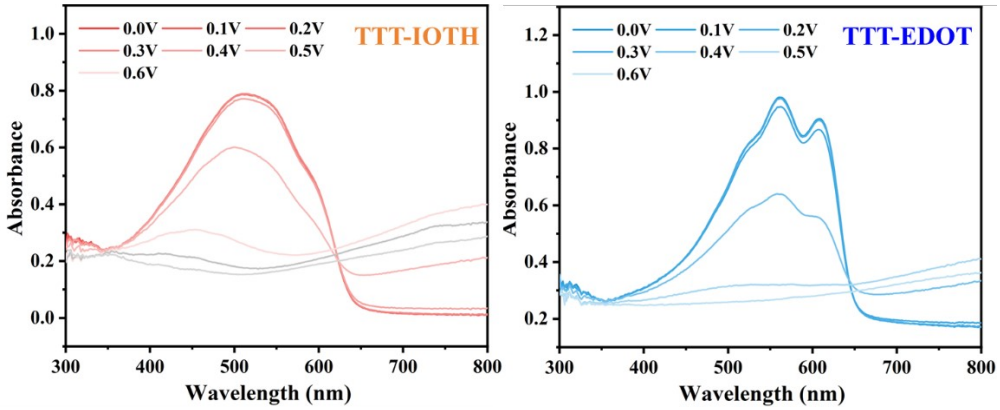

Fig.S13 Spectroelectrochemistry of the devices TTT-IOTH and TTT-EDOT.

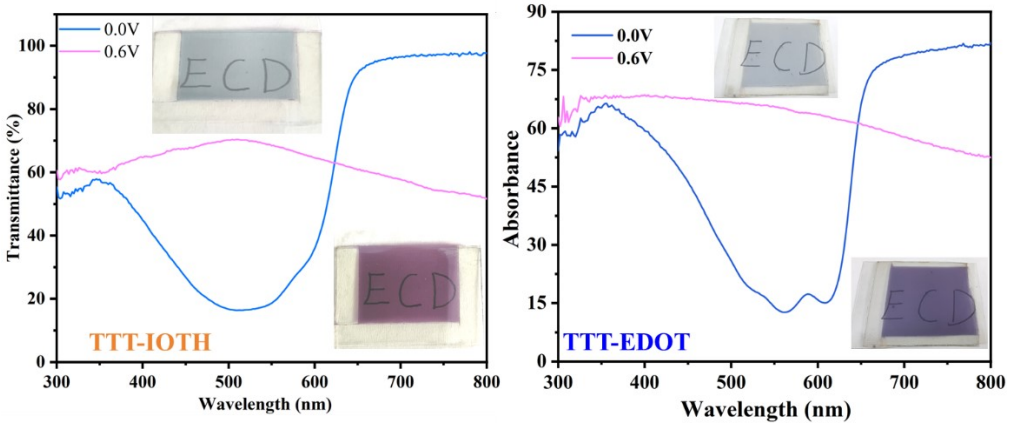

Fig.S14 Transmittance Curves and optical images of the devices based on TTT-IOTH and TTT-EDOT.

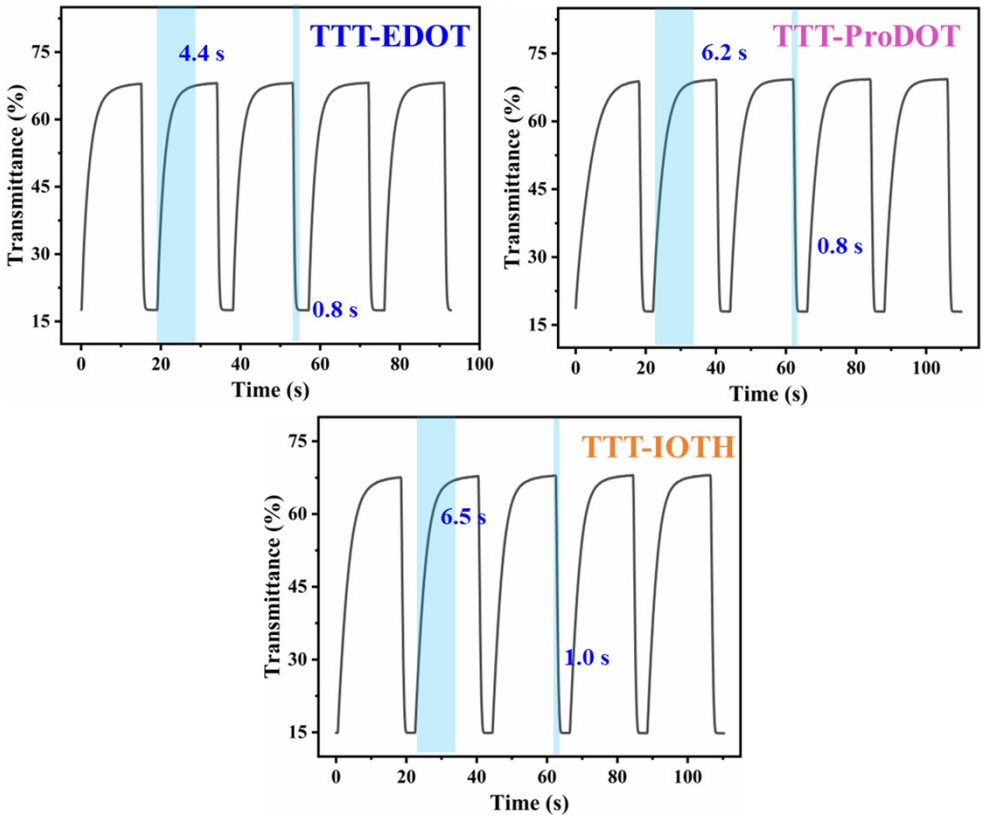

Fig.S15 Switching response of the devices based on TTT-IOTH, TTT-ProDOT and TTT-EDOT.

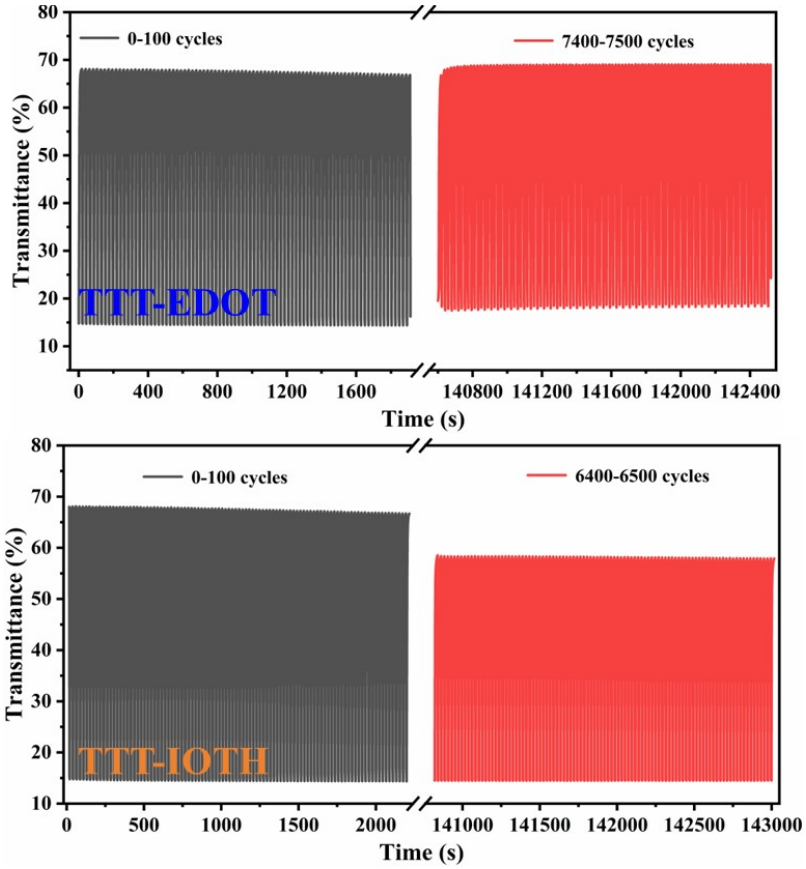

Fig.S16 Switching stability of the devices based on TTT-IOTH and TTT-EDOT.

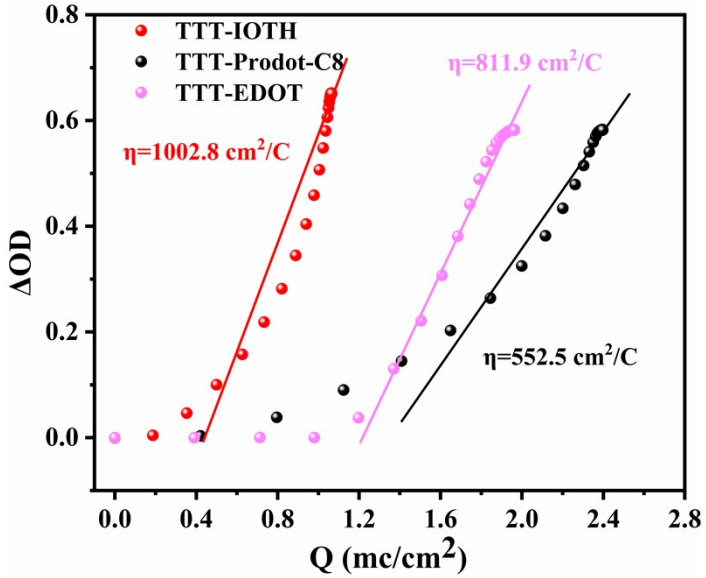

Fig.S17 Coloration efficiency of the devices based on TTT-IOTH, TTT-ProDOT and TTT-EDOT.

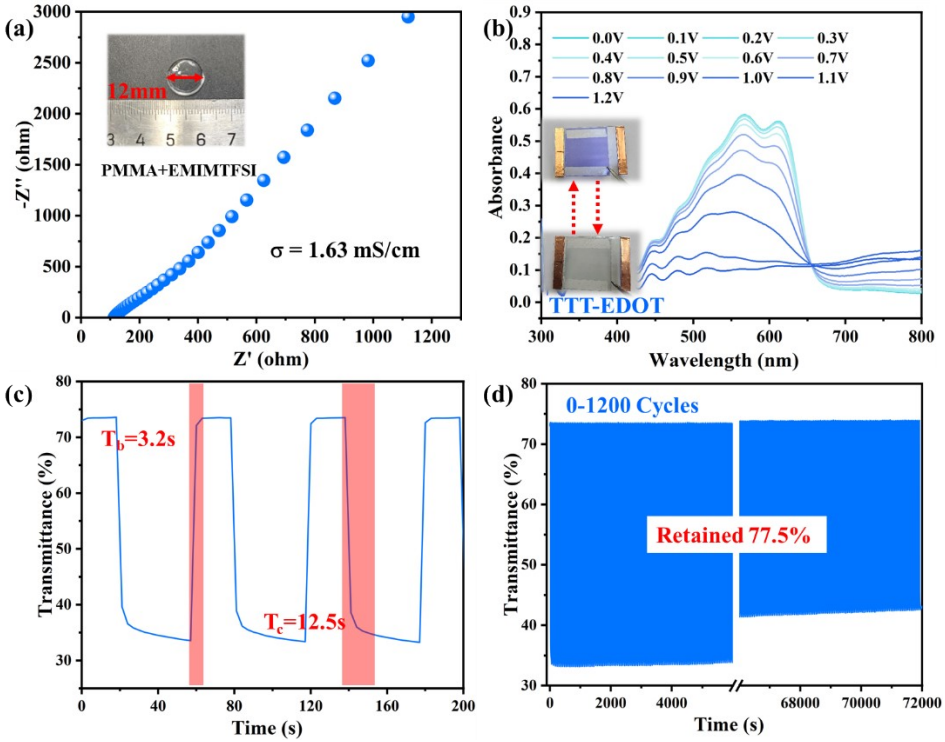

Fig.S18 (a) EIS spectra of gel electrolytes based on PMMA and ionic liquid systems. (b) Spectroelectrochemistry as well as optical photographs of the ECD based on PMMA gel electrolytes. (c) Switching response of the device. (d) Switching stability of the device.

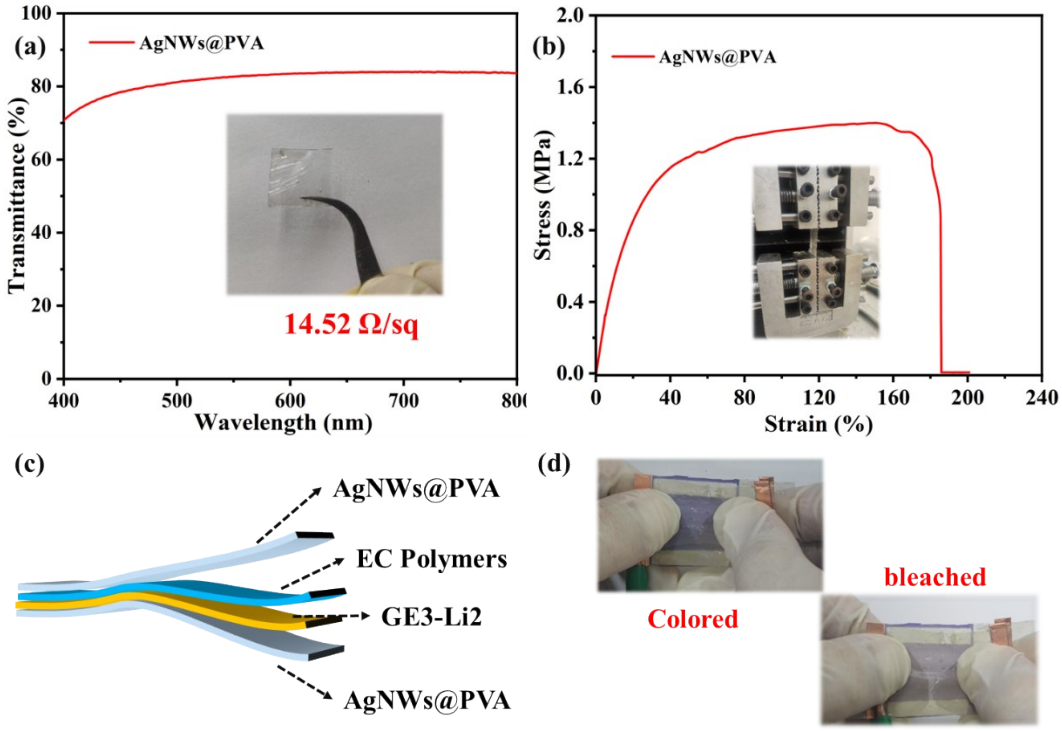

Fig.S19 (a) Optical photograph and transmittance curve of the AgNWs@PVA film. (b) Stress-strain curve of the AgNWs@PVA film. (c) Structural schematic of stretchable

device. (d) Optical photographs of the device in the stretched state with colored state and bleached state.

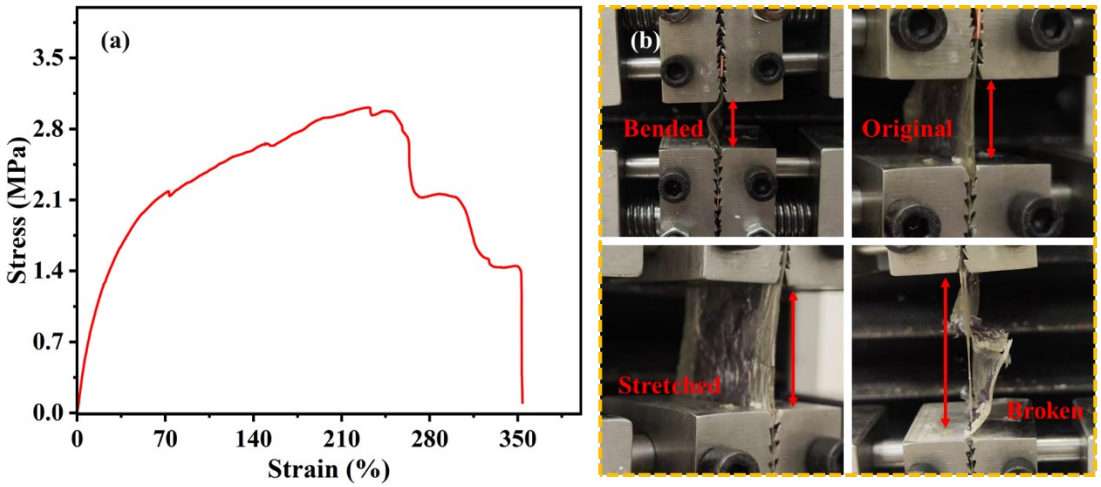

Fig.S20 (a) Stress-strain curve of the stretchable device. (b) Different states of the device under stretching test.

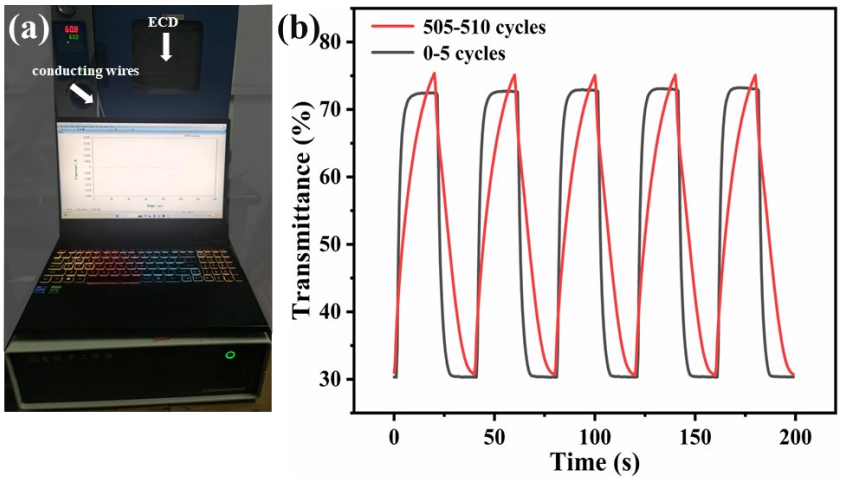

Fig.S21 Schematic diagram of a high-temperature endurance test for the device and square-wave cycle curve before and after the test.