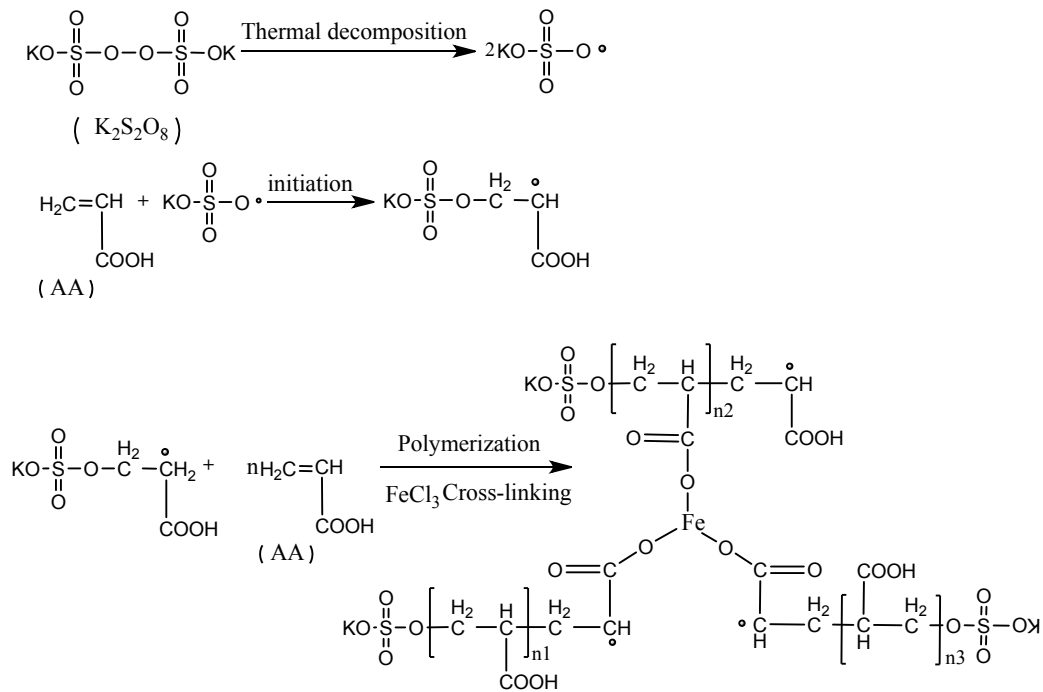


## Supporting Information

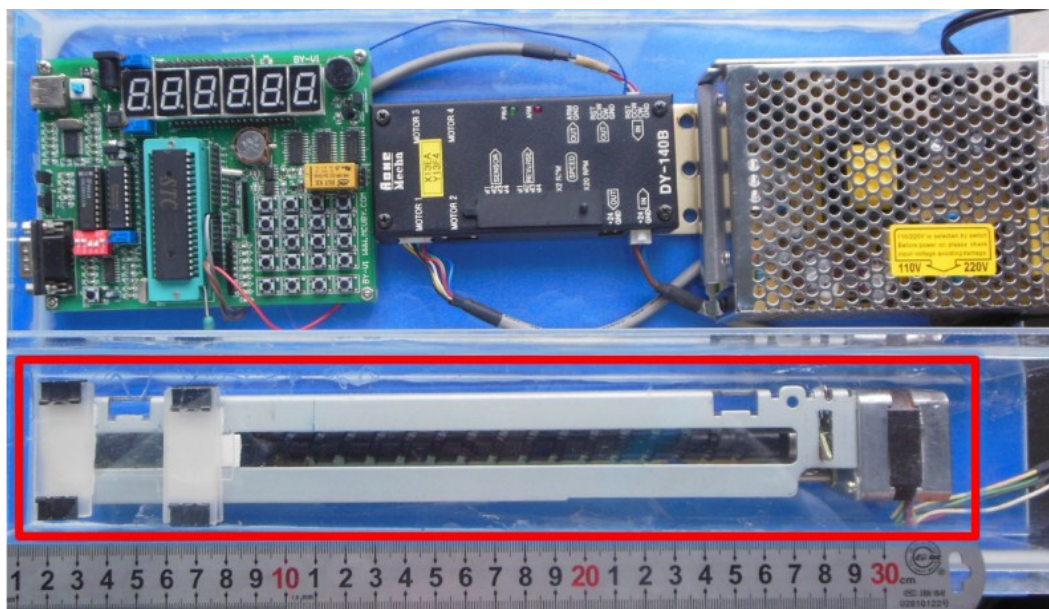
# Self-healable and easy-recyclable supramolecular hydrogel electrolyte for flexible supercapacitors

Yunzhou Guo<sup>a‡</sup>, Xiao Zhou<sup>‡</sup>, Qianqiu Tanga, Hua Bao<sup>a\*</sup>, Gengchao Wang<sup>a\*</sup>, Petr Saha<sup>b\*</sup>

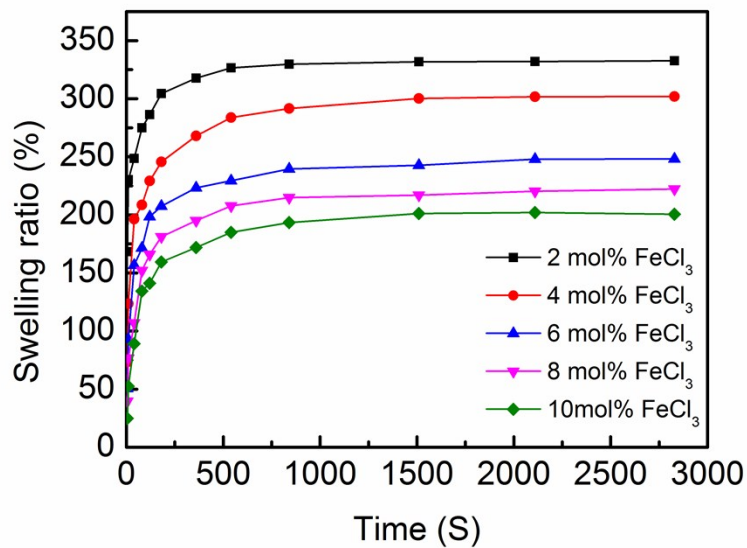
*Shanghai Key Laboratory of Advanced Polymeric Materials, Key Laboratory for Ultrafine  
Materials of Ministry of Education, School of Materials Science and Engineering, East China  
University of Science and Technology, Shanghai 200237, P.R.China*



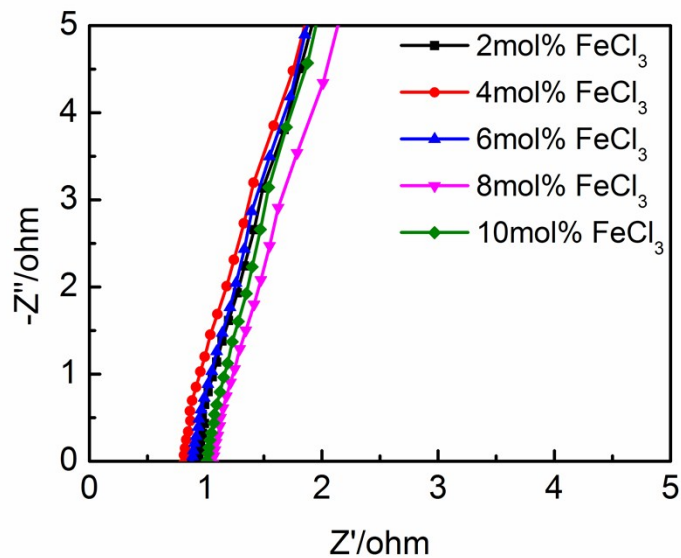
**Fig. S1.** Schematic illustration showing the polymerization of Fe<sup>3+</sup>/PAA hydrogel.



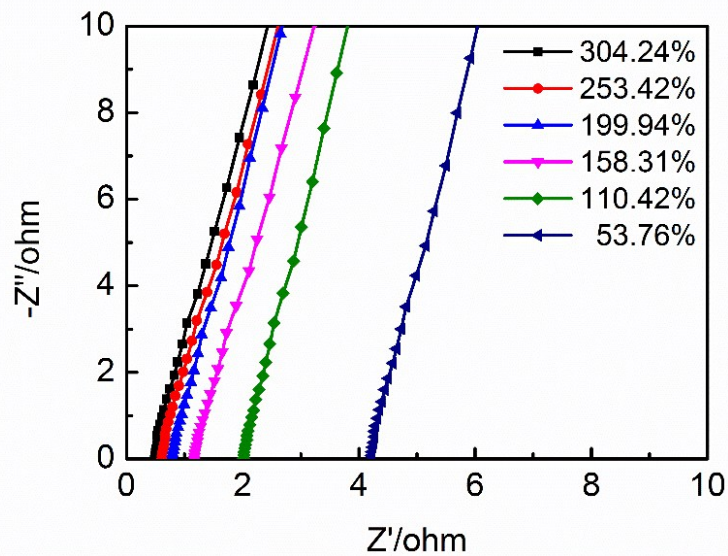
**Fig. S2.** The self-constructed device to perform the repeated stretching of the KCl-Fe<sup>3+</sup>/PAA gel electrolyte.



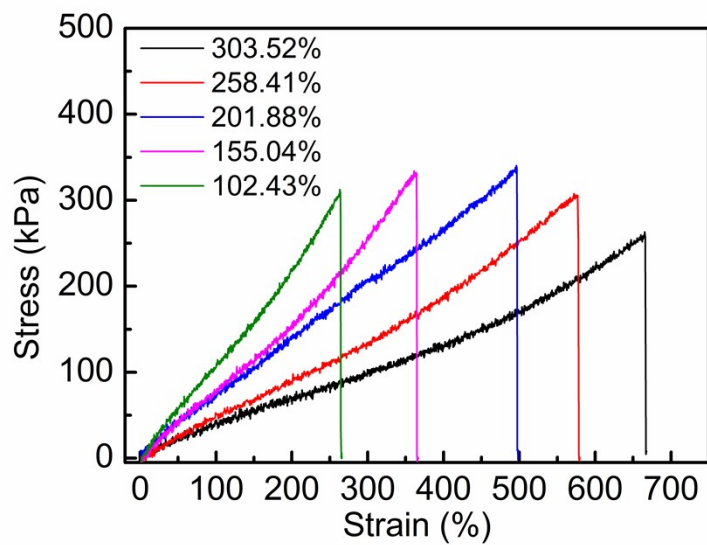
**Fig. S3.** Swelling ratios at various immersing time for Fe<sup>3+</sup>/PAA with different FeCl<sub>3</sub> content.



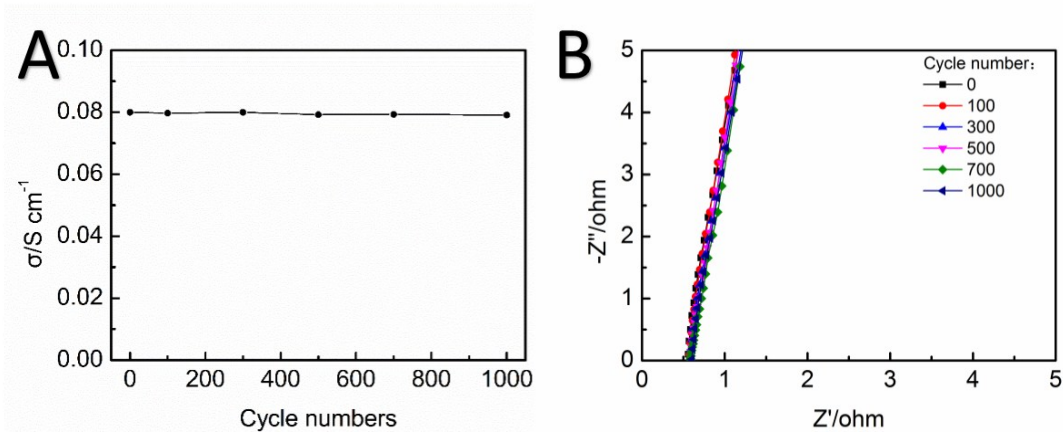
**Fig. S4.** Nyquist plots of KCl-Fe<sup>3+</sup>/PAA hydrogel electrolytes with different FeCl<sub>3</sub> content.



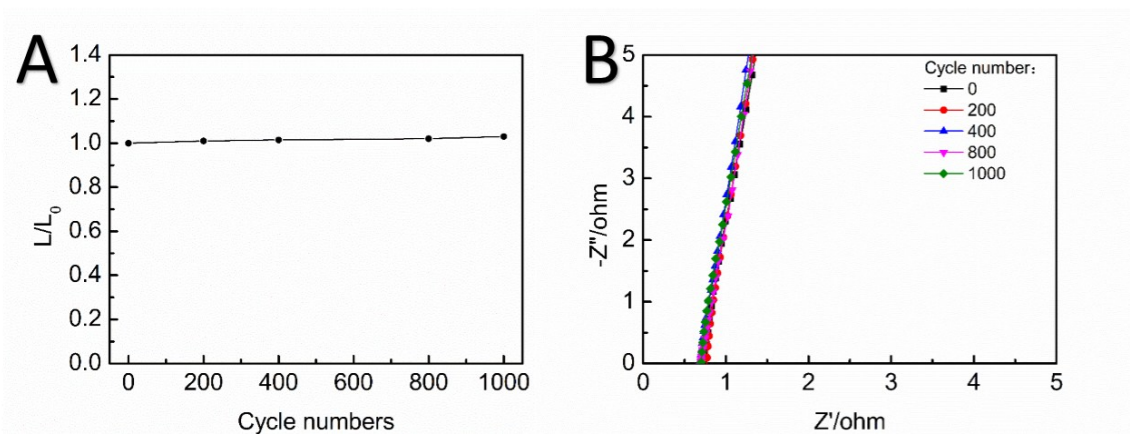
**Fig. S5.** Nyquist plots of KCl-Fe<sup>3+</sup>(4)/PAA electrolyte with various swelling ratio.



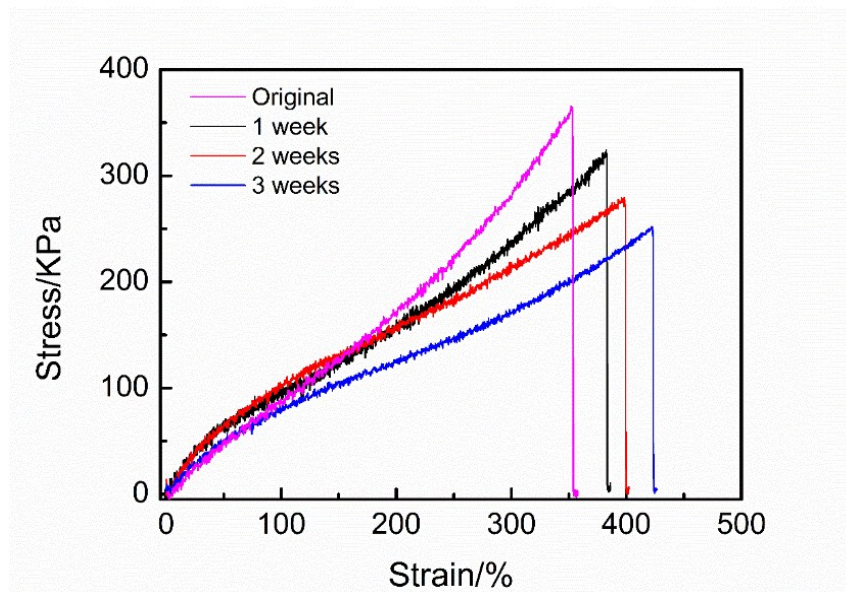
**Fig. S6.** Stress-strain curves of KCl-Fe<sup>3+</sup>(4)/PAA hydrogel electrolytes with different KCl solution swelling ratios.



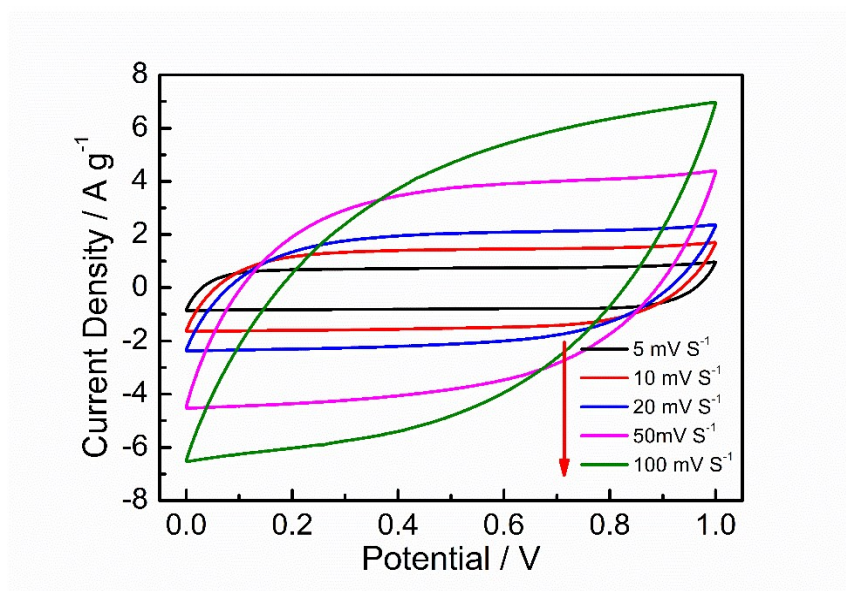
**Fig. S7.** (A) Ionic conductivity as a function of stretching cycle numbers at 200% strain. (B) Nyquist plots of KCl-Fe<sup>3+</sup>/PAA with different stretching cycle numbers.



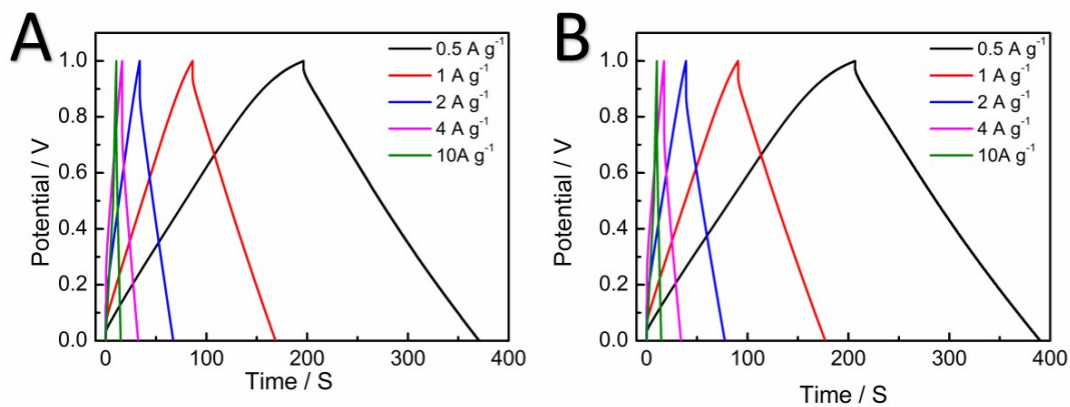
**Fig. S8.** (A) plastic deformation and (B) Nyquist plots of self-repaired KCl-Fe<sup>3+</sup>(4)/PAA hydrogel electrolyte after 1000 cycles of stretching-relaxation.



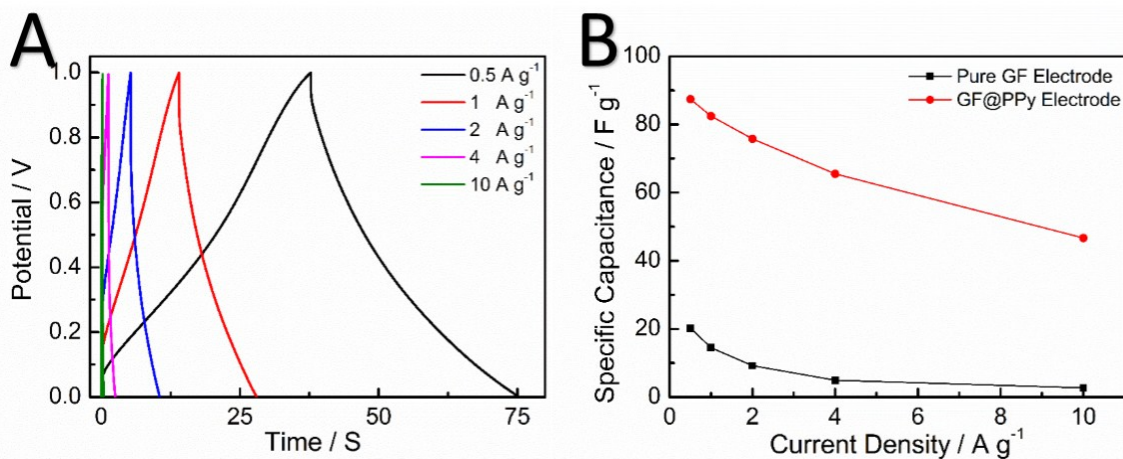
**Fig. S9.** Stress-strain curves of KCl-Fe<sup>3+</sup>(4)/PAA hydrogel electrolyte after immersing in 1M KCl solution with different time.



**Fig. S10.** CV curves of KCl L-supercapacitor over a range of 5-100 mV s<sup>-1</sup>.



**Fig. S11.** Charge/discharge profile of (A) KCl-Fe<sup>3+</sup>/PAA F-supercapacitor and (B) KCl L-supercapacitors at various current density.



**Fig. S12.** (A) Charge/discharge profile of KCl-Fe<sup>3+</sup>/PAA P-supercapacitor at various current density. (B) Normalized specific capacitance comparison of KCl-Fe<sup>3+</sup>/PAA F-supercapacitor and KCl supercapacitor at different current density.