Supporting Information for

A Thermogalvanic Hydrogel for Synchronous Evaporative Cooling and Low-Grade Heat Energy Harvesting

Shirui Pu,[1] Yutian Liao,[1] Kyle Chen,[2] Jia Fu,[1] Songlin Zhang,[2] Lurong Ge,[1] Giorgio Conta,[2] Sofia Bouzarif,[2] Ting Cheng,[1] Xuejiao Hu, [1,*] Kang Liu, [1,*] Jun Chen[2,3*]

[1]MOE Key Laboratory of Hydraulic Machinery Transients, School of Power and Mechanical Engineering, Wuhan University, Wuhan, Hubei 430072, China.
[2]Department of Bioengineering, University of California, Los Angeles, Los Angeles, CA 90095, USA.
[3]Lead contact

Correspondence: jun.chen@ucla.edu (J.C.);
kang.liu@whu.edu.cn (K.L.);
xjhu@whu.edu.cn (X.H.)

Keywords: Low-grade heat, Energy harvesting, Evaporative cooling, Hydrogel, Battery

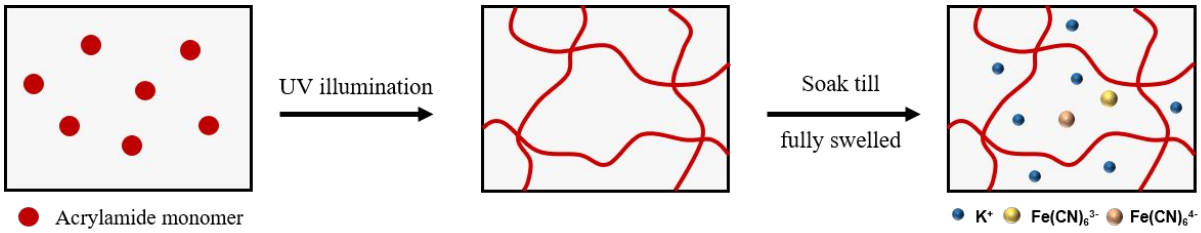

Figure S1. Schematic illustrations showing the flow diagram of the fabrication process of the TG hydrogel. UV illumination was firstly performed onto the hydrogel, which was later on dried at 65 °C and soaked in the mixed solution of $K_4Fe(CN)_6/K_3Fe(CN)_6$ and LiBr until fully swelled.

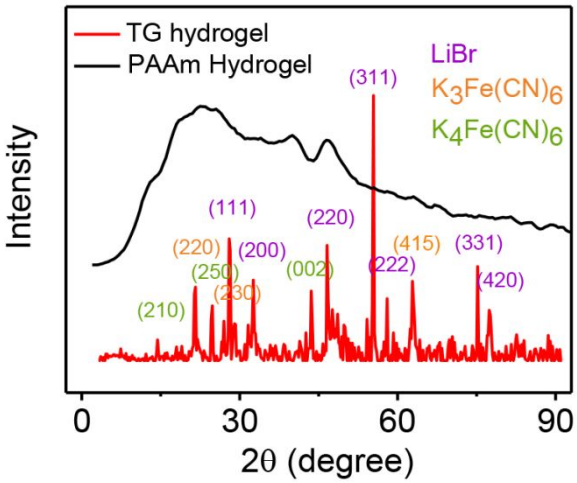

Figure S2. XRD patterns of the dehydrated TG hydrogel sample. The results indicate the existence of K^+, Li^+, Br^-, $Fe(CN)_6^{3-}$ and $Fe(CN)_6^{4-}$ inside the TG hydrogel. Results of pure PAAm hydrogel without ions modification are also plotted as a comparison.

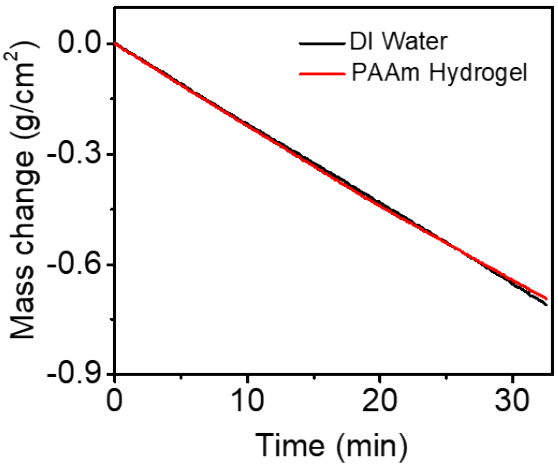

Figure S3. Weight variation of PAAm hydrogel and pure at the temperature of 25 ^{o}C and relative humidity of 65%.

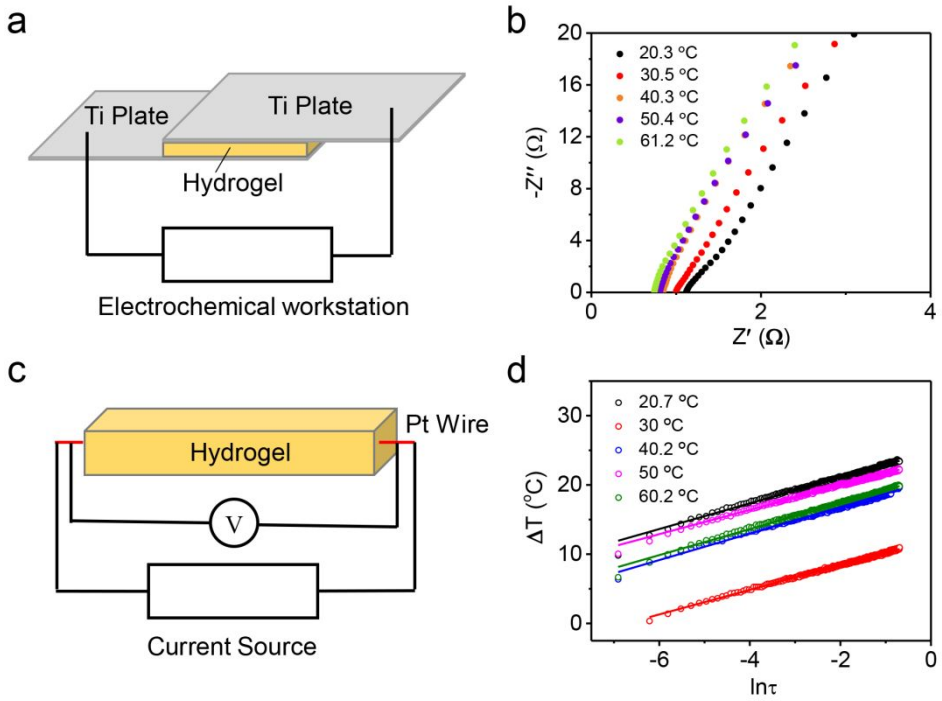

Figure S4. Electrical conductivities and thermal conductivities of the TG hydrogels. (a) Schematic of the electrical conductivity testing setup. (b) Nyquist plots of the TG hydrogel using Ti electrodes recorded by electrochemical station at different temperatures. The gel was shaped into a cubic with the size of 15 mm × 15 mm × 3.6 mm). (c) Schematic of the setup for thermal conductivity measurements. (d) Dependence of temperature rise of the Pt wire on the logarithm of time in transient hot wire measurements.

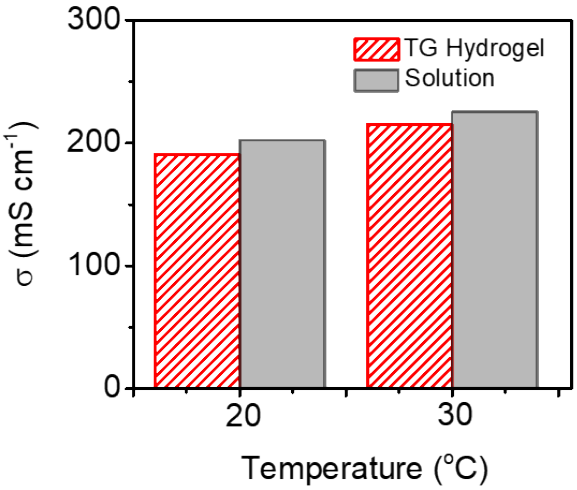

Figure S5. Comparison of the electrical conductivity of TG hydrogel and $K_3Fe(CN)_6$/ $K_4Fe(CN)_6$ (0.1 M) and LiBr (5.4 M) solution with the same ion concentration.

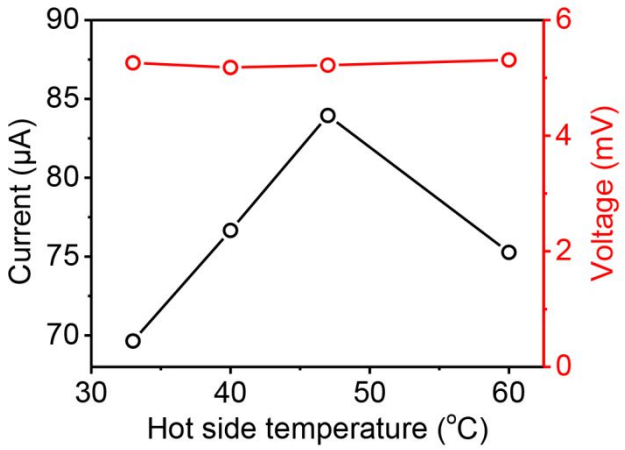

Figure S6. Output current and voltage of the TG hydrogel under a constant temperature difference of 4.5 °C but with different hot side temperatures.