Supplementary Information:

Simulation of thermo-electrochemical cell with graphite rod electrodes

Jili Zheng [a], Jun Li [a,b,*], Liang Zhang [a,b], Yang Yang [a,b]

[a] *Institute of Engineering Thermophysics, Chongqing University, Chongqing 400030, China*

[b] *Key Laboratory of Low-grade Energy Utilization Technologies and Systems, Chongqing University, Ministry of Education, Chongqing 400030, China*

*Corresponding author. Tel.: +86-23-6510-2474; fax: +86-23-6510-2474; E-mail address: lijun@cqu.edu.cn (J. Li).

Experiment Section:

Potassium ferricyanide, potassium ferrocyanide, sodium sulfate, anhydrous ethanol, acetone were purchased from Tianjin Guangfu Co., Ltd. Sodium acetate were purchased from Shanghai Aladdin Reagent Co., Ltd. Graphite rod (99.9 %) was purchased from Shanghai Carbon Factory. All chemical reagents were of analytical grade without the need for further purification before use.

The voltage-current density curve of TEC was drawn by adjusting the resistance box from 5 to 10000 Ω at 0.4 mol/L $Fe(CN)_6^{4-}/Fe(CN)_6^{3-}$ and temperature difference 20 ℃. The power density of the TEC was calculated according to Eq. (1):

$$P = UI/A \qquad (1)$$

Where A is the anodes project area, I and U the sustainable current and cell voltage after the TEC reached steady-state, respectively.

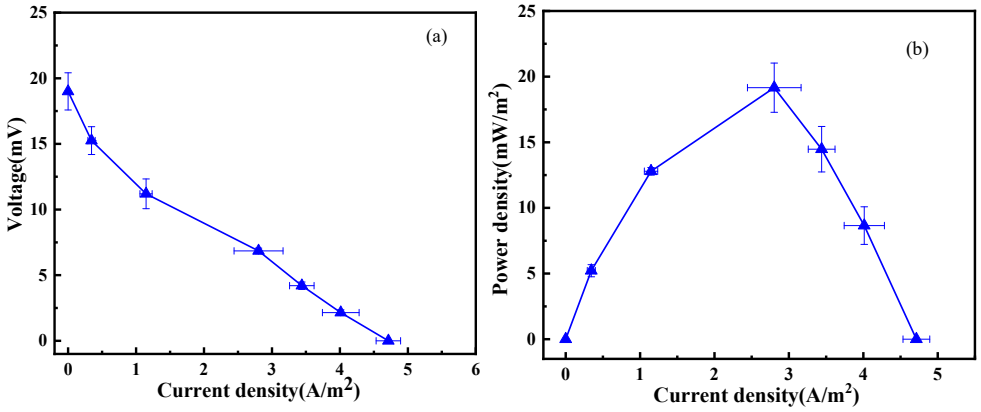

Fig.S1 (a) Polarization and (b) power density curve of the TEC with graphite rod electrodes.

Table S1 Model parameters for TEC simulation.

Parameter (Units)	Value
Cell diameter (mm)	7
Cell length (mm)	20
Density (kg m^{-3}) [1]	$\rho=1063+0.546\times T-0.00147\times T^2$
Diffusion coefficient (m^2 s^{-1}) [1]	$(62.66-0.5336T+1.1482 *10^{-3}T^2) * 10^{-10}$
Electrolyte density reference at 300 K (kg m^{-3}) [1]	$\rho_0=1094.6$
Charge transfer coefficient [2]	0.5
Electrode thermal conductivity (W m^{-1} K^{-1}) [3]	$k_s=0.6$
Number of electrons transferred [4]	1
Anode temperature (K)	320
Cathode temperature (K)	300
Initial $K_3Fe(CN)_6$ concentration (mol m^{-3})	200
Initial $K_4Fe(CN)_6$ concentration (mol m^{-3})	200
Electrolyte heat capacity (J kg^{-1} K^{-1}) [1]	$C_p=4187$
exchange current density (mA cm^{-2}) [5]	7.6
electron transfer coefficient (α)	0.5
electron transfer coefficient (β)	0.5
Thermal-to-voltage conversion (mV K^{-1}) [6]	1.5

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