

Supplementary Information

Symmetric Aqueous Batteries of Titanium Hexacyanoferrate in Na^+ , K^+ and Mg^{2+} Media

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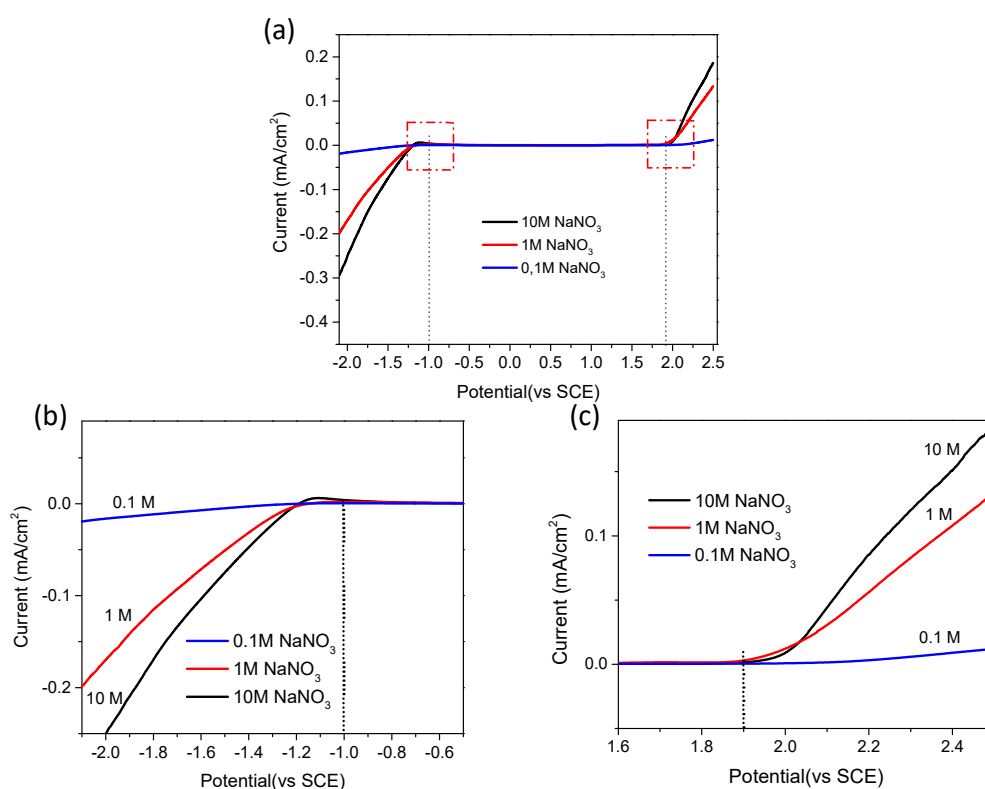


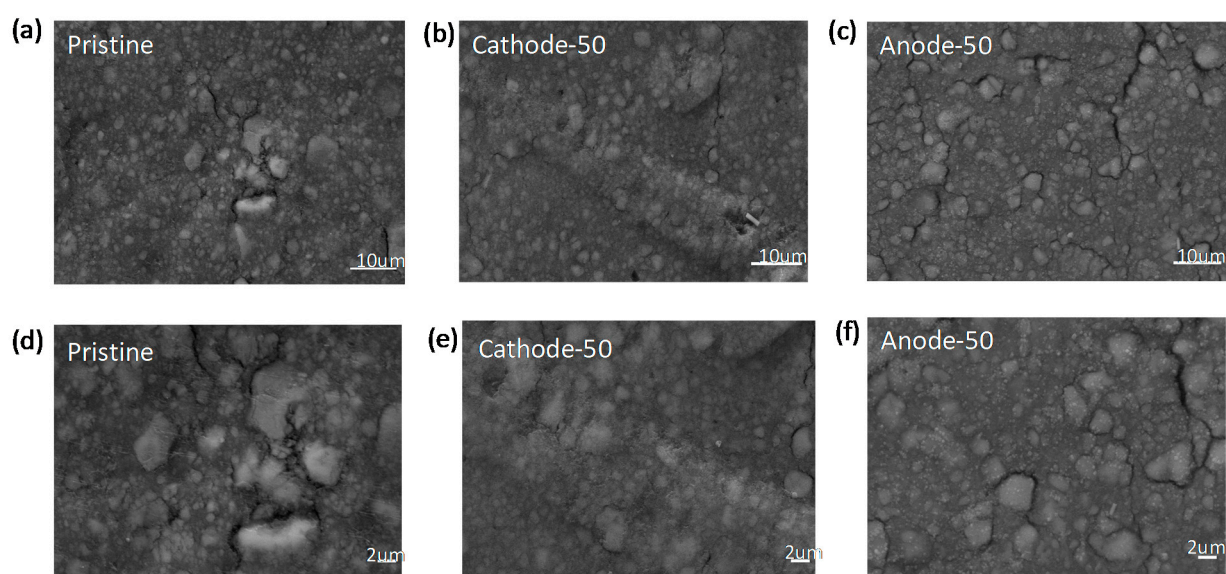
Figure S1. Electrochemical stability window of 0.1 M, 1 M and 10 M NaNO₃ electrolytes on Al mesh electrode. **(a)** Overall electrochemical stability window; **(b)** and **(c)** Magnified view of the regions outlined near anodic and cathodic extremes in figure (a).

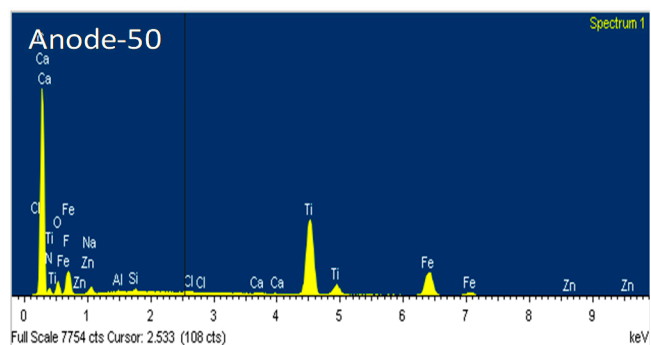
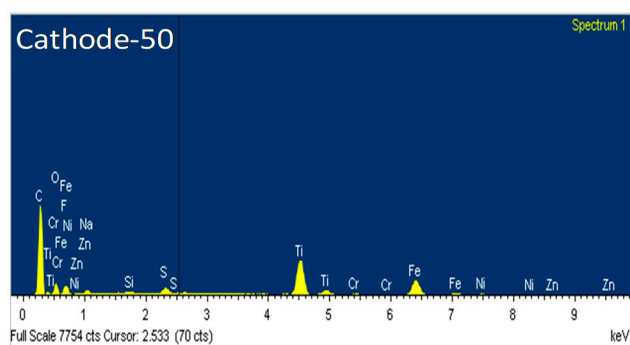
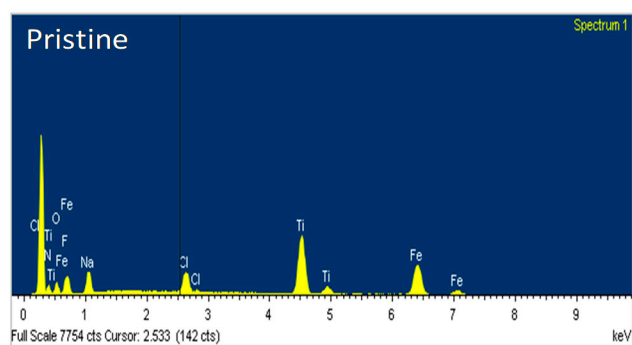
Table S1 EIS fitting result with equivalent circuit.

| | | | | | |
|-------------------|----------------|----------------|--------------|--------------|----------------|
| EIS- Before CV | | | | | |
| | <u>Element</u> | <u>Freedom</u> | <u>Value</u> | <u>Error</u> | <u>Error %</u> |
| | Rs | Free(+) | 16.91 | N/A | N/A |
| | Rct | Free(+) | 229.4 | N/A | N/A |
| | CPE1-T | Free(+) | 5.077E-05 | N/A | N/A |
| | CPE1-P | Free(+) | 0.84162 | N/A | N/A |
| EIS- After CV | | | | | |
| | <u>Element</u> | <u>Freedom</u> | <u>Value</u> | <u>Error</u> | <u>Error %</u> |
| | Rs | Free(+) | 7.605 | N/A | N/A |
| | Rct | Free(+) | 68.69 | N/A | N/A |
| | CPE1-T | Free(+) | 9.6435E-05 | N/A | N/A |
| | CPE1-P | Free(+) | 0.83481 | N/A | N/A |

Table S2 Diffusion coefficient as obtained by CV testing of TiHCF symmetric cell in 0.1M NaNO₃ electrolyte.

| Peaks | Peak 1 | Peak 2 | Peak 3 | Peak 4 | Peak 5 | Peak 6 |
|--|---------|--------|---------|---------|--------|---------|
| Slop | 0.00513 | 0.0101 | 0.00533 | 0.00472 | 0.0107 | 0.00559 |
| Diffusion coefficient (*10 ⁻⁷ cm ² /s) | 1.44 | 5.59 | 1.56 | 1.22 | 6.27 | 1.71 |
| R ² | 0.931 | 0.992 | 0.977 | 0.940 | 0.993 | 0.993 |

**Figure S2.** SEM images of (a, d) pristine electrode; (b, e) Cathode and (c, f) Anode after 50 cycles in 0.1 M NaNO₃ electrolyte.



(d)

| | Atomic % | | |
|-------------------|--------------|--------------|--------------|
| | Ti | Fe | Na |
| Pristine | 14.05 | 12.58 | 11.97 |
| Cathode-50 | 3.77 | 2.64 | 0.39 |
| Anode-50 | 3.59 | 1.92 | 0.41 |

Figure S3. EDS analysis of (a) pristine electrode; (b) Cathode and (c) Anode after 50 cycles in 0.1 M NaNO₃ electrolyte; (d) EDS analysis result of Atomic percentage of Ti, Fe and Na.

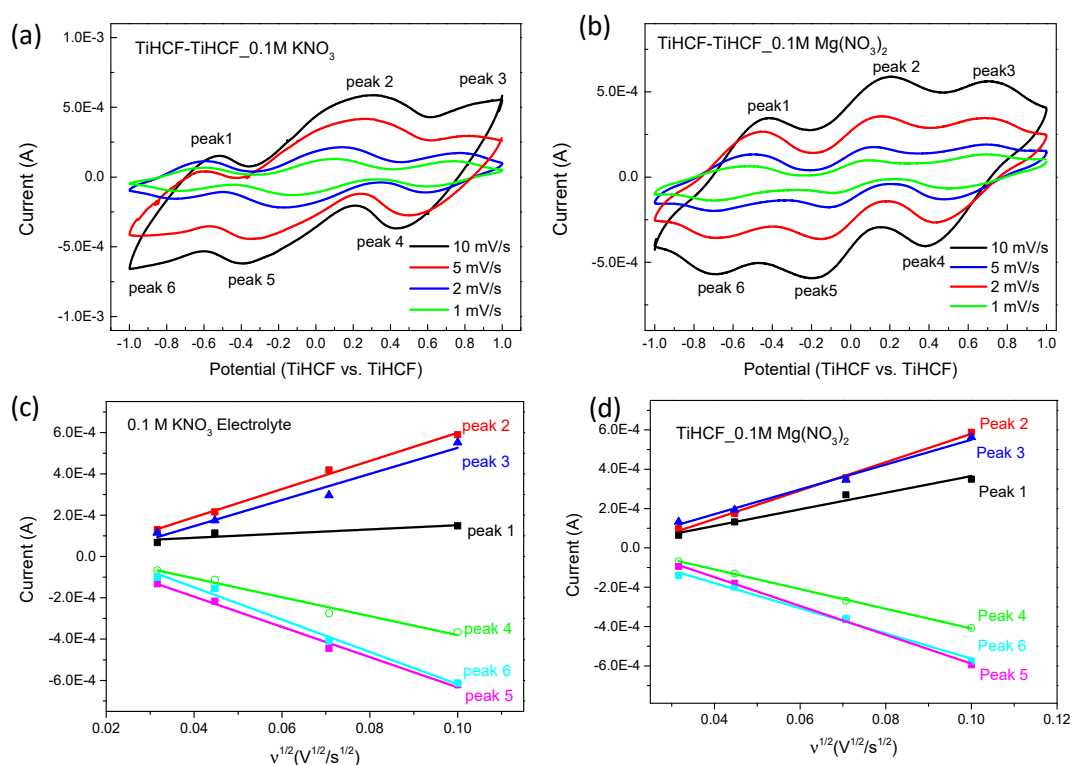


Figure S4. (a, b) Electrochemical performances of TiHCF full cell in 0.1 M KNO₃ and 0.1 M Mg(NO₃)₂ electrolyte at potential range -1.0~1 V; (c, d) relationship between the peak currents (I_p) and the square root of the scan rate (v^{1/2}) in 0.1 M KNO₃ and 0.1 M Mg(NO₃)₂ electrolyte.

Table S3 Diffusion coefficient as obtained by CV testing of TiHCF symmetric cell in 0.1 M KNO₃ and 0.1 M Mg (NO₃)₂ electrolyte.

| | 0.1M KNO ₃ | | | 0.1M Mg(NO ₃) ₂ | | |
|--------|-----------------------|--|----------------|--|--|----------------|
| | Slop | Diffusion coefficient (*10 ⁻⁷ cm ² /s) | R ² | Slop | Diffusion coefficient t (*10 ⁻⁷ cm ² /s) | R ² |
| Peak 1 | 0.00101* | 0.00559 | 0.665 | 0.00432 | 1.02 | 0.963 |
| Peak 2 | 0.00682 | 2.55 | 0.994 | 0.00722 | 2.85 | 0.996 |
| Peak 3 | 0.00632 | 2.19 | 0.959 | 0.00632 | 2.19 | 0.989 |
| Peak 4 | 0.00458 | 1.13 | 0.968 | 0.00500 | 1.37 | 0.999 |
| Peak 5 | 0.00731 | 2.93 | 0.990 | 0.00733 | 2.94 | 0.998 |
| Peak 6 | 0.00781 | 3.34 | 0.985 | 0.00641 | 2.25 | 0.990 |

* The relationship between peak 1 currents (I_p) with the square root of the scan rate (v^{1/2}) in 0.1 M KNO₃ was not in good linear relationship.