Supporting Information

Improving the Thermodynamic Energy Efficiency of Battery Electrode Deionization Using Flow-Through Electrodes

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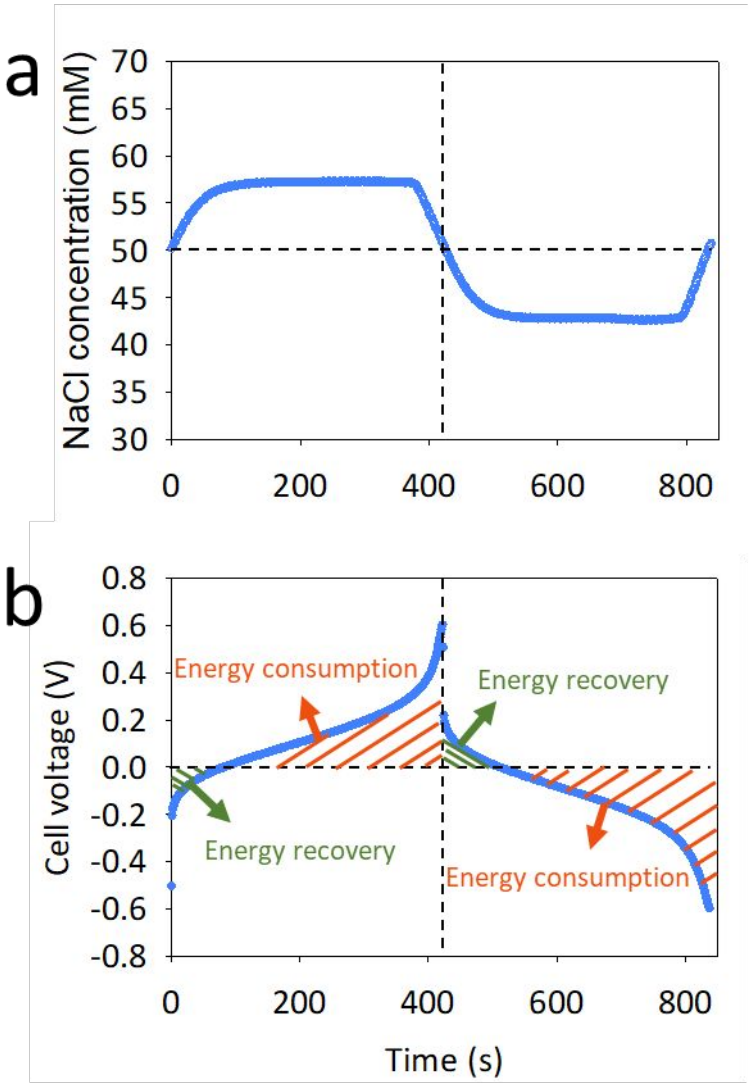

Figure. S1 (a) Representative effluent and (b) cell voltage profiles recorded by using a FB electrode. The stabilized effluent concentration was used to calculate thermodynamic energy efficiency. Energy could potentially be recovered when the direction of applied current is switched until the cell voltage reached 0 V (green hatched area) and the energy could be only consumed the rest of the charging/discharging step (orange hatched area).

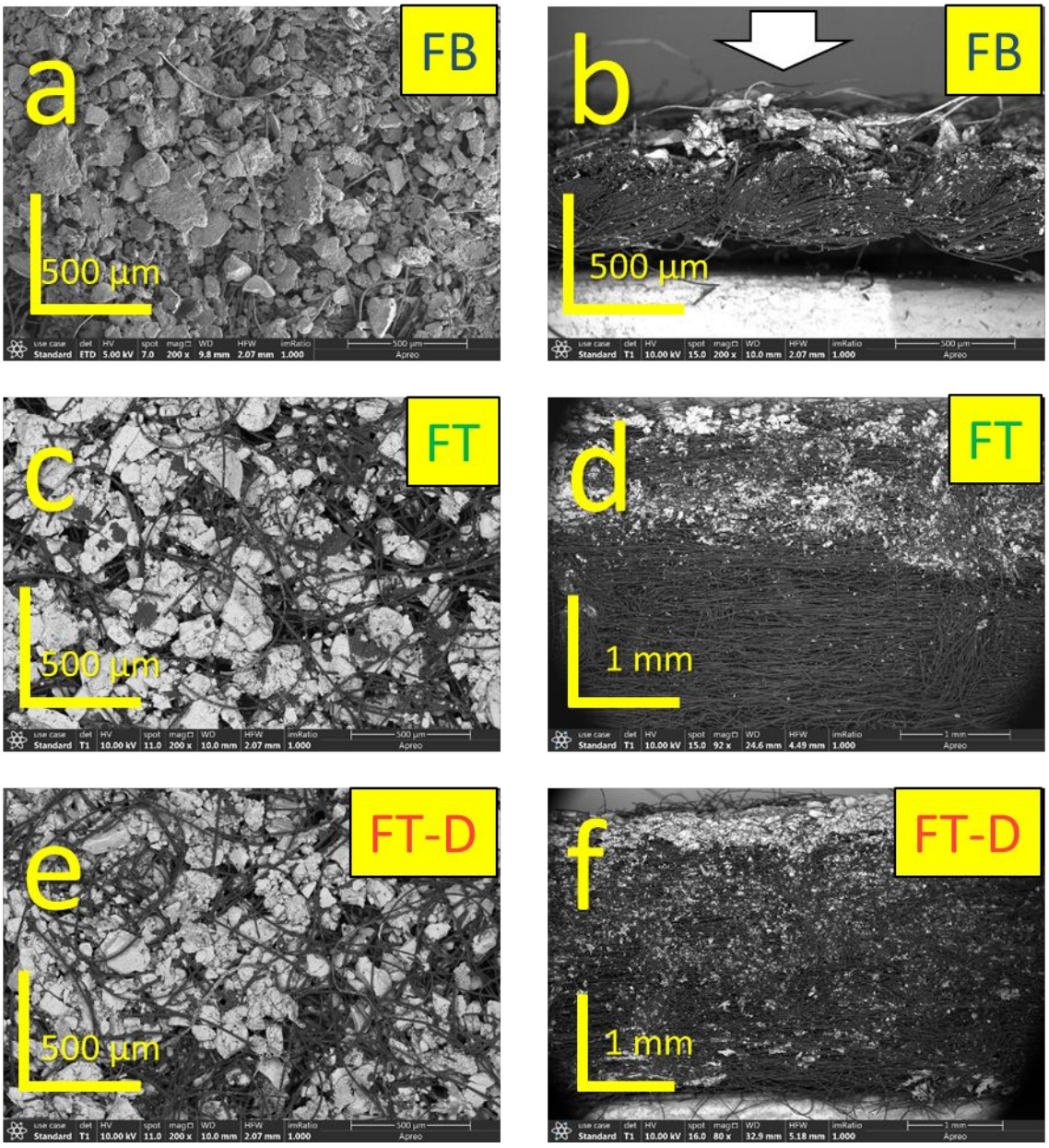

Figure. S2 (a, c, and e) Surface and (b, d, and f) cross-sectional SEM images of (a−b) FB, (c−d) FT, and (e−f) FT-D electrodes. The white arrow indicates the direction of the slurry containing CuHCF was deposited.

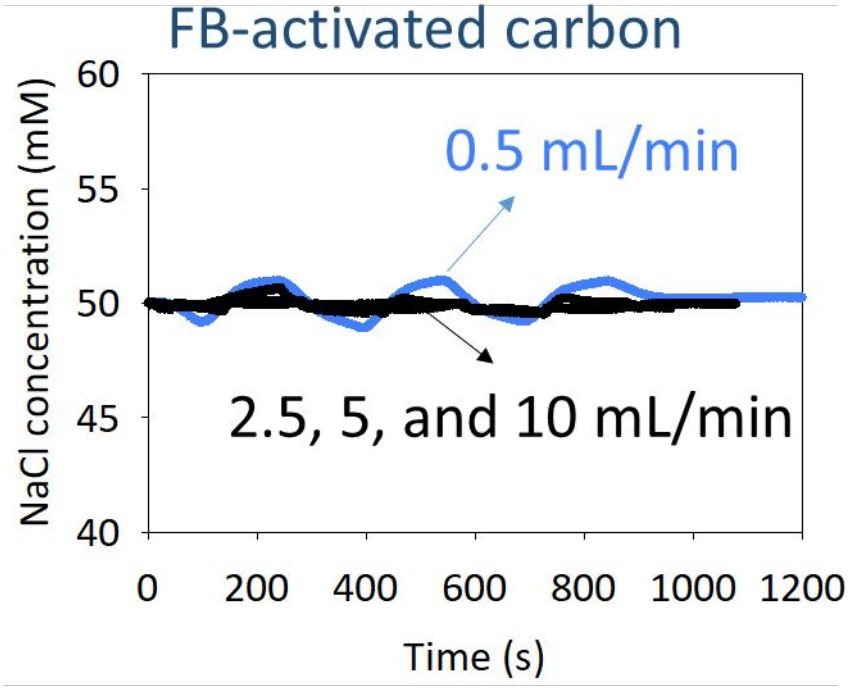

Figure. S3 Representative effluent concentration profiles as a function of flow rate, from 0.5 to 10 mL min^{-1}, using activated carbon electrodes. All experimental conditions were the same as those of FB, and only CuHCF was replaced by activated carbon during electrode fabrication.

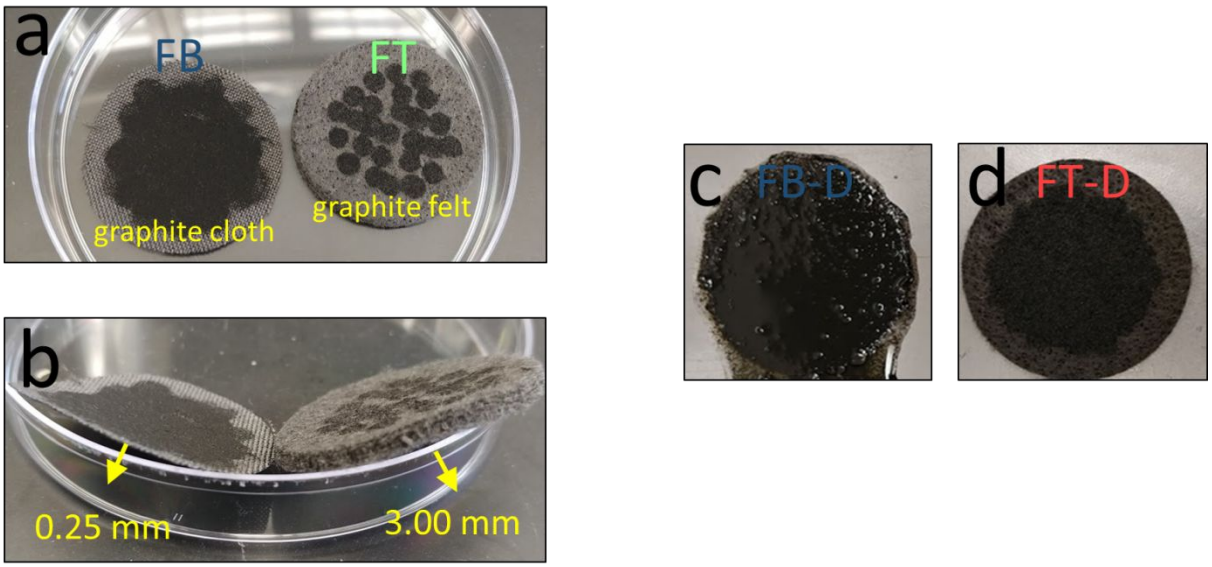

Figure. S4 (a) Top and (b) cross-sectional images of FB and FT electrodes. Images of (c) FB and (d) FT electrode with double loading of CuHCF (named FB-D and FT-D) as-fabricated before drying.

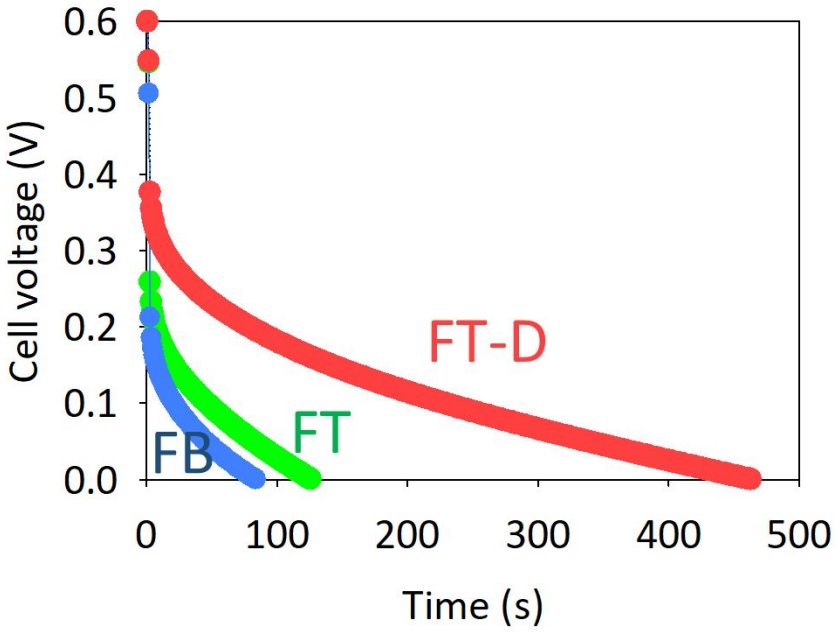

Figure. S5 Cell voltage profiles recorded by using the FB (blue, bottom), FT (green, middle) and FT-D (red, top) electrodes during the energy recovery step of the operation. The ohmic drop was determined in the first 2 s of operation as FB (~0.4 V from 0.6 to 0.2 V), FT (~0.3 V from 0.6 to 0.3 V), and FT-D (~0.2 V from 0.6 to 0.4 V).