Supporting Information

High energy density primary cathode with mixed electron/ion interface



Figure S1. Cross-sectional image of CF_x loaded Cu foil.



Figure S2. The low-resolution SEM images of (a) CF_x and (b) CF_x/GDY , respectively.



Figure S3. The FIB image of CF_x/GDY .



Figure S4. The EDS images of (a) CF_x and (b) CF_x/GDY .



Figure S5. The FTIR spectrum(a) and XRD pattern of CF_x and CF_x/GDY before(b) and after(c)

discharge.



Figure S6. The typical XPS patterns of CF_x and CF_x/GDY



Figure S7. The electrochemistry performance of pouch cell with CF_x/GDY hybrid and the insert photograph are the designed pouch battery. The active mass of pouch cell is about 58.60mg and the weight is 7.92g.



Figure S8. Raman spectrum with pristine materials and discharge product of $CF_x(a)$ and CF_x/GDY .



Figure S9. The R(QR)(QR)(CR) equivalent circuit model.



Figure S10. The high-resolution FIB images and corresponding EDS images of the C1s for the CF_x (a) and CF_x/GDY (b) after cycling.



Figure S11. The electron diffraction images of the CF_x (a) and CF_x/GDY (b) in the discharged states.



Figure S12. The electrochemistry performances of the CF_x (a) and CF_x/GDY (c) and the corresponding ex-situ results (b, d) with different depths of discharge.

	R ₁	R ₂	CPE ₁	R ₃	CPE ₂	R ₄	С
CF _x	2.293	213.7	2.511*10 ⁻⁵	20.44	1.764*10-5	1298	20.45
CF _x /GDY	3.711	86.24	0.0598	5.869*10 -9	1.869*10-5	116.6	4.583*10 ⁻³

Table S1. Nyquist plots of CFx and CFx/GDY after discharge