

**Figure S1 Demonstration of structural changes from KMnF_3 to MnF_3
Optimization of synthesis conditions and structure and morphology of KMnF_3**

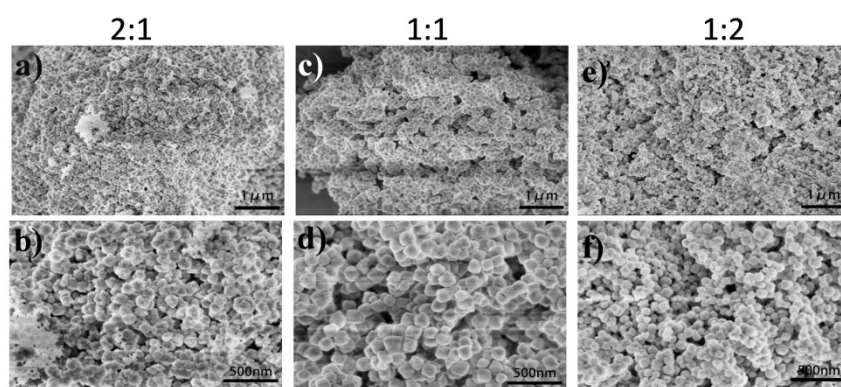


Figure S2 SEM images of KMnF_3 prepared in mixed solvents with different ratios of water and ethanol (a, b-2:1, c, d-2:1, e, f-1:2)

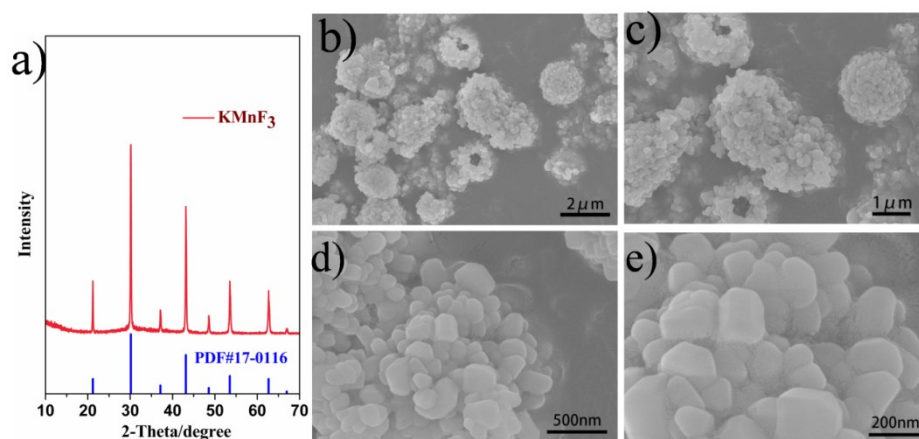


Figure S3 XRD and SEM image of KMnF_3 prepared by rapid pouring

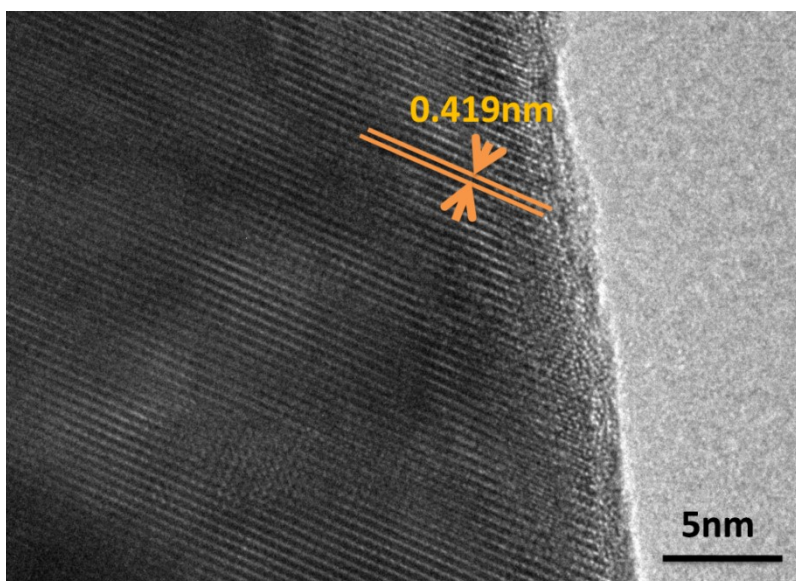


Figure S4 HRTEM analysis of the KMnF₃ material

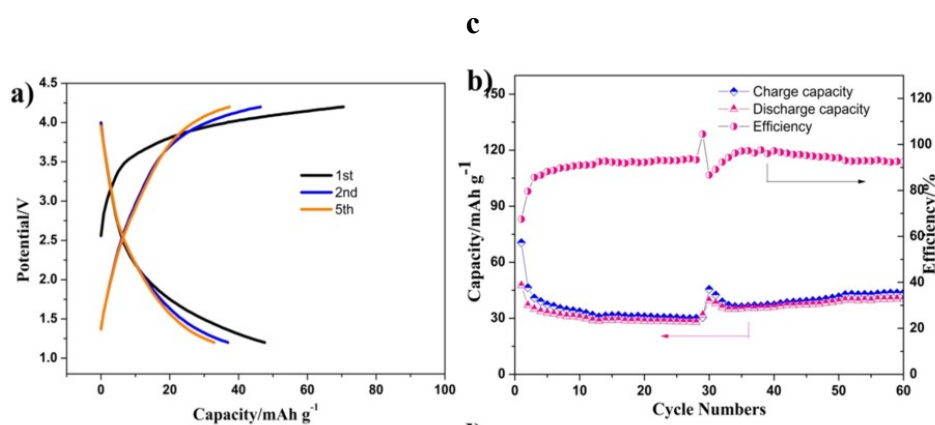


Figure S5 Discharge/charge profiles of of KMnF₃cathode at the current density of 40 mA·g⁻¹ over the voltage range of 4.2–1.2V vs. K⁺/K

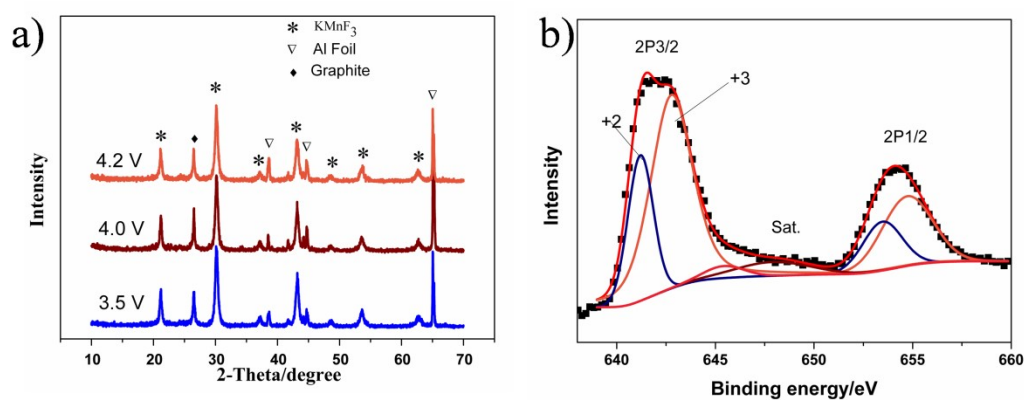


Figure S6 a)XRD patterns of the cathode at different voltages during the first charge. b)

XPS spectrum of electrode pad after the first charge

Table S1 Comparison of potentials of manganese-based electrode materials in KIBS

electrode	The highest working voltage/ V vs K ⁺ /K
K _{0.3} MnO ₂ ¹⁷	3.9
K _{0.5} MnO ₂ ¹⁸	4.0
this work	4.2

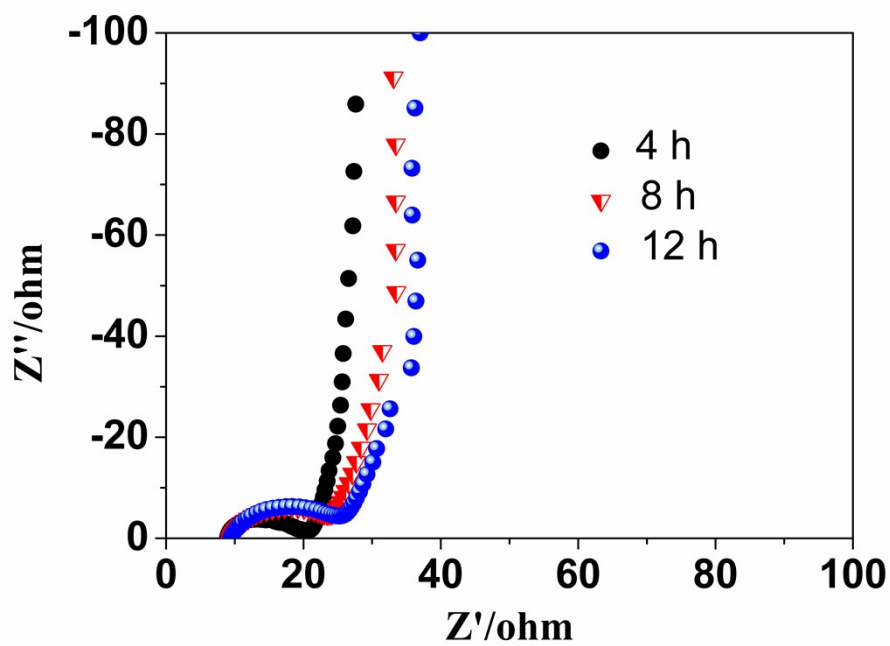


Figure S7 EIS with different self-discharge time

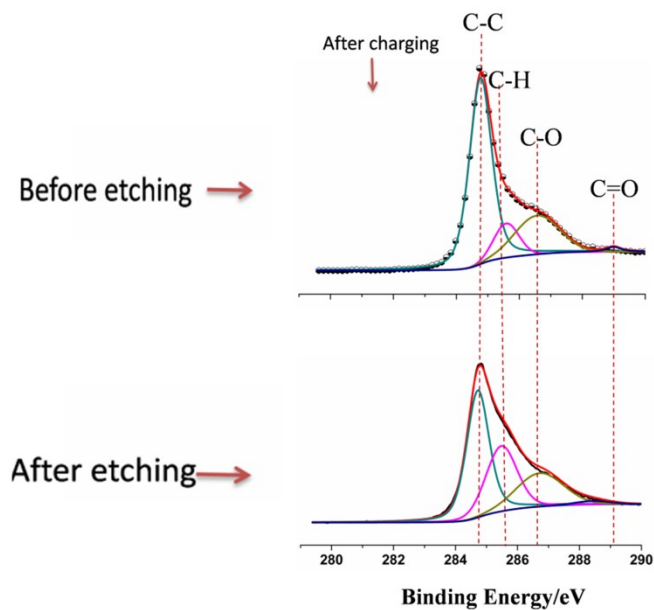


Figure S8 Comparison of XPS test of electrode pad before and after etching

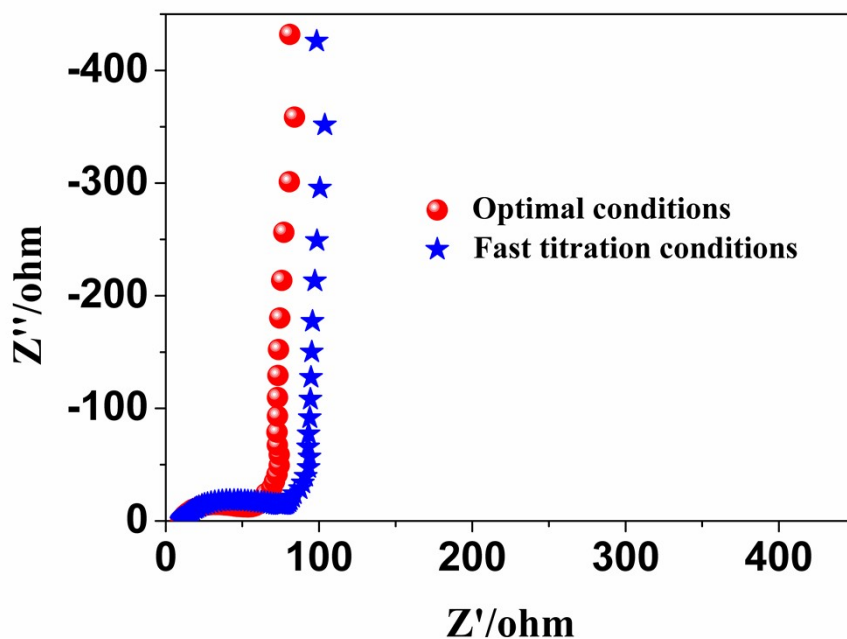


Figure S9 Comparison of EIS of KMnF_3 electrodes synthesized under optimal conditions and rapid tidings conditions after the initial charge and discharge process

Table S2 ICP-OES test results of the manganese content in the electrolyte after the first cycle of charge and discharge of the KMnF_3 electrode synthesized under the optimal conditions and rapid titration conditions.

electrode	The concentration of manganese ions in the electrolyte/mg L ⁻¹
KMnF ₃ synthesized under optimized conditions	0.023
KMnF ₃ synthesized under fast titration conditions	0.041
