Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information for

Fabrication of Flexible $Mn_{0.5}Ti_2(PO_4)_3$/C Nanofibers Film with Superior Cycle Stability for Potassium-ion Batteries

Jing Dai [a], *Die Su* [a], *Jianping Yang* [a], *Wen Zhang* [a], *Qianfu Wang* [a], *Li Liu* [a*], *Hai Hu* [a], *Huifang Li* [b*], *Zhiming Liu* [b]

a National Base for International Science & Technology Cooperation, National Local Joint Engineering Laboratory for Key materials of New Energy Storage Battery, Hunan Province Key Laboratory of Electrochemical Energy Storage and Conversion, School of Chemistry, Xiangtan University, Xiangtan 411105, China

b College of Electromechanical Engineering, Shandong Engineering Laboratory for Preparation and Application of High-performance Carbon-Materials, Qingdao University of Science & Technology, Qingdao, Shandong 266061, China

The KTP/C NFF and MTP/C NFF powder electrode were prepared by coating a slurry, mixing active materials of KTP/C and MTP/C, respectively, carbon black, and PVDF (polyvinylidene fluoride) binder in NMP (N-methyl-2-pyrrolidone) with a weight ratio of 7:2:1, on a copper current collector. The electrode films were placed in a vacuum drying oven at 80 °C overnight.

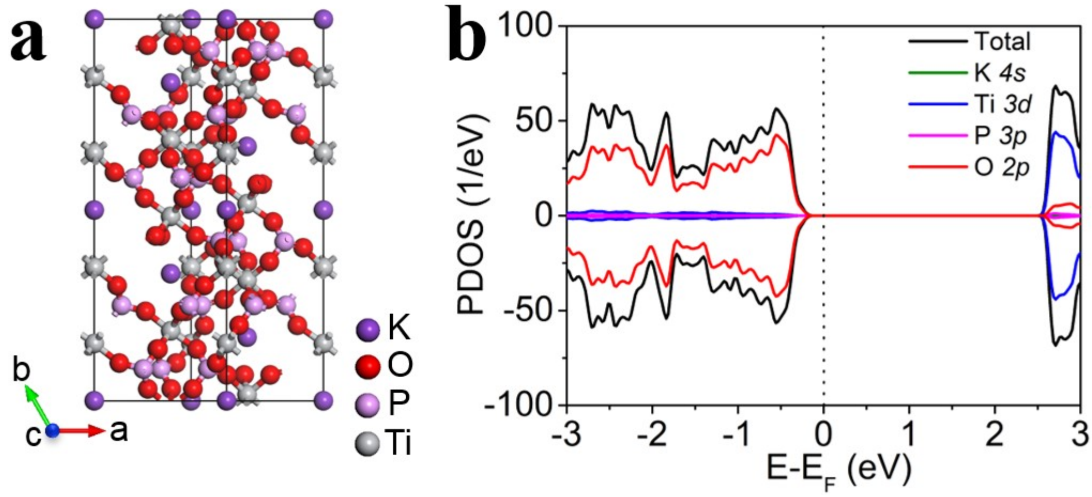


Fig. S1 DFT-optimized geometry of KTP crystals; b) Projected densities of states (PDOS) of KTP crystals, as obtained at the DFT/PBE-D3 level.

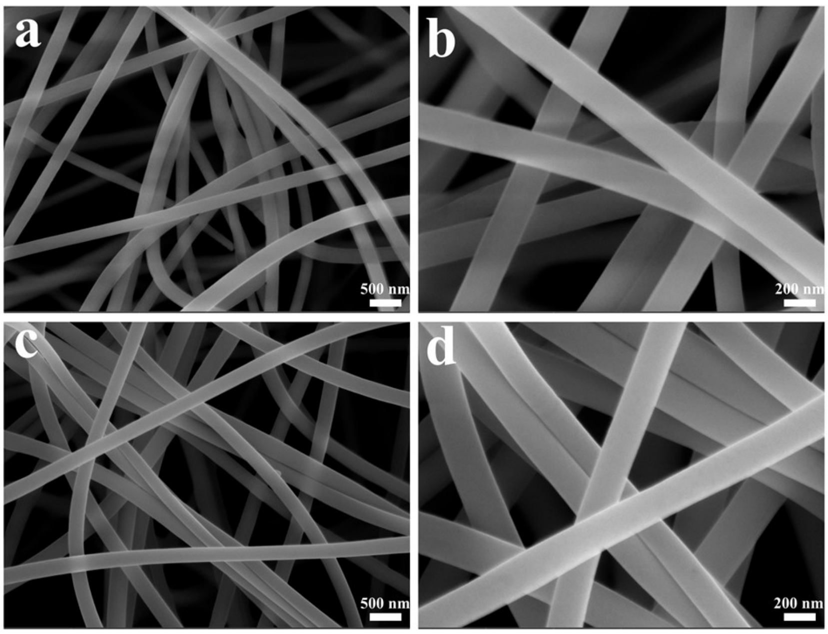


Fig. S2 FE-SEM images of precursor nanofibers of a, b) F-MTP/C NFF and c, d) MTP/C NFF.

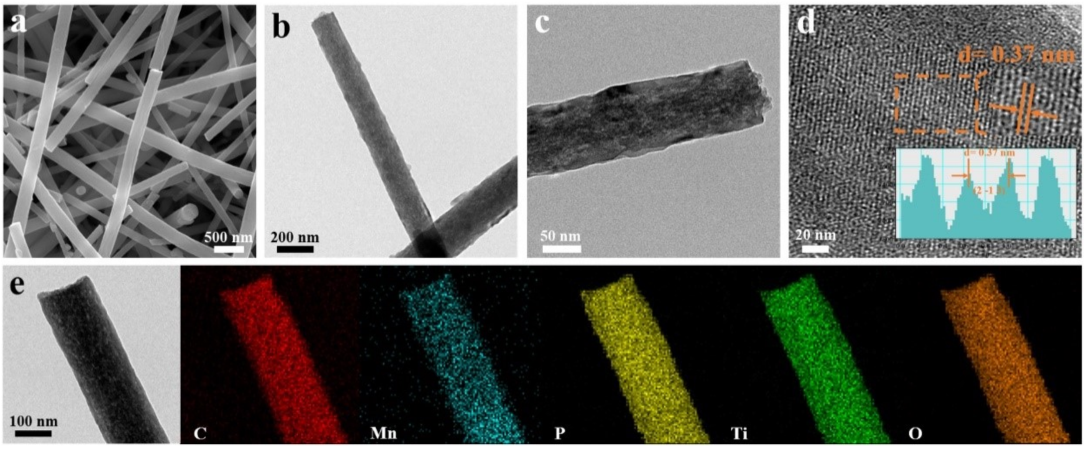


Fig. S3 a) FE-SEM image; b, c) TEM images; d) HR-TEM image; e) Element mapping images of MTP/C NFF.

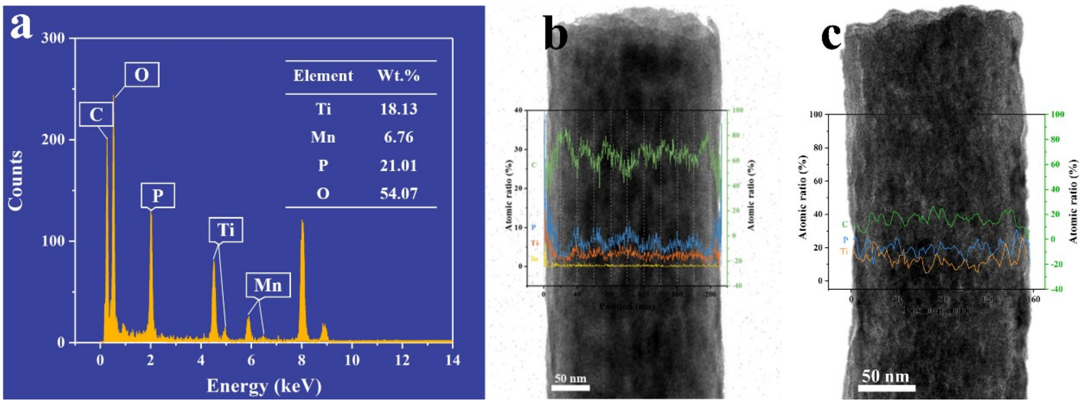


Fig. S4 a,) EDS spectrum of MTP/C NFF. b) TEM-EDX lines scan of the atomic ratio of the elements (C, Ti, P and Se) of F-MTP/C NFF and c) MTP/C NFF.

Table S1 Relatively ratio of Ti $2p_{3/2}$ and Ti $2p_{1/2}$ in the Ti 2p spectrum of F-MTP/C NFF and MTP/C NFF.

Samples	Relative ratio			
	Ti $2p_{3/2}$		Ti $2p_{1/2}$	
F-MTP/C NFF	4.46	1.76	2.40	1
MTP/C NFF	5.28	1.76	2.82	1

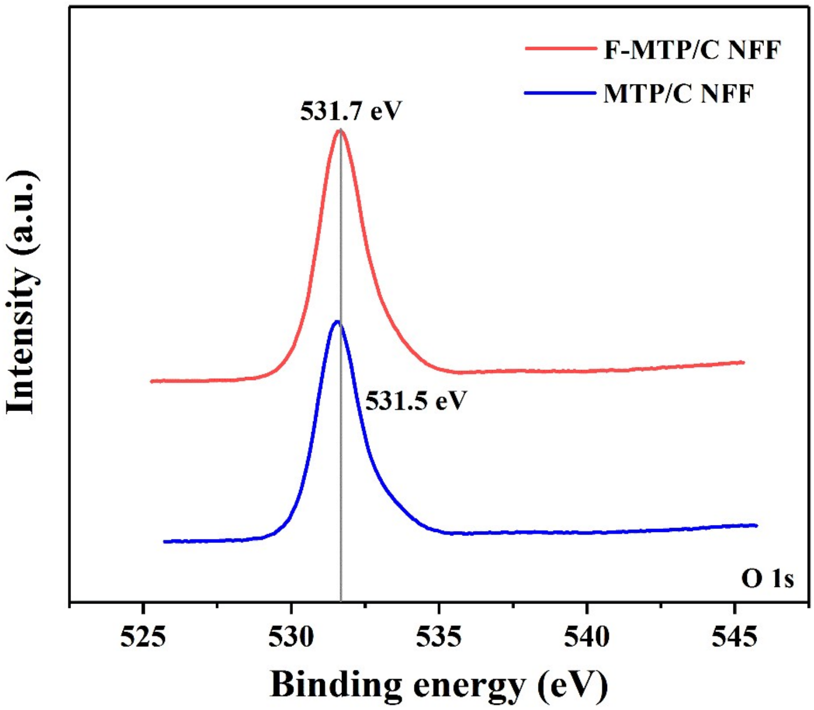


Fig. S5 The O 1s spectra of F-MTP/C NFF and MTP/C NFF.

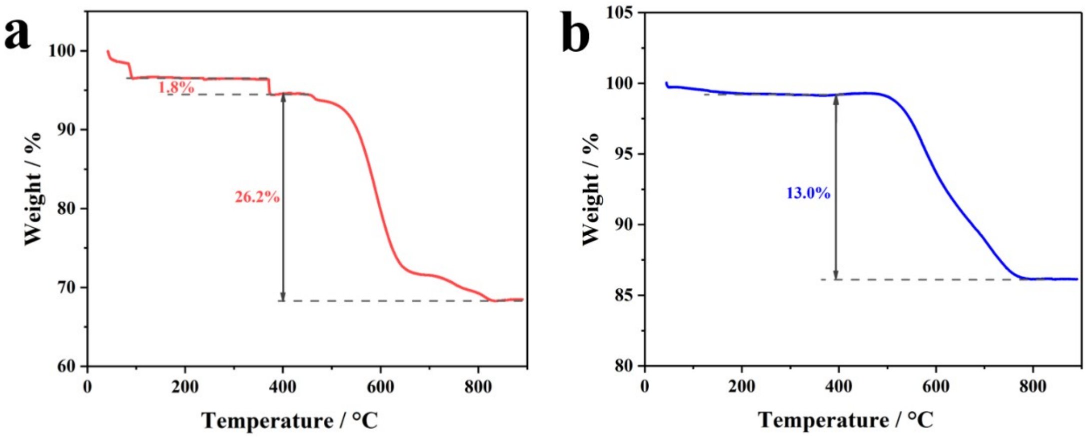


Fig. S6 TG curves in the air atmosphere of a) F-MTP/C NFF; b) MTP/C NFF.

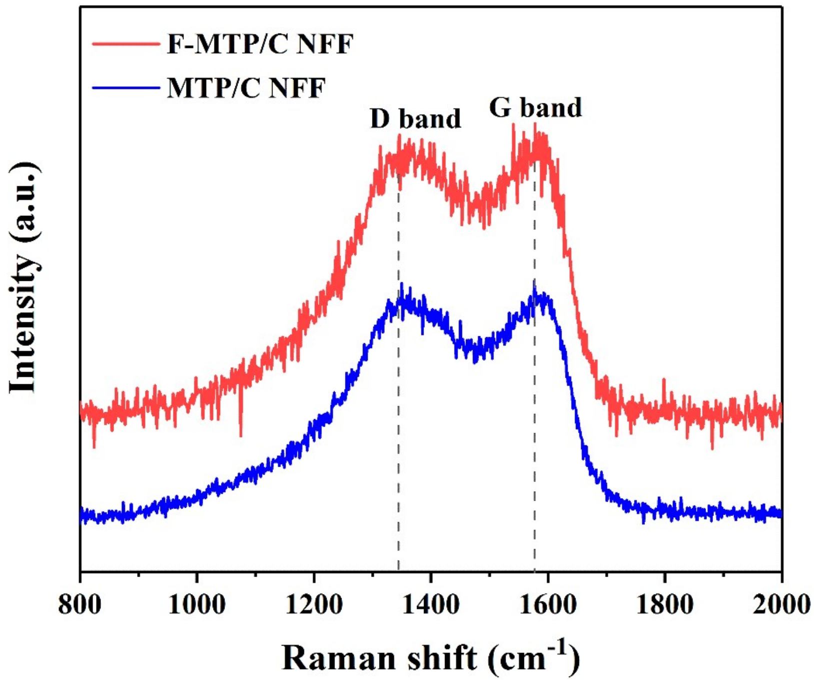


Fig. S7 Raman spectrums of F-MTP/C NFF and MTP/C NFF.

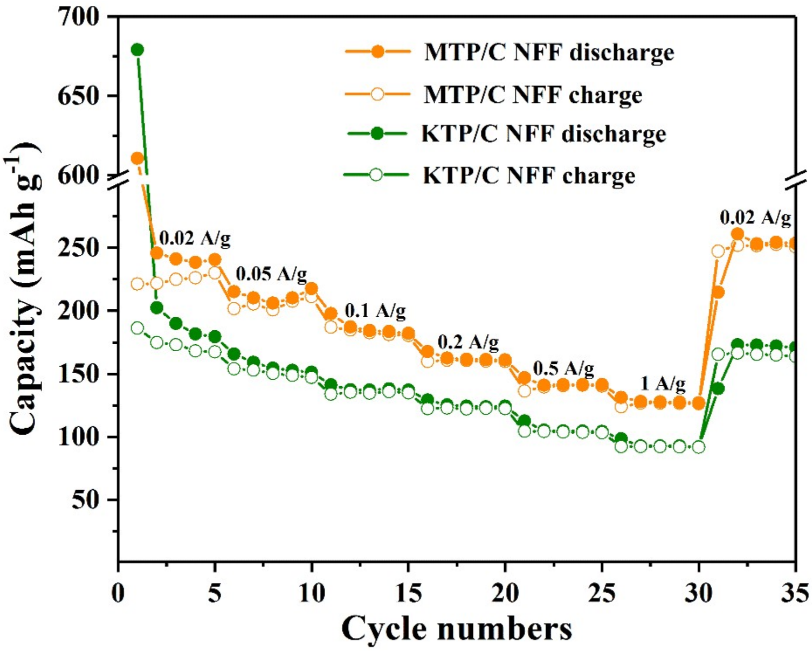


Fig. S8 Rate performance of MTP/C NFF and KTP/C NFF powder.

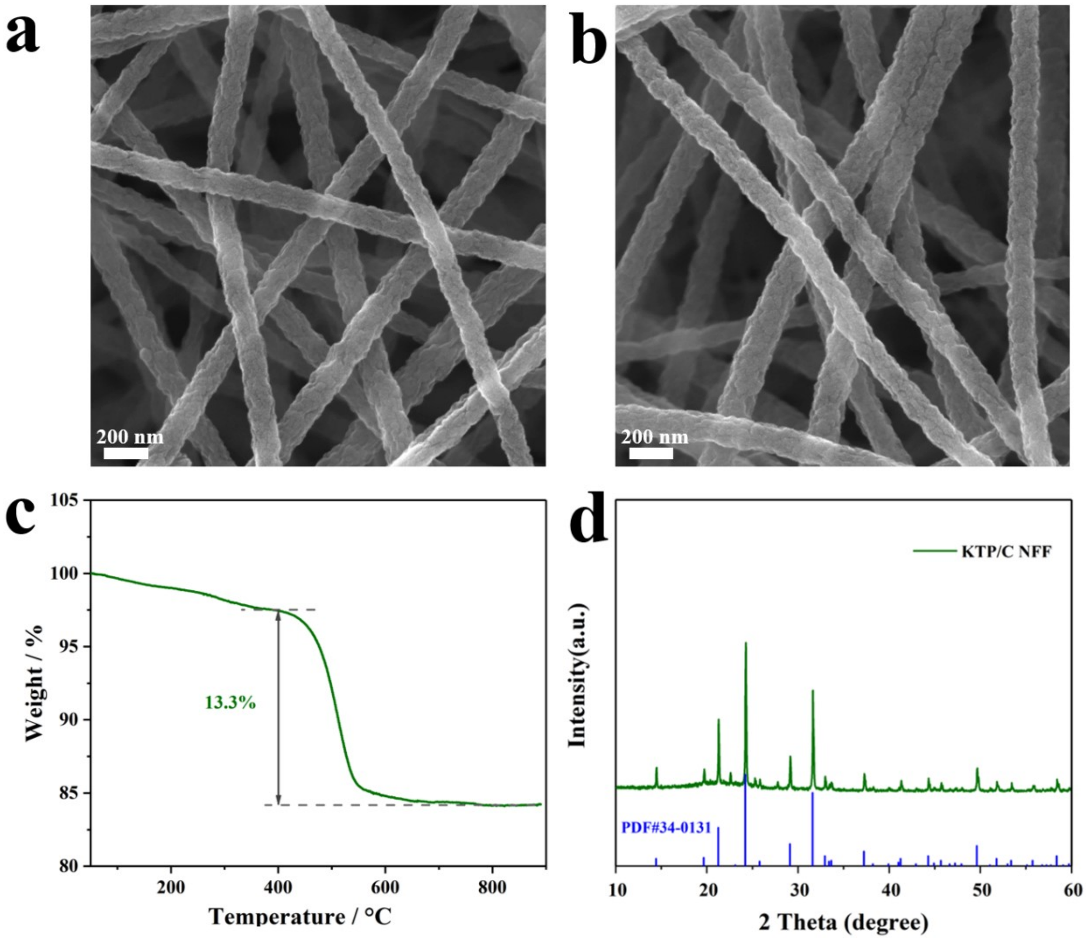


Fig. S9 a, b) FE-SEM images; c) TG curve; d) XRD image of the KTP/C NFF.

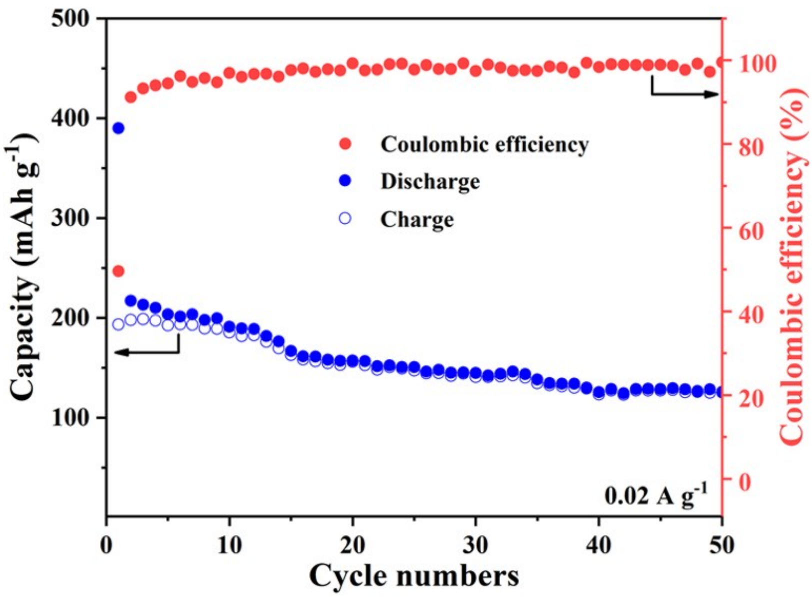


Fig. S10 Cycling performance of MTP/C NFF electrode at current density of 0.02 A g^{-1}.

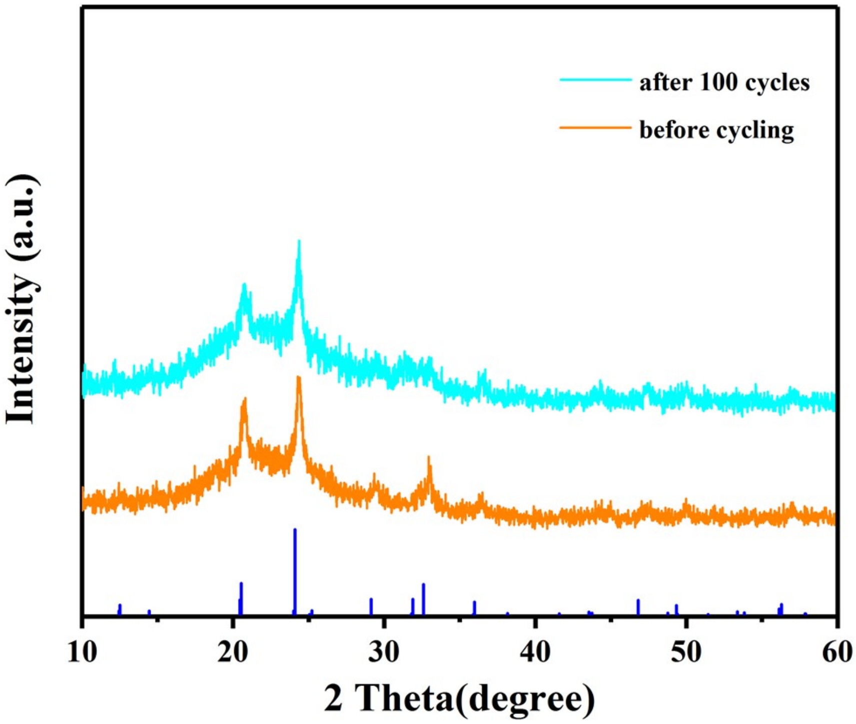
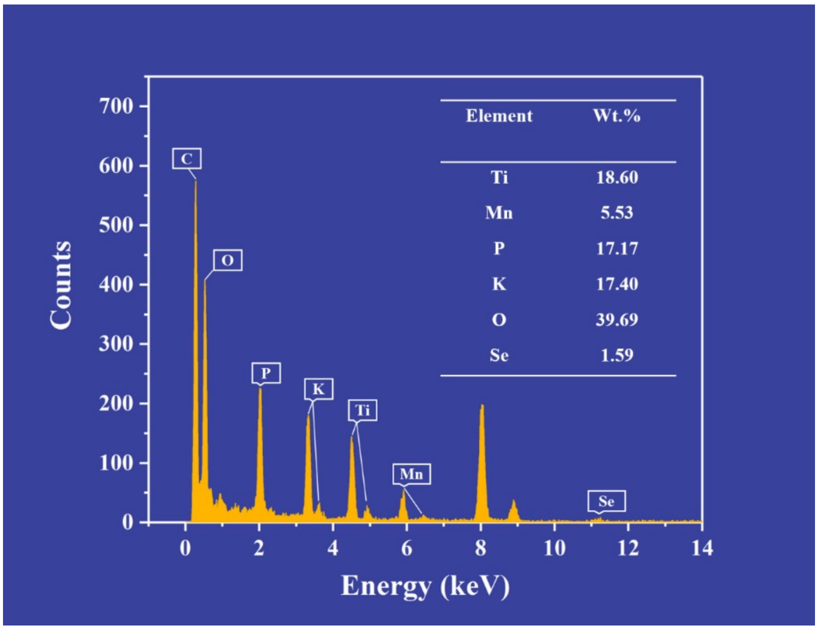


Fig. S11 The XRD patterns of the F-MTP/C NFF electrode before and after cycling at a current density of 1 A g^{-1}.



Element	Wt.%
Ti	18.60
Mn	5.53
P	17.17
K	17.40
O	39.69
Se	1.59

Fig. S12 EDS tests of the F-MTP/C NFF electrode after long-term cycles.