Supporting Information

Boosting Fast Electrochemical Kinetics of $Na_4Fe_3(PO_4)_2(P_2O_7)$ *via* 3D Graphene Network as a Cathode Material for Potassium-ion Batteries

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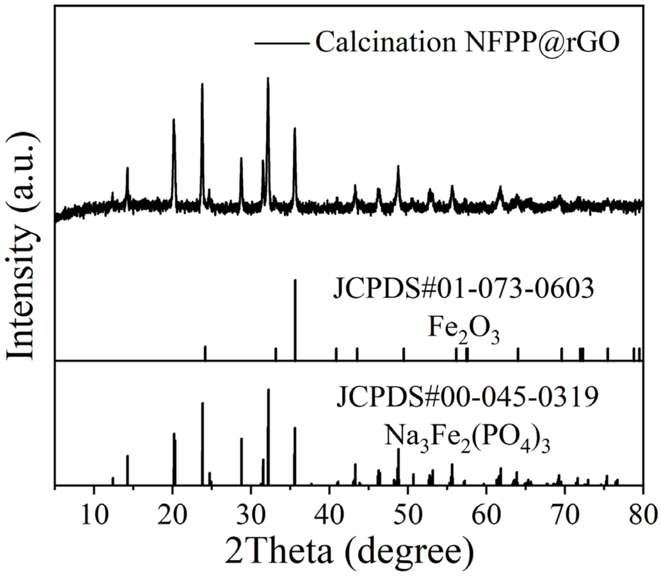

Fig. S1. XRD pattern of NFPP@rGO calcined at 700 °C in the air.

The equation of NFPP@rGO 's pyrolysis reaction is as follows:

$$Na_4Fe_3(PO_4)_2(P_2O_7) + 3/4O_2 \rightarrow 4/3Na_3Fe_2(PO_4)_3 + 1/6Fe_2O_3 \quad (1)$$

$$C + O_2 \rightarrow CO_2 \quad (2)$$

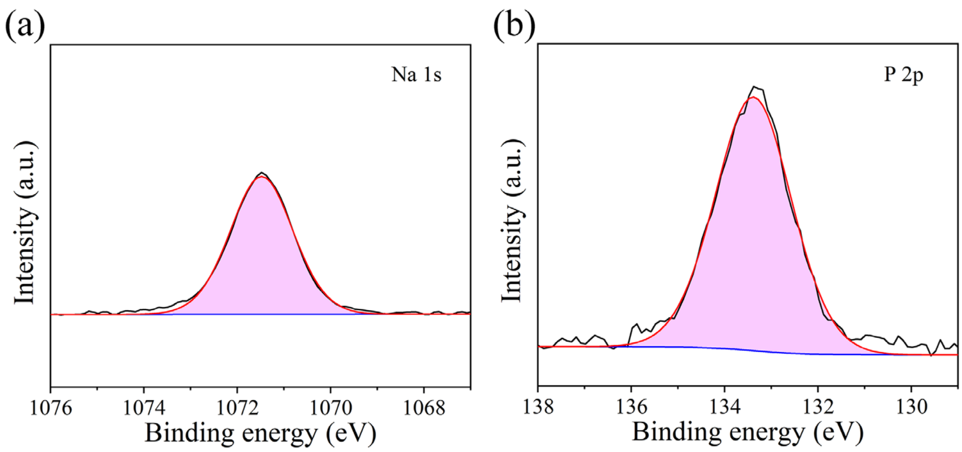

Fig. S2. XPS spectra of (a) Na 1s and (b) P 2p.

Table S1. Electrochemical performance comparison of potassium ion batteries cathode.

Materials	Capacity	Capacity retention	Reference
$Na_4Fe_3(PO_4)_2(P_2O_7)$@rGO	119.1 mAh g^{-1} at 0.1 C	82.1% (500 cycles at 2 C)	This work
$K_4[Mn_2Fe](PO_4)_2(P_2O_7)$	110 mAh g^{-1} at 0.05 C	83% (300 cycles at 1/3 C)	1
$KFePO_4$/C	47 mAh g^{-1} at 10 mA g^{-1}	84% (50 cycles at 10 mA g^{-1})	2
$KVOPO_4$	115 mAh g^{-1} at 0.2 C	86.8% (100 cycles at 0.5 C)	3
KVP_2O_7	60 mAh g^{-1} at 0.25 C	85% (100 cycles at 0.25 C)	4
$KTiOPO_4$@C	102 mAh g^{-1} at 5 mA g^{-1}	80% (50 cycles at 5 mA g^{-1})	5
$KTiPO_4F$/C	94 mAh g^{-1} at 0.05 C	97% (100 cycles at 2 C)	6

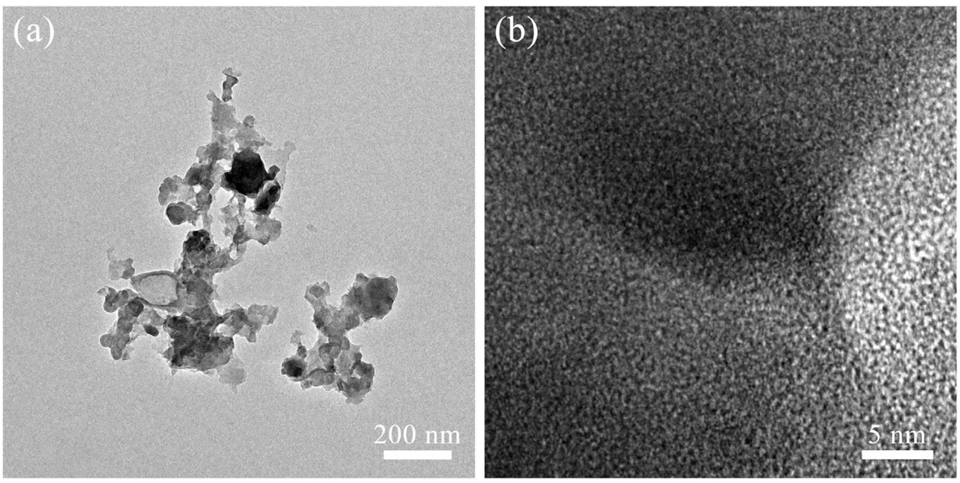

Fig. S3. (a) TEM and (b) HRTEM images of NFPP@rGO after cycles.

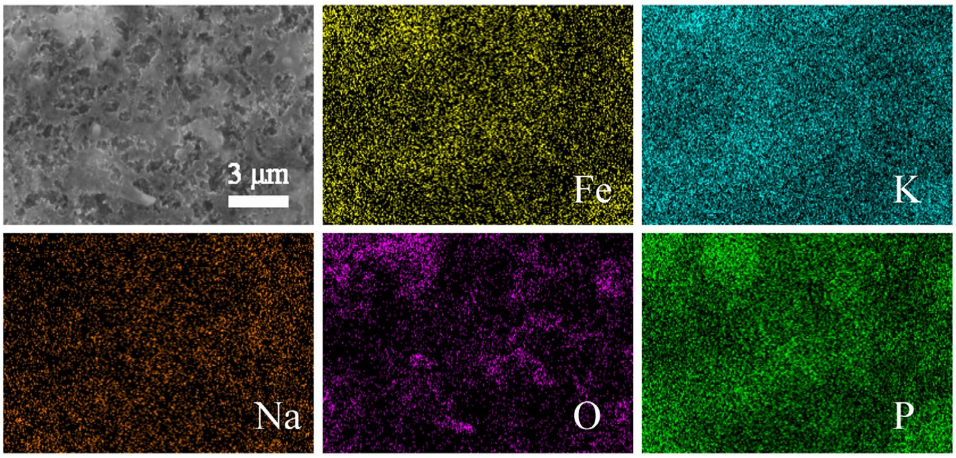

Fig. S4. EDS elemental mapping of NFPP@rGO after cycles.

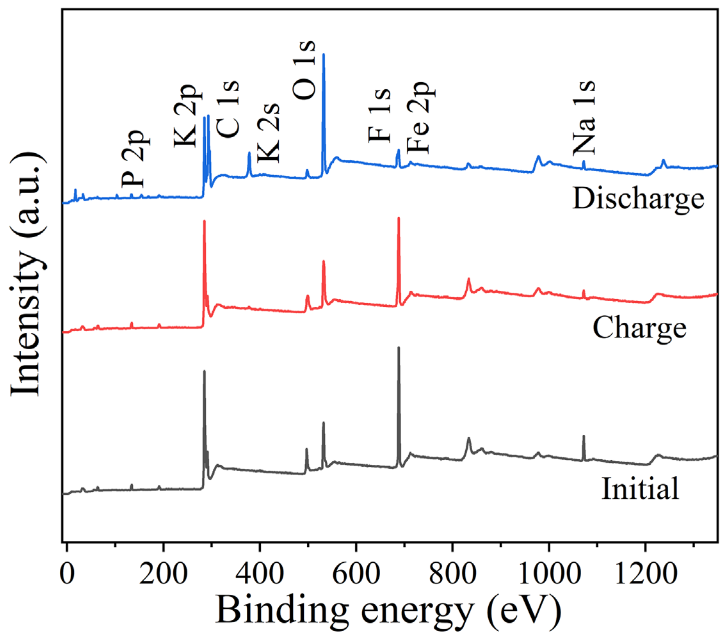

Fig. S5. XPS survey spectras of the initial, first charge, and first discharge of NFPP@rGO electrodes.

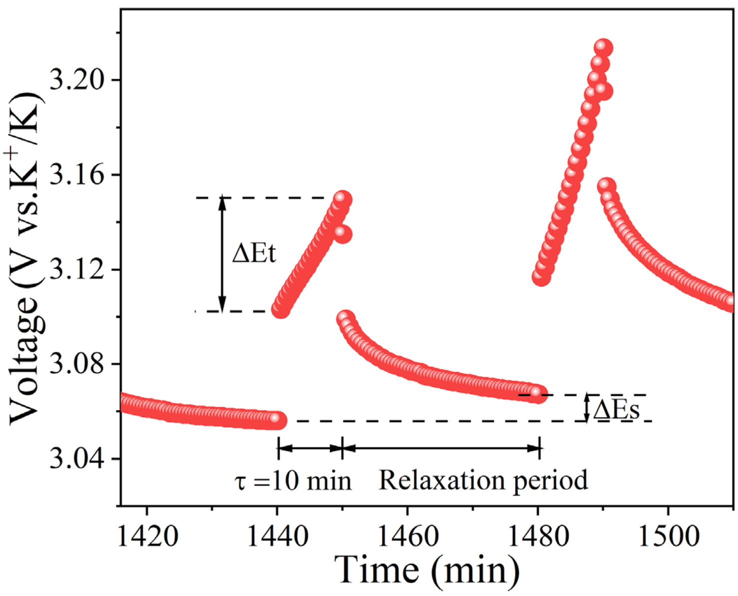

Fig. S6. Schematic illustration of the test steps for GITT experiment.

References:

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