Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting information

Synergistic Effect Between Layer Surface Configurations and K ions of Potassium Vanadate Nanowires for Enhanced Energy Storage Performance

Jiashen Meng,† Ziang Liu,† Chaojiang Niu,† Xiaoming Xu, Xiong Liu, Guobin Zhang, Xuanpeng Wang, Meng Huang, Yang Yu, Liqiang Mai*

State Key Laboratory of Advanced Technology for Materials Synthesis and Processing, Wuhan University of Technology, Wuhan 430070, China

Table S1. Crystallographic parameters of V_2O_5, KV_3O_8 and $K_{0.25}V_2O_5$, respectively.

Chemical formula	**V_2O_5**	**KV_3O_8**	**$K_{0.25}V_2O_5$**
Reference code	**00-041-1426**	**01-073-1483**	**00-039-0889**
Crystal system	**Orthorhombic**	**Monoclinic**	**Monoclinic**
Space group	**Pmmn**	**P21/m**	**A2/m**
a/Å	**11.5160**	**7.6400**	**10.1300**
b/Å	**3.5656**	**8.3800**	**3.6150**
c/Å	**4.3727**	**4.9790**	**15.7400**
α/°	**90.0000**	**90.0000**	**90.0000**
β/°	**90.0000**	**96.9500**	**109.5000**
γ/°	**90.0000**	**90.0000**	**90.0000**
Cell volume/Å³	**179.55**	**316.43**	**543.34**

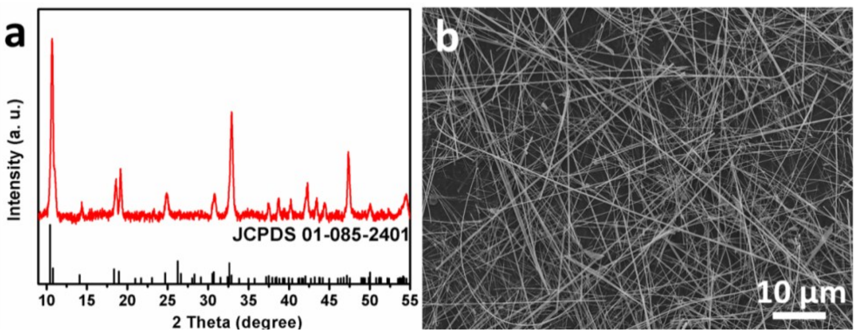

Fig. S1 XRD pattern and SEM image of $H_2V_3O_8$ nanowires.

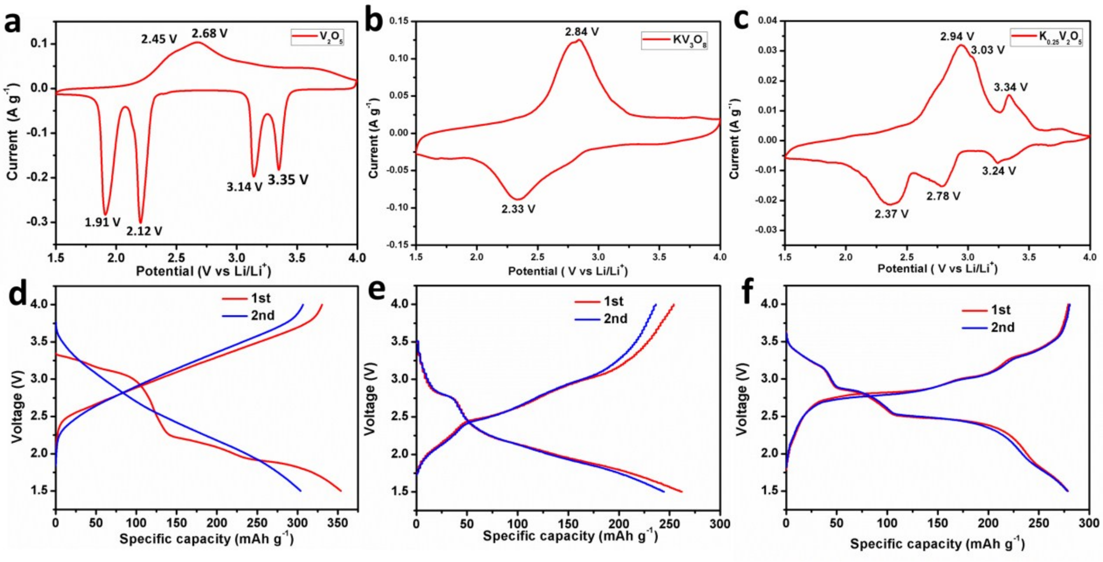

Fig. S2 CV curves of V_2O_5 (a), KV_3O_8 (b) and $K_{0.25}V_2O_5$ (c) nanowires obtained at a scan rate of 0.2 mV s^{-1} and potentials ranging from 1.5-4 V vs. Li/Li^+. Charge-discharge curves of V_2O_5 (d), KV_3O_8 (e) and $K_{0.25}V_2O_5$ (f) nanowires tested at the current density of 100 mA g^{-1}.

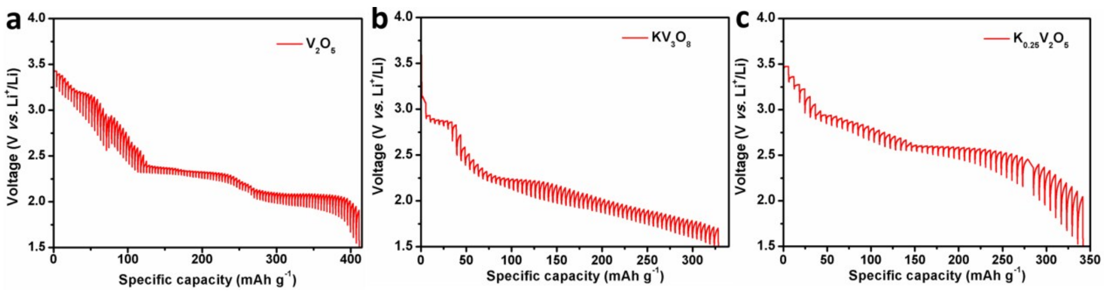

Fig. S3 The galvanostatic intermittent titration technique (GITT) for V_2O_5 (a), KV_3O_8 (b) and $K_{0.25}V_2O_5$ (c) nanowires as Li-ion battery cathodes.

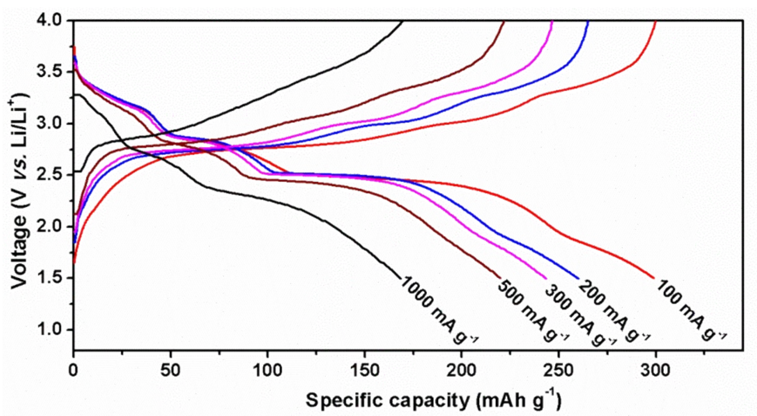

Fig. S4 Charge-discharge curves of $K_{0.25}V_2O_5$ nanowires as Li-ion battery cathodes obtained at different current densities from 100 to 200, 300, 500 and 1000 mA g^{-1}.

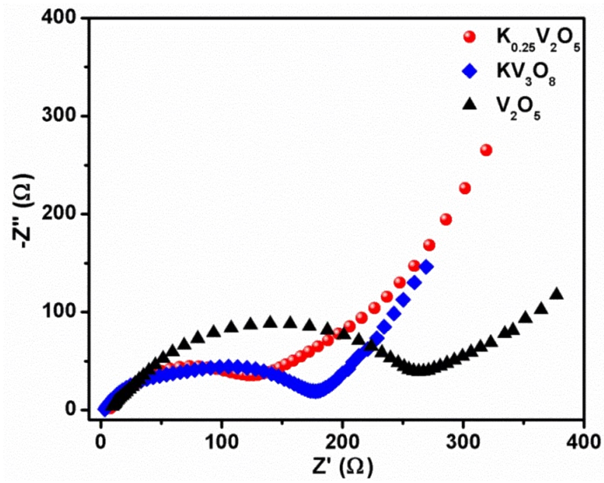

Fig. S5 AC impedance plots of V_2O_5, KV_3O_8 and $K_{0.25}V_2O_5$ nanowires as Li-ion battery cathodes.

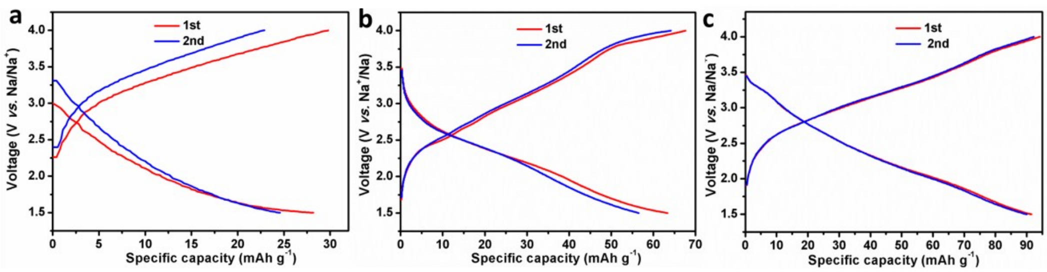

Fig. S6 Charge-discharge curves of V_2O_5 (d), KV_3O_8 (e) and $K_{0.25}V_2O_5$ (f) nanowires as Na-ion battery cathodes tested at the current density of 100 mA g^{-1}.

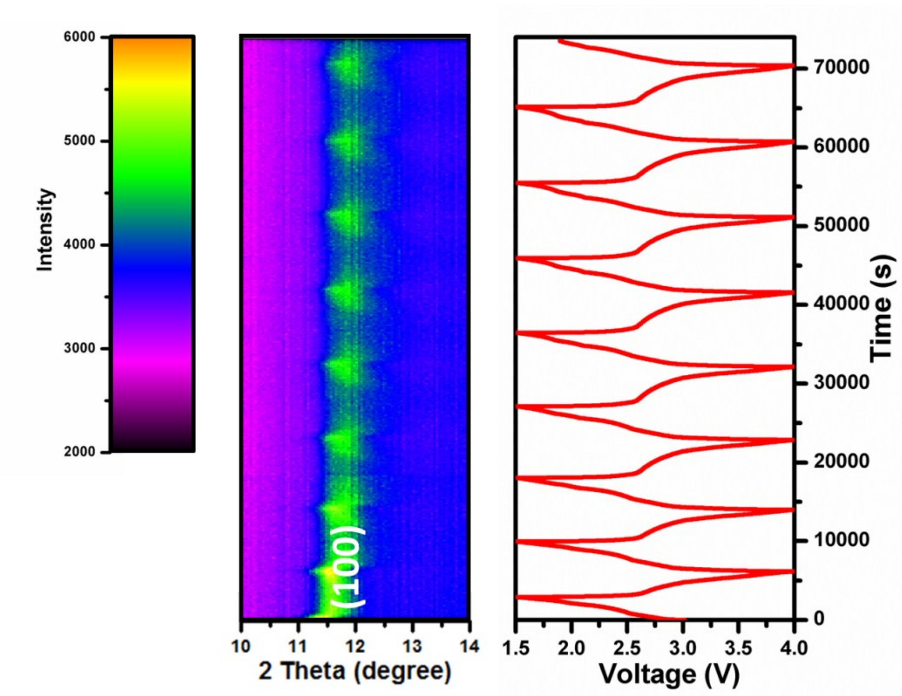

Fig. S7 *In-situ* X-ray diffraction patterns of KV_3O_8 nanowires during galvanostatic charge and discharge at 150 mA g^{-1} in lithium ion batteries. The horizontal axis represents the selected 2θ regions, and time is on the vertical axis. The diffraction intensity is colour coded with the scale bar shown on left. The corresponding voltage curve is plotted to the right.

Table S2 The ICP test results of KV_3O_8 and $K_{0.25}V_2O_5$ nanowires at initial stage and after 100 cycles, respectively.

	K:V at initial stage	**K:V after 100 cycles**	**Change ratio of K**
KV_3O_8 nanowires	**1.013:3**	**0.792:3**	**21.8%**
$K_{0.25}V_2O_5$ nanowires	**0.252:2**	**0.241:2**	**4.4%**