Electronic Supplementary Information

Superior potassium and zinc storage in K-doped VO_2(B) spheres

Qifei Li,[a] Xiangxiang Ye,[a] Yu Jiang,[ab] Edison Huixiang Ang,[c] Weiling Liu,[d] Yuezhan Feng,[e] Xianhong Rui[a] and Yan Yu*[bf]*

[a.] *School of Materials and Energy, Guangdong University of Technology, Guangzhou 510006, China. E-mail: xhrui@gdut.edu.cn*

[b.] *Hefei National Laboratory for Physical Sciences at the Microscale, Department of Materials Science and Engineering, Key Laboratory of Materials for Energy Conversion, Chinese Academy of Sciences (CAS), University of Science and Technology of China, Hefei, Anhui 230026, China. E-mail: yanyumse@ustc.edu.cn*

[c.] *Natural Sciences and Science Education, National Institute of Education, Nanyang Technological University, Singapore 637616, Singapore.*

[d.] *School of Materials Science and Engineering, Nanyang Technological University, Singapore, 639798, Singapore.*

[e.] *Key Laboratory of Materials Processing and Mold (Zhengzhou University), Ministry of Education, Zhengzhou University, Zhengzhou 450002, China.*

[f.] *Dalian National Laboratory for Clean Energy (DNL), Chinese Academy of Sciences, Dalian, Liaoning 116023, China.*

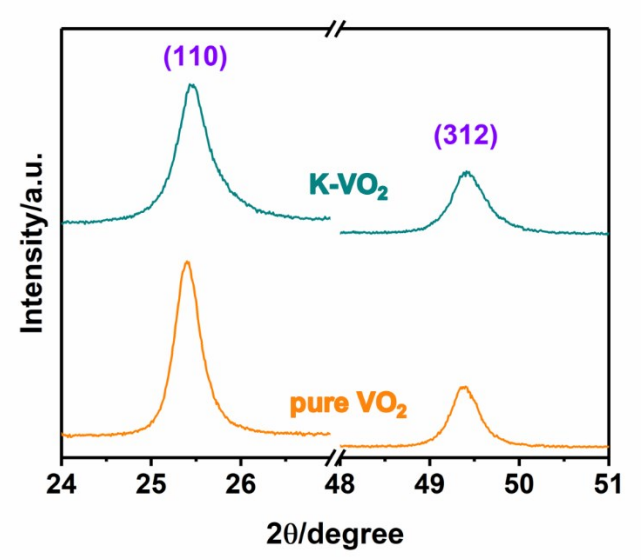

Fig. S1 Amplified XRD patterns of the (110) and (312) peaks.

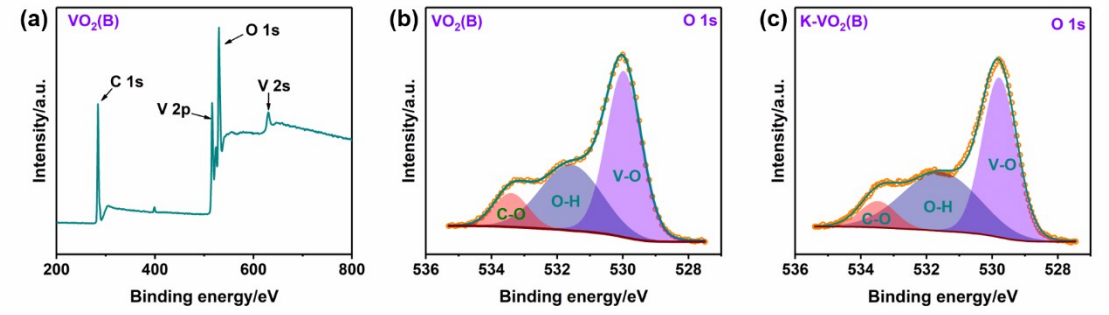

Fig. S2 (a) Full XPS spectrum of un-doped VO_2(B) and the high-resolution XPS of O 1s for (b) un-doped VO_2(B) and K-VO_2(B).

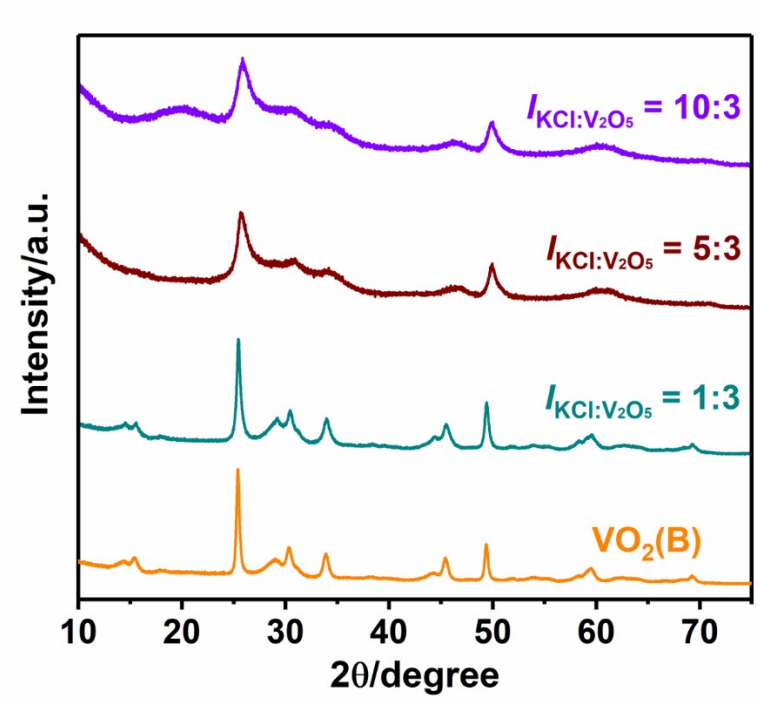

Fig. S3 XRD patterns of various K doped VO_2(B).

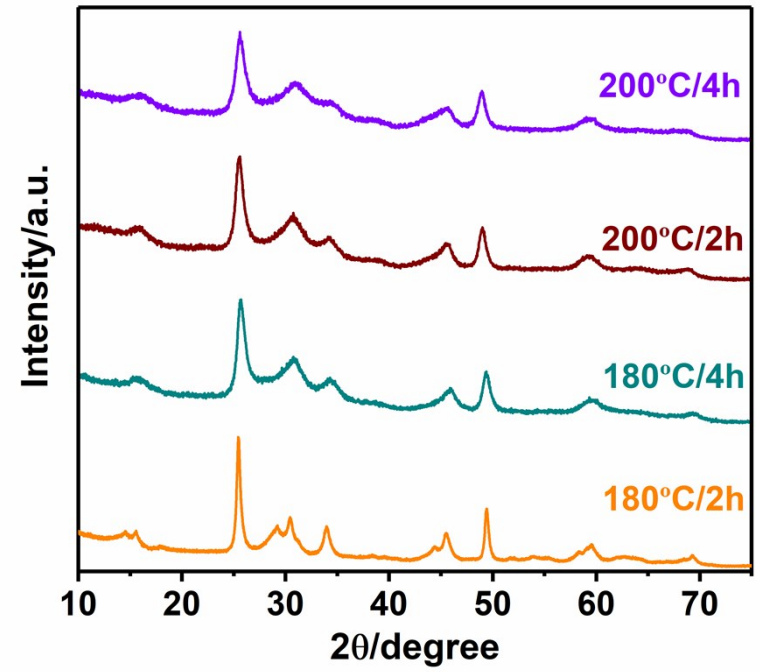

Fig. S4 XRD patterns of the samples prepared with $I_{KCl\ :\ V_2O_5}$ of 1 : 3 under different reaction temperatures and times.

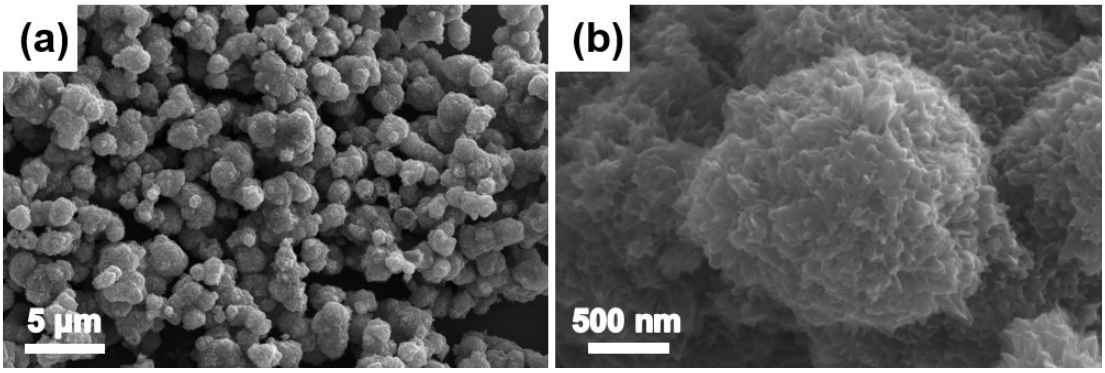

Fig. S5 SEM images of the un-doped VO_2(B).

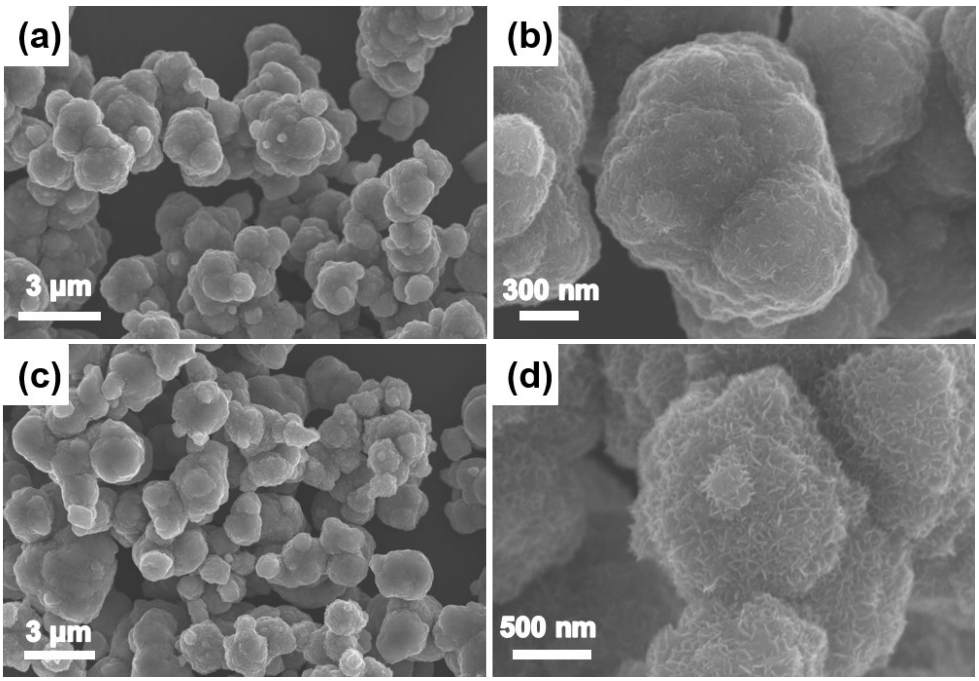

Fig. S6 SEM images of the samples prepared by the $I_{KCl\ :\ V_2O_5}$ of (a, b) 5 : 3 and (c, d)10 : 3.

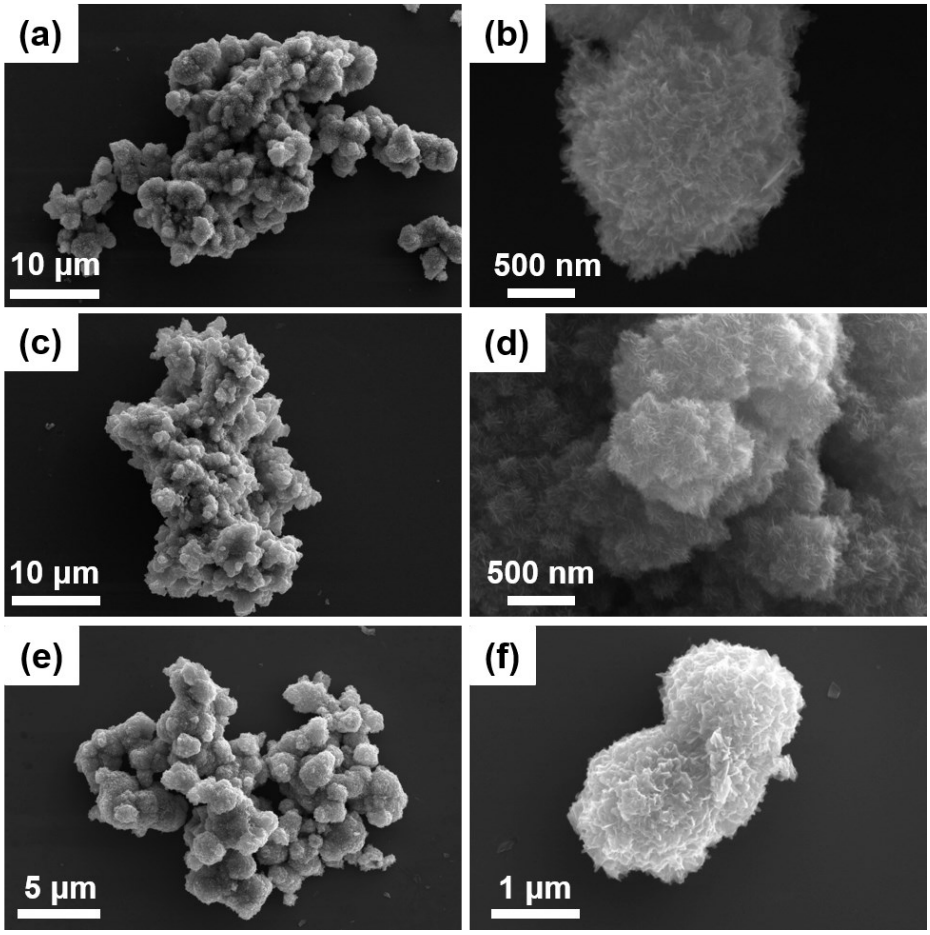

Fig. S7 SEM images of the samples prepared under various conditions: (a, b) 180 ℃ for 4 h, (c, d) 180 ℃ for 4 h and (e, f) 180 ℃ for 4 h.

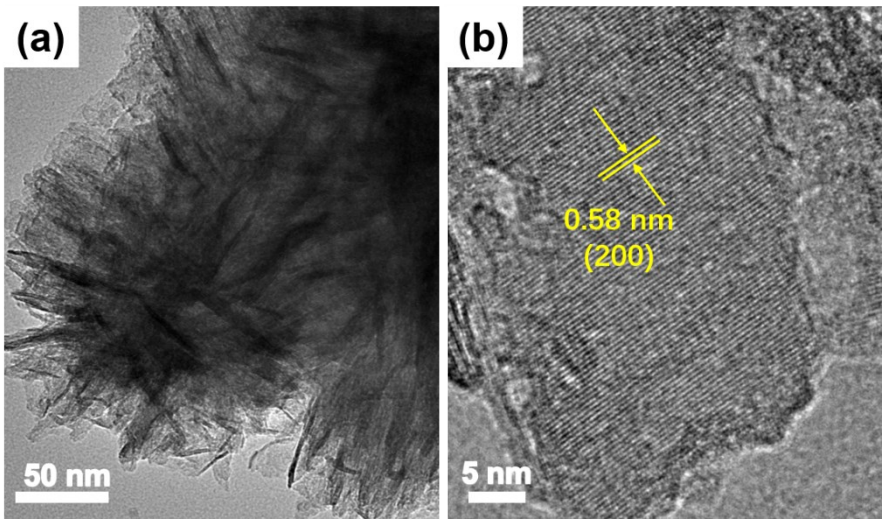

Fig. S8 HRTEM images of the undoped VO_2(B).

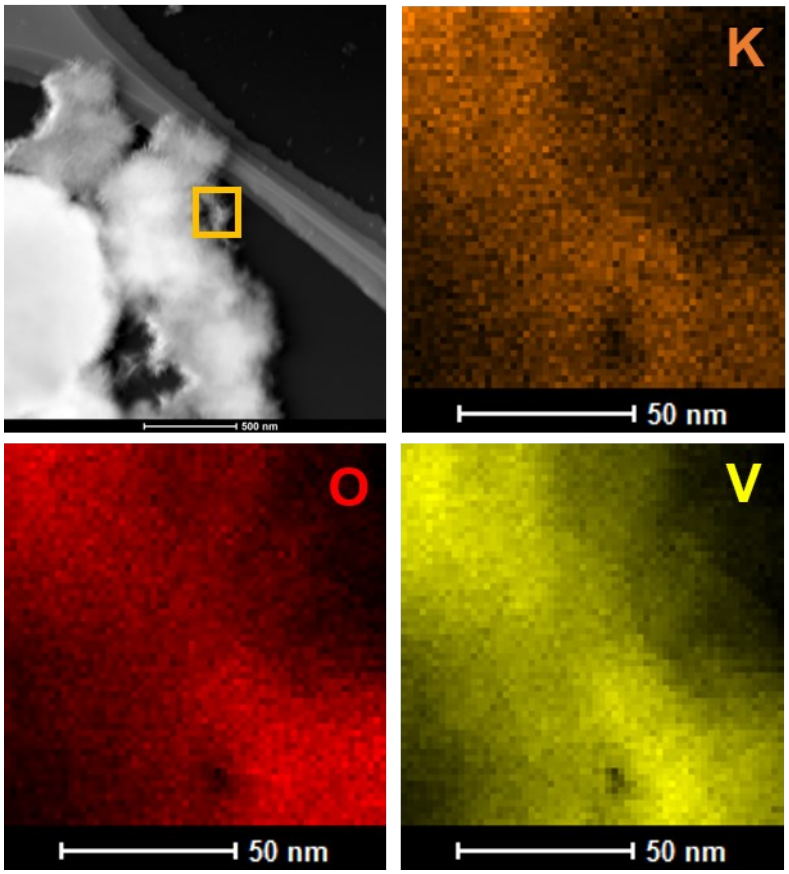

Fig. S9 STEM and the corresponding elemental mapping images of the K-VO_2(B).

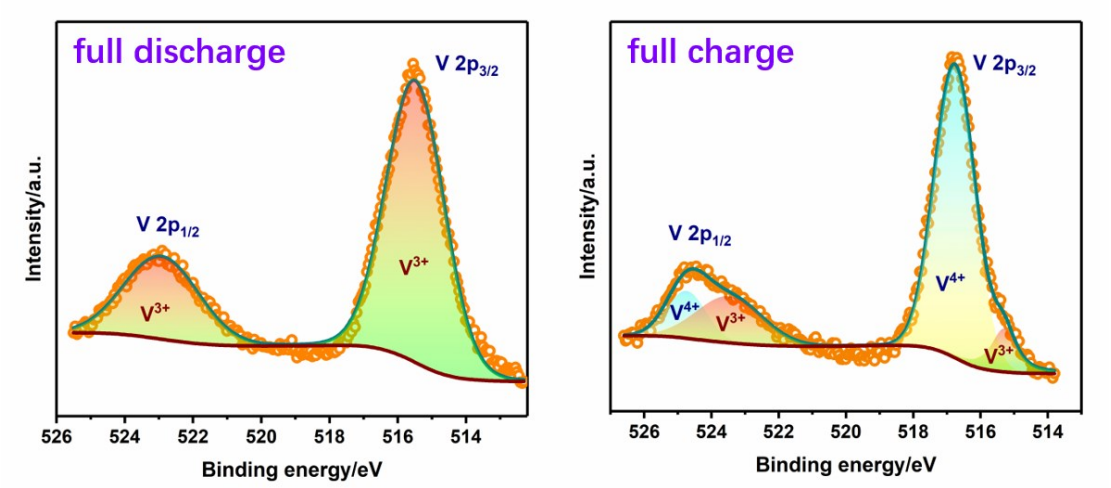

Fig. S10. High-resolution XPS spectrum of V 2p region for K-VO_2(B) anode at (a) full discharge and (b) full charge state.

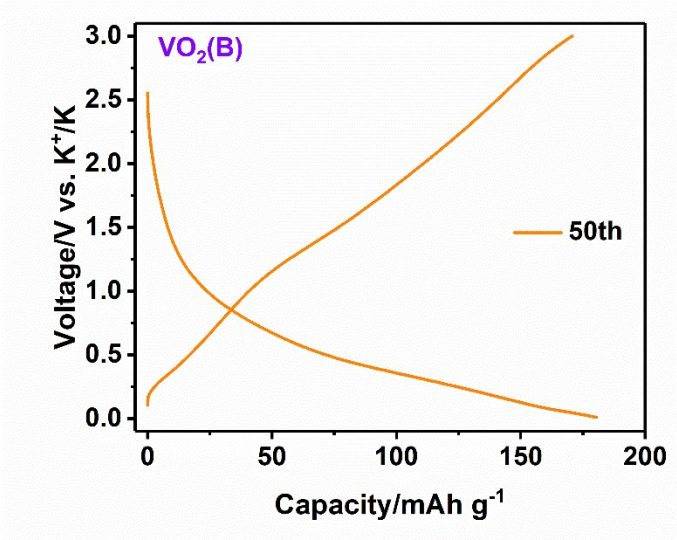

Fig. S11 Galvanostatic charge-discharge profiles at 100 mA g^{-1} for VO_2(B).

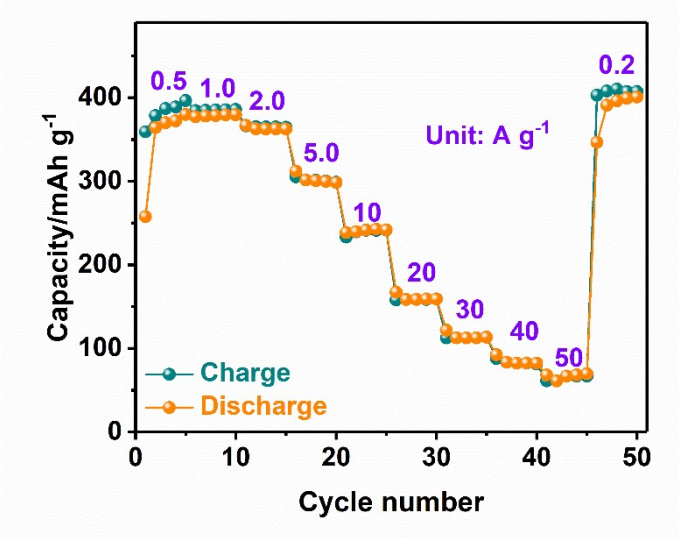

Fig. S12 Rate capability of the undoped VO_2(B) for ZIBs.

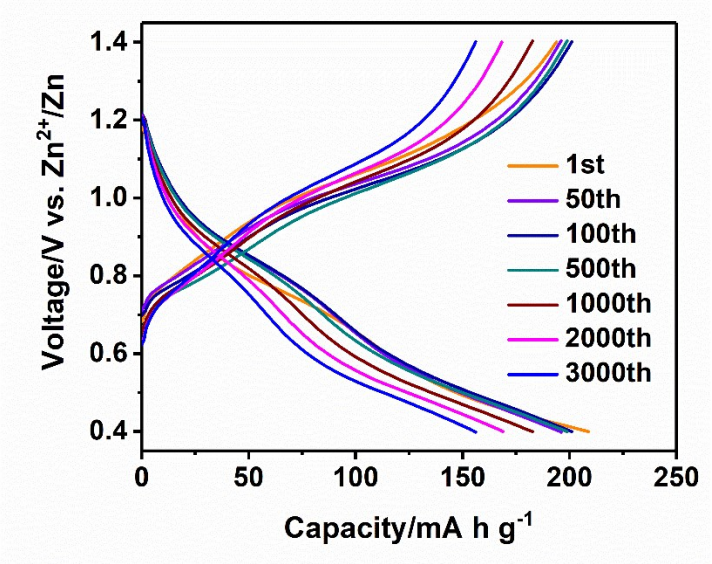

Fig. S13 Galvanostatic charge-discharge profiles of K-VO_2(B) at 20 A g^{-1} in different cycles.

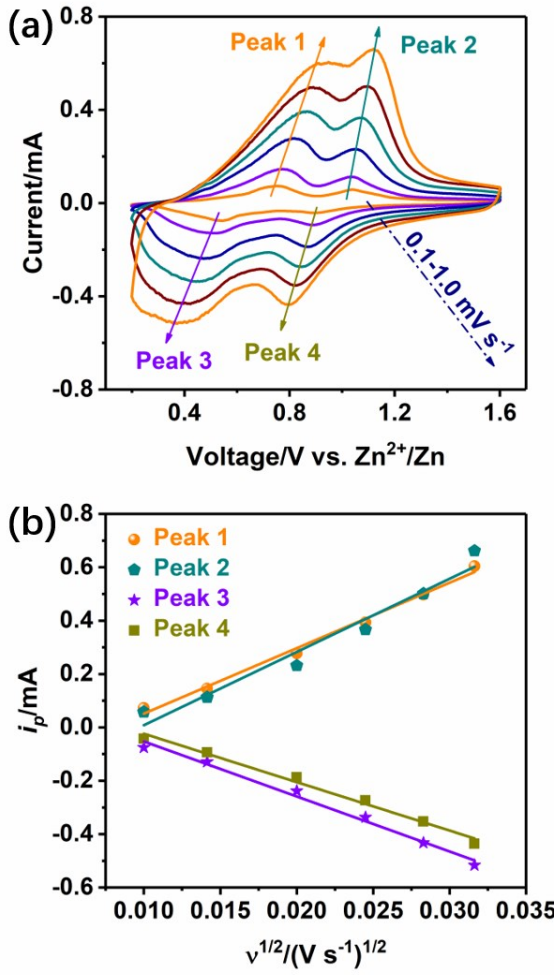

Fig. S14 (a) CV curves at sweep rate from 0.1 to 1.0 mV s^{-1} and (b) the relationship between current peak (i_p) and square root of sweep rate ($\nu^{1/2}$) of K-VO_2(B) as ZIBs cathode.