## SAXS "unveils" porous anodes for potassium-ion batteries: dynamic evolution of pore structure in Fe@Fe<sub>2</sub>O<sub>3</sub>/PCNFs composite nanofibers

Ruiqi Shao<sup>a</sup>, Yingjie Dong<sup>a</sup>, Qingqing Wu<sup>a</sup>, Haiting Shi<sup>\*a</sup>, Jinxi Bao<sup>a</sup>, Feng Tian<sup>b</sup>, Tianyu Li<sup>a</sup>, Zhiwei Xu<sup>\*a</sup>

<sup>a</sup> State Key Laboratory of Separation Membranes and Membrane Processes, School of Textile

Science and Engineering, Tiangong University, Tianjin 300387, China.

<sup>b</sup> Shanghai Synchrotron Radiation Facility, Zhangjiang Lab, Shanghai Advanced Research

Institute, Chinese Academy of Sciences, Shanghai 201204, China

\*Corresponding author: shihaiting@tiangong.edu.cn, xuzhiwei@tiangong.edu.cn

## **Supporting Information**

## Content

Fig. S1 CV curves of Fe@Fe2O3/PCNFs composite in Na-ion cell.

Fig. S2 Rate capability at a current density of 100, 200, 500, 1000, 2000 and 100 mA g<sup>-1</sup> of Fe@Fe2O3/PCNFs composite in Na-ion cell.

Fig. S3 Charge/discharge specific capacity and coulombic efficiency measured with 150 cycles at a current density of 100 mA g<sup>-1</sup>.

Fig. S4 Long-term cycling performance at 1000 mA g<sup>-1</sup>.

Fig. S5 CV curves at different scan rate of 0.5, 1.0, 1.5, 2.0, 2.5 mV s<sup>-1</sup>. Fig. S6 b value.

Fig. S7 Capacitance and diffusion contribution ratio at different scan rate of 0.5, 1.0, 1.5, 2.0, 2.5 mV s<sup>-1</sup> of Fe@Fe2O3/PCNFs composite in Na-ion cell. Fig. S8 Test results of sodium ion cell of Fe@Fe2O3/PCNFs composite: (a) the

first three cycles of charge /discharge curve at a scan rate of 0.1 mV s<sup>-1</sup>, (b) EIS spectrum of the initial state, discharging to 1.5 V, 1.3 V, 1.1 V and (c) EIS spectrum when discharging to 1.1 V, 0.9 V, 0.7 V, 0.5 V, 0.3 V, 0.1 V.



Fig. S1 CV curves of Fe@Fe<sub>2</sub>O<sub>3</sub>/PCNFs composite in Na-ion cell.



Fig. S2 Rate capability at a current density of 100, 200, 500, 1000, 2000 and 100 mA g<sup>-1</sup> of Fe@Fe<sub>2</sub>O<sub>3</sub>/PCNFs composite in Na-ion cell.



Fig. S3 Charge/discharge specific capacity and coulombic efficiency measured with 150 cycles at a current density of 100 mA g<sup>-1</sup>.

Fig. S4 Long-term cycling performance at 1000 mA  $g^{-1}$ .

Fig. S5 CV curves at different scan rate of 0.5, 1.0, 1.5, 2.0, 2.5 mV s<sup>-1</sup>.



**Fig. S6** *b* value.



Fig. S7 Capacitance and diffusion contribution ratio at different scan rate of 0.5, 1.0, 1.5, 2.0, 2.5 mV s<sup>-1</sup> of Fe@Fe<sub>2</sub>O<sub>3</sub>/PCNFs composite in Na-ion cell.



Fig. S8 Test results of sodium ion cell of Fe@Fe<sub>2</sub>O<sub>3</sub>/PCNFs composite: (a) the first three cycles of charge /discharge curve at a scan rate of 0.1 mV s<sup>-1</sup>, (b) EIS spectrum of the initial state, discharging to 1.5 V, 1.3 V, 1.1 V and (c) EIS spectrum when discharging to 1.1 V, 0.9 V, 0.7 V, 0.5 V, 0.3 V, 0.1 V.