Electronic Supplementary Material (ESI) for Nanoscale.
This journal is © The Royal Society of Chemistry 2020

Supporting Information

Fe nanopowder-assisted fabrication of FeO_x/porous carbon for boosting potassium-ion storage performance

Tianqi Wang, Wei Liu, Xiang Gao, Yuan Zhang, Yongxu Du, Wenting Feng, Hongguang Fan*

School of Materials Science and Engineering, Ocean University of China, Qingdao 266100, People's Republic of China.

Email: weiliu@ouc.edu.cn (W. Liu).

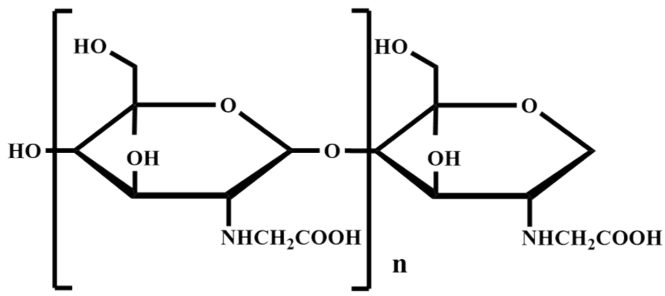

Figure S1 Molecular formula of the carboxymethyl chitosan.

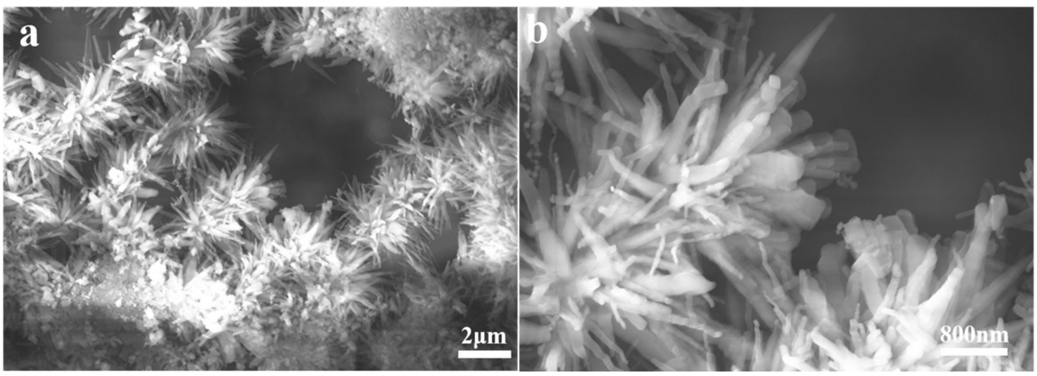

Figure S2 (a, b) SEM images of biomineralized precursor via a freeze-drying process without carbonization.

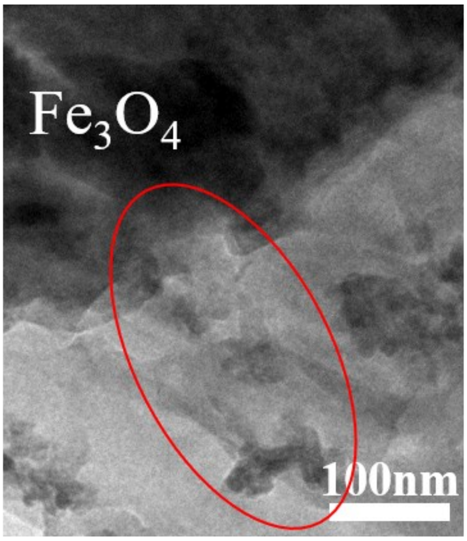

Figure S3 TEM images of GBHCs without removing Fe_3O_4 particles.

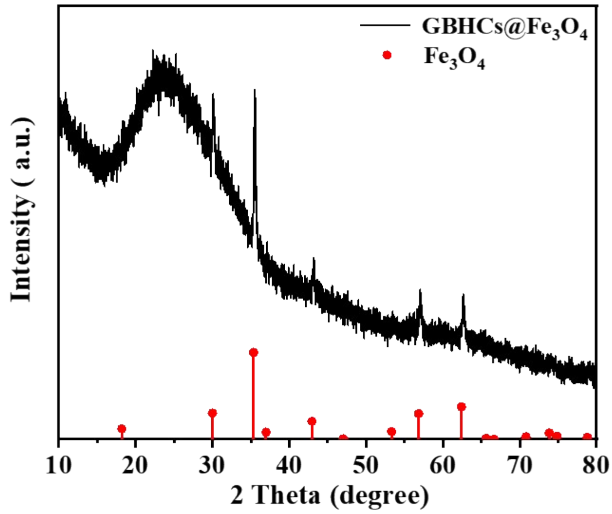

Figure S4 XRD pattern of GBHCs without removing Fe_3O_4.

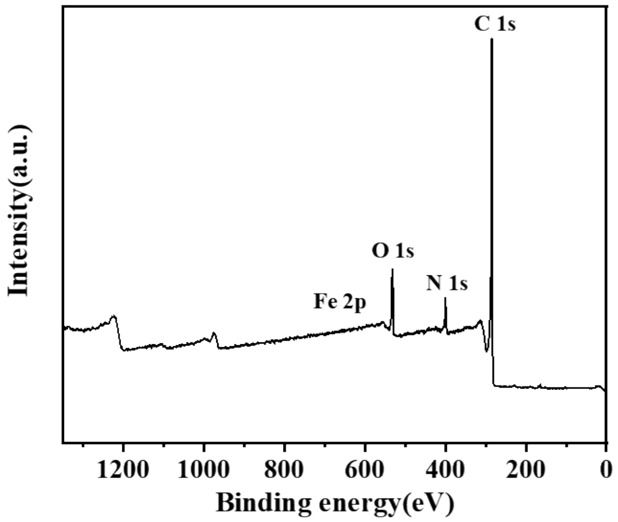

Figure S5 XPS survey spectra of the GBHCs.

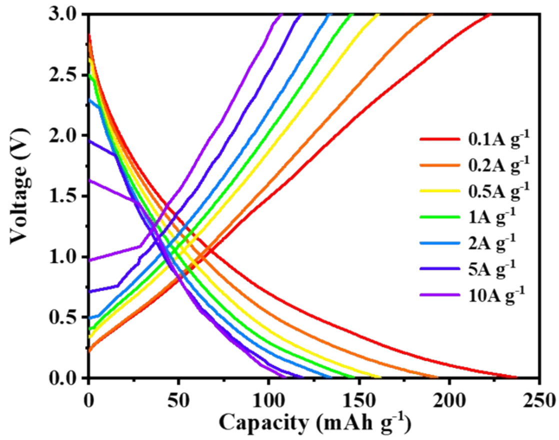

Figure S6 Galvanostatic charge-discharge curves at different current densities of BHCs electrode.

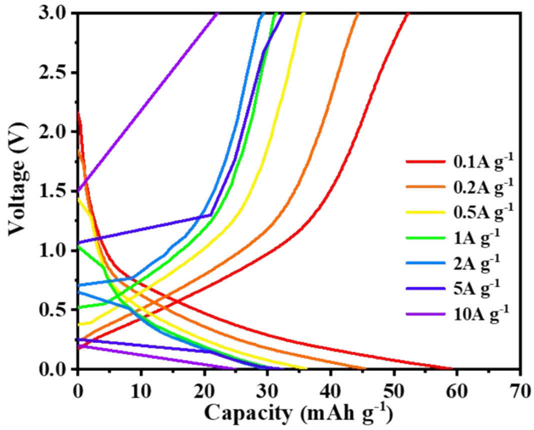

Figure S7 Galvanostatic charge-discharge curves at different current densities of GC electrode.

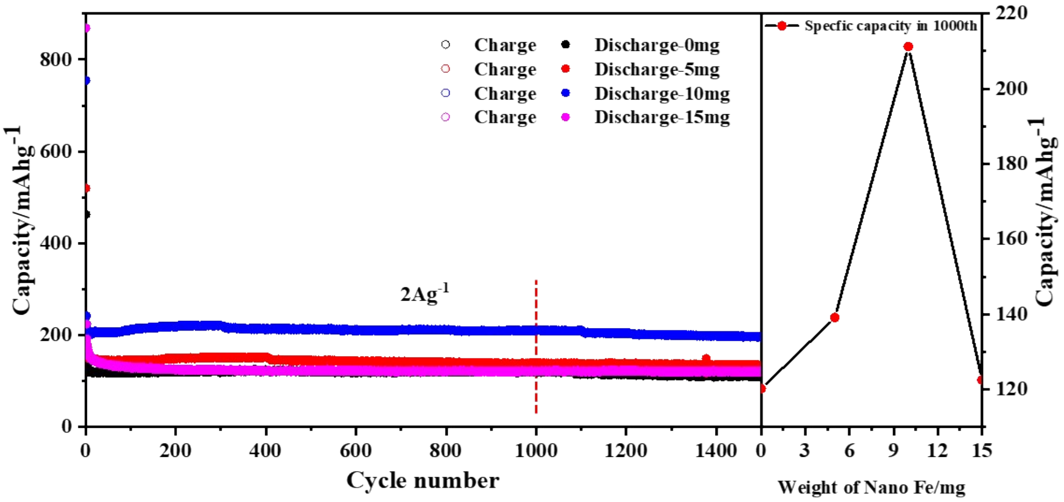

Figure S8 Cycling performance of FeO_x@GBHCs prepared with various Fe powders at current density of 2A g^{-1}.

It can be noted that the cycling capacity increases continuously as the Fe powders content increasing from 0 to 10mg, but a decrease when the amount reaches 15mg.

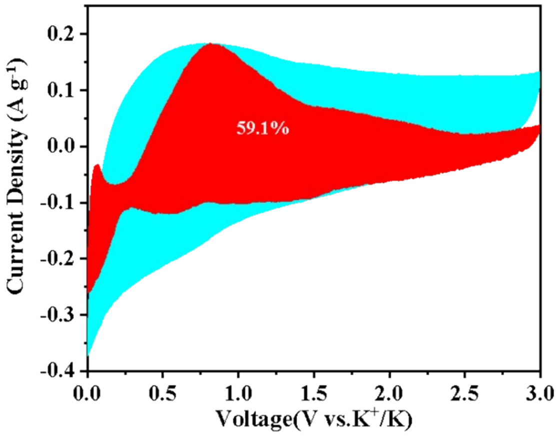

Figure S9 Contribution ratio of the capacitive and diffusion-controlled of BHCs charge at 0.6 mV s^{-1}.

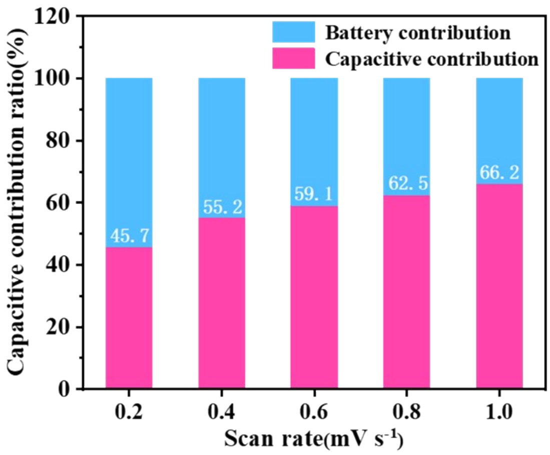

Figure S10 Normalized contribution proportions of capacitance and diffusion of BHCs at different scan rates.

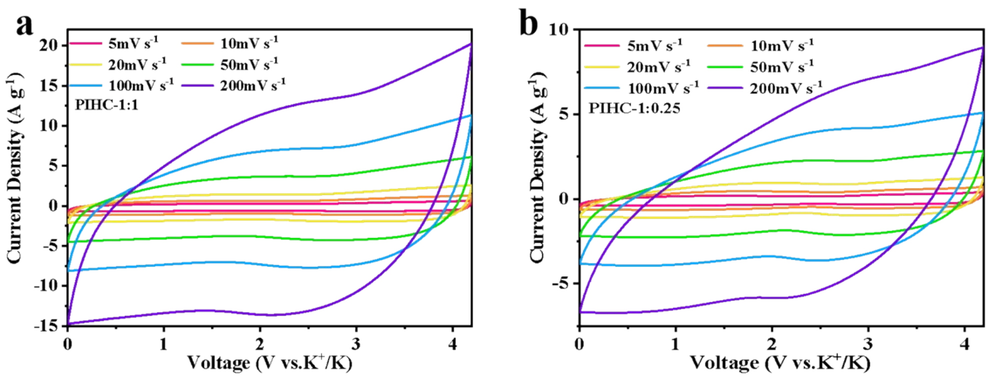

Figure S11 Typical CV curves of the GBHCs //AC PIHCs at different scan rates of the 5-200 mV s^{-1} for the voltage window of 0-4.2 V.

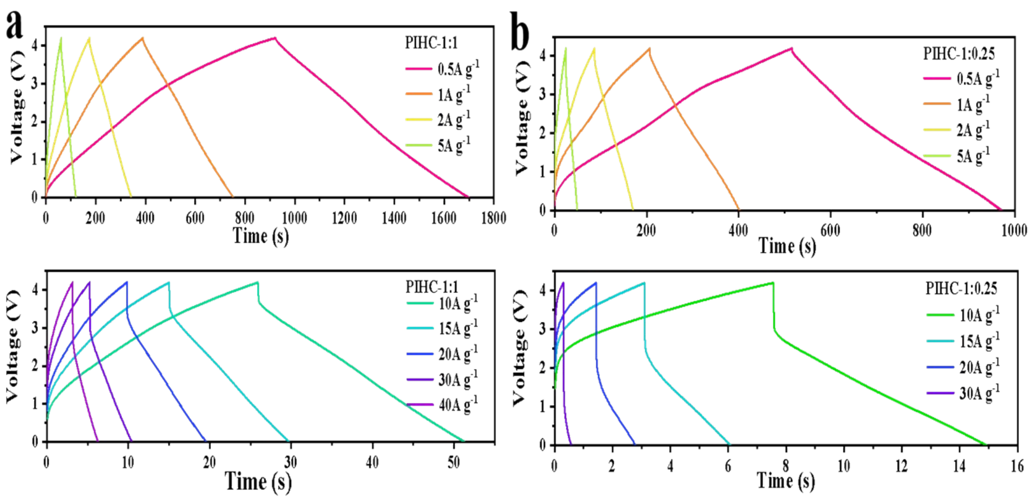

Figure S12 Typical charge-discharge curves of the GBHCs//AC PIHCs at different current densities of the 0.5-30 A g^{-1} for the voltage window of 0-4.2V.

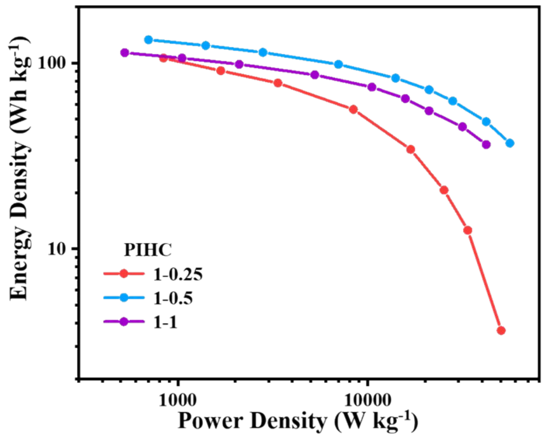

Figure S13 Ragone plots of the GBHCs//AC PIHC with different anode /cathode mass ratio.

Table S1 The specific BET surface area of BHCs and GBPCs.

Sample name	BET Surface Area (m^2/g)
BHCs	970.5247
GBHCs	941.3968

Table S2 Comparisons of the cycling performance of GBHCs electrode with other carbonbased anode materials in PIBs reported in open literature.

Sample	Cycling performance	Ref
GBHCs	200 mAh g^{-1} (3000 cycles, 2A g^{-1})	This work
N/O co-doped carbon	131 mAh g^{-1} (360 cycles, 0.5A g^{-1})	Ref. [41] of the txt
Phosphorus/Nitrogen Cofunctionalized carbon	218 mAh g^{-1} (3000 cycles, 1A g^{-1})	Ref. [44] of the txt
Short-Range Order carbon	146.5 mAh g^{-1} (1000 cycles, 1A g^{-1})	Ref. [46] of the txt
S/O co-doped carbon	108 mAh g^{-1} (2000 cycles, 1A g^{-1})	Ref. [51] of the txt
N doped carbon nanosheets	151 mAh g^{-1} (1000 cycles, 1A g^{-1})	Ref. [56] of the txt
SiC-carbide-derived carbon	192 mAh g^{-1} (1000 cycles, 1A g^{-1})	Ref. [57] of the txt
Bacterial-Derived carbon	158 mAh g^{-1} (1000 cycles, 1A g^{-1}) 141 mAh g^{-1} (1500 cycles, 2A g^{-1})	Ref. [58] of the txt
Highly nitrogen doped carbon nanofibers	146 mAh g^{-1} (4000 cycles, 2A g^{-1})	Ref. [59] of the txt
Co2P@Nitrogen-rich hollow carbon nanocages	130 mAh g^{-1} (1000 cycles, 1A g^{-1})	[1]
VO/C	241 mAh g^{-1} (1000 cycles, 1A g^{-1})	[2]
FeS/MoS2@N-Doped carbon Nanocubes	232 mAh g^{-1} (10000 cycles, 1A g^{-1})	[3]

References

1. D. Das, D. Sarkar, S. Nagarajan and D. Mitlin, *Chem Commun (Camb)*, 2020, **56**, 14889-14892.
2. J. Lu, C. Wang, G. Xia, H. Tong, Y. Yang, D. Zhu and Q. Chen, *J. Mater. Chem. A*, 2020, **8**, 23939-23946.
3. J. Chu, Q. Yu, K. Han, L. Xing, C. Gu, Y. Li, Y. Bao and W. Wang, *J. Mater. Chem. A*, 2020, **8**, 23983-23993.