Supporting Information

Amorphous FeF_3/C nanocomposite cathode derived from metal-organic frameworks for sodium ion batteries

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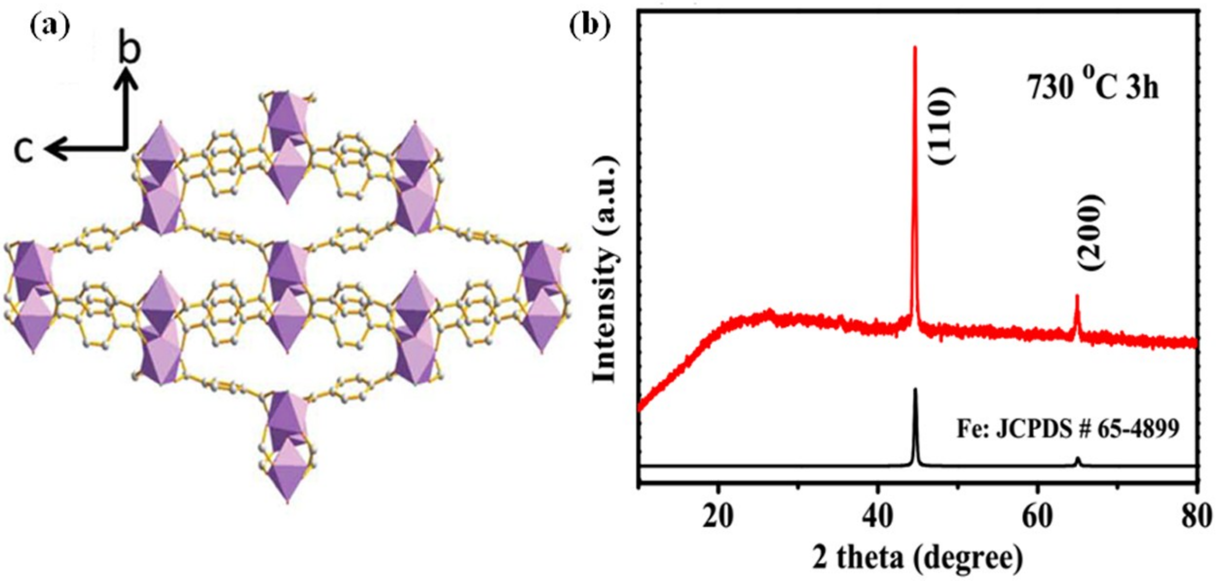

Fig. S1. (a) The structure of MIL-88B, demonstrating the molecular structure and chemical composition of Fe-MOF; (b) XRD pattern of Fe_3O_4/C-730-3h nanocomposites at carbonization temperature of 730 ºC for 3 h, demonstrating the appearance of Fe phase as the carbonization temperature above 730 ºC.

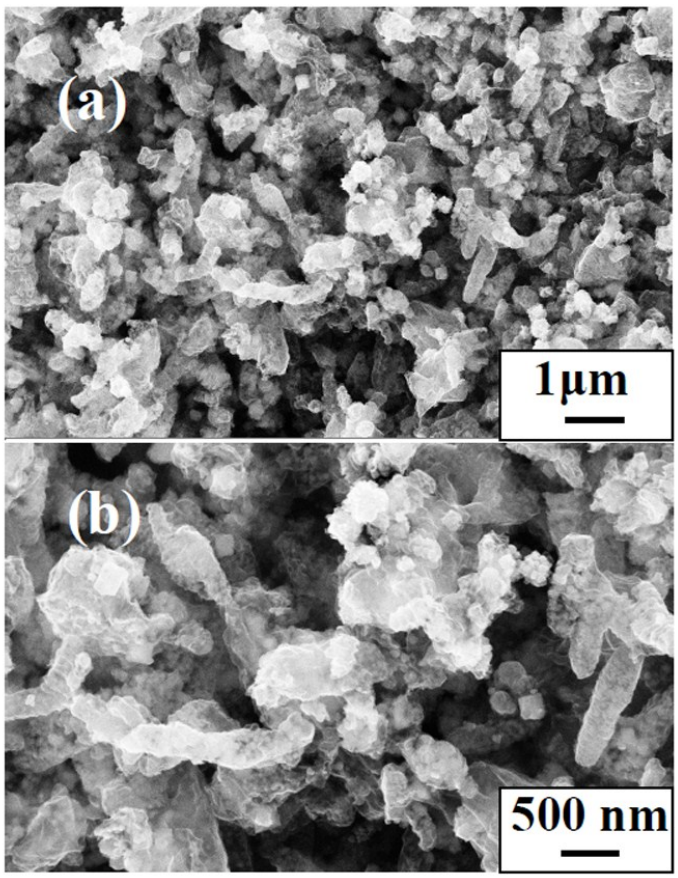

Fig. S2. Low- and high-magnification SEM images of Fe_3O_4/C-700-3h nanocomposites.

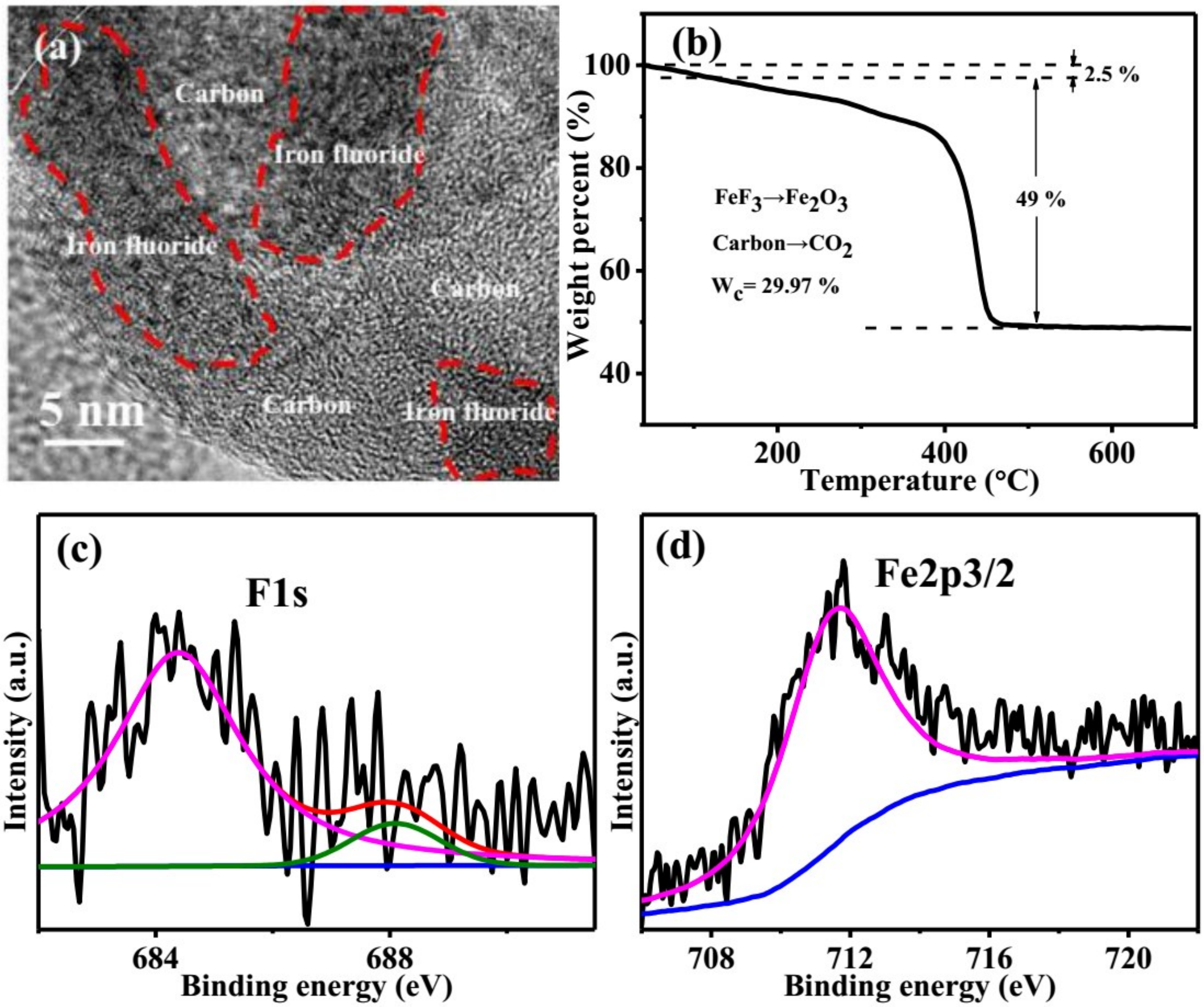

Fig. S3. (a) HRTEM image of $FeF_3 \cdot 3H_2O$/C-700-3h nanocomposites, showing the distribution of iron fluoride particles in the carbon framework and crystallization state of graphitized carbon; (b) TGA curve of the FeF_3/C-700-3h nanocomposites, confirming the carbon content of the sample; (c,d) XPS spectra of the FeF_3/C-700-3h nanocomposites, demonstrating the component of amorphous iron fluoride.

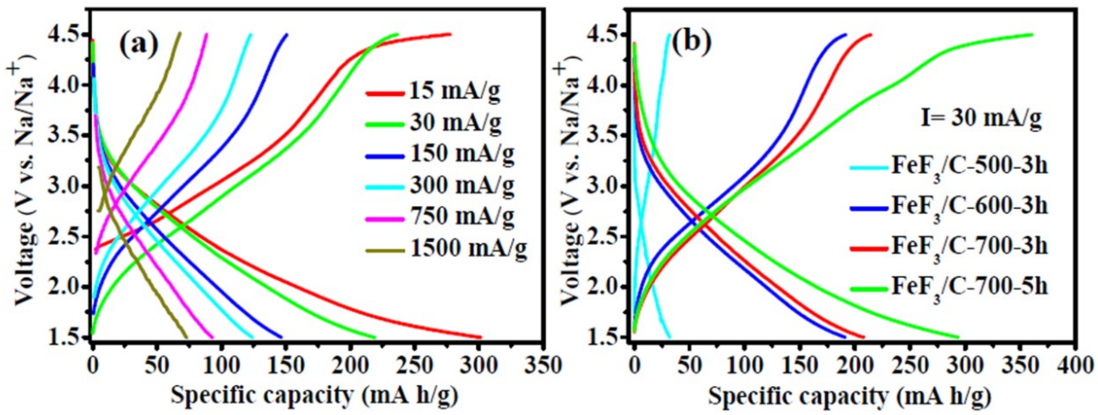

Fig. S4. (a) Galvanostatic charge/discharge voltage profile at various current densities from 15 mA g^{-1} to 1500 mA g^{-1}; (b) charge/discharge voltage profile of the FeF_3/C nanocomposites at various carbonization conditions: FeF_3/C-500-3h from the precursor of 500 ºC carbonization for 3h, FeF_3/C-600-3h from the precursor of 600 ºC carbonization for 3 h, FeF_3/C-700-3h from the precursor of 700 ºC carbonization for 3 h, FeF_3/C-700-5h from the precursor of 700 ºC carbonization for 5 h.

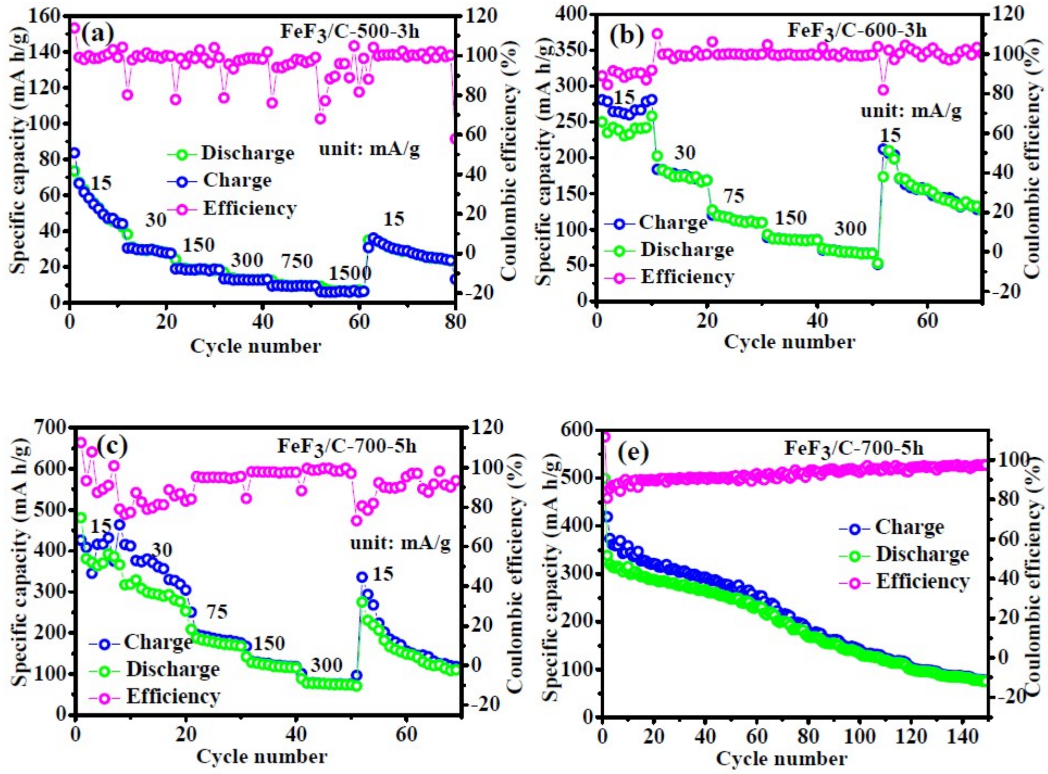

Fig. S5. Electrochemical performances of the FeF_3/C nanocomposites at various carbonization conditions: (a) discharge/charge rate performance of the FeF_3/C nanocomposites at carbonization temperature of 500 ºC for 3h in the voltage range of 1.5–4.5 V; (b) charge/discharge rate performance of the FeF_3/C nanocomposites at carbonization temperature of 600 ºC for 3h in the voltage range of 1.5–4.5 V; (c) charge/discharge rate performance of the FeF_3/C nanocomposites at carbonization temperature of 700 ºC for 5h in the voltage range of 1.5–4.5 V; (d) cycling performance of of the FeF_3/C nanocomposites at carbonization temperature of 700 ºC for 5h in the voltage range of 1.5–4.5 V.

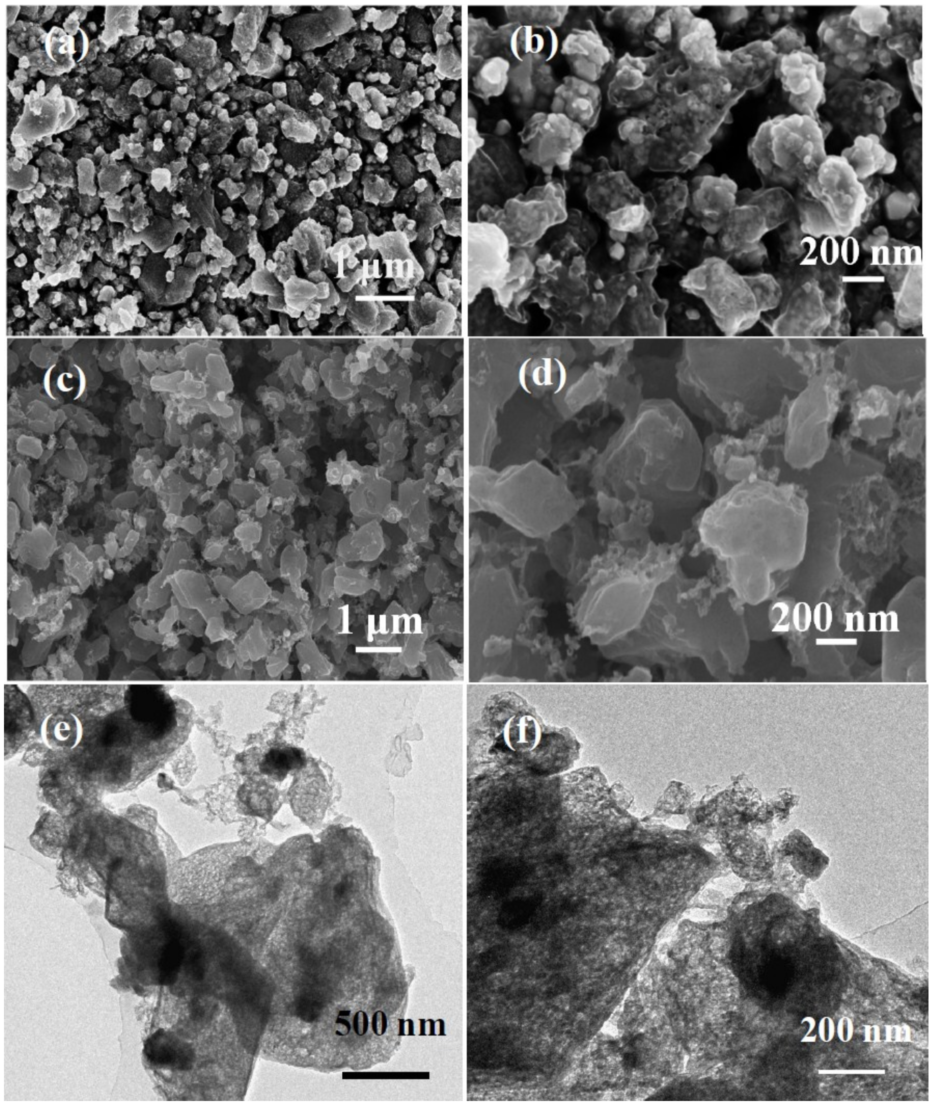

Fig. S6. (a,b) Low- and high-magnification SEM images of the precursor of Fe_3O_4/C-700-5h; (c,d) low- and high-magnification SEM images of FeF_3/C-700-5h nanocomposites; (e,f) TEM images of FeF_3/C-700-5h nanocomposites.

Table S1. The comparison of discharge capacities and fading rates/cycle of the previously reported FeF_3 electrodes.

Electrode	Voltage range (V)	Current density (mA g^{-1})	Discharge capacity (mAh g^{-1}) /(cycle no.)	Ref.
FeF_2/RGO	1.5- 4.5	100	125/(2^{nd})- 70/(1000^{th})	[1]
FeF_3/graphene	1.5- 4.2	60	202/(1^{st})- 167/(50^{th})	[2]
$K_{0.6}FeF_3$/C	1.5-4.2	19.6（0.1C）	295/(1^{st})- 100/(35^{th})	[3]
$FeF_3 \cdot xH_2O$/graphene	1.5- 4.5	~24（0.1C）	334/(1^{st})- 101/(30^{th})	[4]
$FeF_3 \cdot 0.5H_2O$/RGO	1.5- 4.5	11（0.05C）	242/(1^{st})- 230/(100^{th})	[5]
$FeF_3 \cdot 0.5H_2O$	1.2-4.0	22（0.1C）	135/(2^{nd})- 98/(50^{th})	[6]
$FeF_3 \cdot 0.33H_2O$/SWNTs	1.2- 4.0	~23（0.1C）	130/(1^{st})- 74/(50^{th})	[7]
$FeF_3 \cdot 0.5H_2O$/MWNTs	1.5-4.5	22（0.1C）	108/(1^{st})- 90/(100^{th})	[8]
FeF_3/C	1.5- 4.5	75	286/(1^{st})- 126/(100^{th})	This work

References

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