Electronic Supplementary Material (ESI) for Sustainable Energy & Fuels.

Support information:

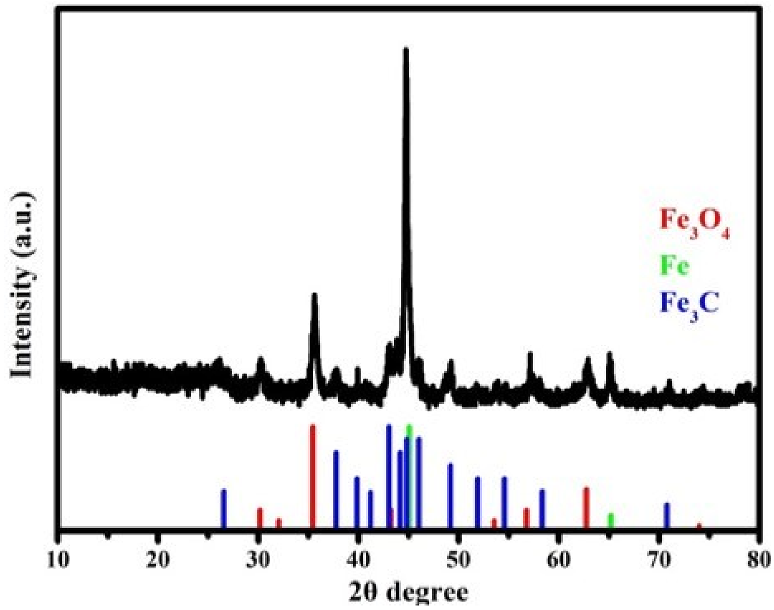

Figure S1. XRD pattern of Fe_3O_4@C.

It's a mixture of Fe_3O_4, Fe and Fe_3C. Fe comes from the reduction of Fe_3O_4. The Fe_3C is due to the reaction of the Fe and the C at high temperatures. The XRD result of FeSe@C indicate that the composition does not affect the formation of FeSe.

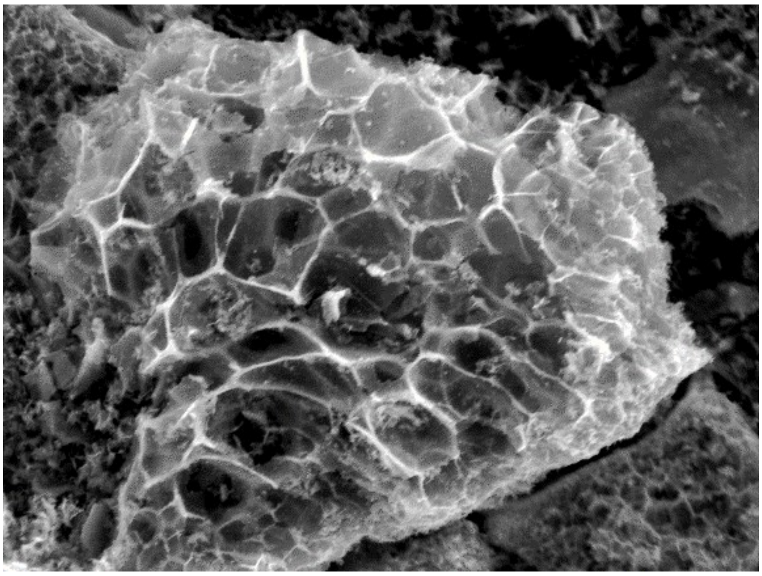

Figure S2. SEM image of Fe_3O_4@C.

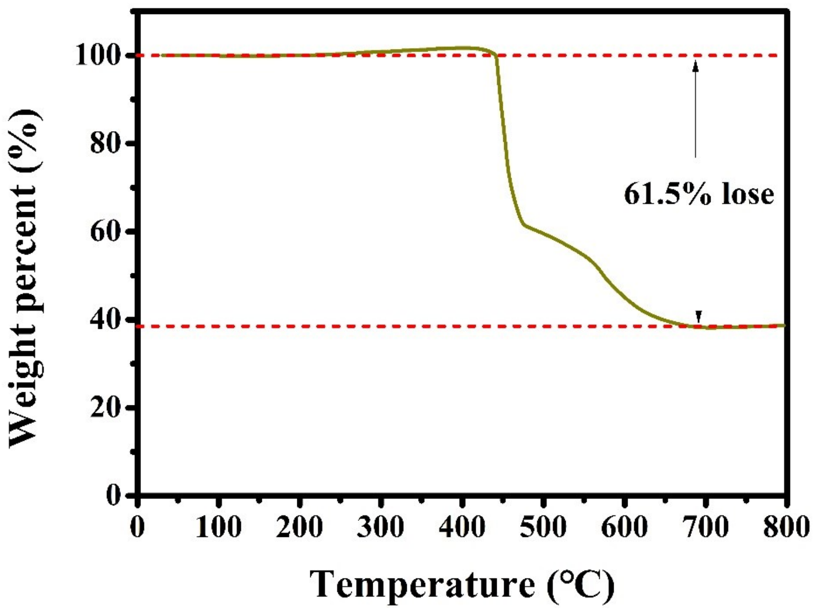

Figure S3. TGA curve of FeSe@C.

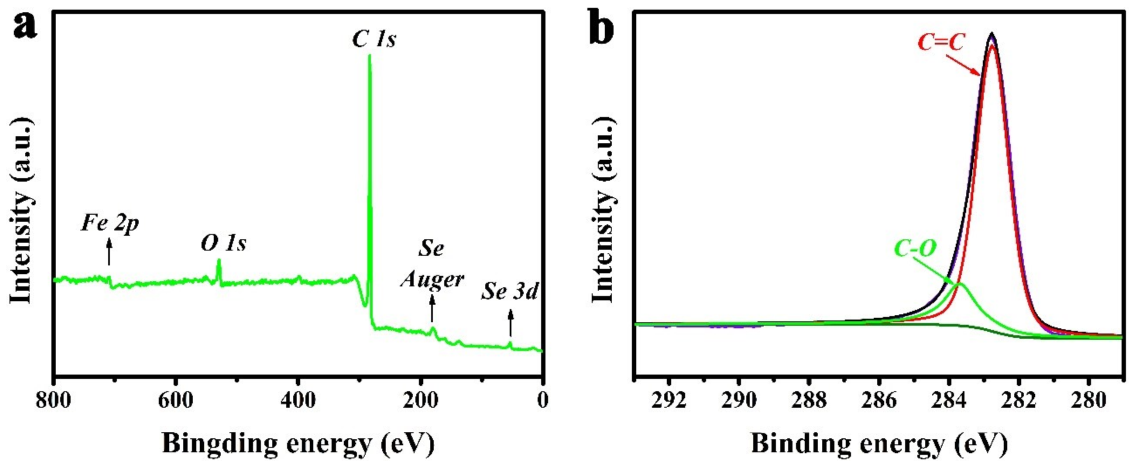

Figure S4. (a) XPS scanning spectra of FeSe@C; (b) High resolution XPS spectrum of C1s.

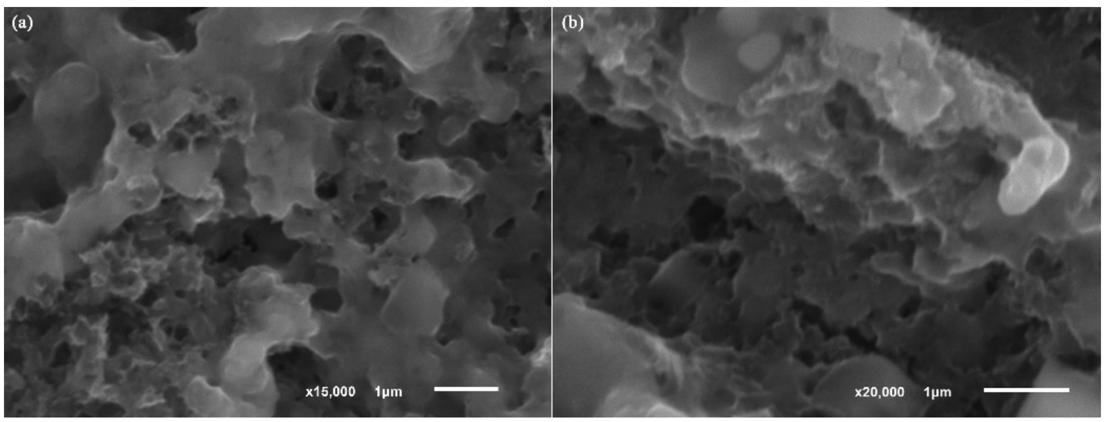

Figure S5. SEM pictures of FeSe@C after cycle.

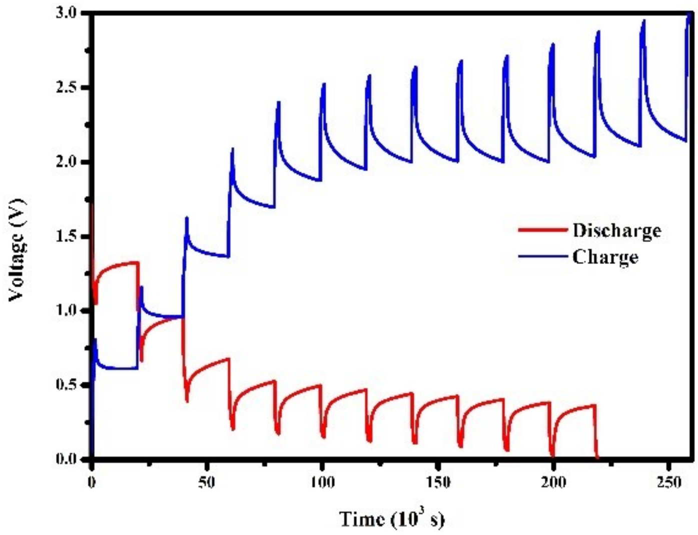

Figure S6. GITT test results of first cycle.

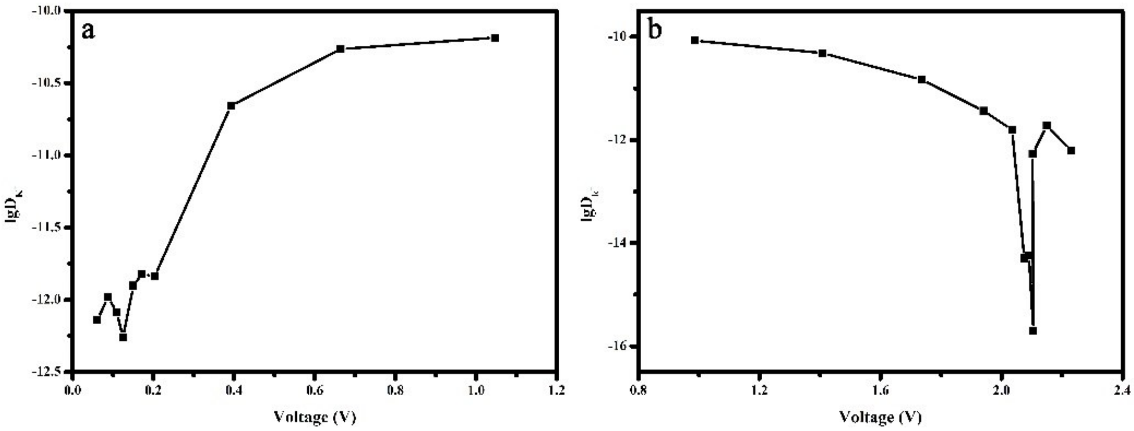

Figure S7. Potassium diffusion coefficient calculated by GITT test results: (a) discharge; (b) charge.

Table S1. Comparison of performance between FeSe@C and different anode materials of potassium ion batteries.

Materials	Specific Capacity /mAh g^{-1}	Current Density /mA g^{-1}	Cycles /n	Ref.
$K_2Ti_8O_{17}$	110.7	20	50	[1]
MoO_2/rGO	104.2	500	500	[2]
T-Nb_2O_5	104	400	400	[3]
Co_3O_4-Fe_2O_3/C	220	50	50	[4]
$K_{0.25}TiS_2$	151.1	24	120	[5]
VS_2 NSA	410	100	60	[6]
2H-MoS_2	64	20	200	[7]
$MoSe_2$/C	226	1000	1000	[8]
WS_2	56.6	5	100	[9]
G@p-FeS_2@C	503	1000	100	[10]
	207(rGO@C)	1000	100	
CPL-CuSe	337	200	40	[11]
FeSe@C	298.5	500	200	This work

Reference

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