

Supplementary Information

High capacity potassium-ion battery anodes based on black phosphorus

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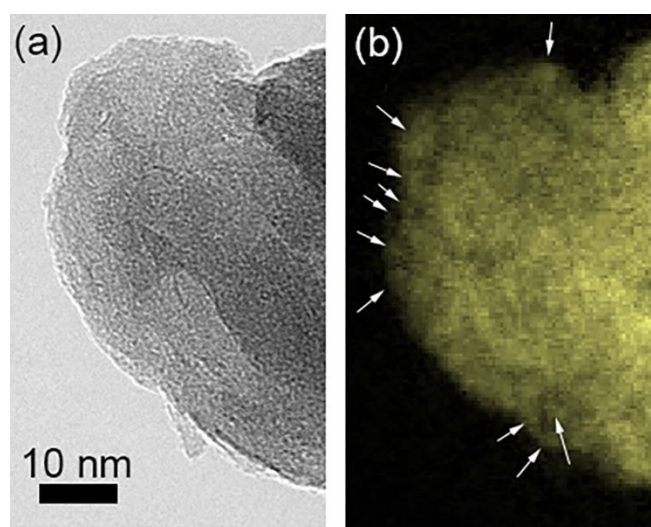


Fig. S1 Energy-filtered images of a thin edge in the specimen: (a) elastic image; (b) P map.

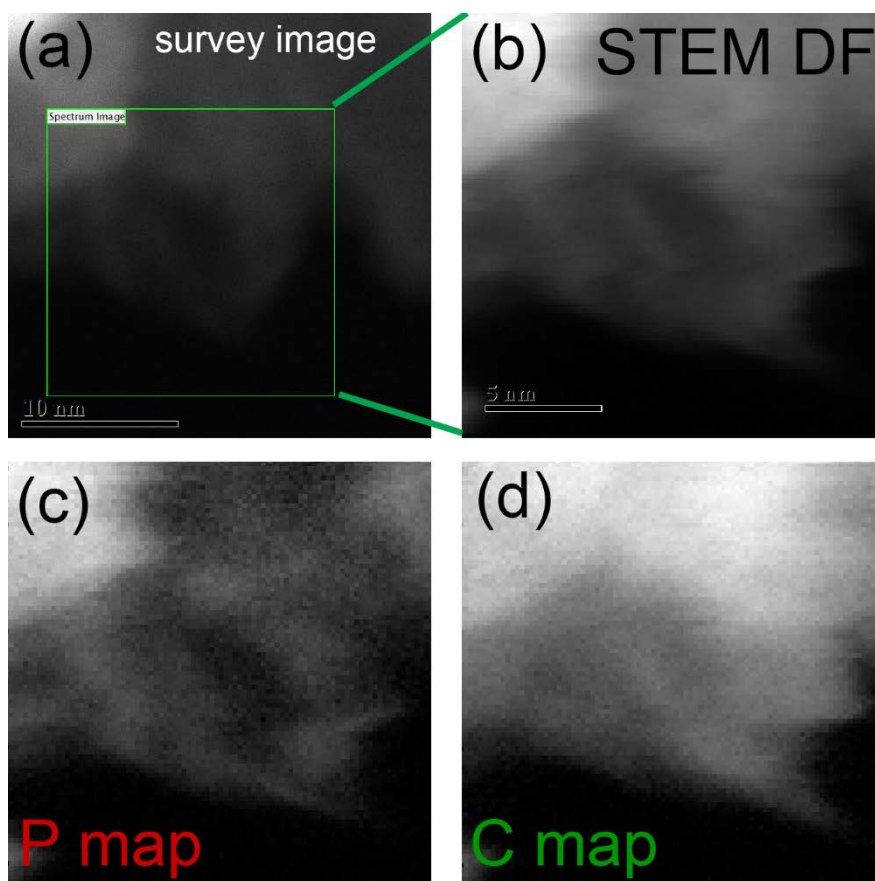


Fig. S2 STEM-EELS spectrum imaging of a thin area in the specimen (BP-C 1:1): (a) survey image; (b) dark-field STEM image of the area of interest; (c, d) P and C maps extracted from the data cube.

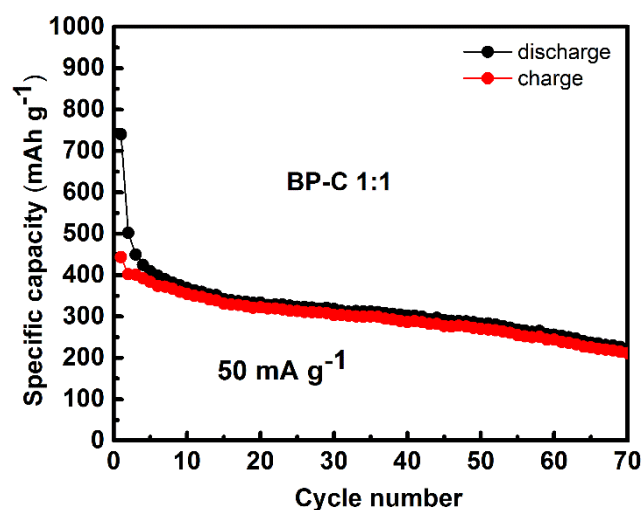


Fig. S3 Cyclic stability of BP-C 1:1 sample in the potential window of 2-0.01 V vs K/K⁺

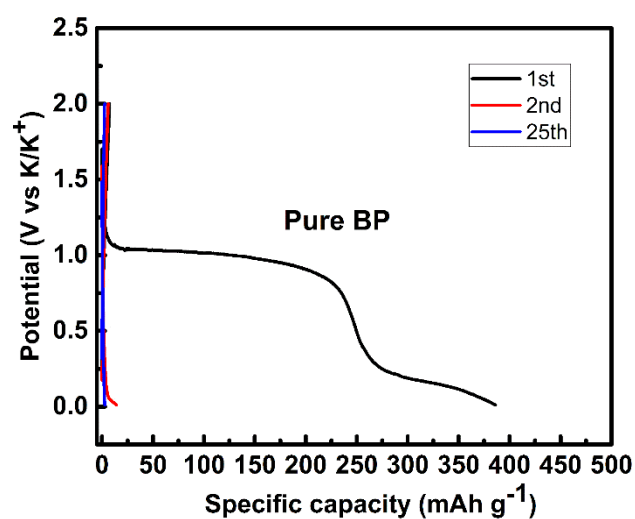


Fig. S4 Charge-discharge profiles of black phosphorus material synthesized by ball milling of red phosphorus. The testing current is 10 mA g⁻¹.

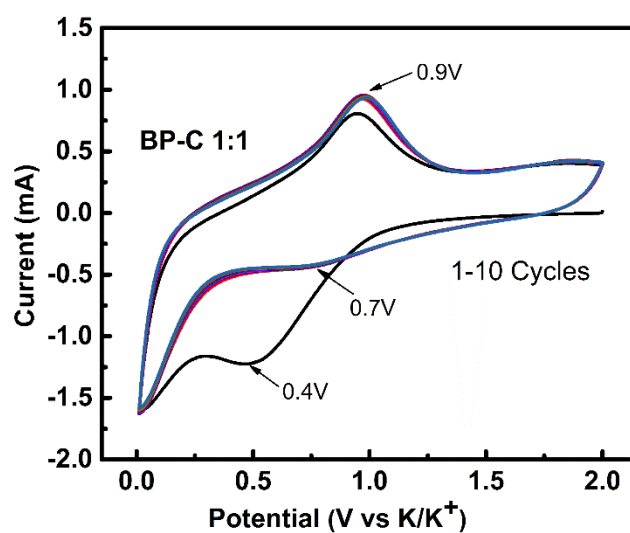


Fig. S5 CV curves of an electrode assembled with BP-C 1:1. The test was performed at a scan rate of 0.5 mV s^{-1} within a potential range of 0.01-2.0 V vs K/K⁺.

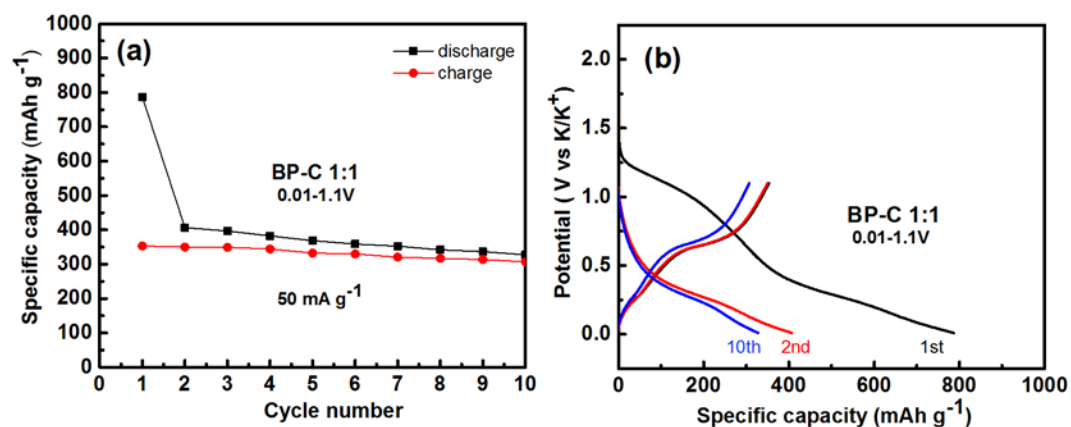


Fig. S6 Preliminary cycling results for sample BP-C 1:1 in the potential window of 1.1 – 0.01 V vs K/K⁺

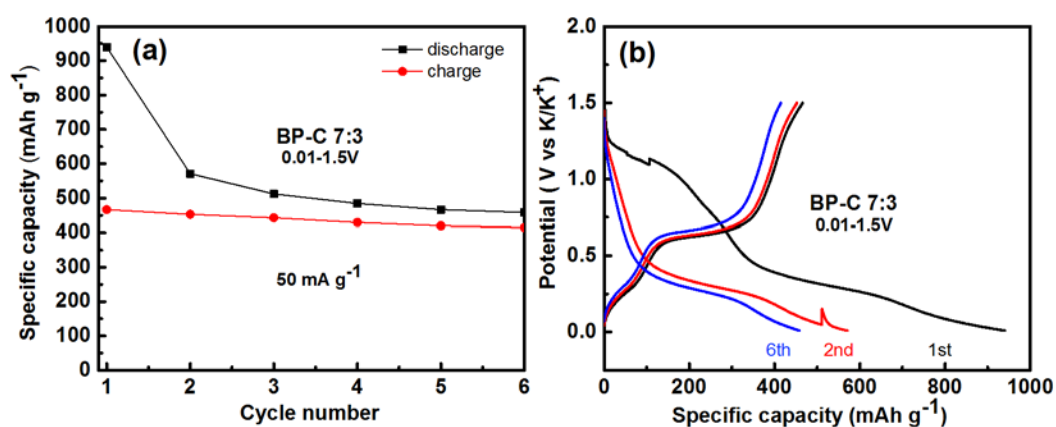


Fig. S7 Preliminary cycling results for sample BP-C 7:3 in the potential window of 1.5 – 0.01 V vs K/K⁺

Table S1. Capacities of BP-C 1:1 and 7:3 electrodes cycled in full and restricted potential windows

BP-C 1:1 (0.01-2V)			BP-C 1:1 (0.01-1.1V)		
Cycle number	Discharge capacity	Charge capacity	Cycle number	Discharge capacity	Charge capacity
1	740.1	433.2	1	786.7	353.0
2	502.2	402.2	2	406.5	349.9
10	363.6	354.4	10	363.6	354.4
Charge capacity stability after 10th cycle 81%			Charge capacity stability after 10th cycle 87%		
BP-C 7:3 (0.01-2V)			BP-C 7:3 (0.01-1.5V)		
Cycle number	Discharge capacity	Charge capacity	Cycle number	Discharge capacity	Charge capacity
1	917.6	616.8	1	940.1	466.3
2	649.2	592.5	2	571.1	452.8
6	557.6	525.8	6	458.5	414.9
Charge capacity stability after 6th cycle 85%			Charge capacity stability after 6th cycle 90%		

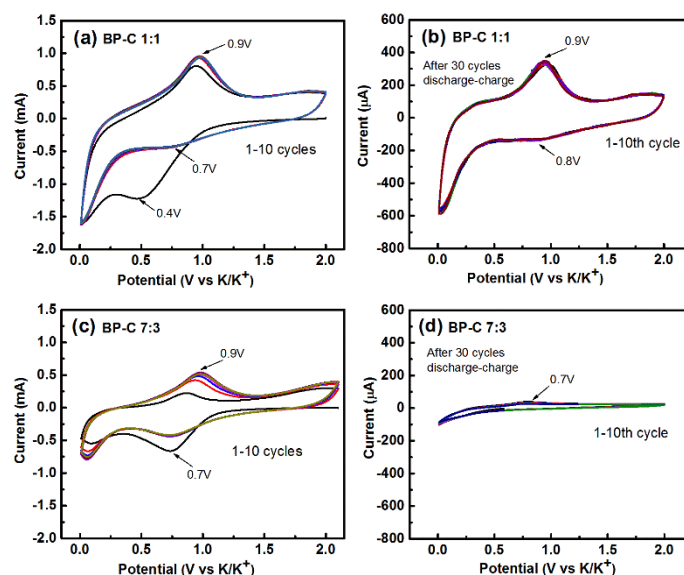


Fig S8 Cyclic voltammetry curves of BP-C 1:1 and 7:3 electrodes before (a,c) and after performing 30 discharge-charge cycles in the potential range of 2-0.01 V vs K/K^+ (b,d)