Supporting Information

High Pseudocapacitance Boosts Monolithic Porous Carbon Cloth/Closely Packed TiO_2 Nanodots as Anode of All-Flexible Sodium Ion Battery

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The calculation of capacitive contribution

The capacitive and diffusion-controlled capacity can be calculated by the following equation:[1-4]

$$I(V) = k_1 v + k_2 v^{1/2} \quad (1)$$

where k_1 and k_2 are the capacitive and the diffusion-controlled constants for the total

capacity at a particular voltage respectively, while v is the sweep rate. To obtain k_1 and k_2, the CV curves at different scan rate (0.2, 0.4, 0.6, 0.8, 1, 3, 5 and 8 mV s^{-1}) are collected. During the potential range from 0.13 to 3.0 V, the current values of eight CV curves at the interval of every 0.05 V (such as 3.00, 2.95 and 2.90 V) are recorded. A set of current values (eight) at a particular potential and scan rates (v) are substituted in equation (1). We can get the values of k_1 and k_2 and capacitive capacity (k_1v) at this potential. At same scan rate, the ratio of the area consisting of all k_1v at the interval of every 0.05 V and CV curves area is the percentage of capacitive contribution.

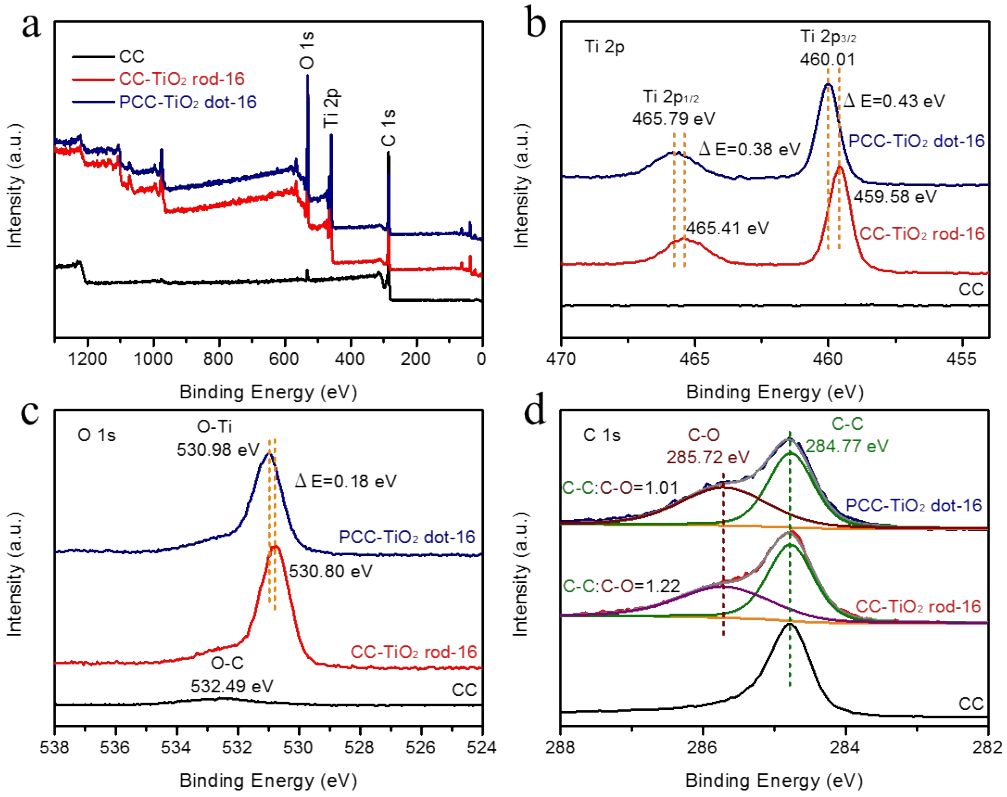

Figure S1. (a) XPS survey, (b) Ti 2p, (c) O 1s and (d) C 1s spectra of CC and CC-TiO_2 rod-16 and PCC-TiO_2 dot-16.

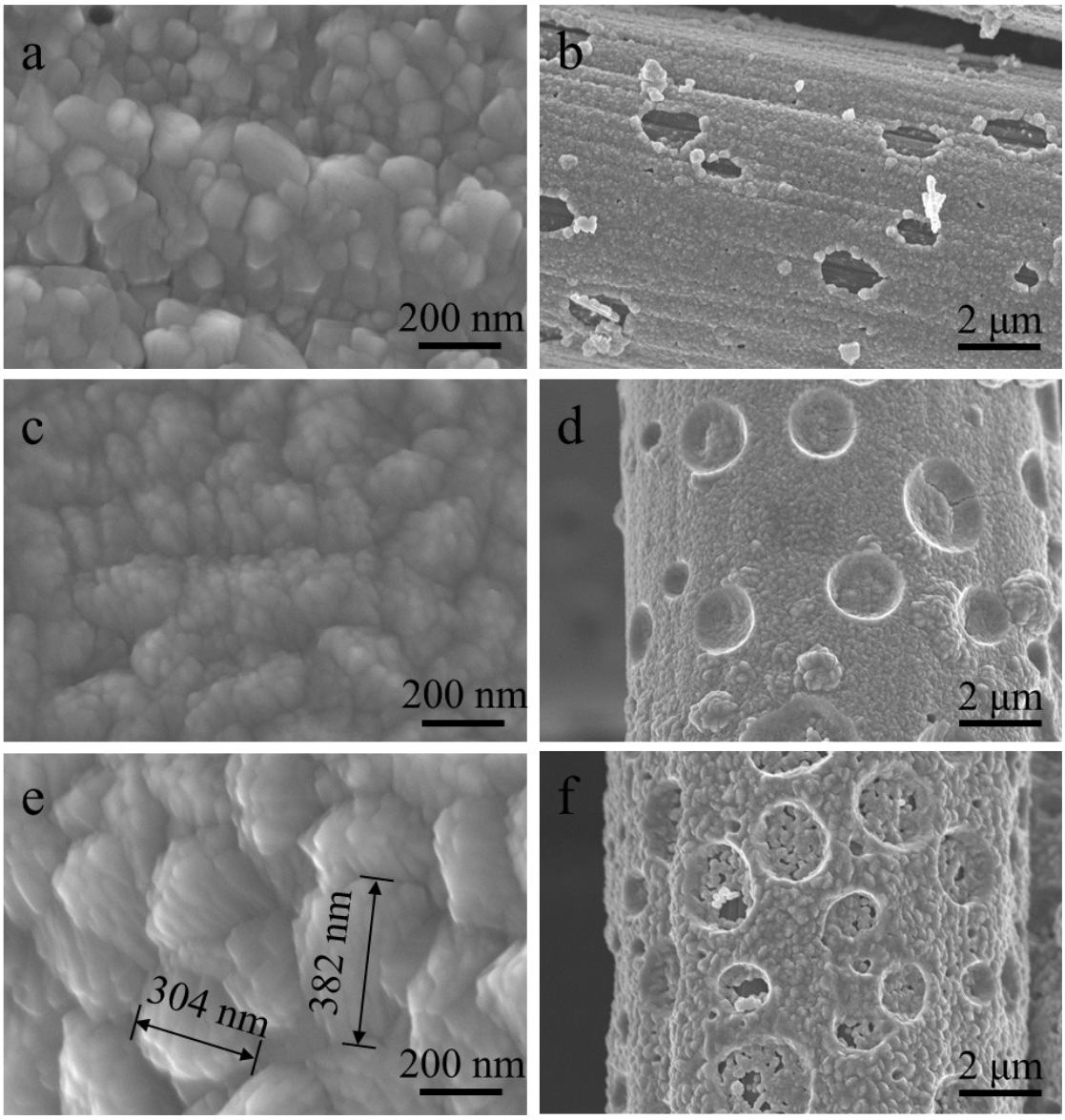

Figure S2. SEM images of (a,b) PCC-TiO_2 dot-8, (c,d) PCC-TiO_2 dot-12 and (e,f) PCC-TiO_2 dot-20.

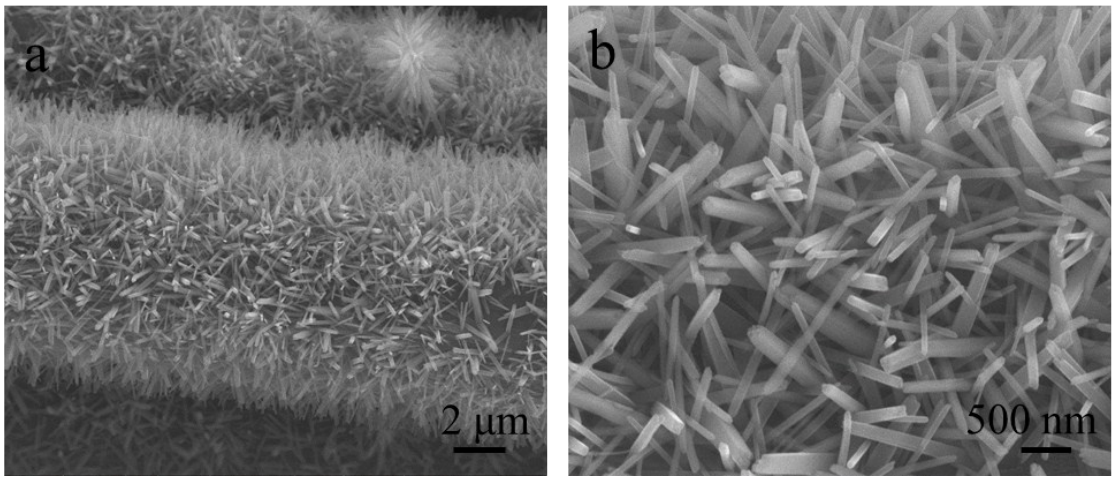

Figure S3. SEM images of CC-TiO_2 rod-16.

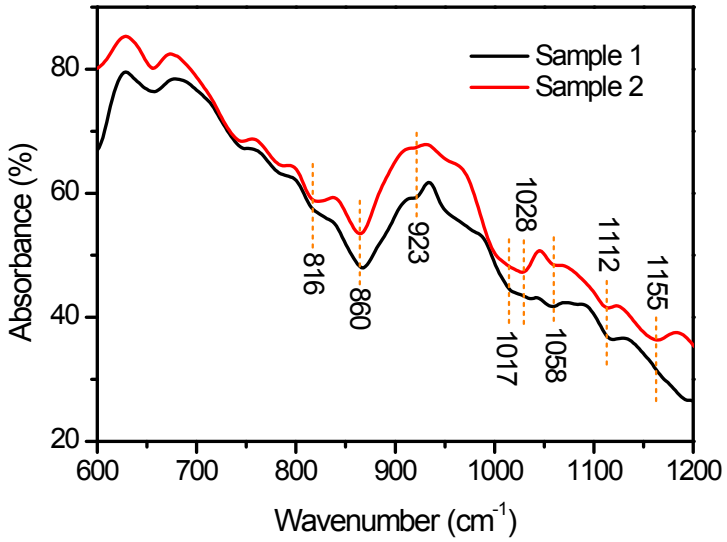

Figure S4. FTIR spectra of polybutylene.

Polybutylene can be obtained by collecting the solid after hydrothermal reaction. In FTIR spectra (Fig. S4), the characteristic peaks at 816, 860, 923, 1017, 1028, 1058, 1112 and 1155 cm^{-1} are assigned to polybutylene.[5-8] The peak at 923 cm^{-1} is ascribed to the CH_2 and CH_3 rocking vibrations of polybutylene.[5-8] The peak at 1155 cm^{-1} corresponds to the backbone CH_2 bending vibrations and C-C covalent-bond vibrations of polybutylene.[5-8] While the undefined peaks reflect the generation of side product.

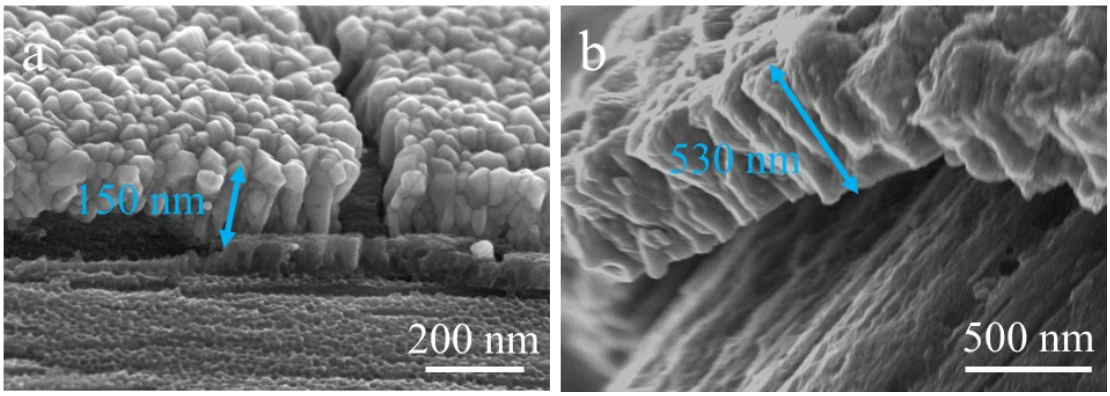

Figure S5. Cross section SEM images of (a) PCC-TiO_2 dot-4 and (b) PCC-TiO_2 dot-16.

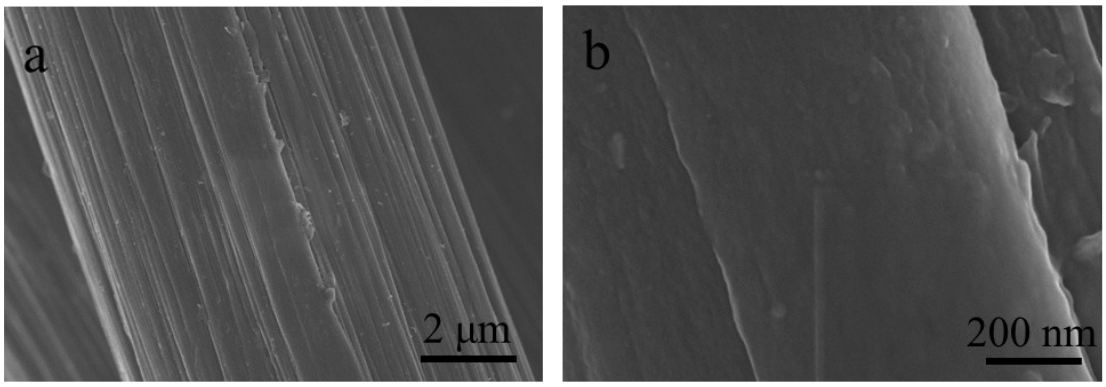

Figure S6. SEM images of CC.

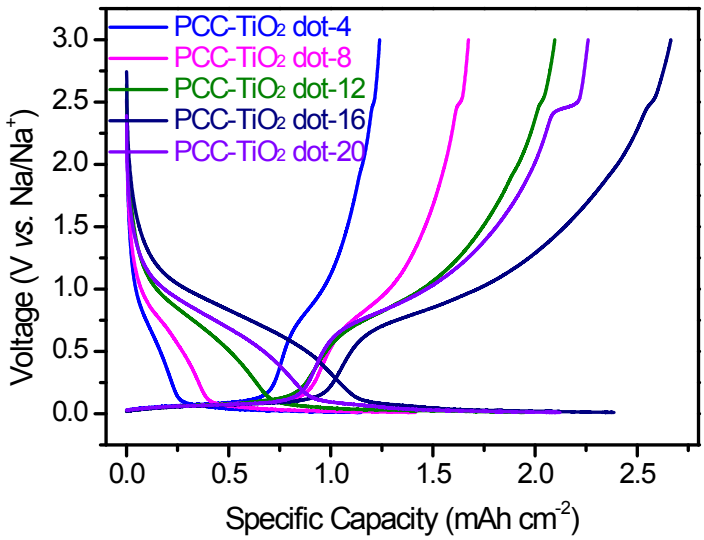

Figure S7. Charge-discharge curves of PCC-TiO_2 dot-4, PCC-TiO_2 dot-8, PCC-TiO_2 dot-12, PCC-TiO_2 dot-16, PCC-TiO_2 dot-20.

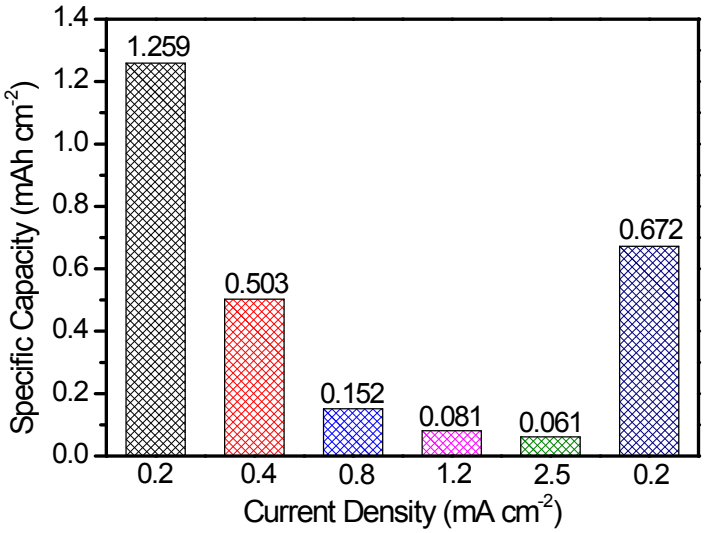

Figure S8. Discharge capacities of PCC in PCC-TiO_2 dot-16 at different current densities.

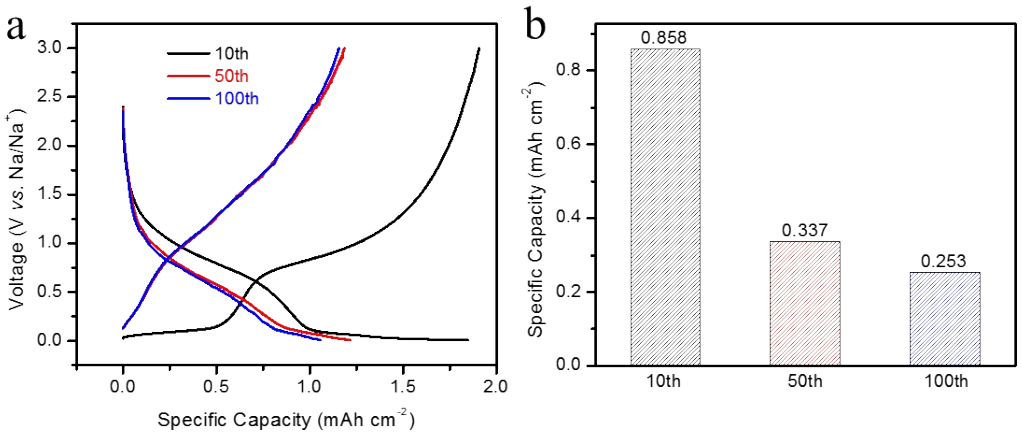

Figure S9. (a) Charge-discharge curves of PCC-TiO_2 dot-16 at current density of 0.2 mA cm^{-2} and (b) discharge capacities of PCC in PCC-TiO_2 dot-16 at 10th, 50th, 100th cycles.

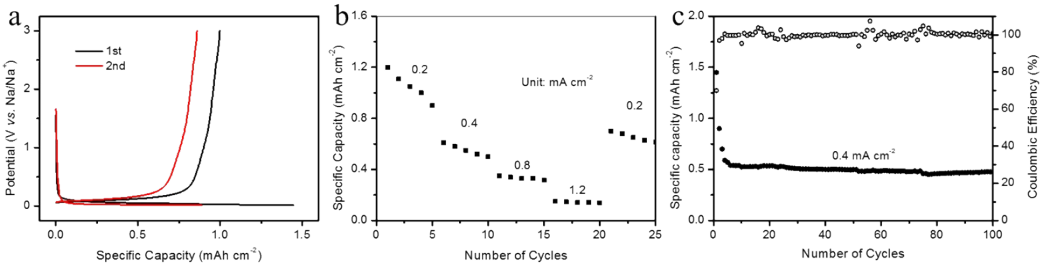

Figure S10. (a) Charge-discharge curves, (b) rate capability and (c) cycling performance of PCC.

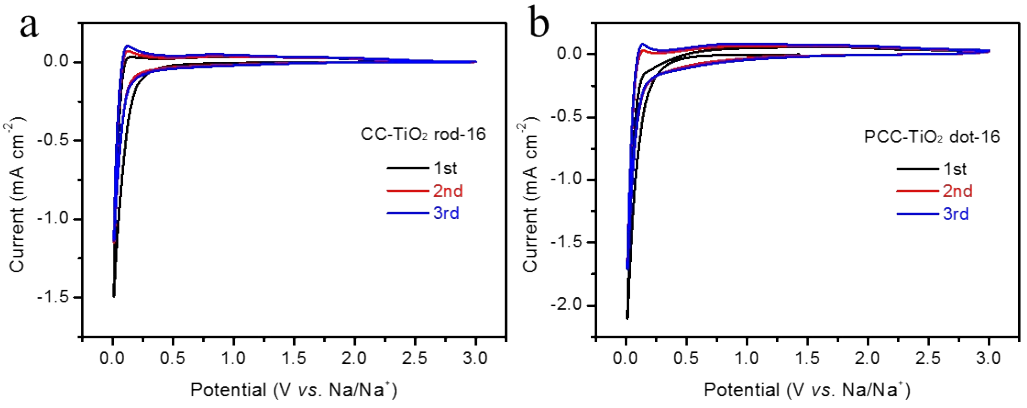

Figure S11. CV curves of (a) CC-TiO_2 rod-16 and (b) PCC-TiO_2 dot-16 with a scan rate of 0.1 mV s^{-1}.

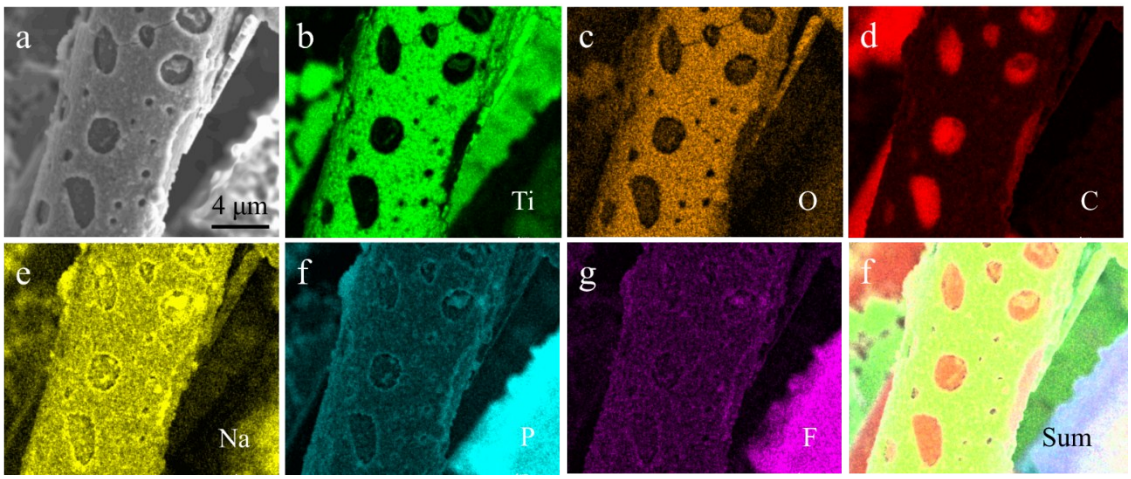

Figure S12. Elemental mappings of PCC-TiO_2 dot-16-after.

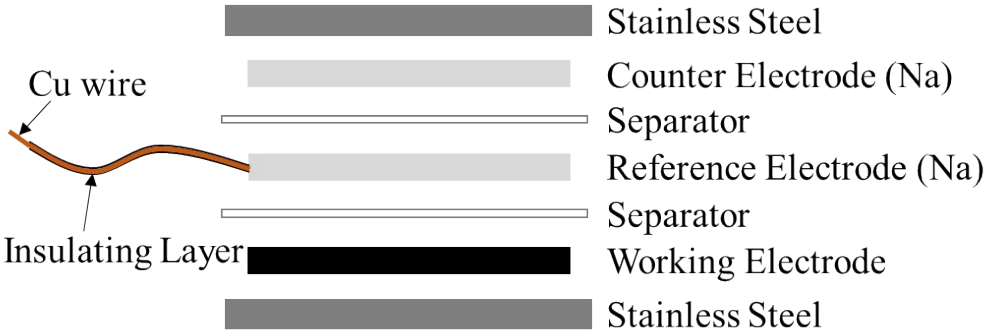

Figure S13. Schematic diagram of a three-electrode cell.

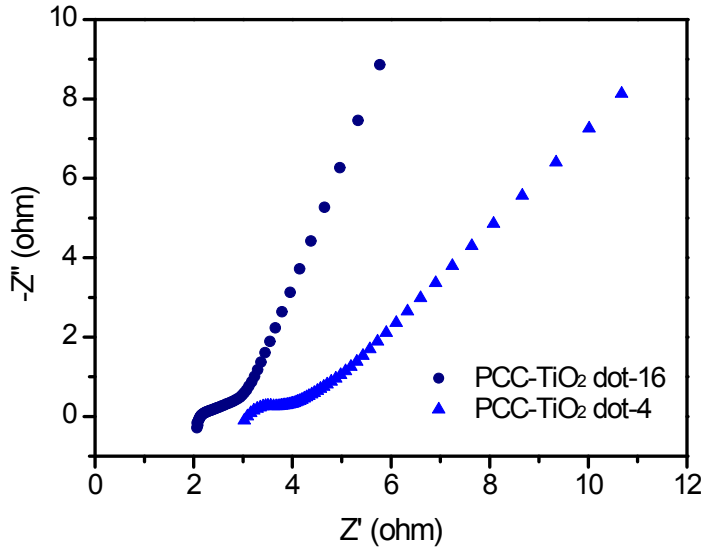

Figure S14. Nyquist spectra of PCC-TiO_2 dot-4 and PCC-TiO_2 dot-16 after 5cycles.

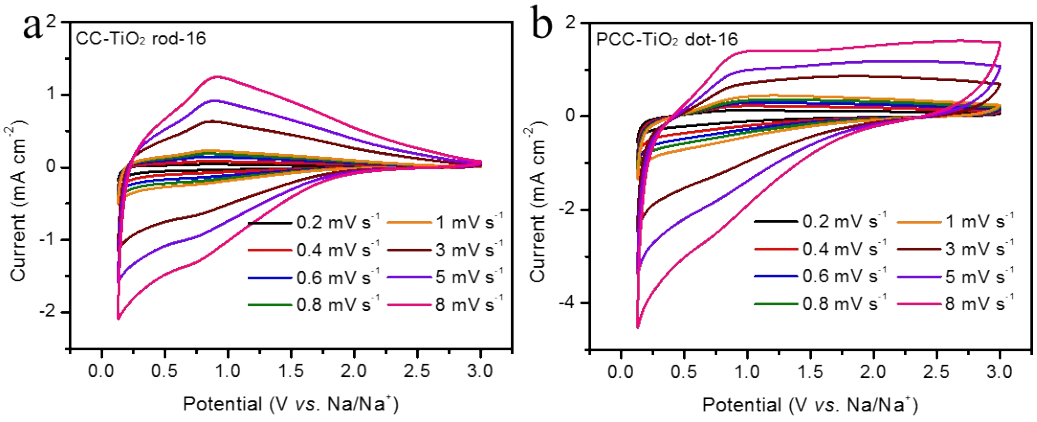

Figure S15. CV curves of CC-TiO_2 rod-16 and PCC-TiO_2 dot-16.

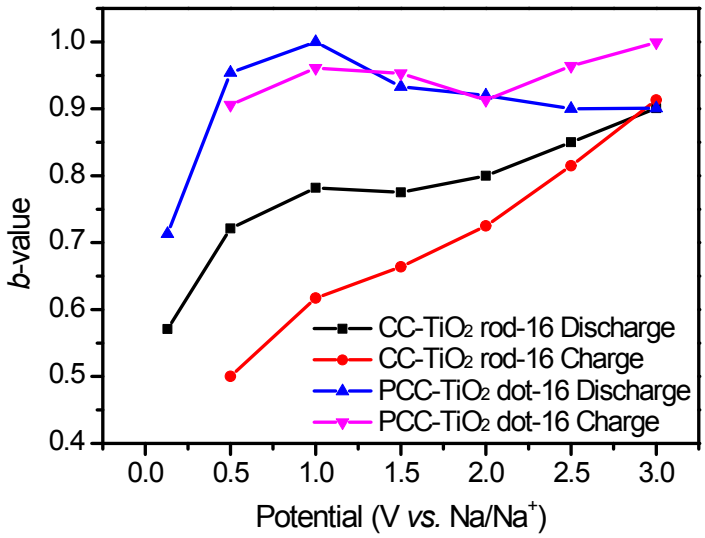

Figure S16. *b* values of the electrode at different SOC.

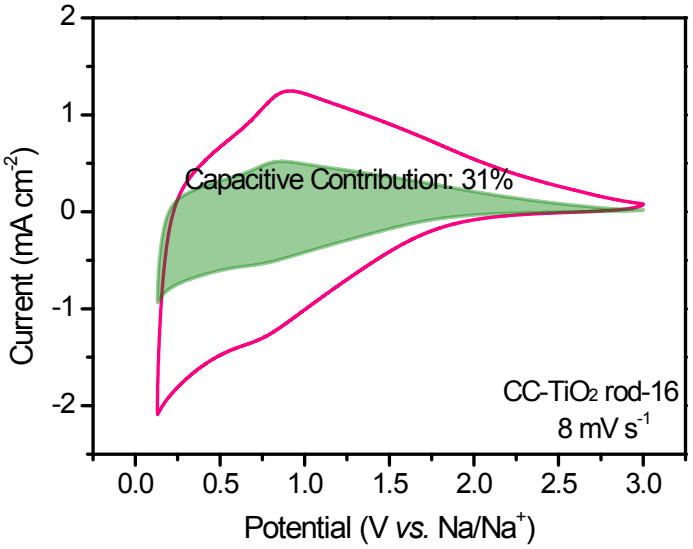

Figure S17. Quantitative analysis of capacitive contribution of CC-TiO_2 rod-16.

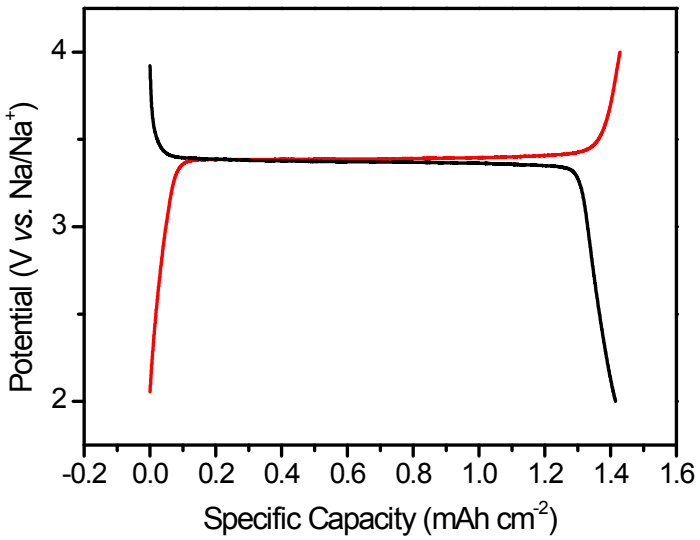

Figure S18. Charge-discharge curves of CC-NVPO.

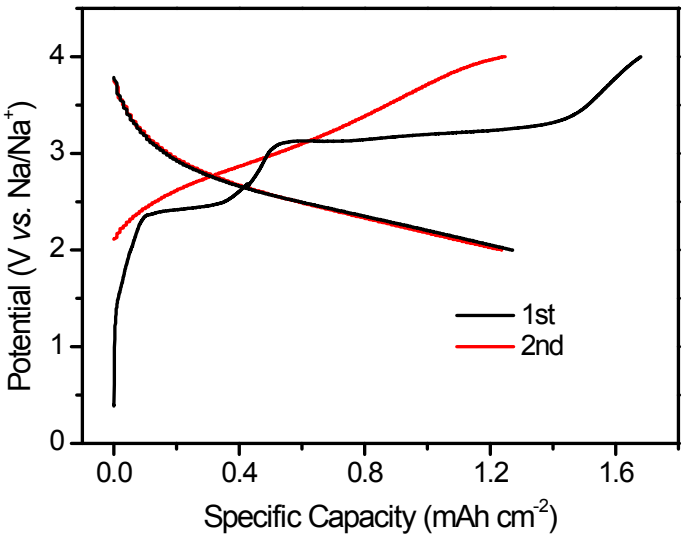

Figure S19. Charge-discharge curves of CC-NVPO || PCC-TiO_2 dot-16 full cell.

References

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