# Supplementary Information

## A Phenazine-Based Organic Polymer for Long-Life Sodium Storage

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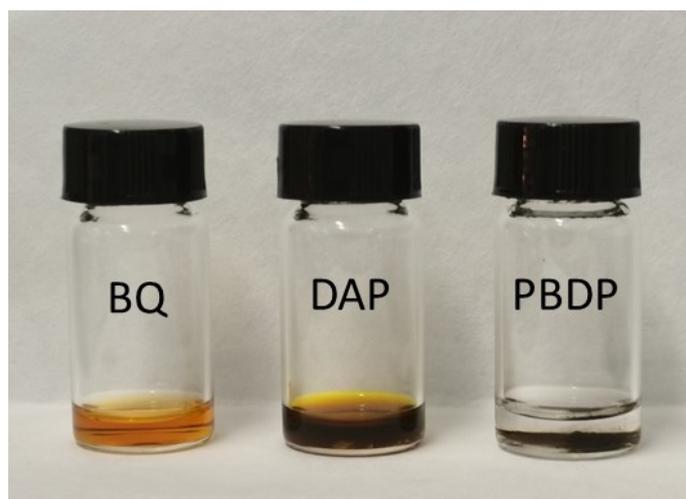
E-mail: qypan@hbnu.edu.cn(Dr. Qiyun Pan)

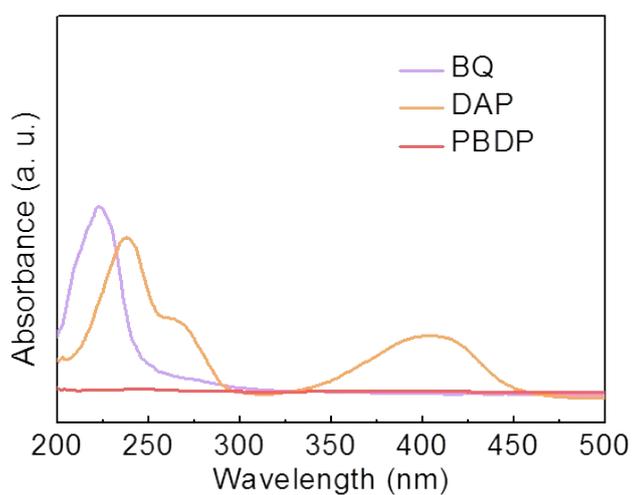Fig. S1 Optical images of BQ, DAP and PBDP dissolved in electrolyte.



Fig. S2 The comparison of UV-vis spectra of BQ, DAP and PBDP in electrolyte.
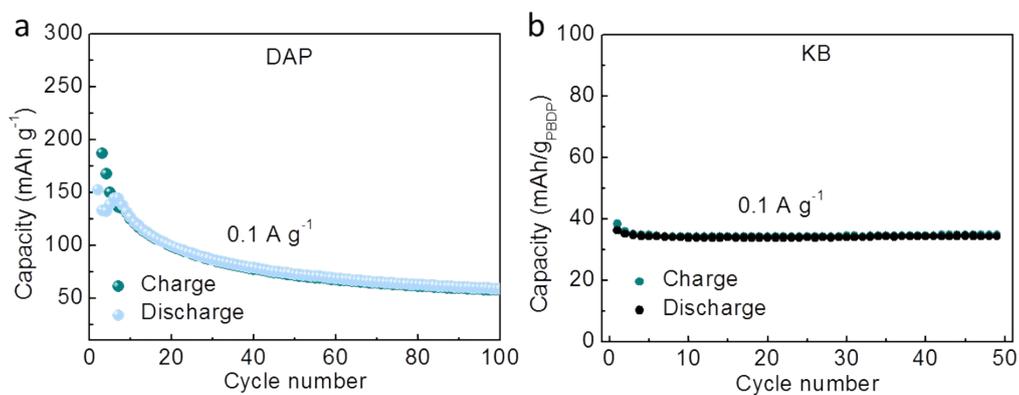


Fig. S3 a) Cycle performances of DAP electrode at 0.1 A g$^{-1}$. b) Cycle performances of the KB at the current density of 0.1 A g$^{-1}$ (mass based on average loading of PBDP).
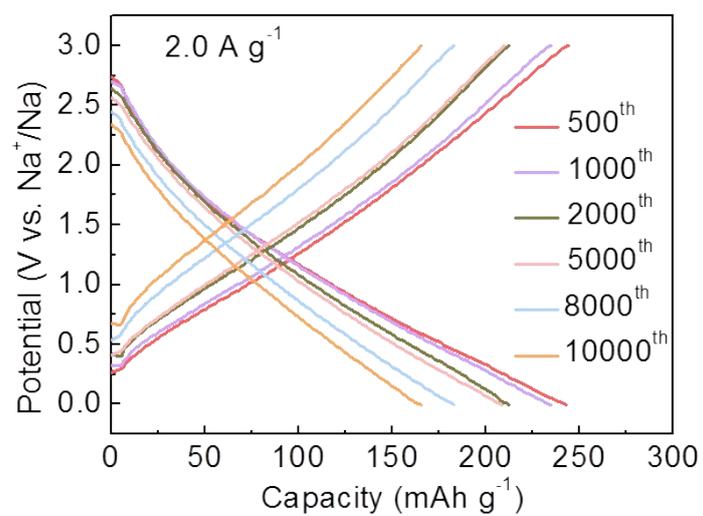
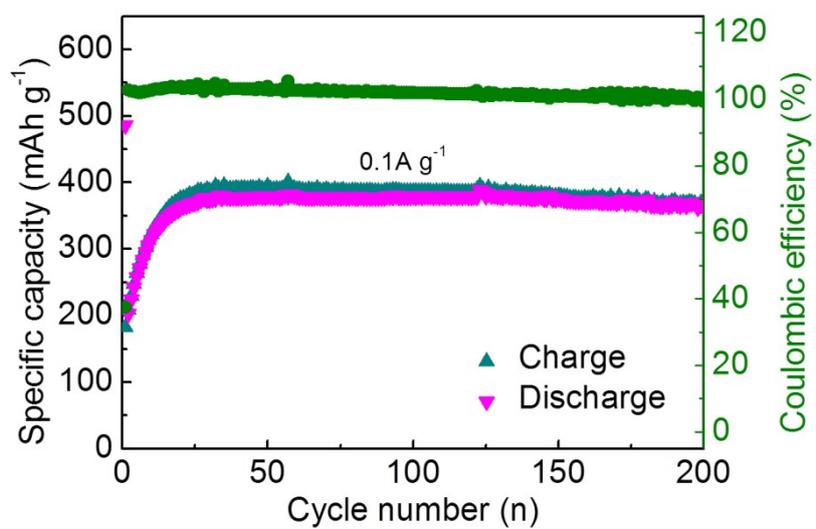Fig. S4 Galvanostatic discharge-charge curves for PBDP at 2.0 A g$^{-1}$.



Fig. S5 Cycling performance of PBDP electrode at the current density of 0.1 A g$^{-1}$.
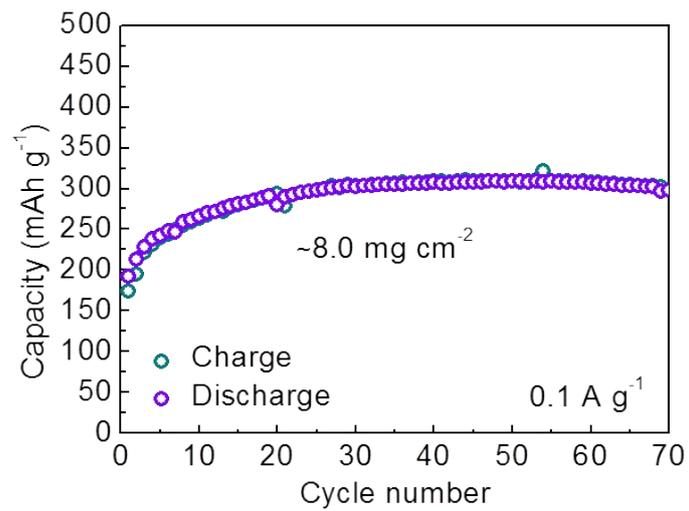
Fig. S6 Cycling performance at high mass loading of ~8.0 mg cm$^{-2}$.



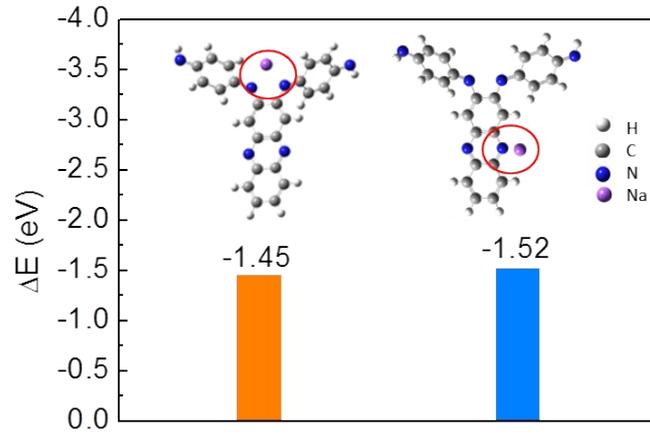Fig. S7 Optical image of separator after cycled.
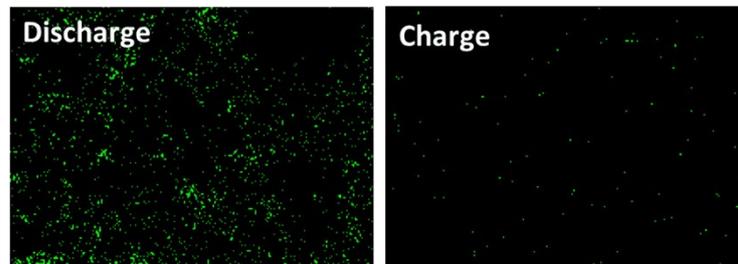
Fig. S8 DFT calculations of binding energy.



Fig. S9 Na elemental mapping of PBDP electrodes at different states.
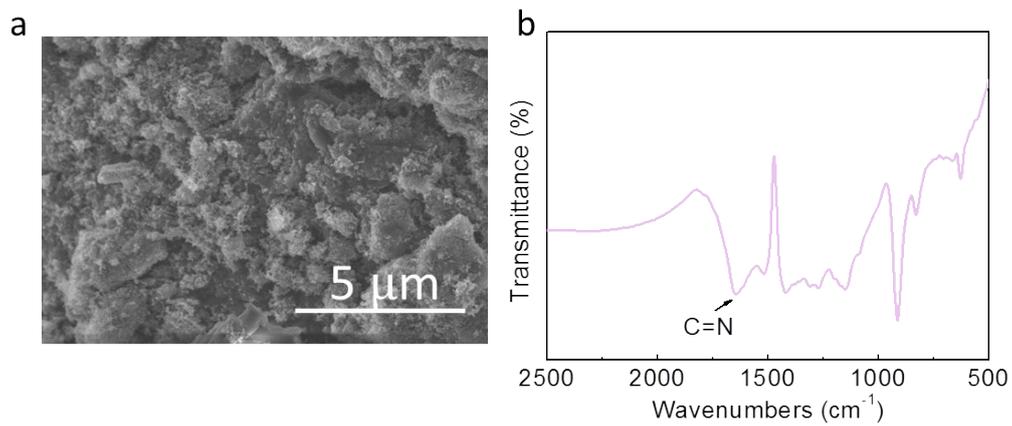


Fig. S10 a) SEM image and b) FTIR curve of PBDP after cycling.

Table S1 Comparison of representative organic anode materials in SIBs.

| Materials | Capacity (mA g⁻¹, mAh g⁻¹) | Cycle | Rate (mA g⁻¹, mAh g⁻¹) | Active mass loading (mg cm⁻²) | Conductive agent (type, content) | Ref. |
|---|---|---|---|---|---|---|
| PPD | 50, 413 | 100 mA g⁻¹, 100 cycles, 48% | 1000, 112.2 | - | Ketjen Black, 30 wt% | [1] |
| Na-NDC | 25, 248 | 20 mA g⁻¹, 400 cycles, 80% | 500, 205 | 1.55 | Super C65, 30 wt% | [2] |
| DFTP-Na | 20, 236 | 1000 mA g⁻¹, 1000 cycles, 79% | 5000, 81 | 1.5 | Carbon black, 30 wt% | [3] |
| TBC | 50, 191 | 50 mA g⁻¹, 600 cycles, 70% | 400, 53 | 1.5 | Carbon black, 30 wt% | [4] |
| TFPB-TAPT | 30, 245 | 30 mA g⁻¹, 500 cycles, 50% | 200, 145 | 1.65 | - | [5] |
| Na-CPP | 18.7, 213 | 935 mA g⁻¹, 1200 cycles, 89.9% | 1870, 159.8 | 1.2-1.6 | Super P, 20 wt% | [6] |
| Na4PTC | 50, 130 | 2000 mA g⁻¹, 20000 cycles, 95% | 5000, 100 | 1-2 | Super P, 20 wt% | [7] |
| HHTP-TABQ | 100, 459 | 5000 mA g⁻¹, 1000 cycles, 84.5% | 5000, 148 | - | carbon nanotubes, 40 wt% | [8] |
| CityU-33 | 100, 410 | 200 mA g⁻¹, 2000 cycles, 97% | 2000, 195 | 0.5 | Ketjen Black, 30 wt% | [9] |
| **PBDP** | **50, 385** | **2000 mA g⁻¹, 10000 cycles, 70%** | **5000, 93** | **1-2** | **Ketjen Black, 30 wt%** | **This work** |

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