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# Supplementary Information

## Preparation of Bacterial Cellulose Based Nitrogen-doped Carbon Nanofibers and Their Applications in Oxygen Reduction Reaction and Sodium-ion Battery

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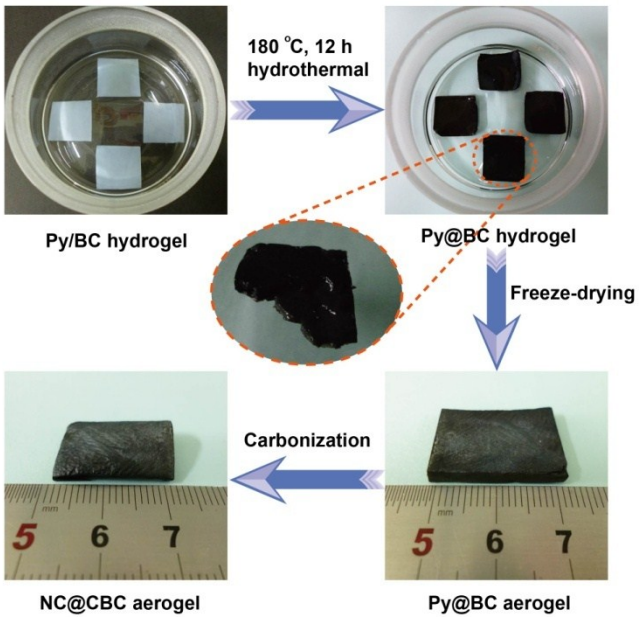


Fig. S1 Optical images showing the sample preparation involved in this work.

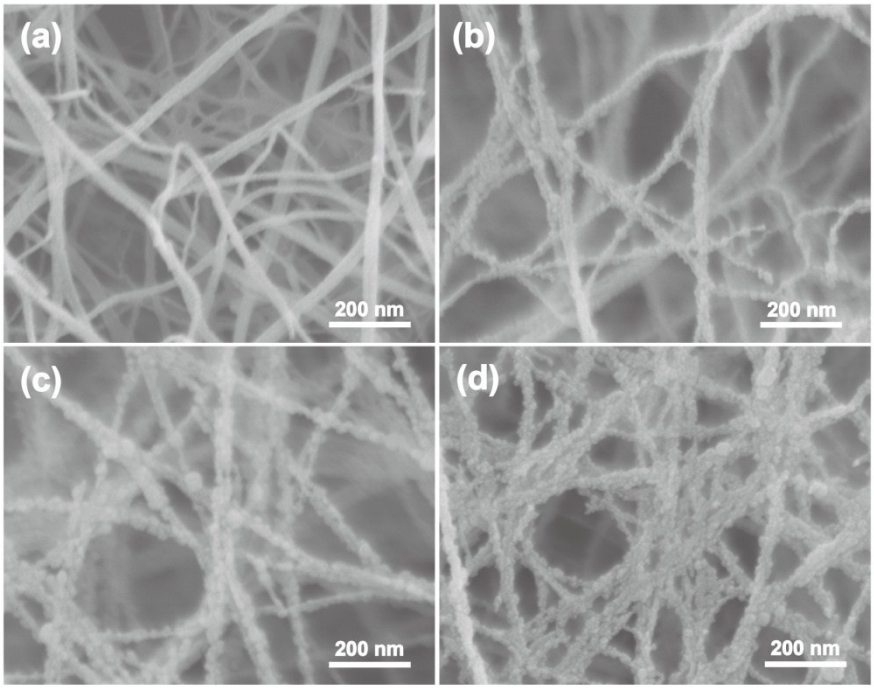


Fig. S2 Representative SEM images of (a) CBC-900, (b) NC@CBC-0.02-900, (c) NC@CBC-0.05-900, and (d) NC@CBC-0.1-900.

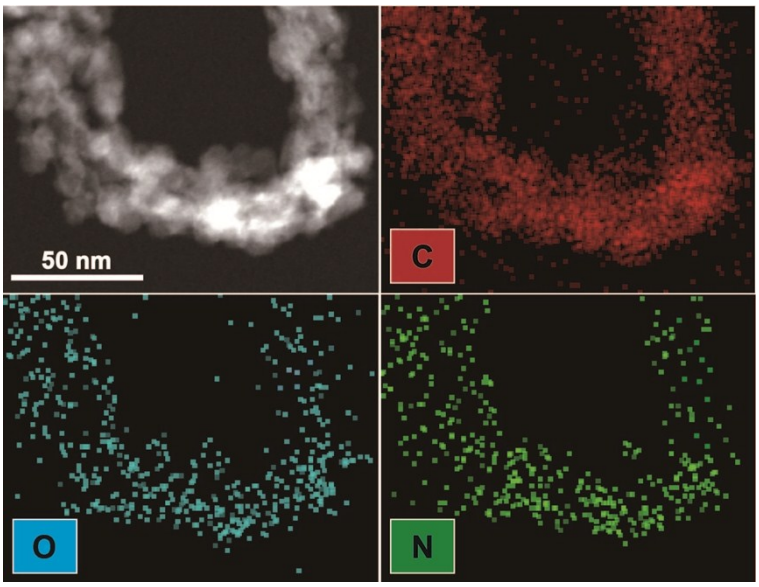


Fig. S3 STEM image of NC@CBC-0.05-900 and the corresponding elemental mapping of C (red), O (blue), and N (green).

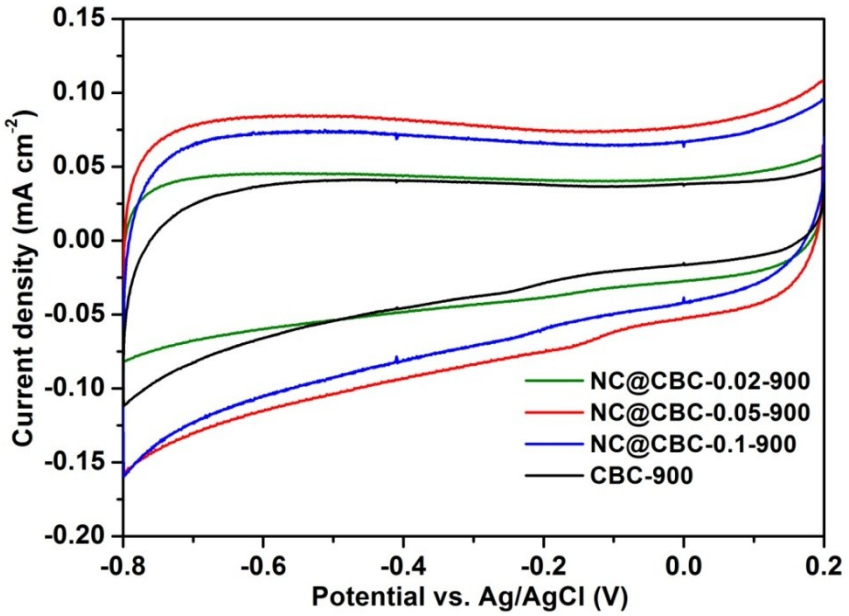


Fig. S4 CV curves of CBC-900 and NC@CBC-X-900 in $N_2$-saturated 0.1 M KOH aqueous solution at a scanning rate of 10 mV $s^{-1}$.

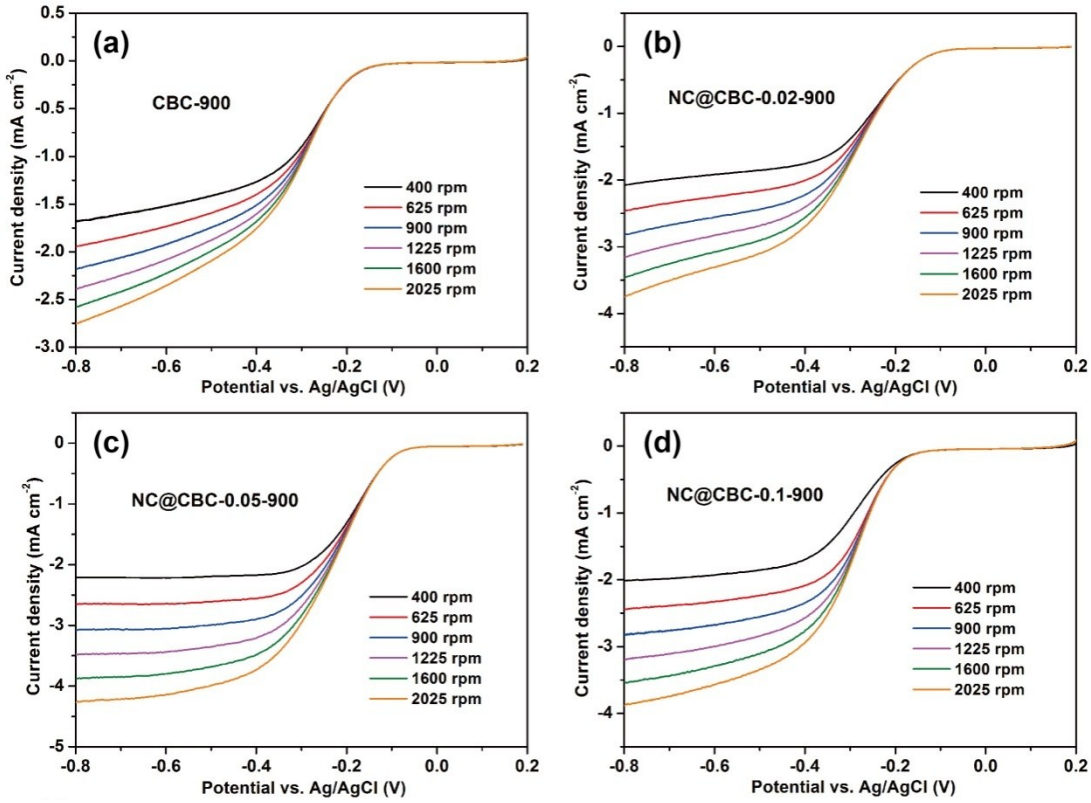


Fig. S5 LSV curves of (a) CBC-900, (b) NC@CBC-0.02-900, (c) NC@CBC-0.05-900, and (d) NC@CBC-0.1-900 in $O_2$-saturated 0.1 M KOH aqueous solution obtained under different rotation rates.

Table S1 Onset potential, half-wave potential, diffusion-limiting current density ($J_L$), and kinetic current density ($J_K$) of CBC-900 and NC@CBC-X-900 derived from LSV curves obtained under a consistent rotating rate of 1600 rpm.

| Samples | Onset potential (V) | Half-wave potential (V) [a] | $J_L$ (mA cm$^{-2}$) [b] | $J_K$ (mA cm$^{-2}$) [c] |
|---|---|---|---|---|
| CBC-900 | -0.090 | -0.329 | -2.576 | 8.78 |
| NC@CBC-0.02-900 | -0.046 | -0.303 | -3.462 | 18.21 |
| NC@CBC-0.05-900 | -0.019 | -0.229 | -3.877 | 74.71 |
| NC@CBC-0.1-900 | -0.090 | -0.302 | -3.541 | 25.60 |

[a] Half-wave potential is calculated at which the current density is a half of the $J_L$

[b] $J_L$ is derived from the current density of the LSV (1600 rpm) at -0.8 V

[c] $J_K$ is calculated from the mass-transport correction of RDEwith equation: $J_K = J \times J_L/(J_L - J)$

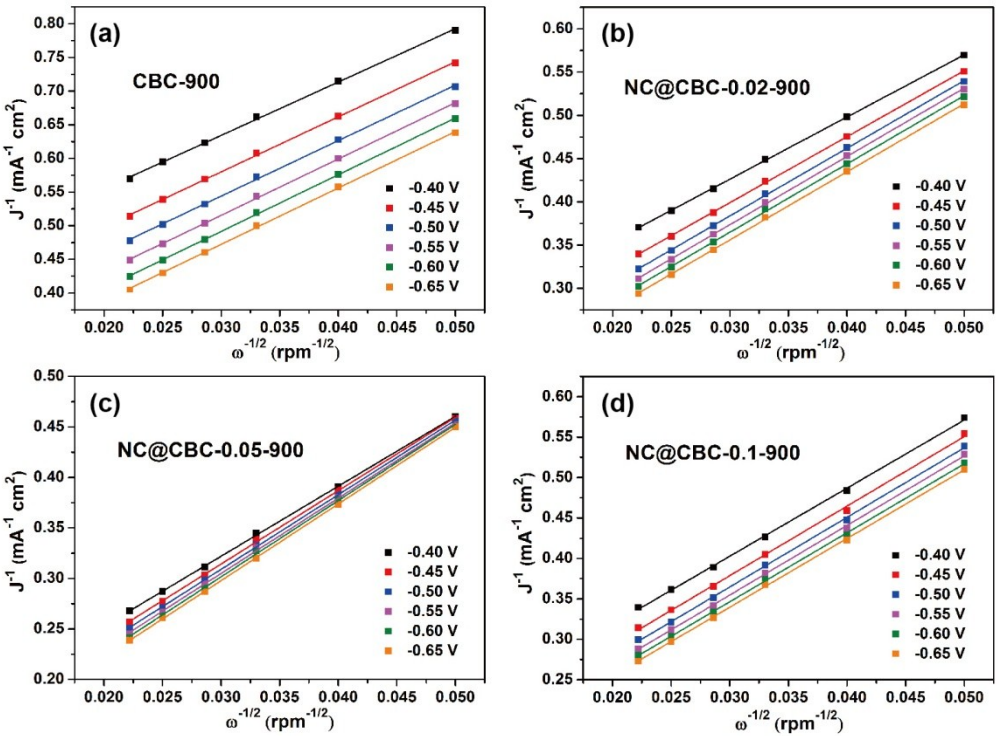


Fig. S6 K-L plots of (a) CBC-900, (b) NC@CBC-0.02-900, (c) NC@CBC-0.05-900, and (d) NC@CBC-0.1-900 at the potentials ranging from -0.65 to -0.40 V (*vs.* Ag/AgCl).

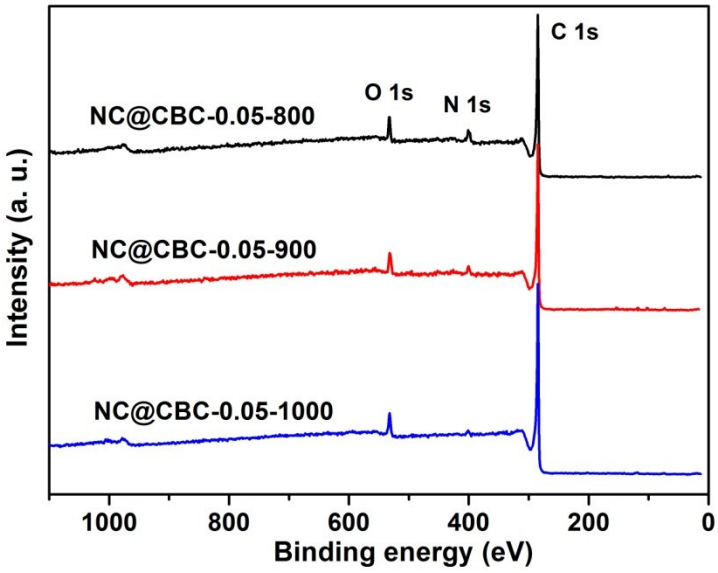


Fig. S7 XPS survey spectra of NC@CBC-0.05-800, NC@CBC-0.05-900, and NC@CBC-0.05-1000.

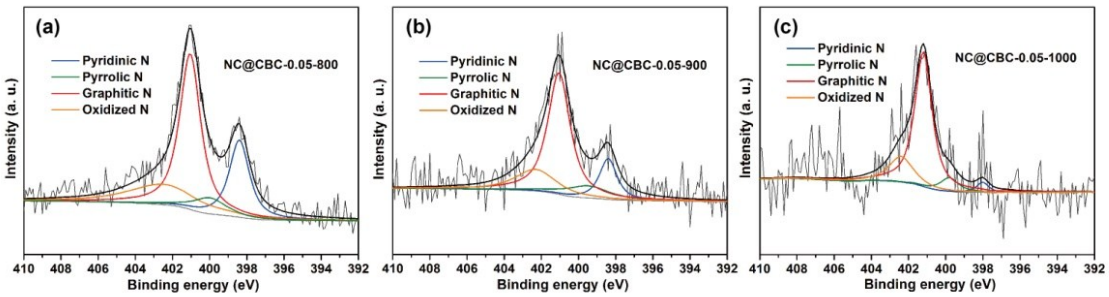


Fig. S8 XPS N1s spectra of (a) NC@CBC-0.05-800, (b) NC@CBC-0.05-900 and (c) NC@CBC-0.05-1000.

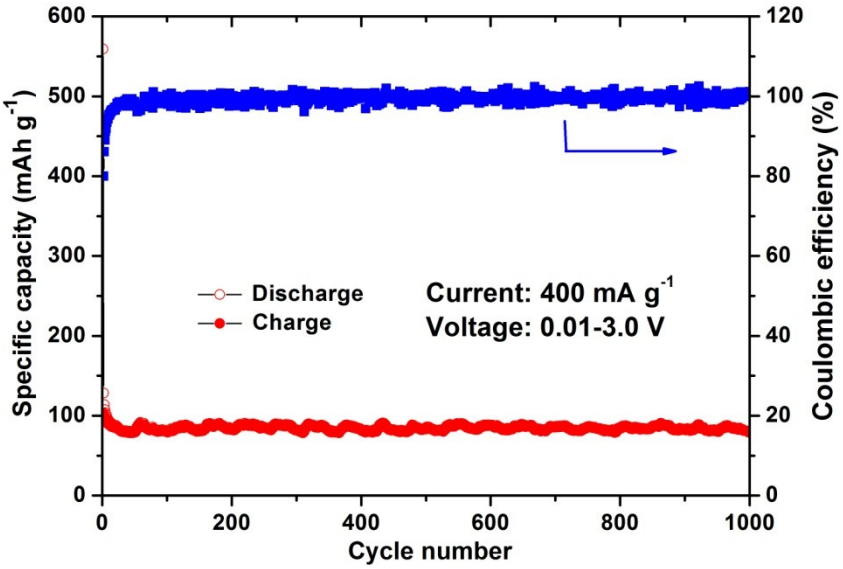


Fig. S9 Long-term cycle performance of CBC-900 as anode in SIBs at a current density of 400 mA $g^{-1}$.

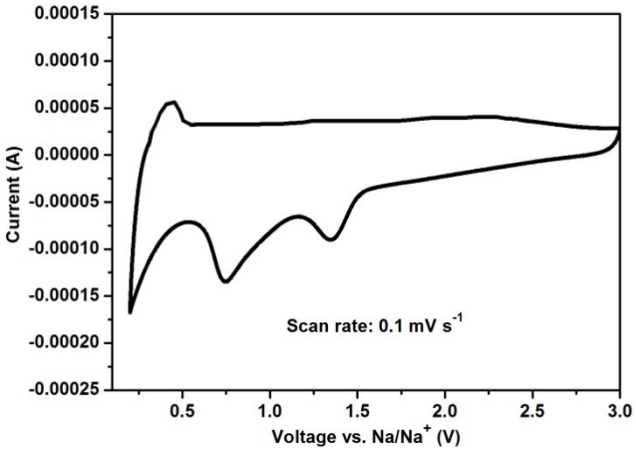


Fig. S10 The first CV cycle of NC@CBC-0.05-900 as anode in SIBs at a scan rate of 0.1 mV $s^{-1}$.

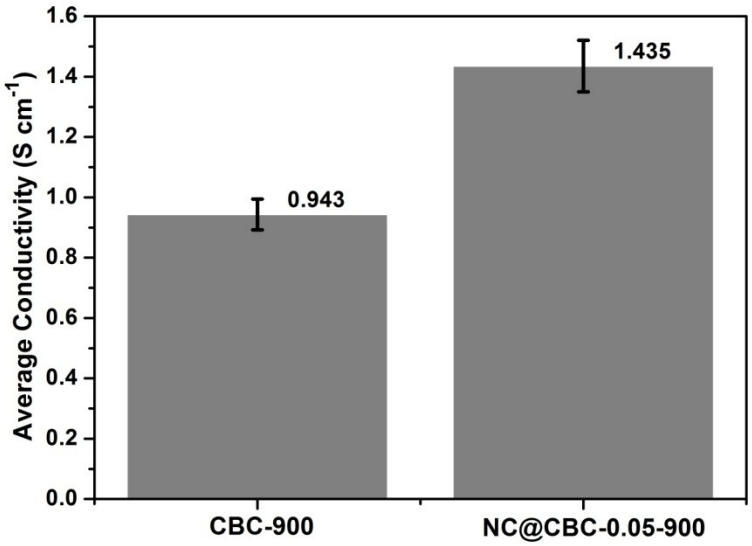


Fig. S11 Comparison of conductivity between CBC-900 and NC@CBC-0.05-900.

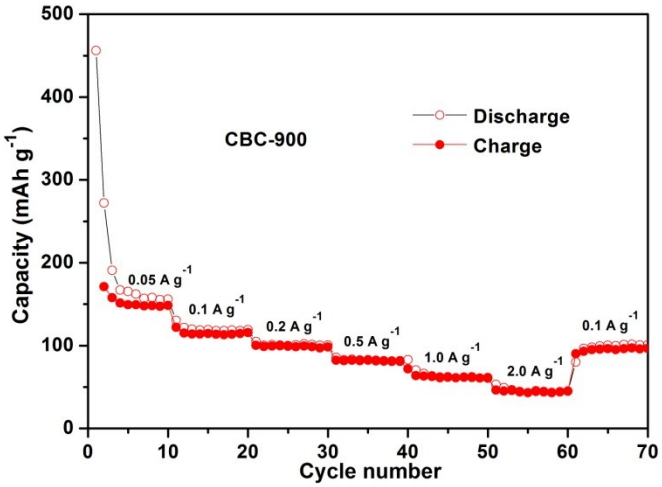


Fig. S12 Rate performance of CBC-900 electrode at various current densities.