Flexible cathode and multifunctional interlayer based on carbonized bacterial cellulose for high-performance lithium–sulfur batteries

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**Fig. S1** Bending tests of S/CBC cathode with 81 wt.% sulfur content.

**Fig. S2** (a) SEM image of the BC, (b) enlarged SEM image of the BC.
**Fig. S3** TEM image of CBC nanofibers.

**Fig. S4** SEM image of the cross section of CBC membrane.
Fig. S5 N₂ adsorption/desorption isotherms of CBC.

Fig. S6 Cycling performances of S@CBC-In when LiNO₃ additive is absent in the electrolyte.
**Fig. S7** XPS spectra of as-prepared S/CBC composite, CBC interlayer after 300 cycles at 800 mA g\(^{-1}\), and pristine CBC membrane.

Fig. S7 shows the X-ray photoelectron spectroscopy (XPS) spectra of S/CBC composite before assembling into the battery, CBC interlayer after 300 cycles, and pristine CBC membrane. The presence of sulfur in S/CBC composite and cycled CBC interlayer can be confirmed through the identification of S2s and S2p3/2 binding.\(^1\) However, the sulfur content (according to the peak area) in S/CBC composite is much lower than that of TGA results (Fig. 3c). It is attributed to the significant sublimation of surface sulfur when exposed to high-energy X-ray beam and the ultrahigh vacuum chamber of XPS apparatus.\(^2\)

For cycled CBC interlayer, the existence of sulfur signal indicates its role in acting as a fresh collector for sulfur species. In addition, all the samples exhibit a strong C1s peak and weak O1s peak, suggesting a dominant carbonaceous material with little oxygen groups.
Fig. S8 The corresponding EDS mapping of (a) S and (b) C for the region shown in Figure 7d.

As shown from Fig. S8, the signal intensity of S is much stronger than that of C, which demonstrates that a large amount of S species accumulated on the surface of S@CBC cathode.

Table S1. All the R<sub>ct</sub> values measured for S@CBC-In and S@CBC during the 300 cycles at a current density of 800 mA g<sup>-1</sup>.

<table>
<thead>
<tr>
<th>Sample</th>
<th>1</th>
<th>3</th>
<th>5</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>80</th>
<th>100</th>
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<th>160</th>
<th>180</th>
<th>200</th>
<th>250</th>
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Fig. S9 All the measured EIS plots of the batteries S@CBC-In and S@CBC after charging to 2.7 V at 800 mA g\(^{-1}\).

Reference
