Supplementary Information for:

Novel double-cathode configuration to improve cycling stability of lithium-sulfur battery

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Fig. S1 SEM images of (a) CMK-3 purchased and (b) MiPCS synthesized.

Fig. S2 XRD patterns of pristine S, CMK-3, S/CMK-3, MiPCS and S/MiPCS.
Fig. S3 Thermo-gravimetric analysis (TGA) of (a) S/CMK-3 and (b) S/MiPCS.

Fig. S4 Cycling performance of the S/MiPCS cell at 0.1C and 0.5C at 1.0–3.0 V.

Fig. S5 Electrolyte of (a) S/MiPCS and (b) S/CMK-3 cathodes collected from cycled cells at 0.2C between 1–3 V after 3 cycles. (c) Dissembled cells of S/MiPCS and S/CMK-3.

Three S/CMK-3 cells and S/MiPCS cells were dissembled to collected electrolyte for considering different sulfur loading. Both of them were washed with 2 ml DME, and 1.5 ml was stored in a transparent 5 ml glass bottle.
**Fig. S6** Cycling performance comparison of the PureS cathode cell and DCC-PureS.

**Table S1** Comparison of specific capacity of S/CMK-3 cathode, S/MiPCS cathode and DCC.

<table>
<thead>
<tr>
<th></th>
<th>S/CMK-3 cathode</th>
<th>S/MiPCS cathode</th>
<th>DCC(S/CMK-3@S/MiPCS) cathode</th>
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<tbody>
<tr>
<td>Mass specific capacity (mAh/g) (0.5C)</td>
<td>400</td>
<td>190</td>
<td>320</td>
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<tr>
<td>Area specific capacity (mAh/cm²) (0.5C)</td>
<td>1.15</td>
<td>0.29</td>
<td>1.34</td>
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Gravimetric specific capacity is based on the mass of S/C, super P and binder.