Supporting Information

Bifunctional Surface Modification Coupled with Oxygen Defect Engineering Enables High Performance Li-rich Cathode

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Fig. S1 XRD results of 1w%, 3w%, 5w% and LNCM samples
Fig. S2 Comparison of charge/discharge curves at 0.5C with different number of turns (a,b) 3w% PAN; (c-d) LNCM

Table S1 1w%, 3w%, 5w% and LNCM first cycle Coulomb efficiency

<table>
<thead>
<tr>
<th>samples</th>
<th>1w%PAN</th>
<th>3w%PAN</th>
<th>5w%PAN</th>
<th>LNCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>first cycle efficiency</td>
<td>82.4%</td>
<td>83.1%</td>
<td>81.6%</td>
<td>80.9%</td>
</tr>
</tbody>
</table>
Fig. S3 XPS analysis results of oxygen element in 1w%, 3w%, 5w% and LNCM
Fig. S4 3w%-PAN sample face sweep test results
Fig. S5 3w%-PAN sample face sweep test results
Fig. S6 (a,c) Linear relationship between $E$ and $t^{1/2}$ of 3w% PAN and LNCM; (b,d) Single GITT titration curves of 3w% PAN and LNCM.
Fig. S7 Atomic arrangement (a) spinel phase; (b) salt rock phase; (c) layered structure

Fig. S8 AC Impedance Equivalent Circuit