Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information

Promoting sulphur conversion chemistry with Tri-modal porous N, O-codoped carbon for stable Li-S batteries

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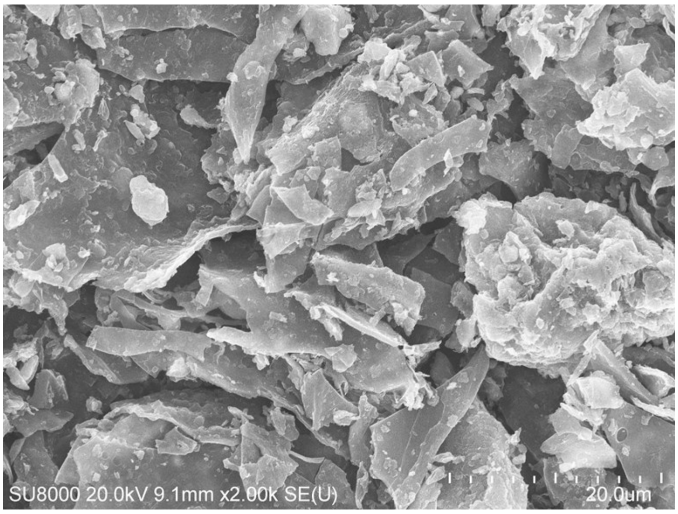

Figure S1. SEM image of the collected bagasse.

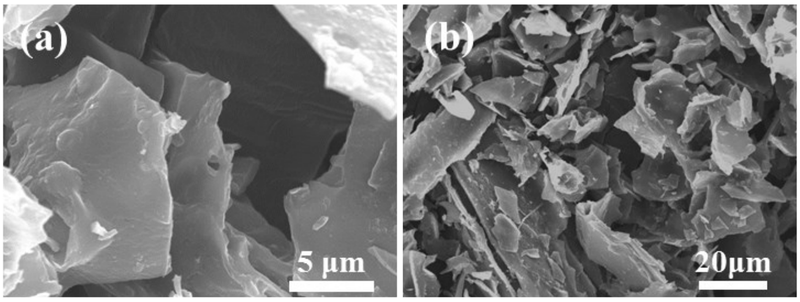

Figure S2. SEM images of pristine bagasse after pre-carbonization at 600 °C.

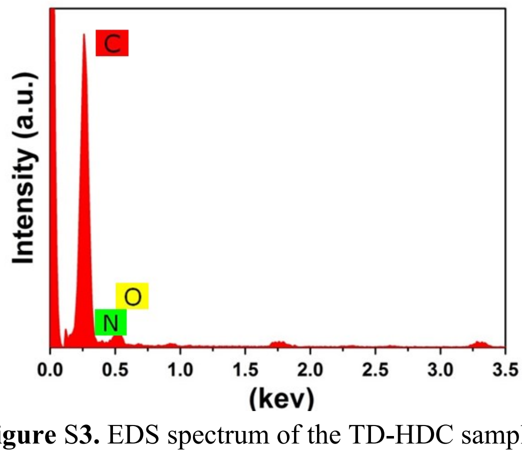

Figure S3. EDS spectrum of the TD-HDC sample.

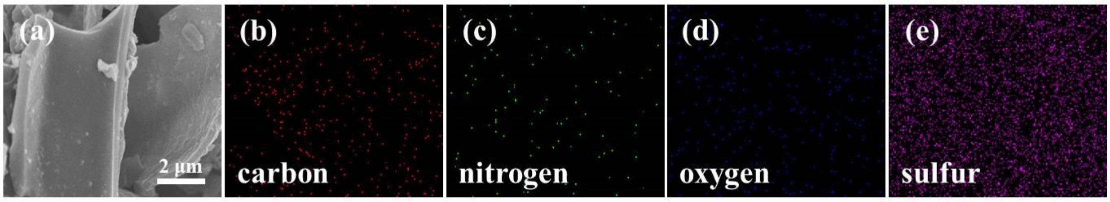

Figure S4. SEM and EDS mapping images of the S/TD-HDC sample.

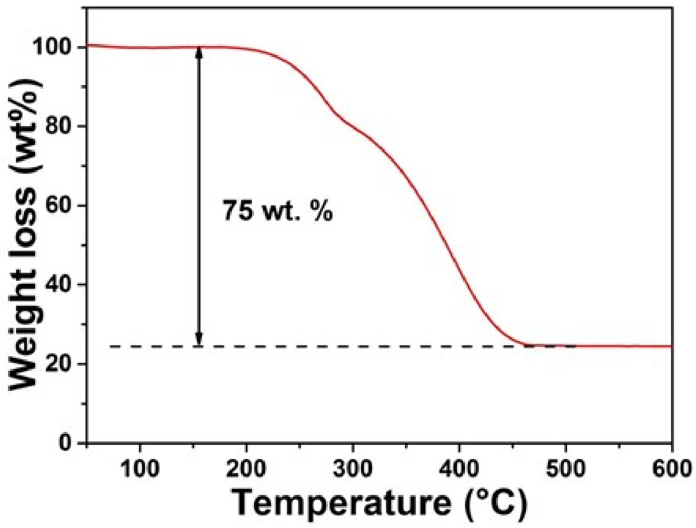

Figure S5. The TGA curve of the obtained S/TD-HDC under the N_2 atmosphere.

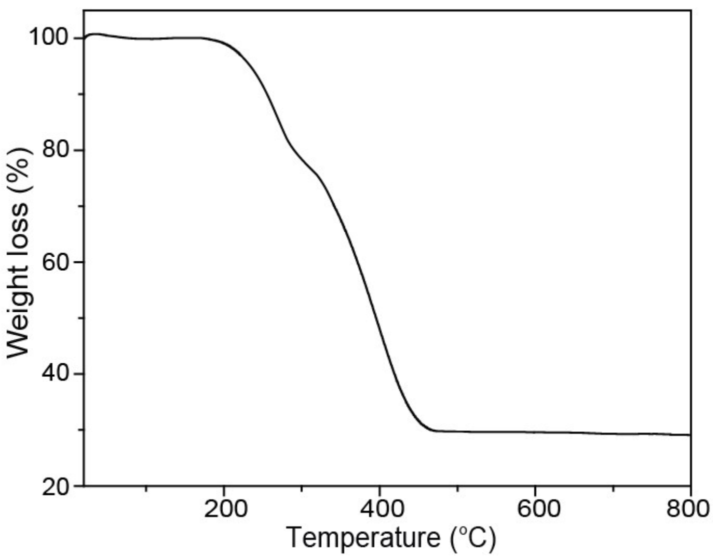

Figure S6. The TGA curve of the obtained S/HDC under the N_2 atmosphere.

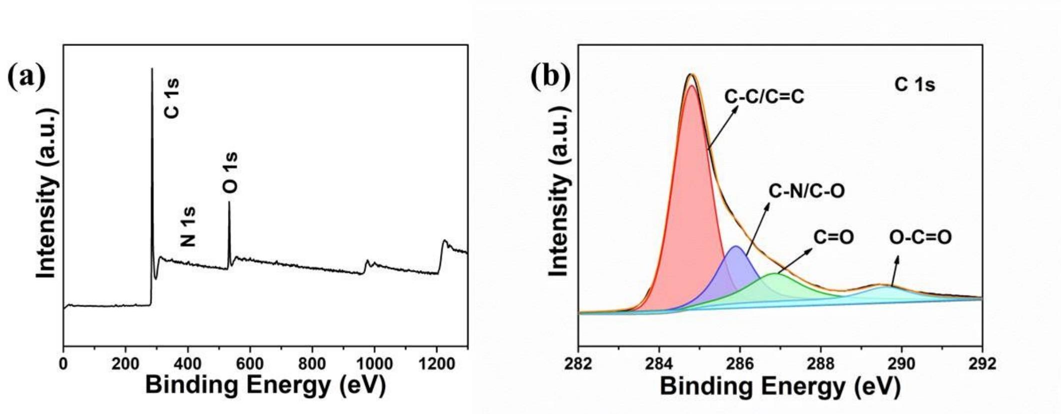

Figure S7. (a) Survey and (b) high-resolution C 1s XPS spectra of TD-HDC.

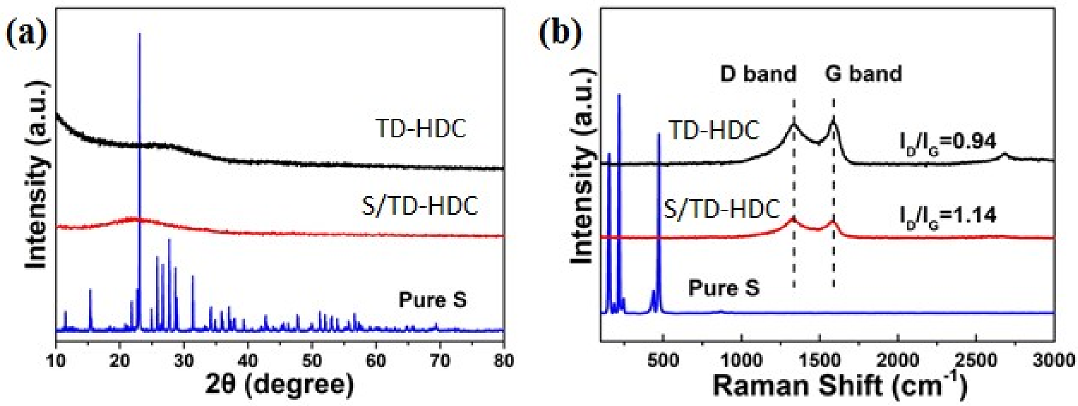

Figure S8. XRD and Raman patterns of the S/TD-HDC.

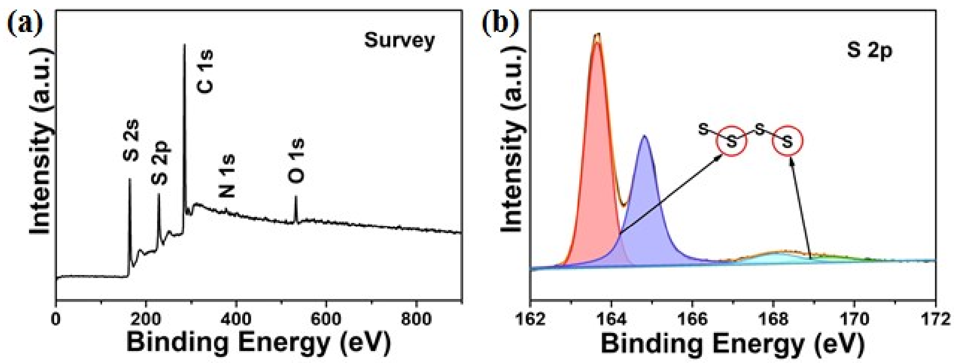

Figure S9. (a) Survey and (b) high-resolution S 2p spectra of S/TD-HDC.

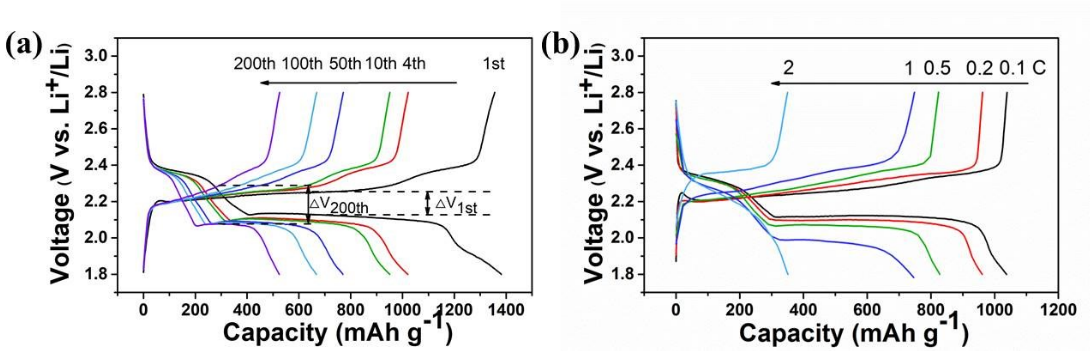

Figure S10. Discharge and charge profiles of the S/HDC cathode at (a) 0.2 C and (b) different rates, respectively.

Table S1 Specific surface areas and pore textural parameters of the as-obtained porous carbon materials.

Samples	S_{total} *(m² g⁻¹)*	V_{total} *(cm³ g⁻¹)*	V_{micro} *(cm³ g⁻¹)*	V_{meso} *(cm³ g⁻¹)*
HDC	2043.8	0.9758	0.7267	0.2491
TD-HDC	1758.1	1.2237	0.5392	0.6845

Table S2 Elemental analysis of HDC and TD-HDC from XPS results.

Samples	*C (at%)*	*N (at%)*	*O (at%)*
HDC	91.4	0.86	7.74
TD-HDC	88.01	1.1	10.89

Table S3. Comparisons of TD-HDC and other carbon materials reported in the literatures serving as sulfur hosts for LSBs.

Materials	Sulfur Content (wt%)	Electrochemical performance	Refs.
N, O codoped hollow carbon spheres	66%	905, 706, 587 and 422 mAh g^{-1} @ 0.2, 0.5, 1, and 2 C	1
Hierarchically porous carbon materials	48.4%	980, 800, 650 and 500 mAh g^{-1} @ 0.1, 0.3, 0.5 and 1 C	2
N, O codoped nonporous carbonaceous material	40%	726, 540, 546, and 558 mAh g^{-1} @ 0.2, 0.5, 1, and 2 C	3
N doped hollow carbon nanospheres	90.4%	1139, 1003, 884, 711, and 476 mAh g^{-1} @ 0.2, 0.3, 0.5, 1, and 2 C	4
N-doped porous carbon cages	69.58%	1047.3, 840.8, 663.4, 515.6 mAh g^{-1} @ 0.2, 0.5, 1, and 2 C□	5
Activated porous carbon	63%	750, 680, 615, and 520 mAh g^{-1} @ 0.2, 0.5, 1, and 2 C□	6
Fish-scale porous carbon	–	1071, 864, 539, and 413 mAh g-1@ 0.1, 0.2, 0.5, and 1 C□	7
N-doped hierarchical porous carbon	53.8%	1188.6, 1011.3, 781.5 and 668.1 mAh g^{-1} @ 0.2, 0.5, 1, and 2 C□	8
Defect-rich hierarchically porous carbon	72.21	1288, 1005, 884, 771 and 694 mAh g^{-1} @ 0.1, 0.2, 0.5, 1, and 2 C	9
TD-HDC	75%	1160.8, 1053.7, 960.3, 855.6 and 648.8 mAh g^{-1} at 0.1, 0.2, 0.5, 1 and 2 C	**This work**

Table S4 The impedance parameters of the two Li–S cells based on equivalent circuit fitting of the experimental data.

Sample	*Cycle number*	R_e (Ω)	R_s (Ω)	R_{ct} (Ω)	W_o (Ω)
HDC	Before cycling	2.9	–	74.4	19.6
	After 200 cycles	12.7	36.5	21.5	26.1
TD-HDC	Before cycling	5.9	–	58.7	12.7
	After 200 cycles	7.9	22.7	12.5	18.1

Reference

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