

Electronic supplementary information

Duplex trapping and charge transfer with polysulfides by diketopyrrolopyrrole-based organic framework for high-performance lithium-sulfur batteries

Jie Xu,[†] Shiming Bi,[‡] Weiqiang Tang,[†] Qi Kang,[§] Dongfang Niu,^{*,†} Shuozhen Hu,[†]

Shuangliang Zhao,[†] Limin Wang,[‡] Zhong Xin[†] and Xinsheng Zhang^{*,†}

[†] State Key Laboratory of Chemical Engineering and School of Chemical Engineering, East China University of Science and Technology, Shanghai 200237, China.

[‡] Key Laboratory for Advanced Materials, Institute of Fine Chemical, School of Chemistry & Molecular Engineering, East China University of Science and Technology, Shanghai, 200237, China.

[§] Department of Polymer Science and Engineering, Shanghai Key Laboratory of Electrical Insulation and Thermal Ageing, Shanghai Jiao Tong University, Shanghai 200240, PR China.

*E-mail: dfniu@ecust.edu.cn

*E-mail: xszhang@ecust.edu.cn

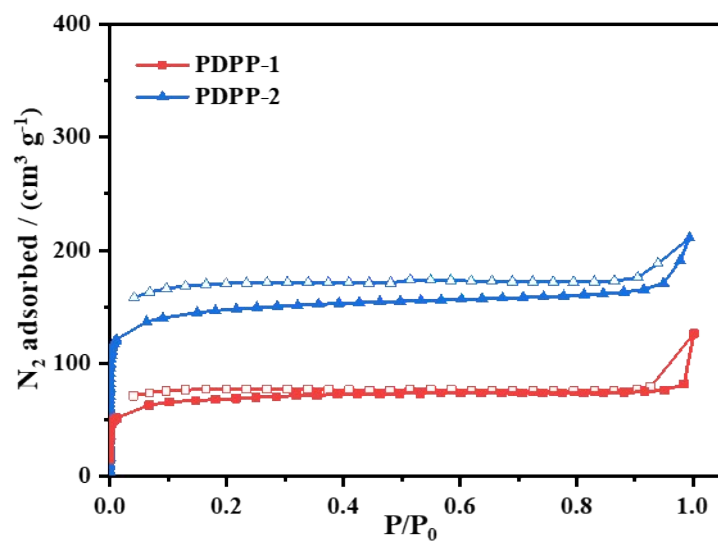


Figure S1. N₂ adsorption isotherms of PDPP-1 and PDPP-2 under 77 K.

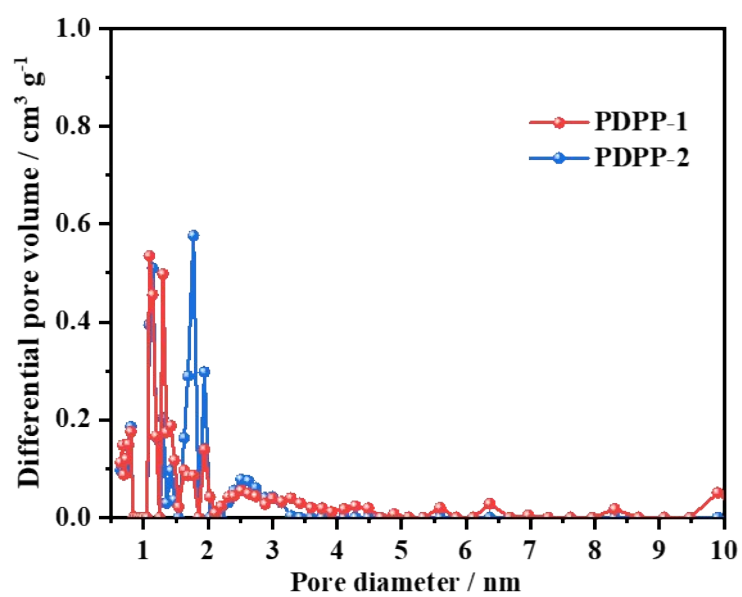


Figure S2. Pore size distributions of PDPP-1 and PDPP-2.

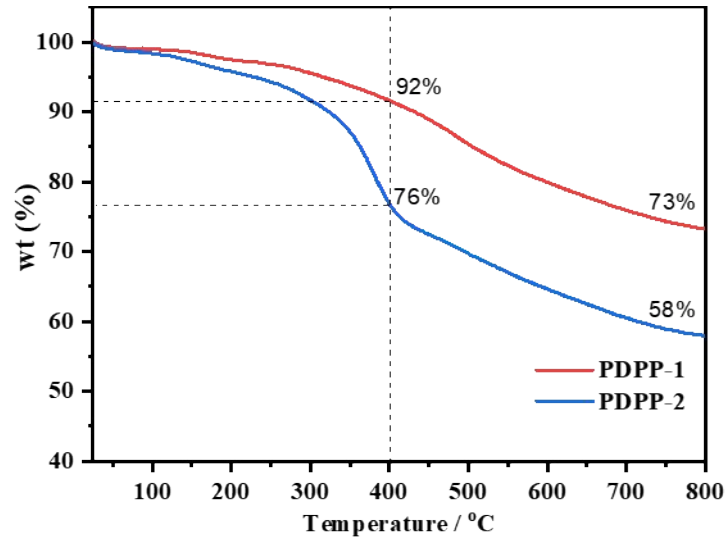


Figure S3. Thermogravimetric analysis of PDPP-1 and PDPP-2 under nitrogen atmosphere.

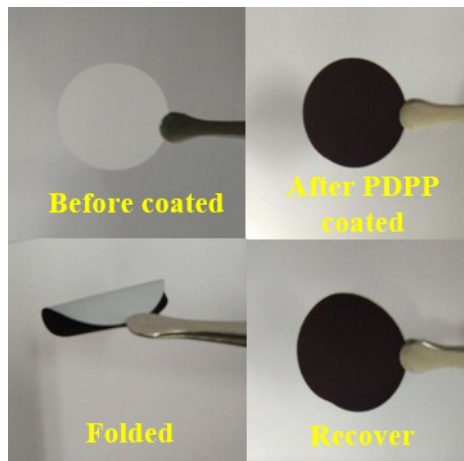


Figure S4. Optical images of PDPP separator before and after coating

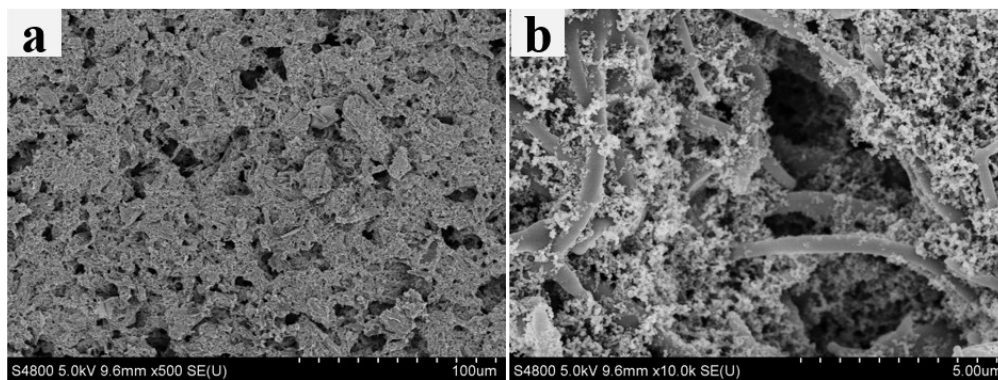


Figure S5. SEM images of PDPP-1 modified separator.

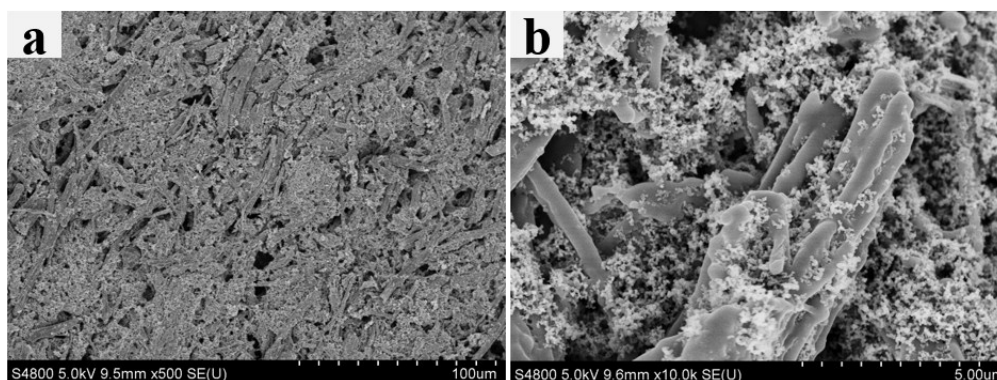


Figure S6. SEM images of PDPP-2 modified separator.

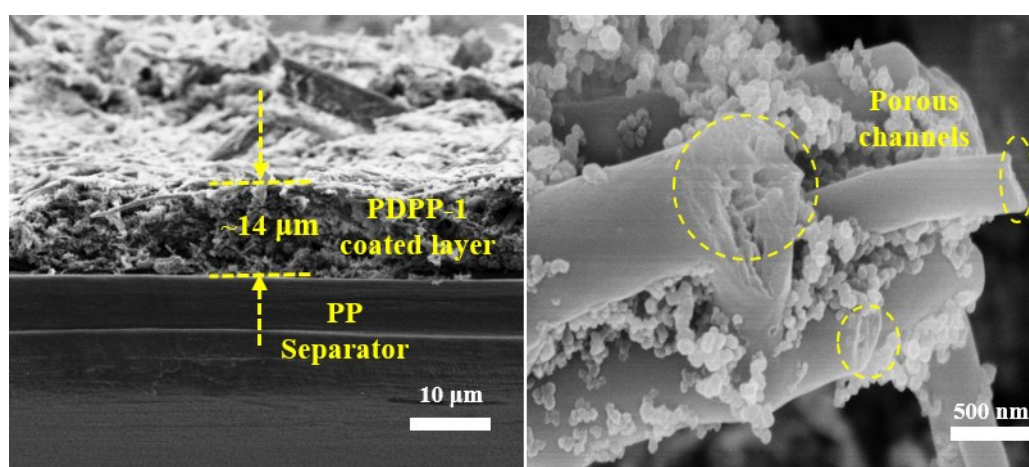


Figure S7. Cross sectional SEM images of PDPP-1 modified separator.

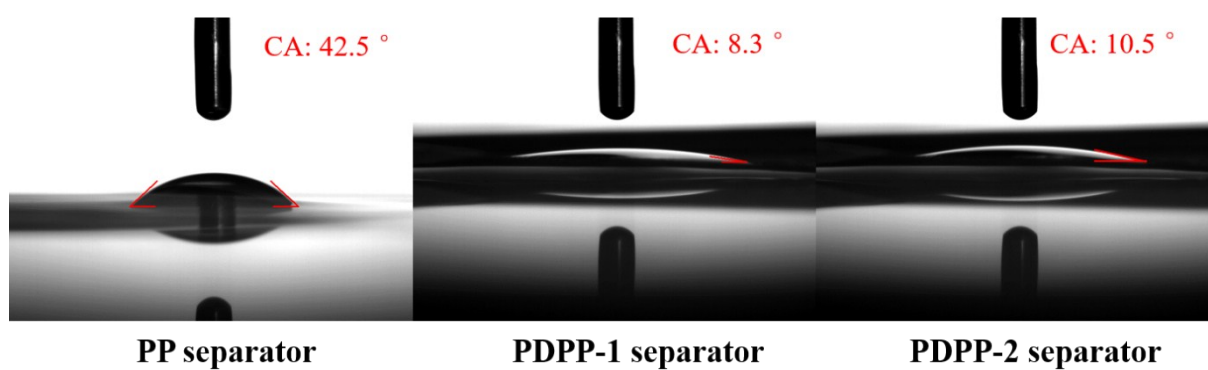


Figure S8. Contact angle measurements of PP separator and PDPP-n modified separators.

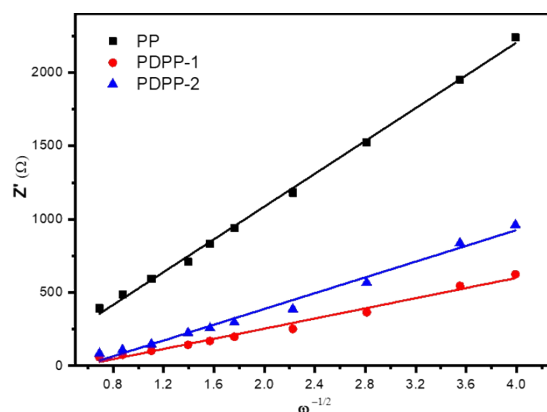


Figure S9. Warburg plots of the cells with PP and PDPP separators recorded at initial state.

Table S1. EIS test results of the cells with various separator recorded at initial state.

Separator	R_s/Ω	R_{ct}/Ω	Warburg Coefficient
PP	4.6	83	559
PDPP-1	2.8	20	173
PDPP-2	3.3	33	269

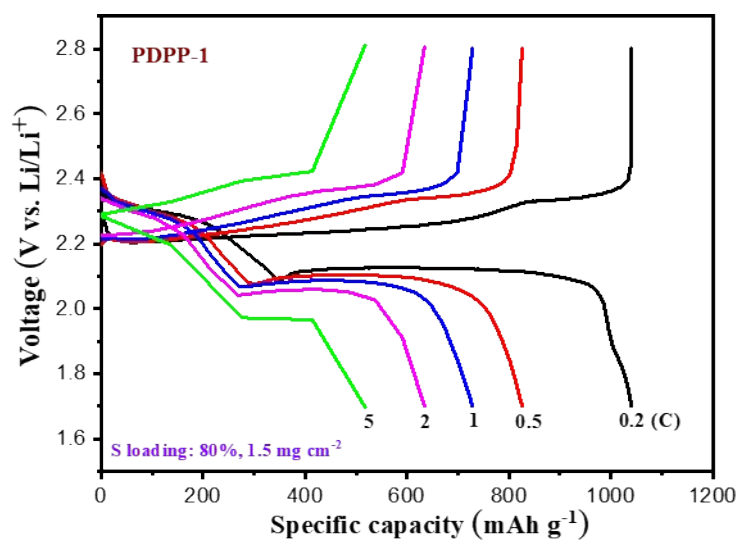


Figure S10. Charge/discharge profiles of PDPP-1 at different rates.

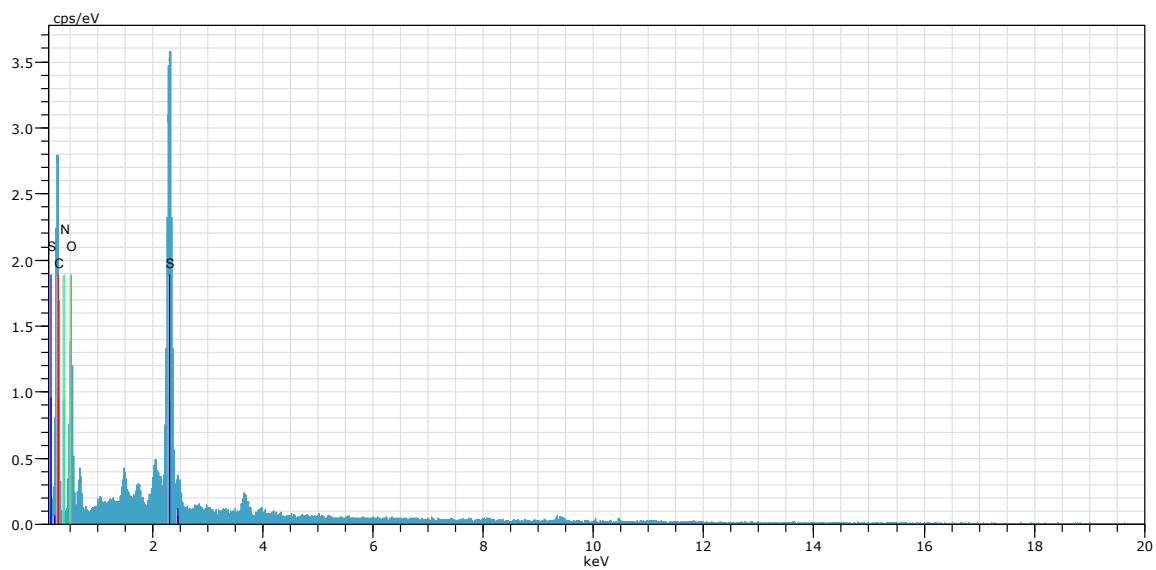


Figure S11. EDX spectra of PDPP-1 modified separator over 600 cycles at 1.0 C.

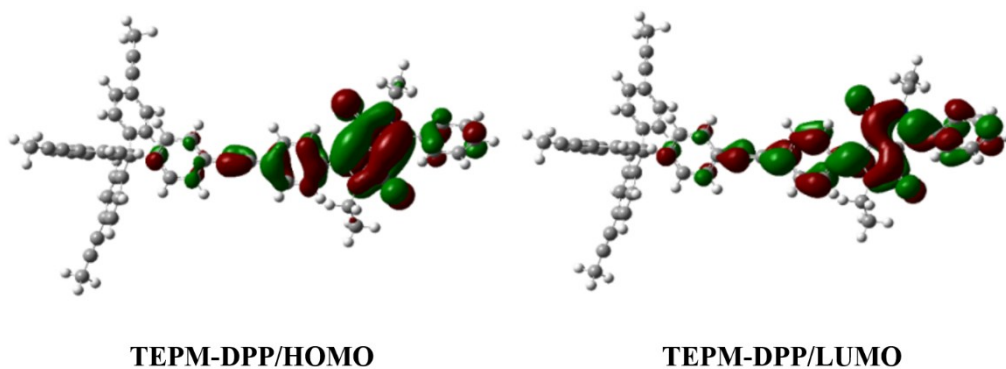


Figure S12. Optimized frontier molecular orbital of the monomer of POF (TEPM-DPP).

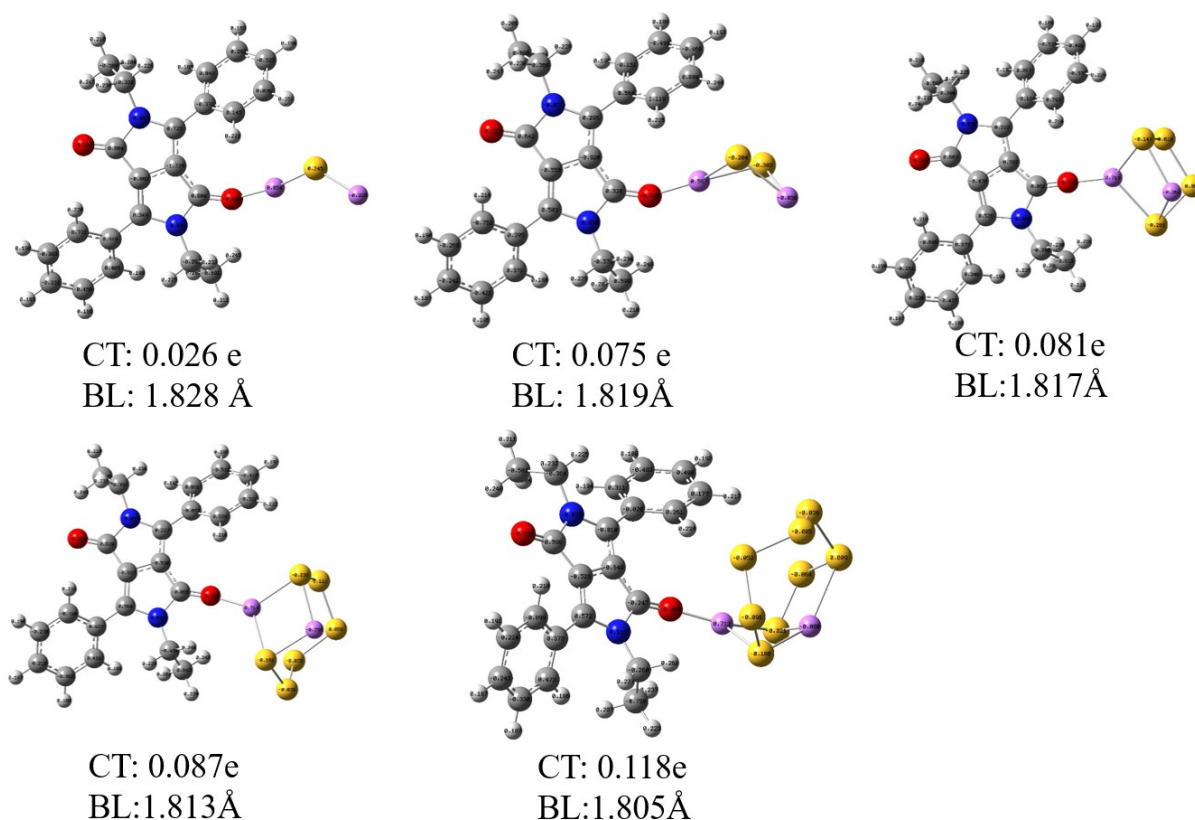


Figure S13. Optimized geometry of DPP-LiPSs cluster with charge distribution, charge transfer denoted as CT and bond length denoted as BL.

Table S2. Comparison of the electrochemical performance between PDPP-1 and other POP materials modified the cells either in cathode or separator.

Separator	Sulfur loading (mg cm ⁻²)	Sulfur content	Cathode	Discharge Capacity	Publish Year	Ref.
Celgard 2400	~0.2	24%	CTF-1/S	848 mAh g ⁻¹ , 1 st , 0.2 C	2014	S1
Celgard 2300	N/A	25%	POP-A	927 mAh g ⁻¹ , 1 st , 0.2 A g ⁻¹	2014	S2
Celgard 2400	1.8-2.0	24%	PPN-13-S	1086 mAh g ⁻¹ , 1 st , 0.1 C	2016	S3
Celgard 2300	N/A	33%	Por-COF/S	1000 mAh g ⁻¹ , 1 st , 0.1 C	2016	S4
Celgard 2400	N/A	37.2%	S-CTF-1	670 mAh g ⁻¹ , 1 st , 0.05	2016	S5

Celgard 2400	0.7	51.6%	SF-CTF-1 (1:3)	1138 mAh g ⁻¹ , 1 st , 0.05 C	2017	S6
Celgard 2300	1.2	36.6%	TPE-IEMPO-S	900 mAh g ⁻¹ , 1 st , 0.1 C	2017	S7
Celgard 2400	0.8-1.2	49%	Py-COF/S	960 mAh g ⁻¹ , 1 st , 0.5 C	2018	S8
Y-FTZB	1.0	70%	sulfur	1101 mAh g ⁻¹ , 1 st , 0.1 C	2017	S9
PB/Celgard	N/A	60%	KB/sulfur	984.1 mAh g ⁻¹ , 1 st , 0.2 C	2018	S10
PDPP-1	1.5	80%	CB/sulfur	1063 mAh g ⁻¹ , 1 st , 0.2 C 540 mAh g ⁻¹ , 600 th , 1.0 C	-	This work

Supplementary references

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