Supplementary Information for

Functional Separator Coated by Sulfonated Metal Organic Framework/Nafion Hybrids for Li-S Batteries

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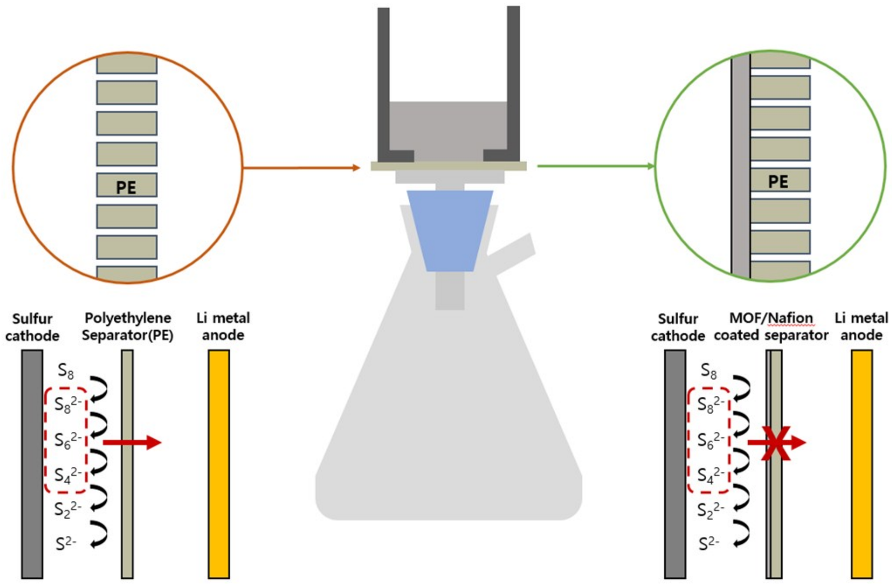

Figure S1. Fabrication process of MOF/Nafion hybrid coated separator.

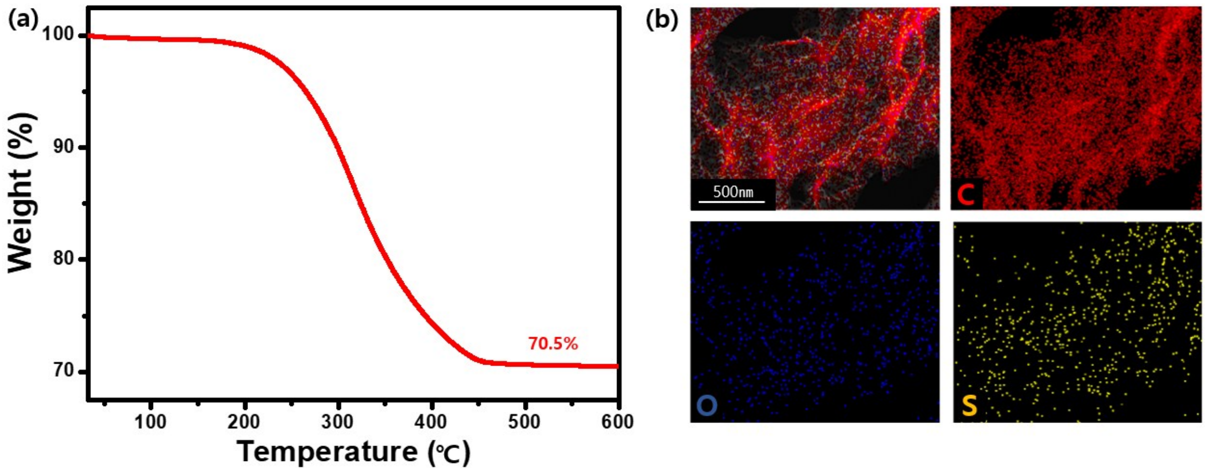

Figure S2. Characterization of rGO/sulfur composite cathode. (a) Thermogravimetric analysis and (b) STEM images and elemental distributions of C, O, and S.

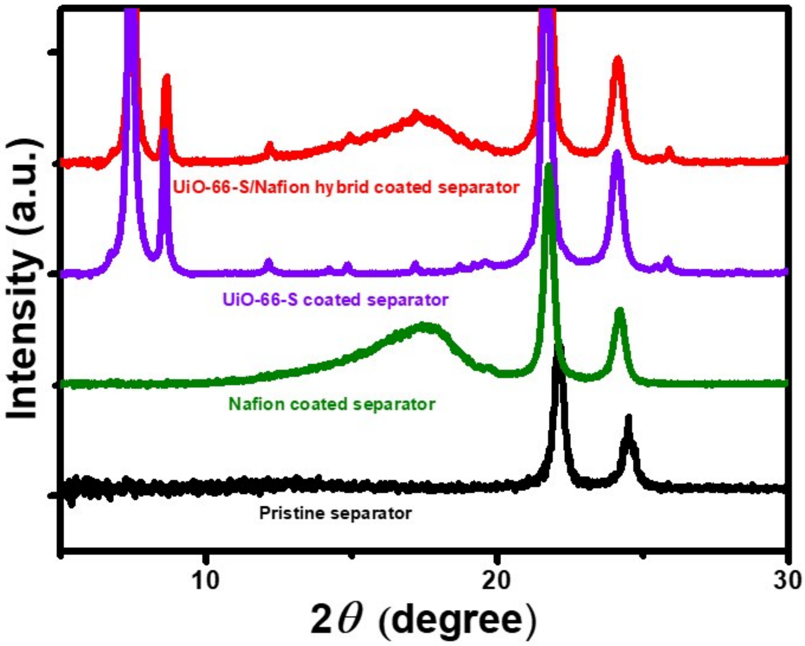

Figure S3. XRD patterns of pristine, Nafion-coated separator, UiO-66-S-coated, and UiO-66-S/Nafion hybrid-coated separators.

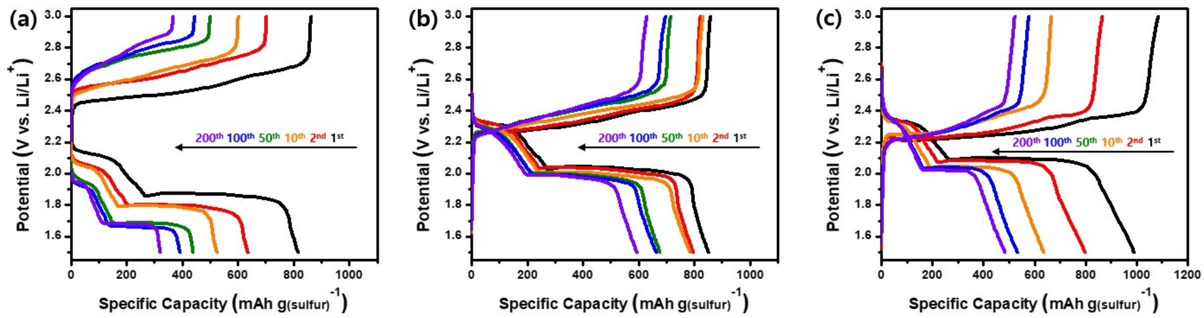

Figure S4. GCD profiles of Li-S batteries with (a) pristine, (b) Nafion-coated, and (c) UiO-66-S-coated separators at 0.2C.

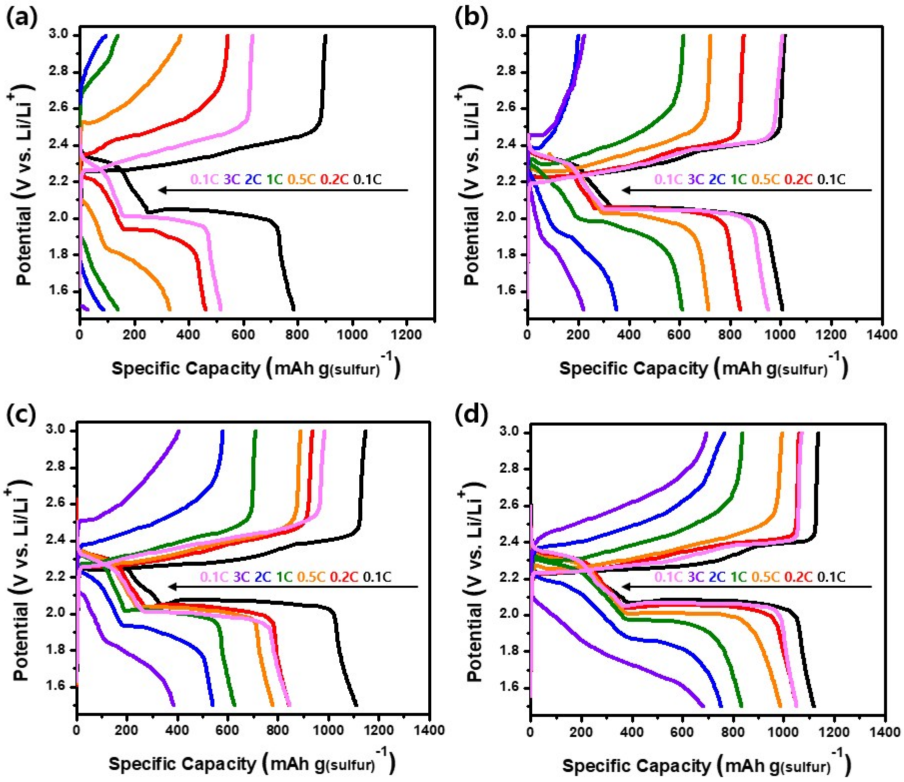

Figure S5. GCD profiles at different C rates with (a) pristine, (b) Nafion-coated, (c) UiO-66-S-coated, and (c) UiO-66-S/Nafion hybrid-coated separators.

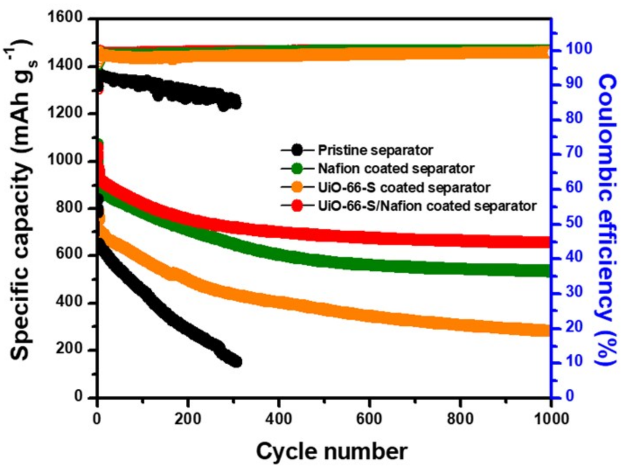

Figure S6. Cycling performances and Coulombic efficiencies of Li-S cells with pristine-, Nafion-coated, UiO-66-S-coated, and UiO-66-S/Nafion hybrid-coated separators at 1C.

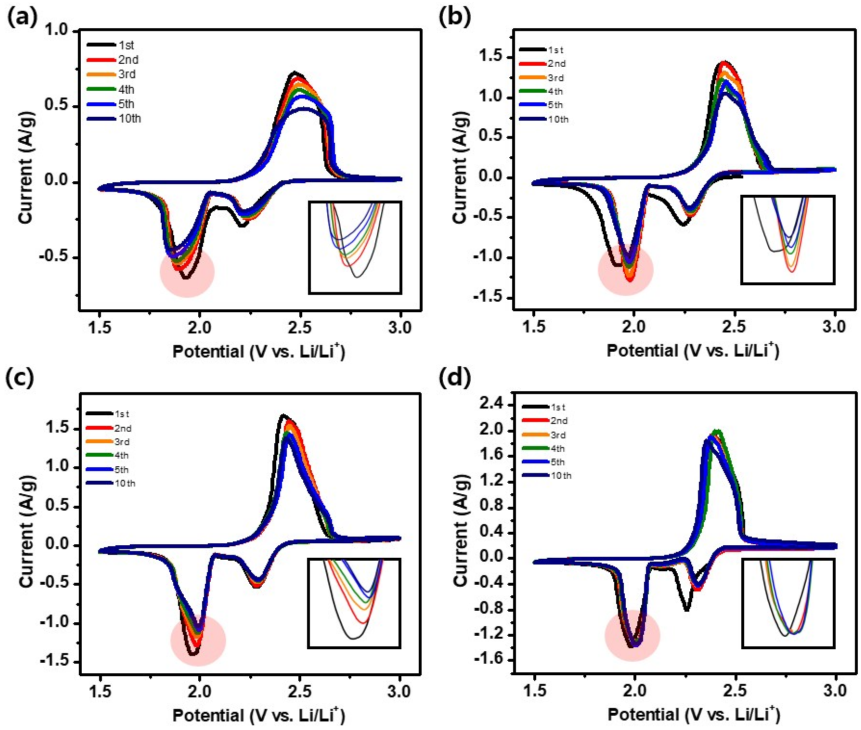

Figure S7. CV profiles of (a) pristine, (b) Nafion-coated, UiO-66-S-coated, and UiO-66-S/Nafion hybrid-coated separators at a scan rate of 0.1 mV s^{-1} for 10 cycles.

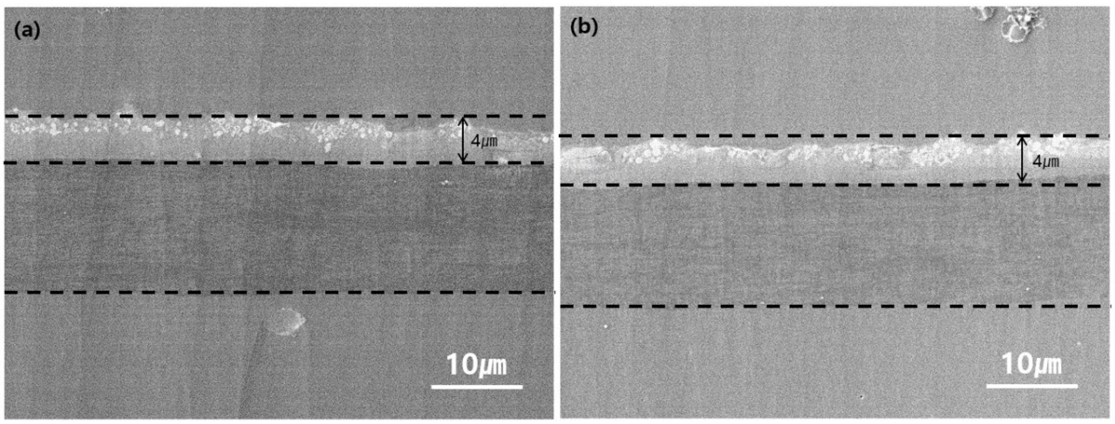

Figure S8. Cross-sectional SEM images of UiO-66-S/Nafion hybrid-coated separator (a) before and (b) after cycling process.

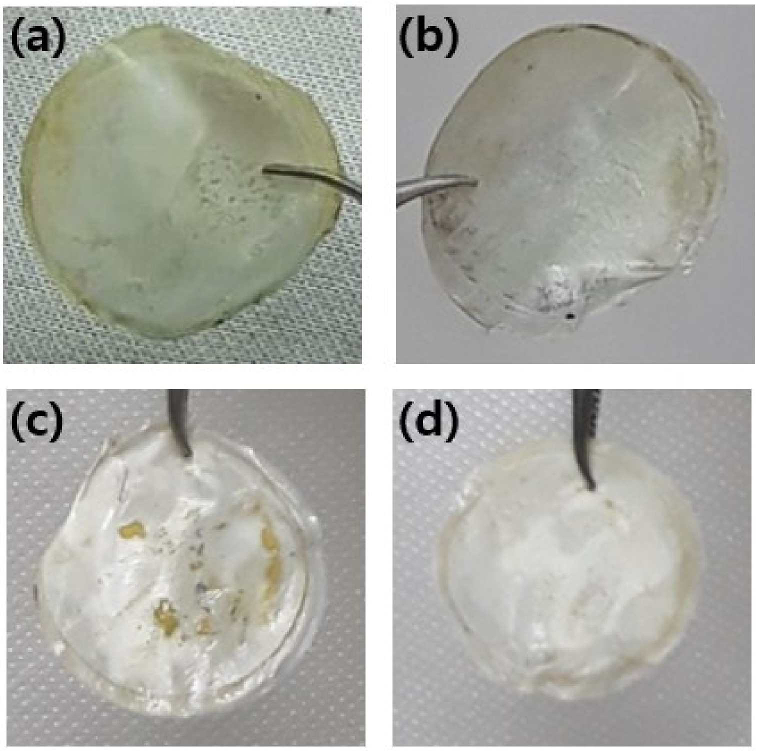

Figure S9. Digital photographs of (a) pristine, (b) Nafion-coated, (c) UiO-66-S coated, and (d) UiO-66-S/Nafion hybrid-coated separators after cycling process.

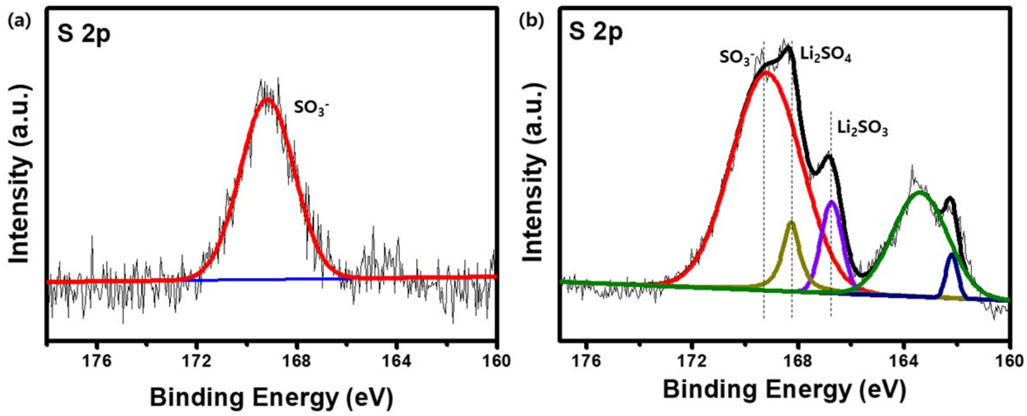

Figure S10. XPS S2p scans of UiO-66-S/Nafion hybrid-coated separator (a) before and (b) after mixing with a long chain polysulfide of 0.1M Li_2S_6 in DOL/DME.

Table. S1 Comparisons of Li-S cell with UiO-66-S/Nafion hybrid-coated separator with previous literatures using MOF-modified separators.

Paper	Material	Specific capacity at low rates (mAh/g)	Specific capacity at high rates (mAh/g)	Rate capability (%)	Cycle stability (%)	Initial coulombic efficiency (%)
* This work	UiO-66-S/Nafion	1185 mAh/g (0.1C) 1061 mAh/g (0.2C)	958 mAh/g (1C)	80.8% (compared to 0.1C) 90.3% (compared to 0.2C)	77.4% (200 cycle)	98.0%
			889 mAh/g (2C)	75.0% (compared to 0.1C) 83.8% (compared to 0.2C)		
			785 mAh/g (3C)	66.2% (compared to 0.1C) 74.0% (compared to 0.2C)		
Nature Energy, 2016, **1**, 16094; Ref 43	HKUST-1@GO	1072 mAh/g (0.2C)	488 mAh/g (3C)	45.5% (compared to 0.2C)	72.1% (100 cycle)	~95%
ACS Energy Letters, 2017, **2**, 2362-2367; Ref 44	Y-FTZB	~1480 mAh/g (0.1C)	~500 mAh/g (2.5C)	33.8% (compared to 0.1C)	50.6% (300 cycle)	-
	ZIF-7	~1250 mAh/g (0.1C)	~300 mAh/g (2.5C)	24.0% (compared to 0.1C)	43.8% (300 cycle)	-
	ZIF-8	~1180 mAh/g (0.1C)	~200 mAh/g (2.5C)	16.9% (compared to 0.1C)	39.3% (300 cycle)	-
	HKUST-1	~600 mAh/g (0.1C)	~100 mAh/g (2.5C)	16.7% (compared to 0.1C)	17.9% (300 cycle)	90%
Electrochimica Acta, 2018, **265**, 151-159; Ref 45	Mn-BTC MOF	~1450 mAh/g (0.1C)	~900 mAh/g (1C)	62.1% (compared to 0.1C)	74.0% (80 cycle)	94%
Energy Storage Materials, 2018, **14**, 383-391**;** Ref 46	CNT@ZIF-30	1654.7 mAh/g (0.1C) 1081.7 mAh/g (0.2C)	583.2 mAh/g (2C)	35.2% (compared to 0.1C) 53.9% (compared to 0.2C)	54.8% (100 cycle)	~100%
ACS applied materials & interfaces, 2018, **10**, 30451-30459; Ref 47	Polystyrene sulfonate@HKUST-1	~1400 mAh/g (0.2C)	835 mAh/g (1C)	59.6% (compared to 0.2C)	60.6% (500 cycle)	~99%
			423 mAh/g (5C)	30.2% (compared to 0.2C)		
Electrochimica Acta, 2018, **283**, 1291-1299**;** Ref 48	Ni-MOF@MWCNT	~1380 mAh/g (0.2C)	968 mAh/g (2C)	70.1% (compared to 0.2C)	87.1% (300 cycle)	~100%