Supporting Information

Facile one-pot synthesis of biomass-derived activated carbon as an interlayer material for BAC/PE/Al_2O_3 dual coated separator in Li-S batteries

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Sample	BC	BAC-700	BAC-800	BAC-900
Surface Area ($m^2 g^{-1}$)	0.673	2.597	12.324	571.611

Table. S1 Surface area of BC and BAC powders depending on the activation temperature from 700 to 900 ℃.

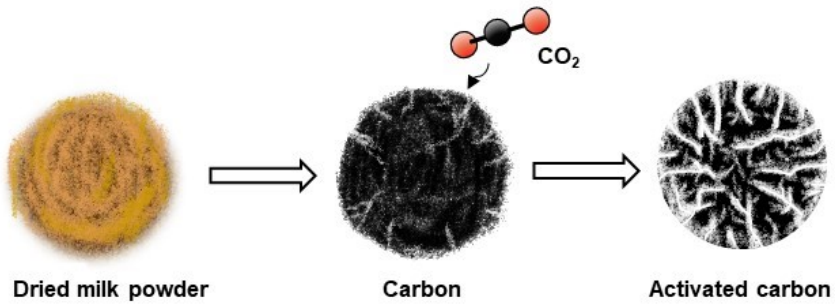

Figure S1. A schematic illustration of activation process by physical CO_2 activation.

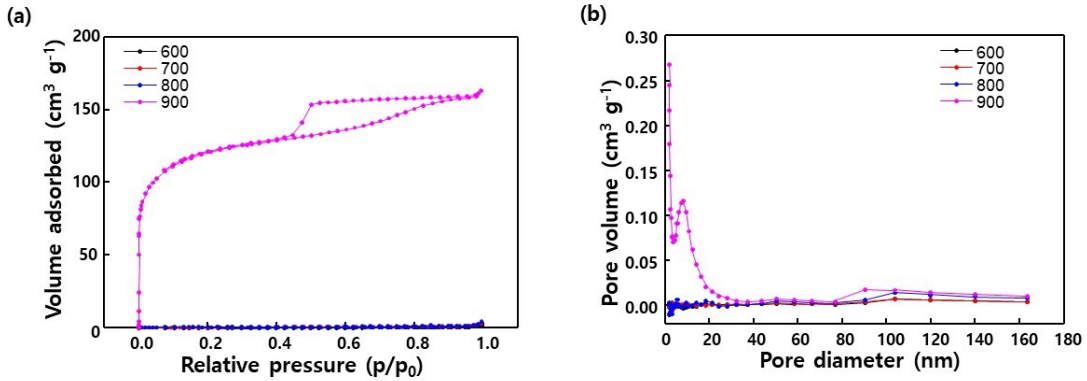

Figure S2. (a) BET isotherm and (b) BJH pore size distributions of BC and BAC.

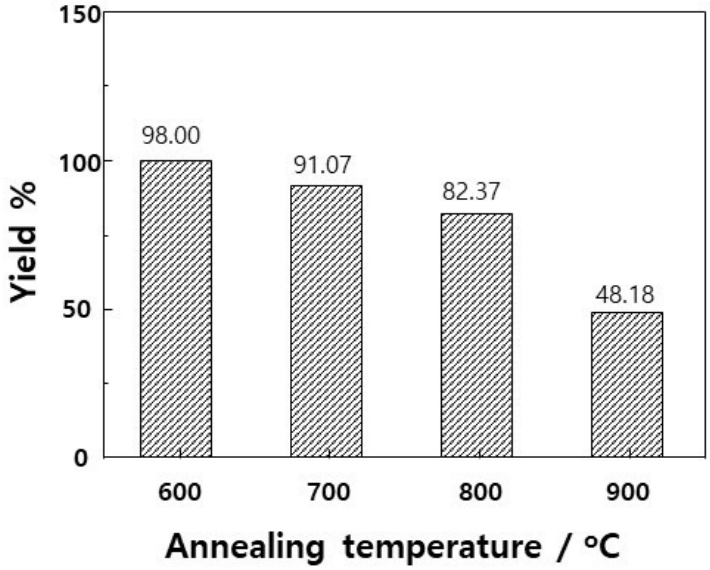

Figure S3. Yields of BAC powder by facile one-pot synthesis method at different activation temperature.

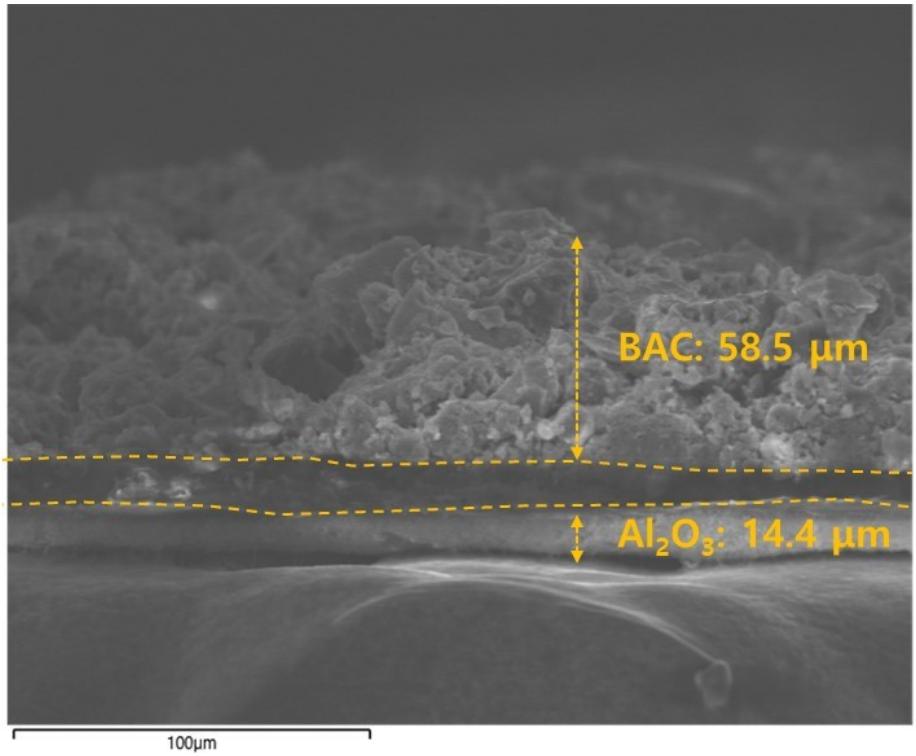

Figure S4. Cross-section SEM image of BAC/PE/Al_2O_3 separator.

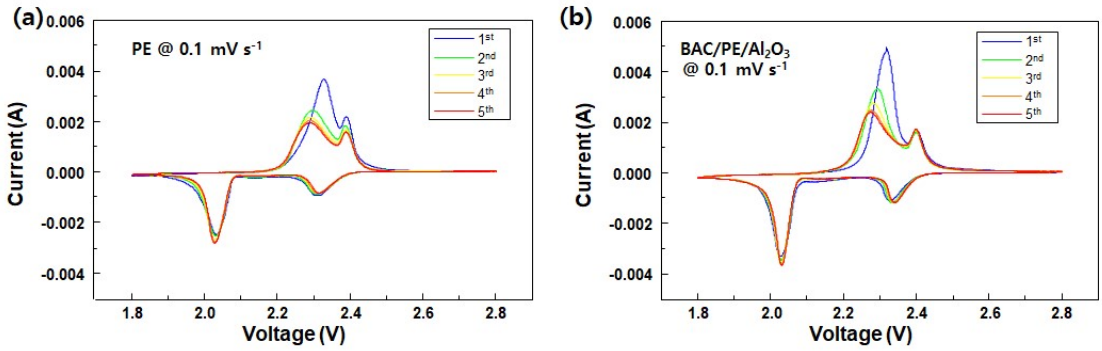

Figure S5. Cycle Voltammogram of samples prepared with PE (a) and BAC/PE/Al_2O_3 separator (b) tested at 0.1 mV s^{-1} for 5 cycles.

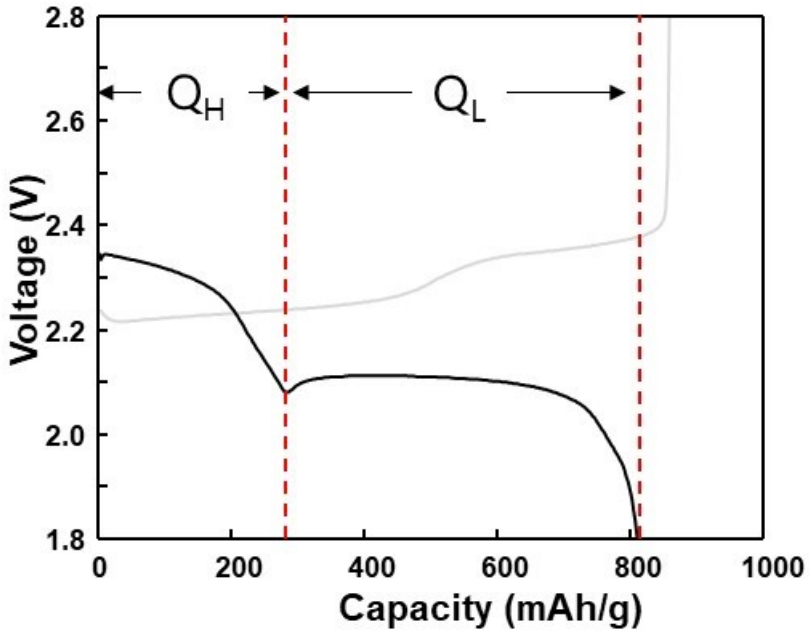

Figure S6. Charge and discharge curves of the Li-S coin-cell with Q_H and Q_L region.

Table S2. Q_H, Q_L, and Q_L/Q_H ratio values of both samples.

Cycle	PE			BAC/PE/Al_2O_3		
	Q_H	Q_L	Q_L/Q_H	Q_H	Q_L	Q_L/Q_H
5	153	360	2.35	211	550	2.61
20	129	272	2.11	205	504	2.46
50	114	245	2.15	182	448	2.46
100	124	262	2.11	142	353	2.49

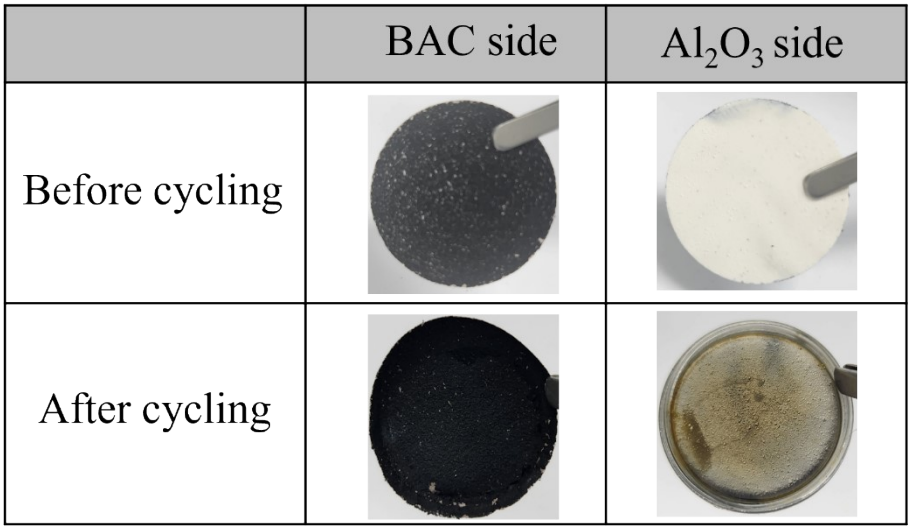

Figure S7. Morphology of BAC/PE/Al_2O_3 separators before and after charge/discharge process.

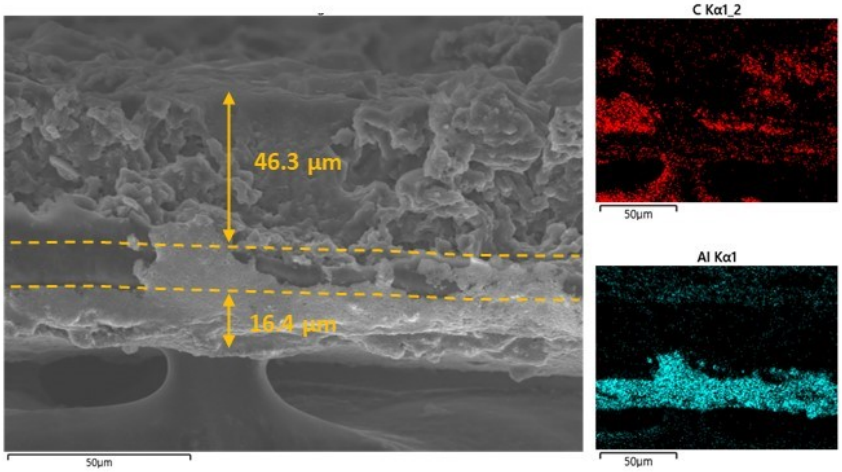

Figure S8. Cross-section SEM image and EDS mapping of BAC/PE/Al_2O_3 separators after charge/discharge process.