Supplementary Information

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Polymer Lithium-Sulfur Batteries with a Nafion Membrane and an Advanced Sulfur Electrode

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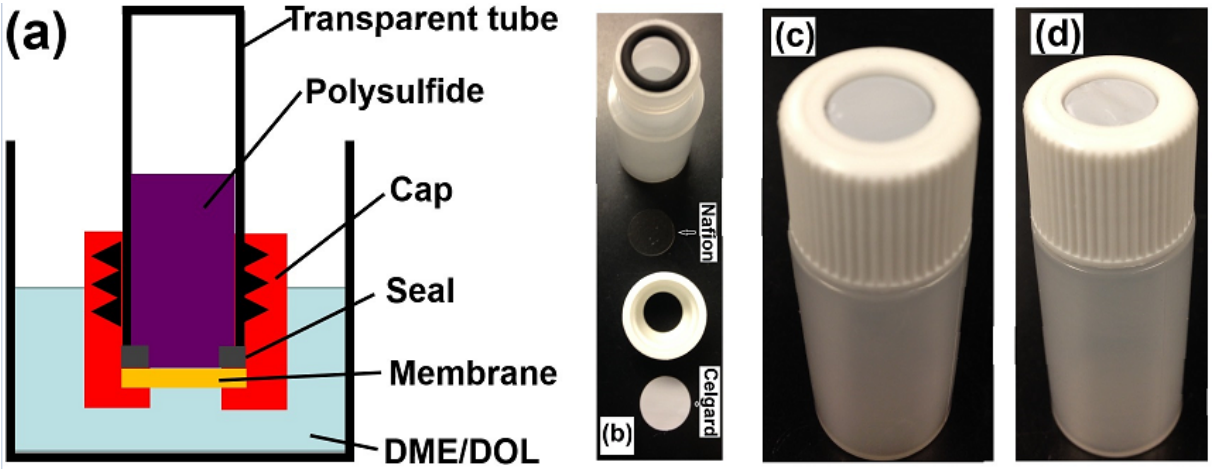

Fig. S1. (a) Schematic of a setup for polysulfide permeation tests. (b) Apparatus for the polysulfide permeation experiments. (c) Photograph of the sealed transparent tube with a piece of lithiated Nafion membrane embedded. (d) Photograph of the sealed transparent tube with a piece of Celgard membrane embedded.

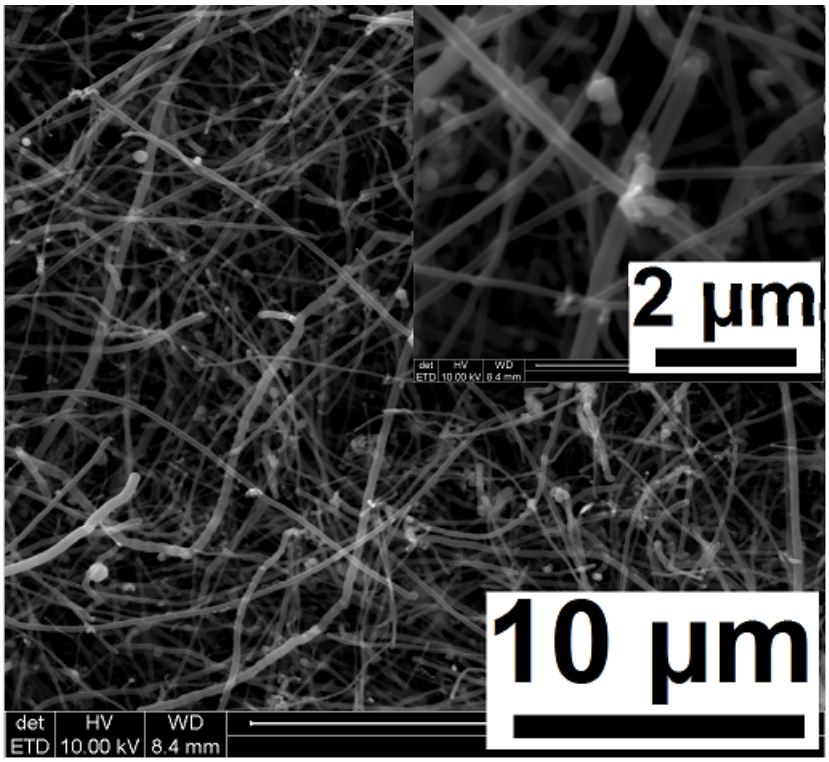

Fig. S2. Scanning electron microscopy (SEM) image of an as-prepared carbon nanofiber (CNF) paper electrode (without activation process).

Table S1. The Brunauer–Emmett–Teller (BET) surface area and pore volume of the un-activated versus CO_2-activated CNF paper electrodes.

	Unactivated CNF paper	CO_2-activated CNF paper
BET surface area, $m^2\ g^{-1}$	41	714
Pore volume, $m^3\ g^{-1}$	0.14	1.06

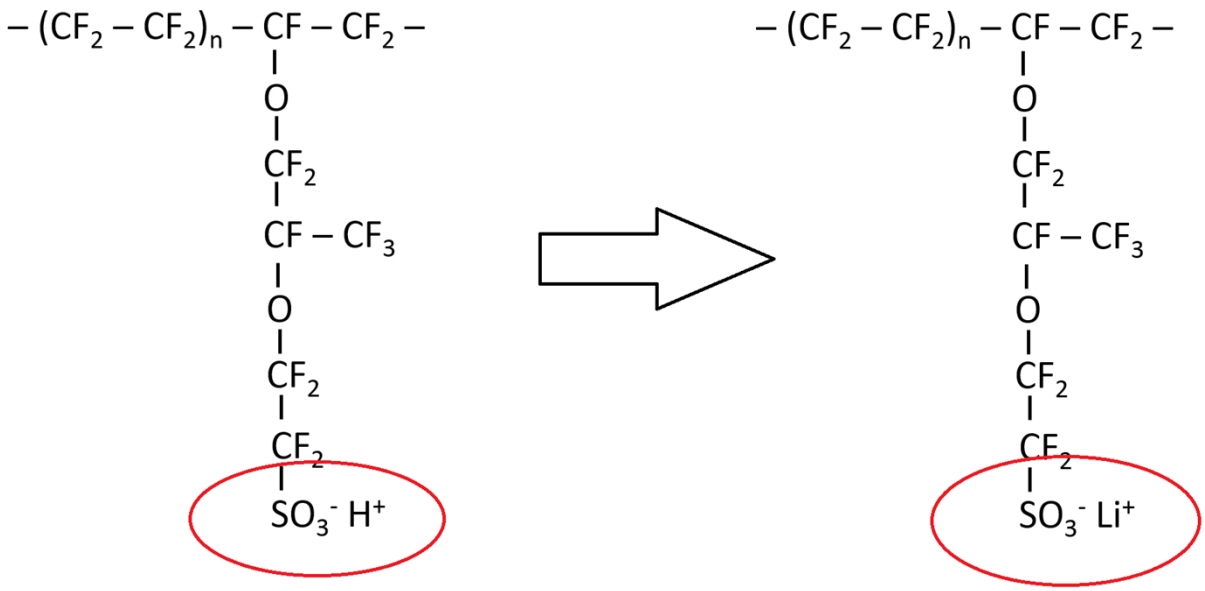

Fig. S3. Molecular structures of the original Nafion and lithiated Nafion materials.

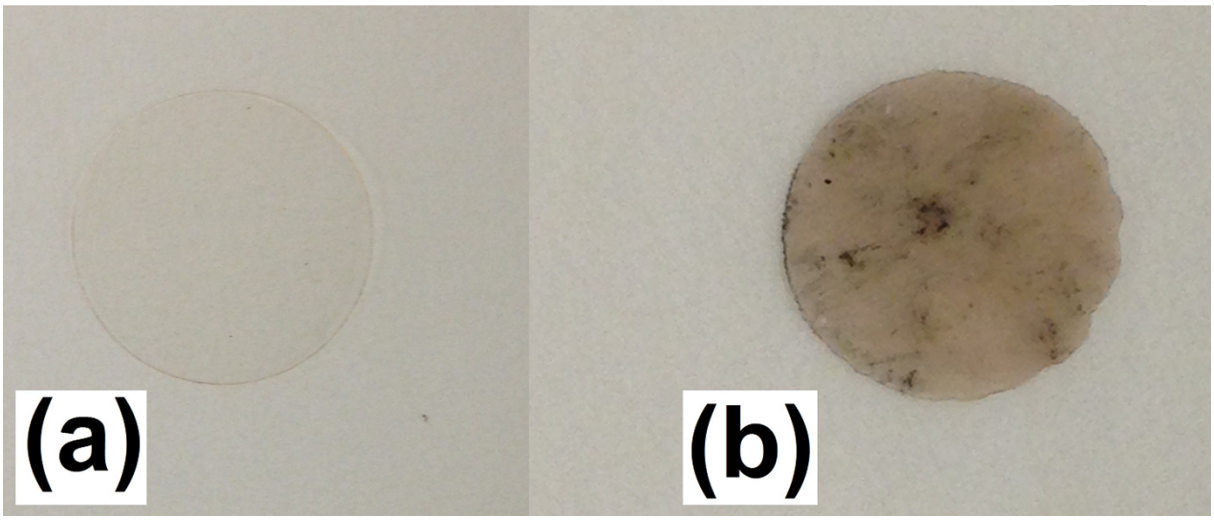

Fig. S4. Pictures of (a) a piece of fresh Nafion membrane and (b) a piece of cycled (after 500 cycles at C/5 rate) Nafion membrane taken out from a Li || Nafion / CNF interlayer || AC-CNF/lithium polysulfide cell.

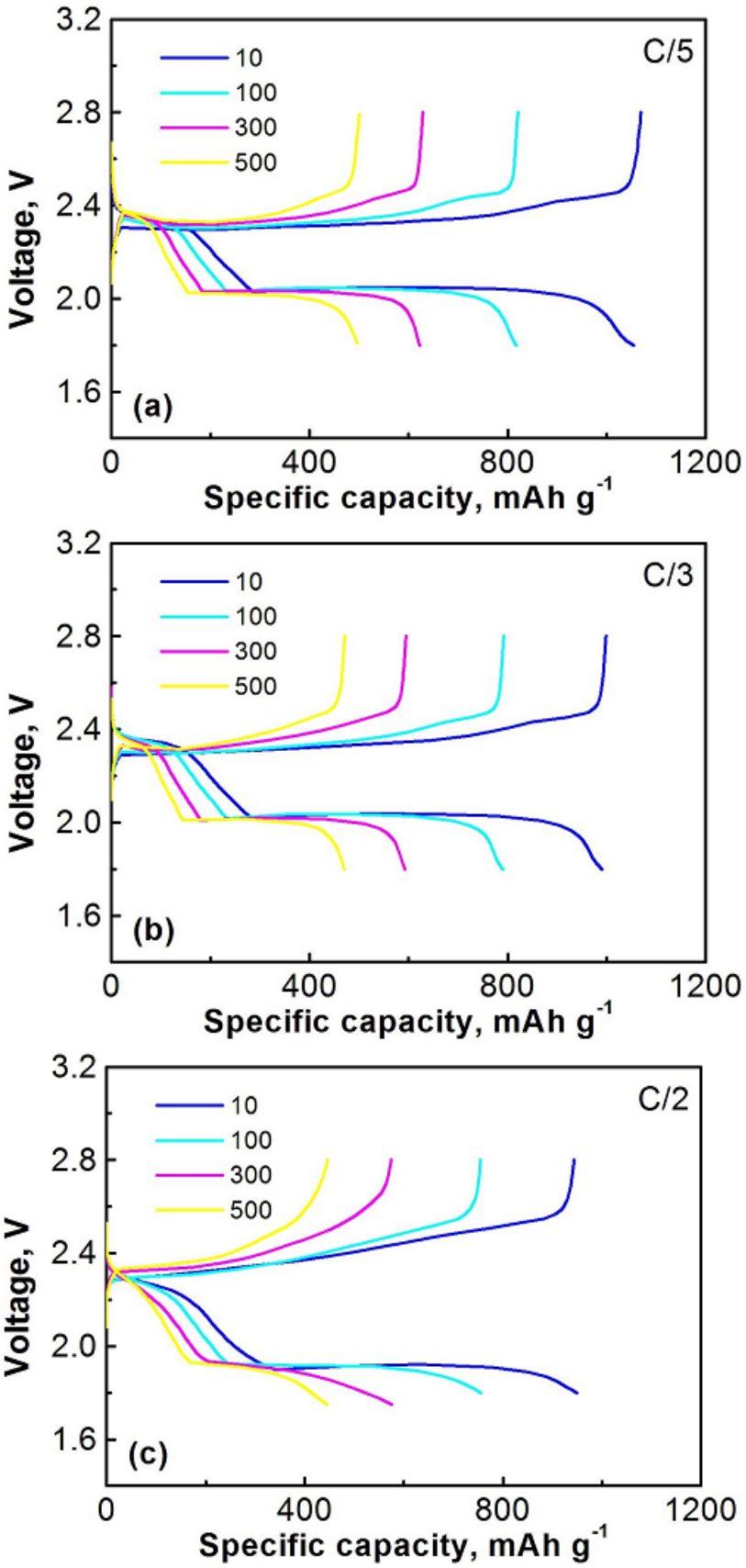

Fig. S5. Charge/discharge profiles of the Li || Nafion / CNF interlayer || AC-CNF/lithium polysulfide batteries at different representative cycles (10, 100, 300, and 500 cycles) at (a) C/10, (b) C/5, and (c) C/3 rates.