

Supplementary Information

For

A bidirectionally conductive composite membrane based on copper-coated electrospun PI-CNT fibers as current collector for lithium-ion batteries

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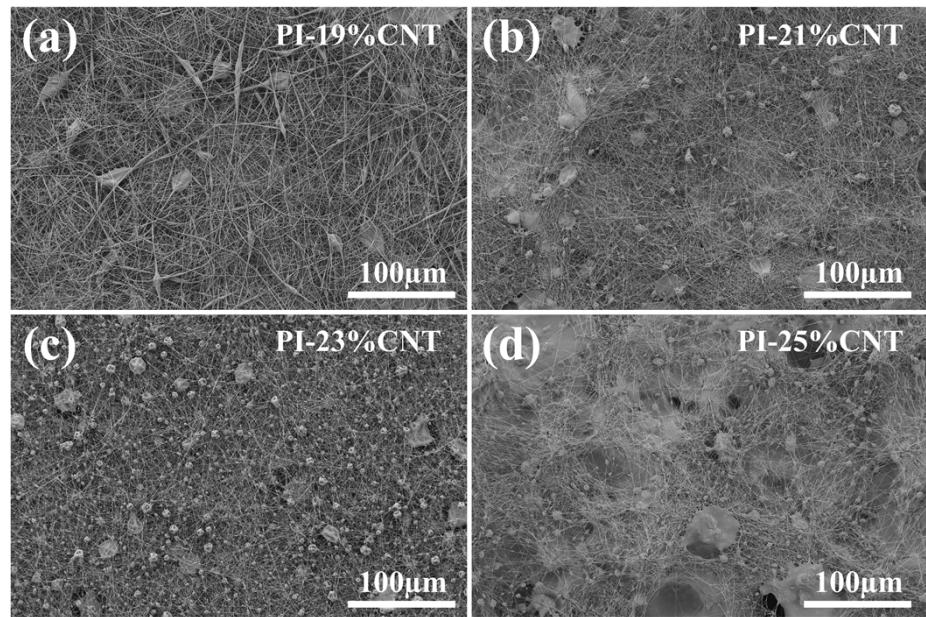


Figure S1. SEM images of (a) PI-19%CNT, (b) PI-21%CNT, (c) PI-23%CNT, and (d) PI-25%CNT membranes.

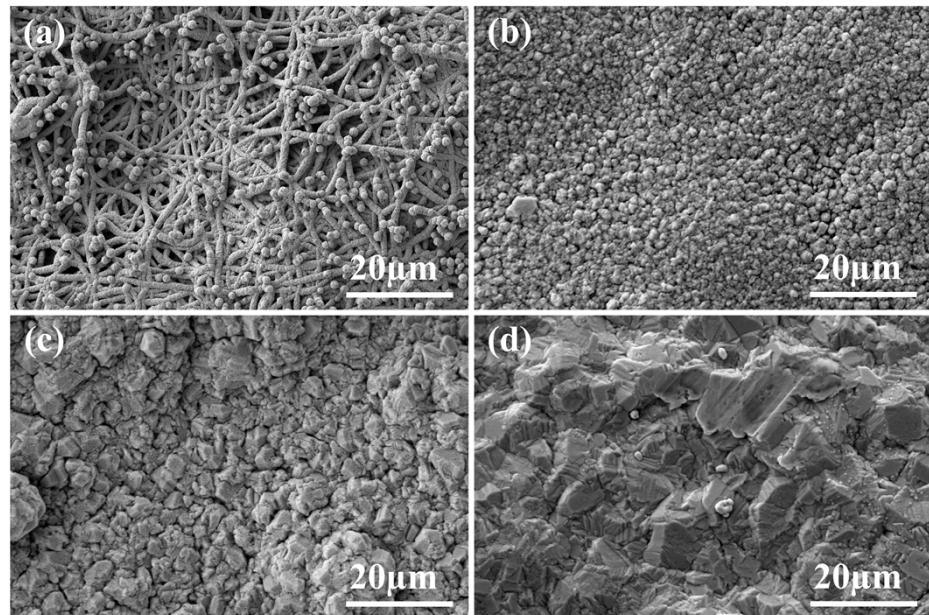


Figure S2. SEM images of PI-17%CNT membranes subjected to electroless copper deposition for (a) 45 min, (b) 90 min, (c) 135 min, and (d) 180 min, respectively.

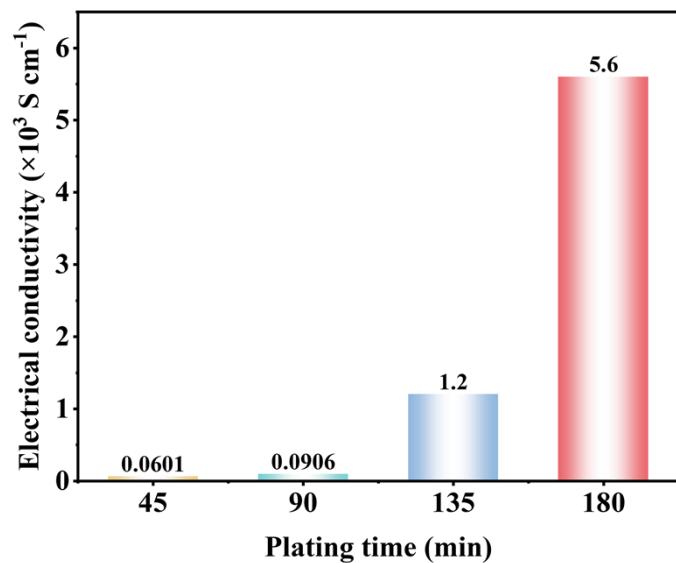


Figure S3. Electrical conductivity of the PI-17% CNT composite membrane at copper plating times of 45 min, 90 min, 135 min, and 180 min.

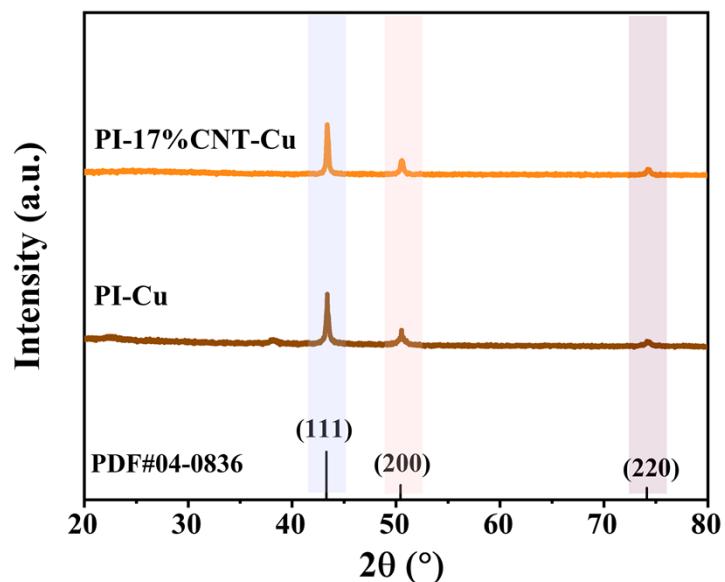


Figure S4. XRD patterns of PI-Cu and PI-17% CNT-Cu CCs.

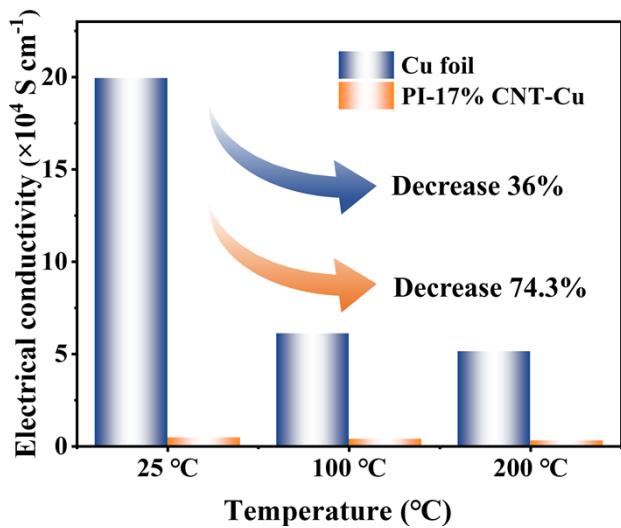


Figure S5. Changes in the electrical conductivity of Cu foil and PI-CNT-Cu CCs under varying temperatures.

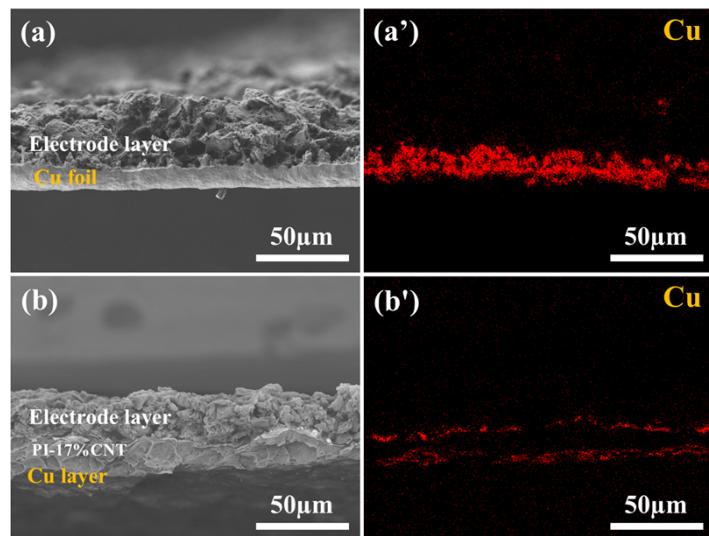


Figure S6. Cross-sectional SEM images of pristine electrodes on (a) Cu foil and (b) PI-17%CNT-Cu, accompanied by their corresponding Cu elemental mappings from EDS analysis (a') and (b').

Table S1. Fitted values of R_b , R_{SEI} , and R_{ct} for cells assembled with different CCs after the 1st and 200th cycles.

Sample	Cycle number	R_b (Ω)	R_{SEI} (Ω)	R_{ct} (Ω)
Cu foil/Graphite	1st	3.4	9.7	55.0
PI-10%CNT-Cu/Graphite		2.1	8.7	36.9
PI-15%CNT-Cu/Graphite		1.9	5.6	36.4
PI-17%CNT-Cu/Graphite		1.8	5.0	33.5
Cu foil/Graphite	200th	2.7	14.7	181
PI-10%CNT-Cu/Graphite		2.6	11.1	141
PI-15%CNT-Cu/Graphite		1.9	6.2	106
PI-17%CNT-Cu/Graphite		1.6	4.9	76