Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supplementary Information

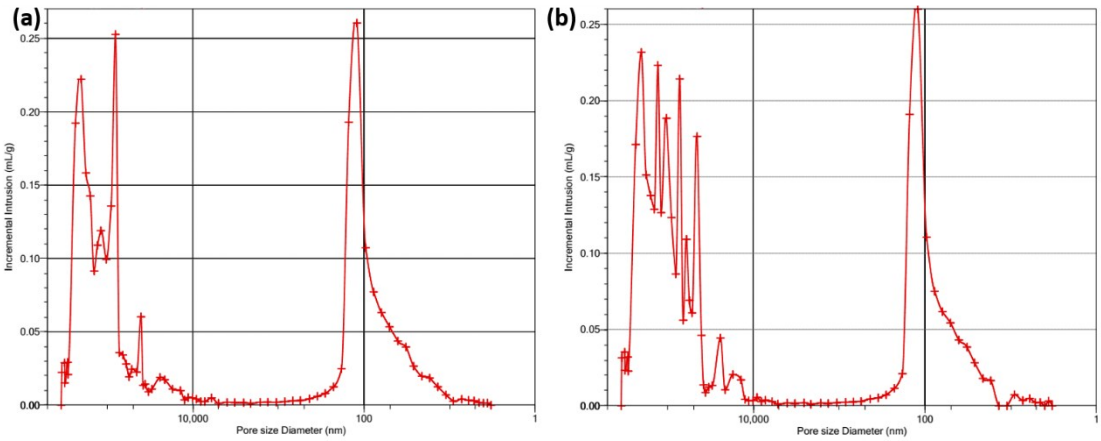

Figure S1. Pore size distribution of (a) blank separator and (b) SMS revealed by MIP.

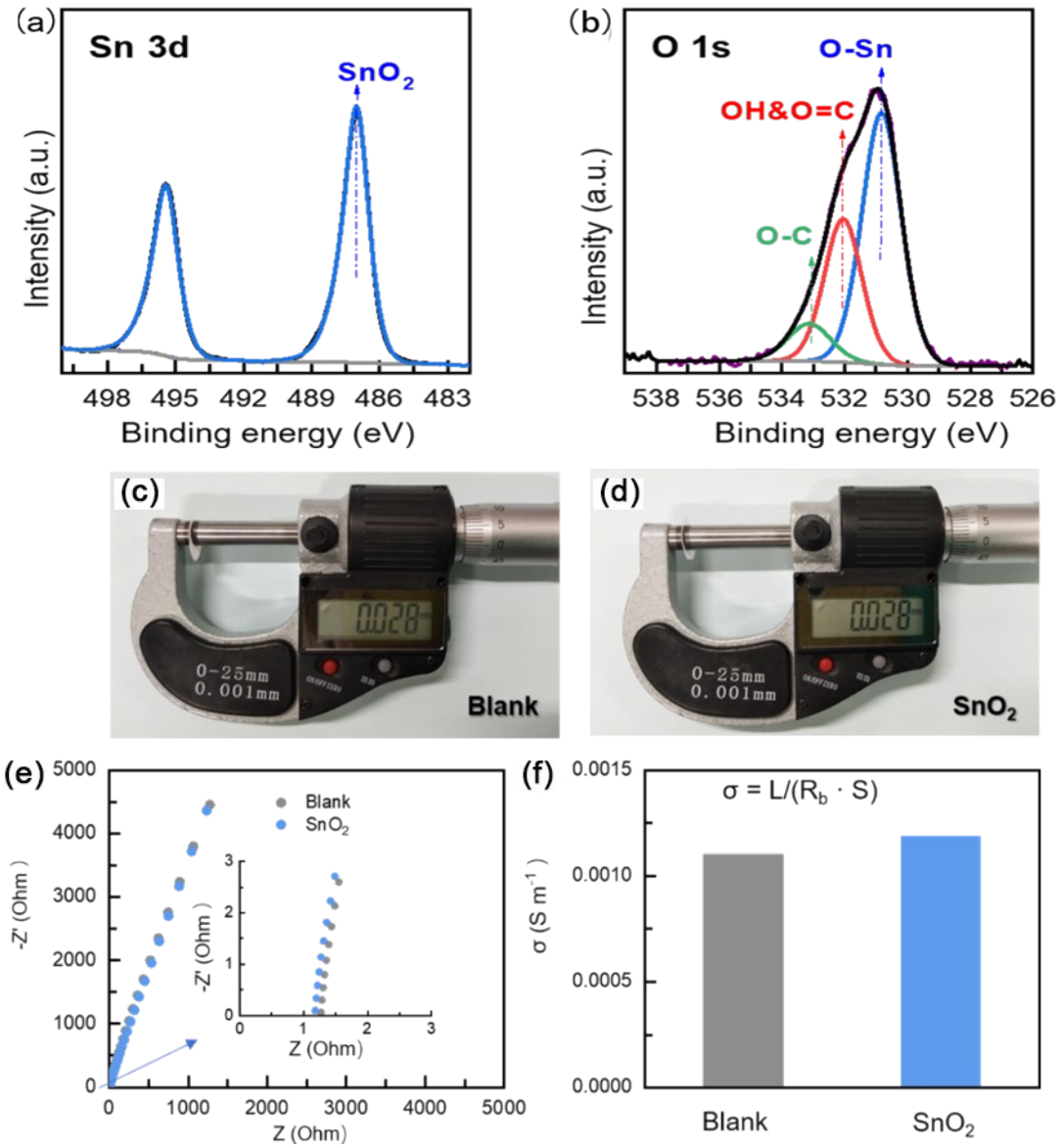

Figure S2. XPS spectra of (a) Sn 3d and (b) O1s of pristine SMS. Thickness of (c) blank separator and (d) SMS. (e) AC impedance spectroscopy, and (d) calculated ion conductivity of different separators.

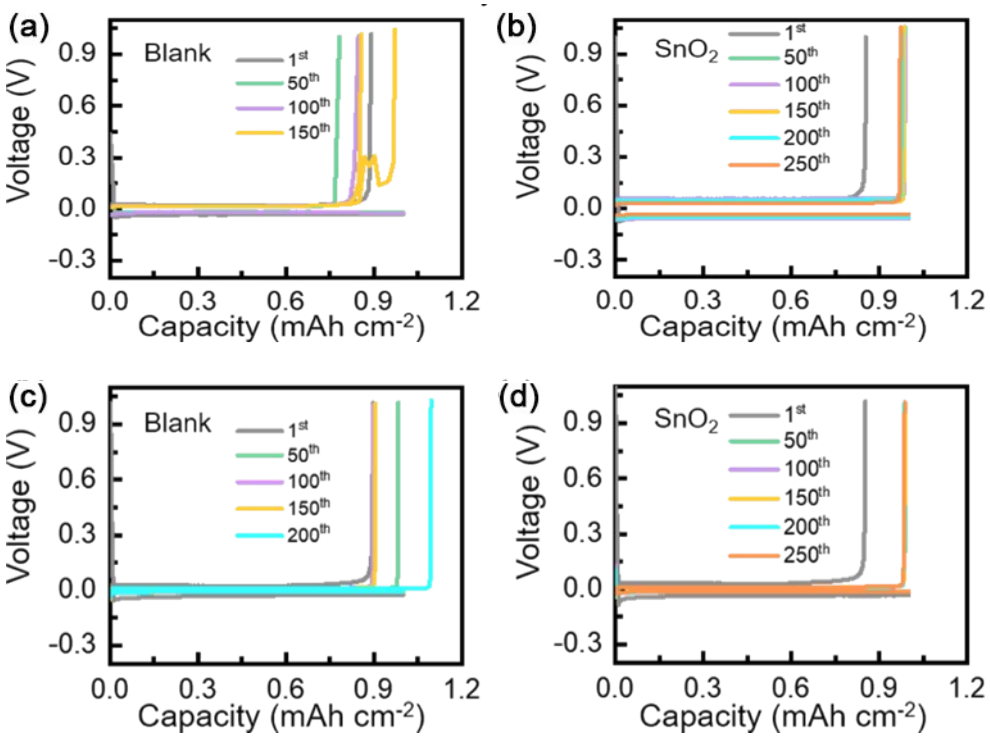

Figure S3. Voltage-Capacity profiles of Li‖Cu cells with (a) blank separator and (b) SMS at 0.5 mA cm^{-2}, 1mAh cm^{-2}. Voltage-Capacity profiles of Li‖Cu cells with (c) blank separator and (d) SMS at 1 mA cm^{-2}, 1mAh cm^{-2}.

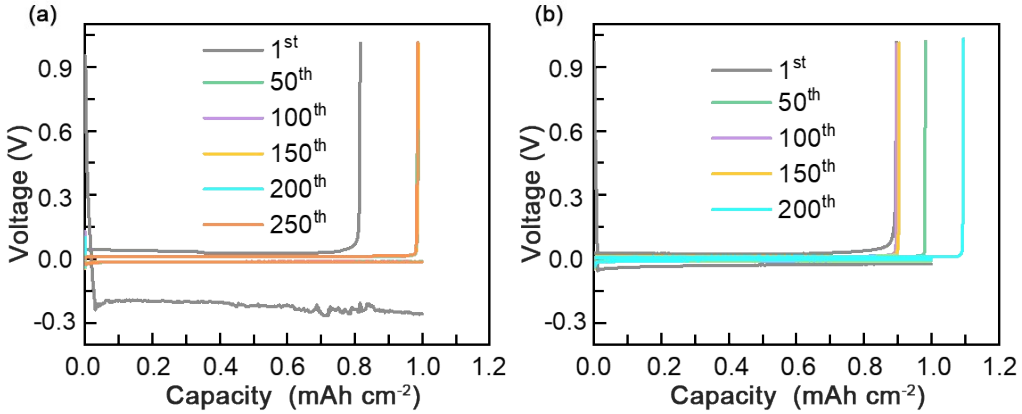

Figure S4. Voltage-capacity profiles of (a) Li‖SnO_2 coated Cu and (b) Li‖Cu cells with both blank separators.

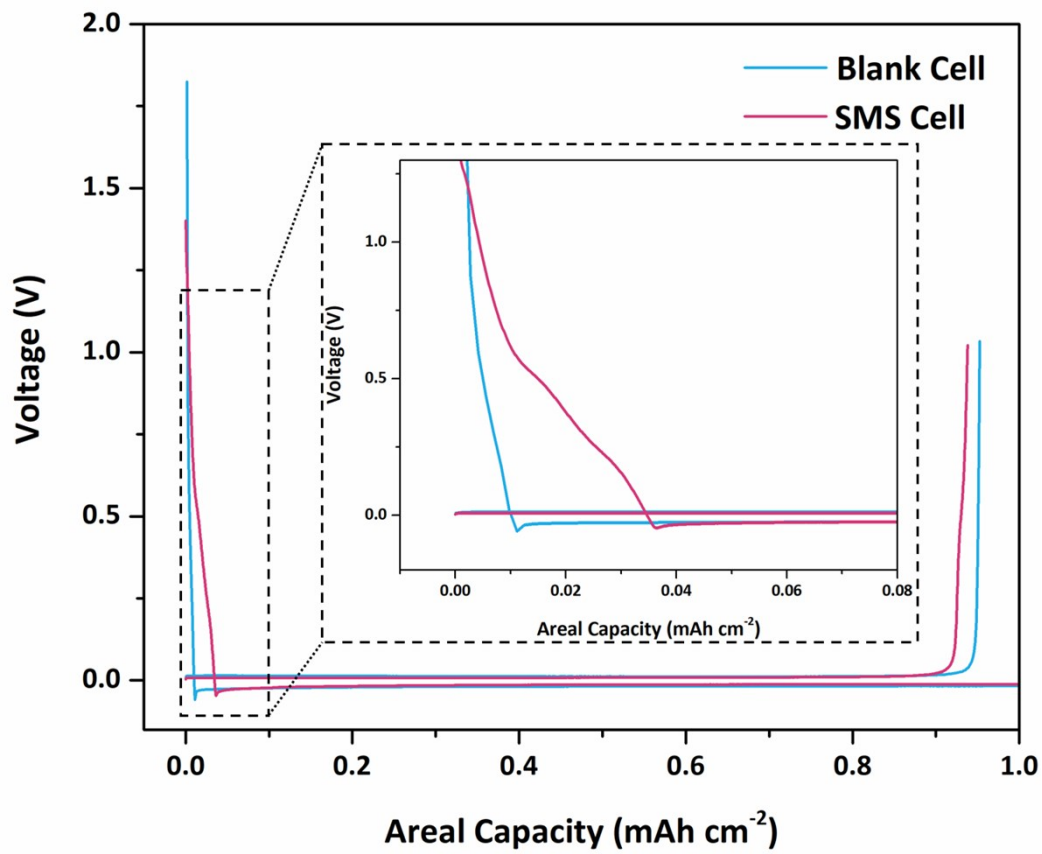

Figure S5. Initial voltage curves of blank Li‖Cu cell and SMS Li‖Cu cell.

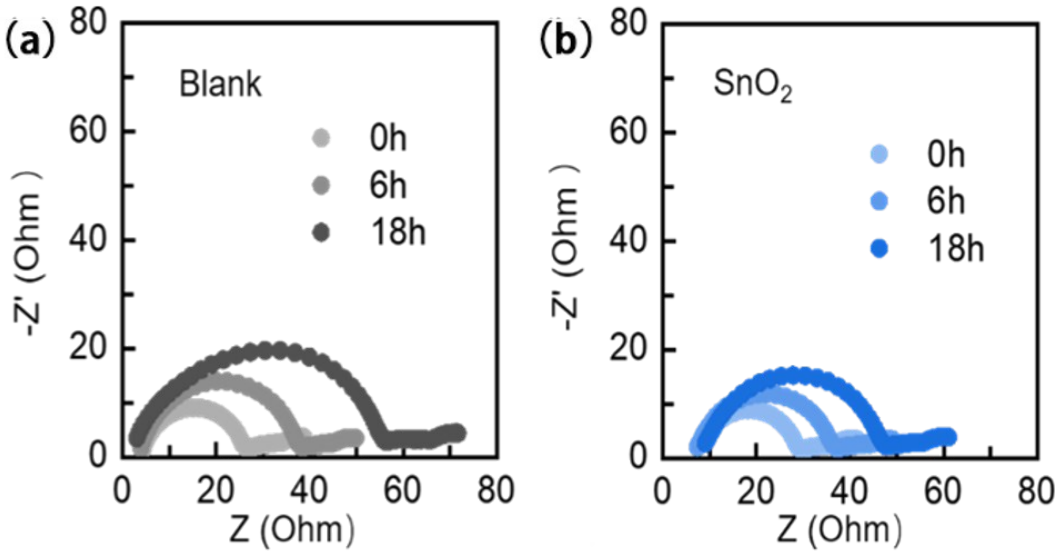

Figure S6. Time evolution of impedance response of symmetrical Li||Li cells with (a) blank separator and (b) SMS.

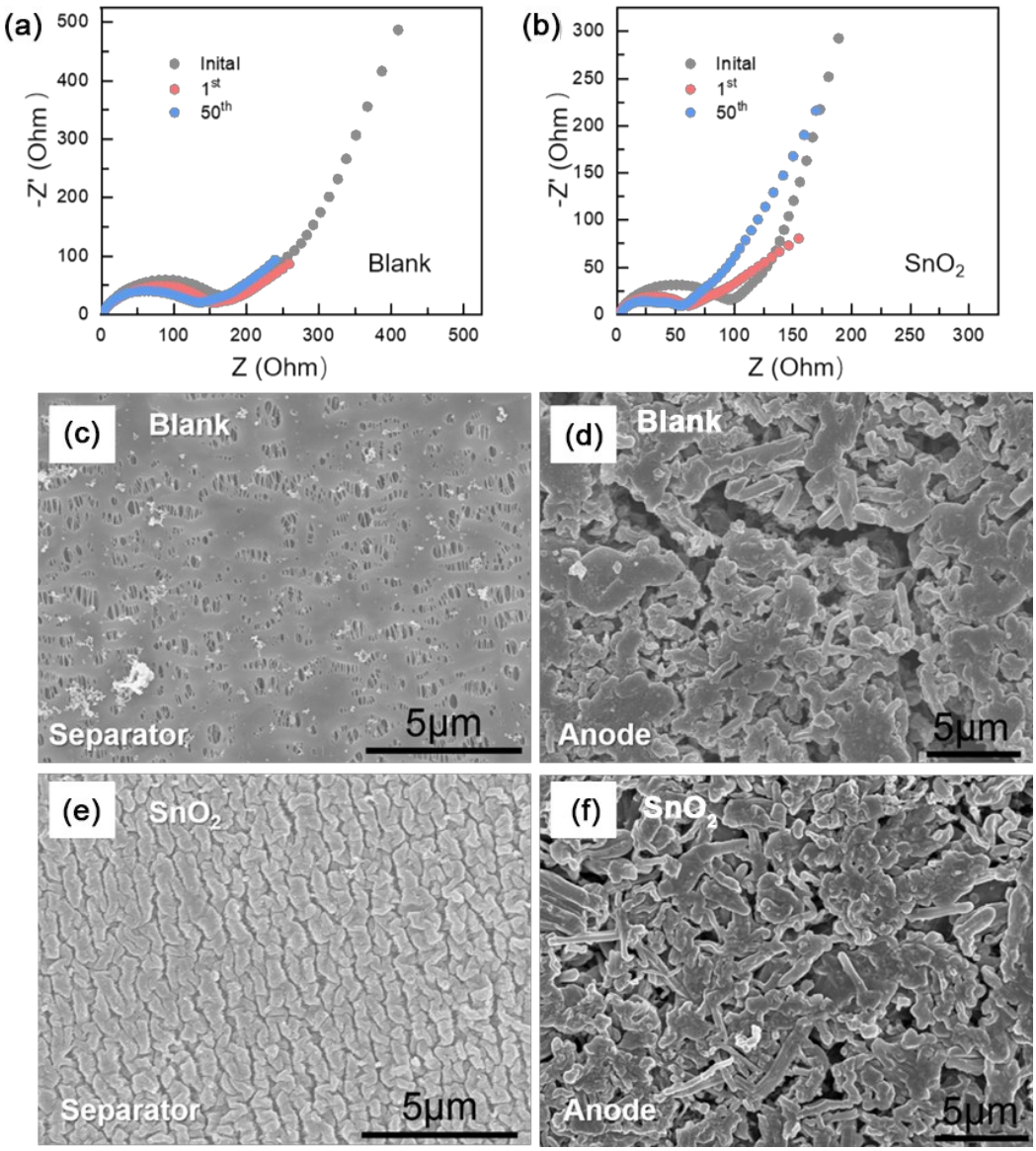

Figure S7. AC impedance of Li||LFP cells with (a) blank and (b) SnO_2 composite separators after different cycles. SEM images of the (c) blank and (d) SMS and (d-f) corresponding Li deposition morphologies after 15 cycles.

Table S1 Intrusion and pore data summary from MIP

Samples	Total Intrusion Volume **(mL/g)**	Total Pore Area **(m^2/g)**	Average Pore Diameter **(nm)**	Porosity **(%)**
Blank Separator	**3.0147**	**64.275**	**187.61**	**71.6469**
SMS	**3.6018**	**60.664**	**237.49**	**74.0324**