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

Supporting Information

Realization of High-Performance Room Temperature Solid State Li-Metal Batteries using LiF/PVDF-HFP Composite Membrane Protecting LATP Ceramic Electrolyte

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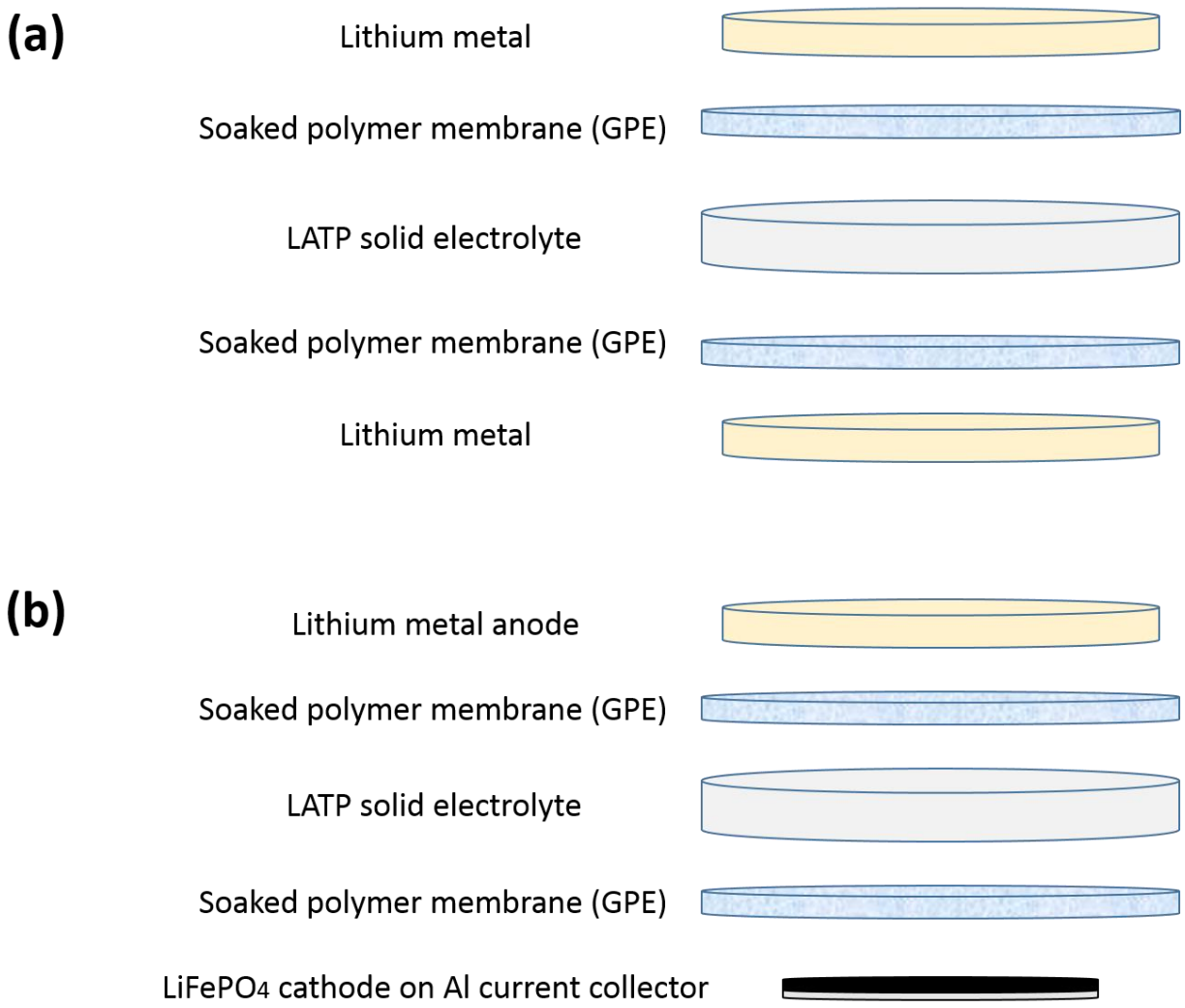

Fig. S1 Configuration of (a) symmetric cell and (b) full cell.

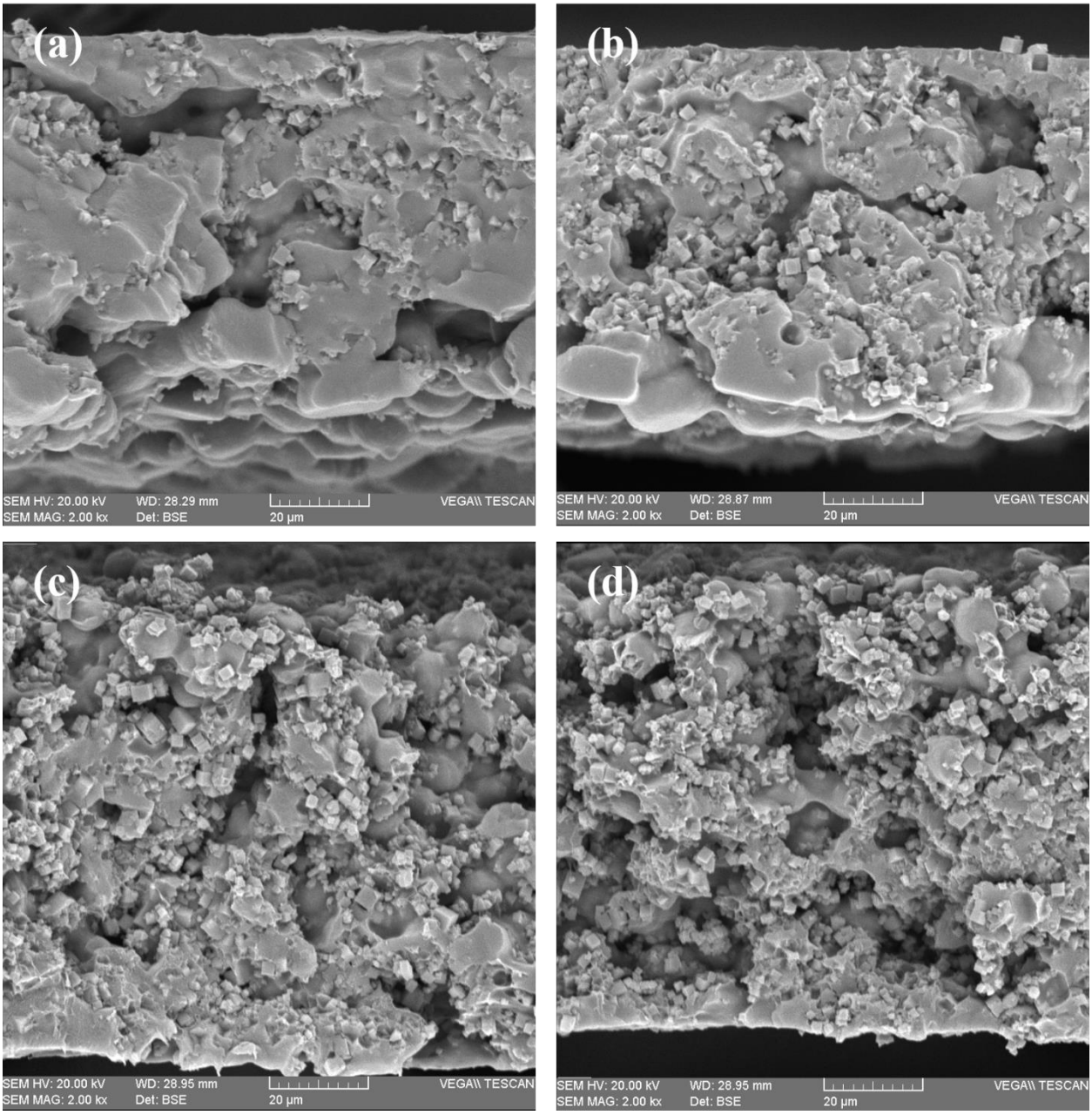

Fig. S2 Backscattered electron images of the synthesized GPEs. (a) GPE25, (b) GPE50, (c) GPE75, and (d) GPE100.

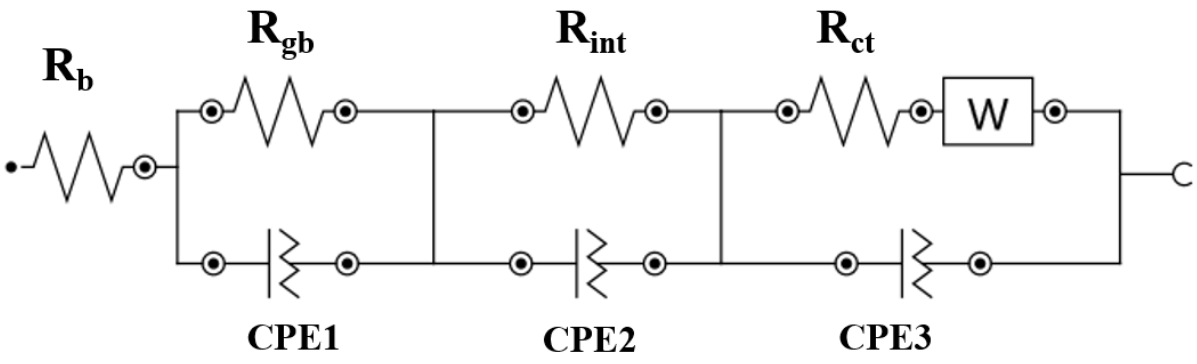

Fig. S3 Equivalent circuit for the symmetric cells and full cell

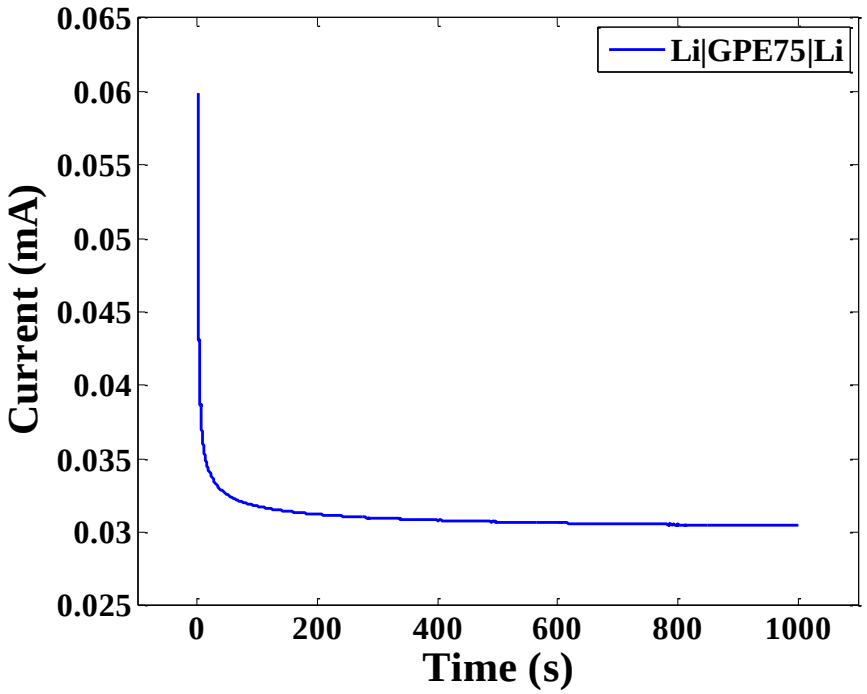

Fig. S4 Chronoamperometry curves of Li|GPE75|Li cell at 10mV DC polarization.

I_0 = 59.8 µA - $I_{Steady\ State}$ = 30.4 µA

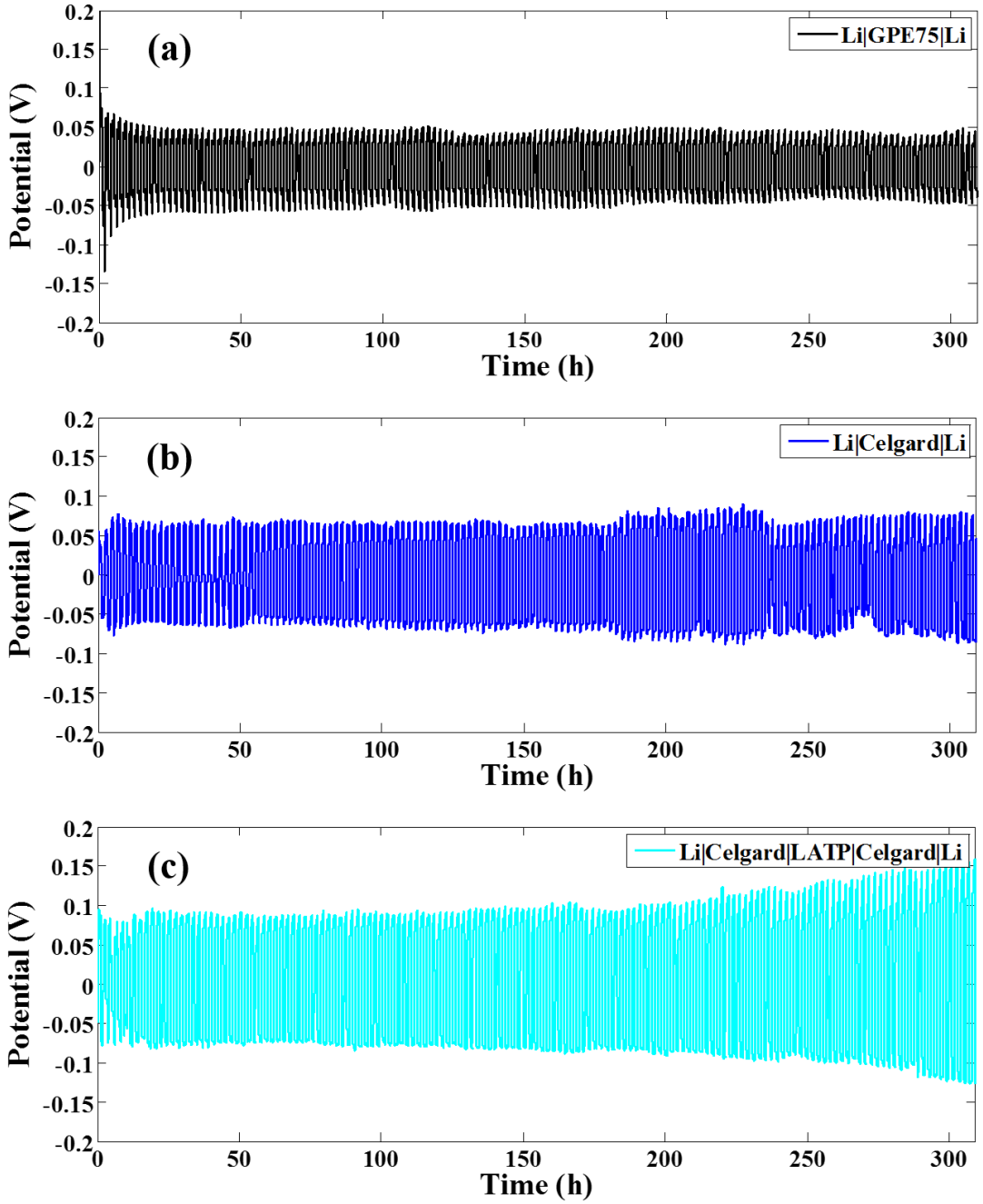

Fig. S5 Voltage profile of the (a) Li|GPE75|Li, (b) Li|Celgard|Li, and (c) Li|Celgard|LATP|Celgard|Li symmetric cells after 300 h of cycling. The Li|GPE75|Li cell showed stable operation with the lowest over-potential of about 50 mV at the last cycles. The situation is almost similar for the cell with a commercial celgard separator, except that the over-potential is slightly higher (about 75 mV). In contrast, the over-potential of the Li|Celgard|LATP|Celgard|Li cell started to increase after t=150 h and reached 125 mV at t=300 h, which implies the relatively poor protection capability of the Celgard compared to GPE75.