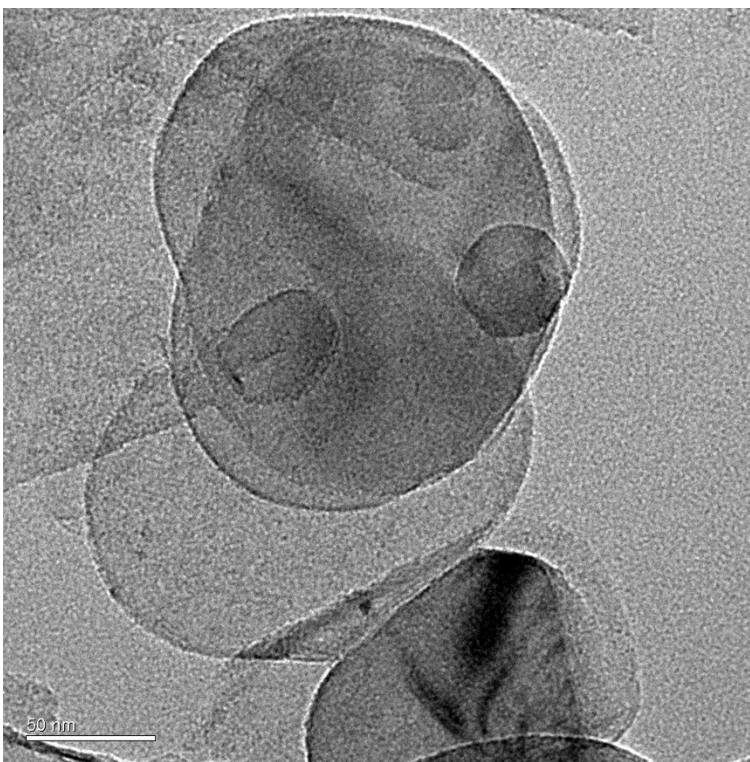


## Supporting information

### An ultrathin, strong, flexible composite solid electrolyte for high-voltage lithium metal batteries

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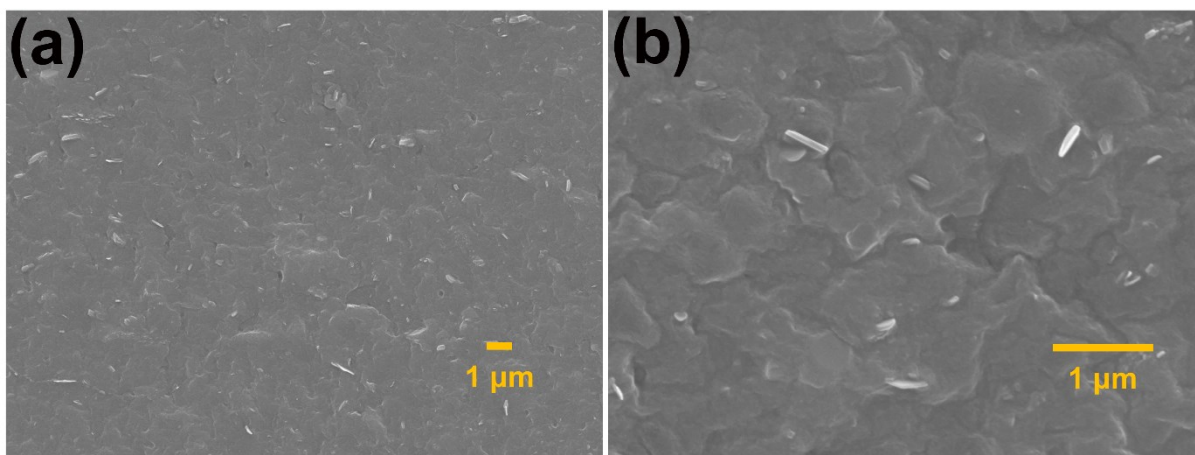
Department of Mechanical and Aerospace Engineering, The Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong, China



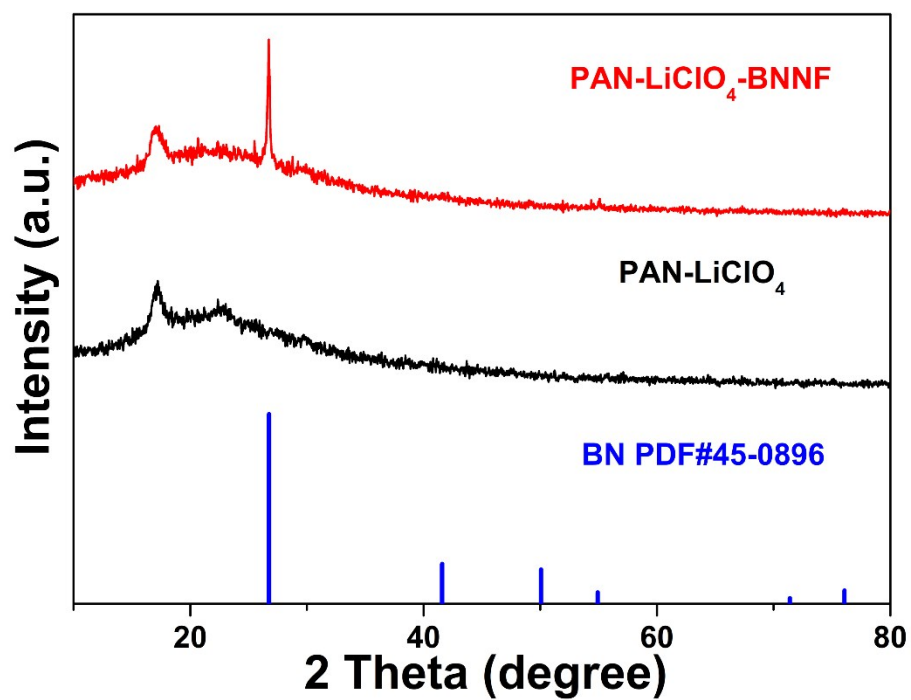
**Figure S1.** Transmission electron microscopy (TEM) image of the BNNFs.

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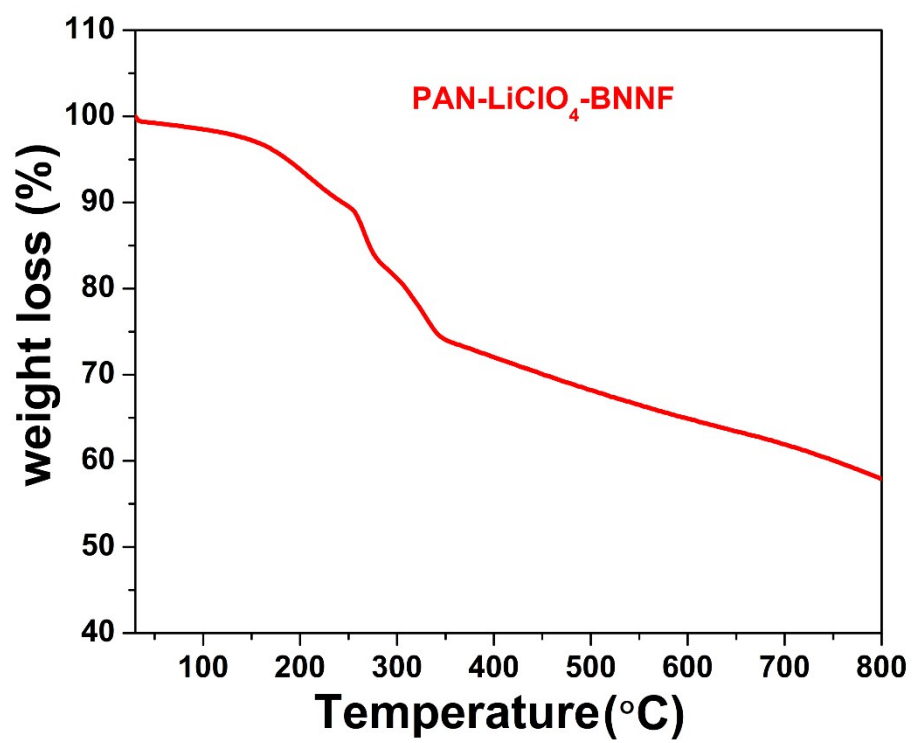
\*Corresponding author. E-mail: [metzhao@ust.hk](mailto:metzhao@ust.hk) (T.S. Zhao)



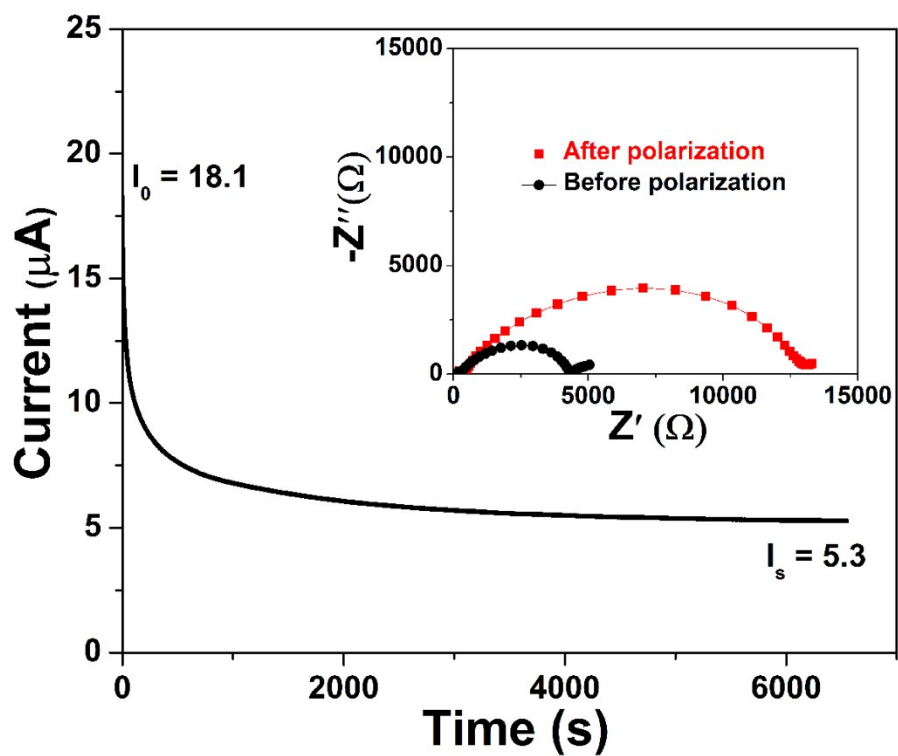
**Figure S2.** Cross-sectional SEM images of the PAN-LiClO<sub>4</sub>-BNNF composite electrolyte at magnifications of 5000 (left) and 20000 (right).



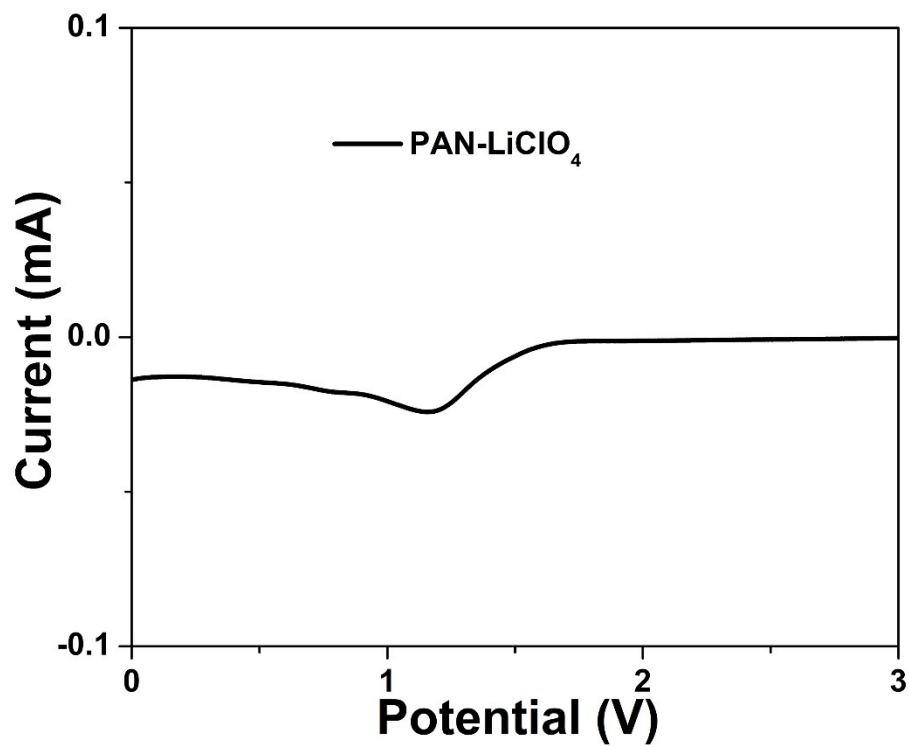
**Figure S3.** XRD patterns of the PAN-LiClO<sub>4</sub> polymer electrolyte and the PAN-LiClO<sub>4</sub>-BNBF composite electrolyte.



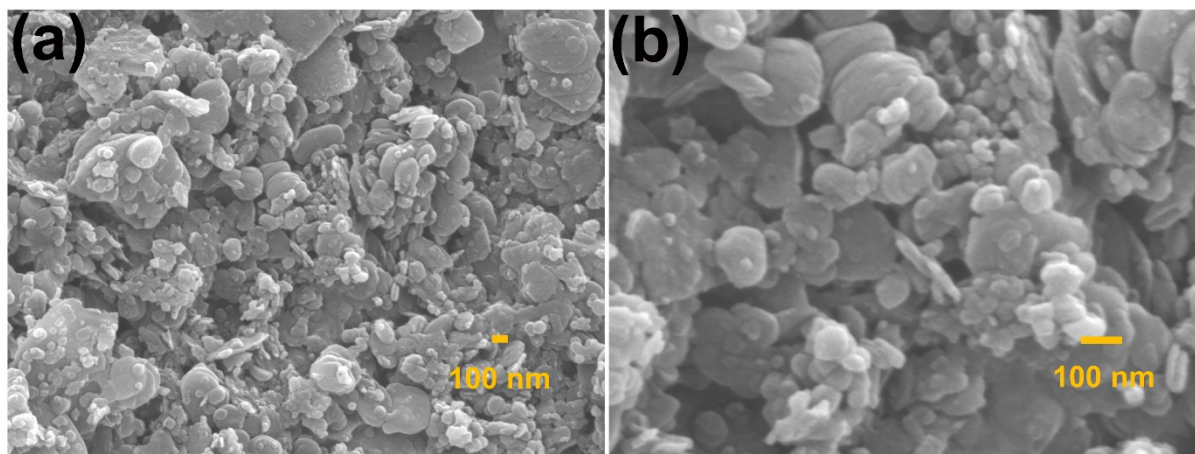
**Figure S4.** The TGA curve of the PAN-LiClO<sub>4</sub>-BNNF composite electrolyte.



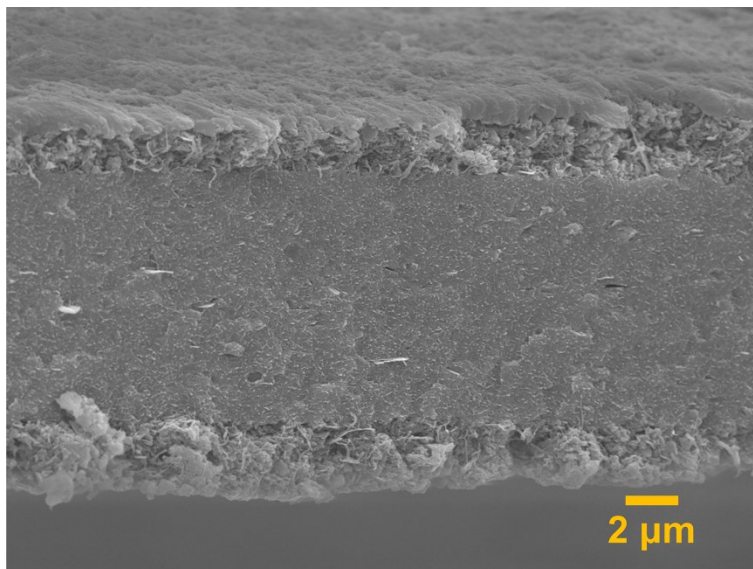
**Figure S5.** Chronoamperometry of the Li/PAN-LiClO<sub>4</sub>/Li symmetric cell with an applied voltage of 0.1 V. The inset is the impedance spectra of the symmetric cells before and after polarization.



**Figure S6.** LSV scans for the PAN-LiClO<sub>4</sub>-BNNF composite electrolyte from 0 to 3 V.

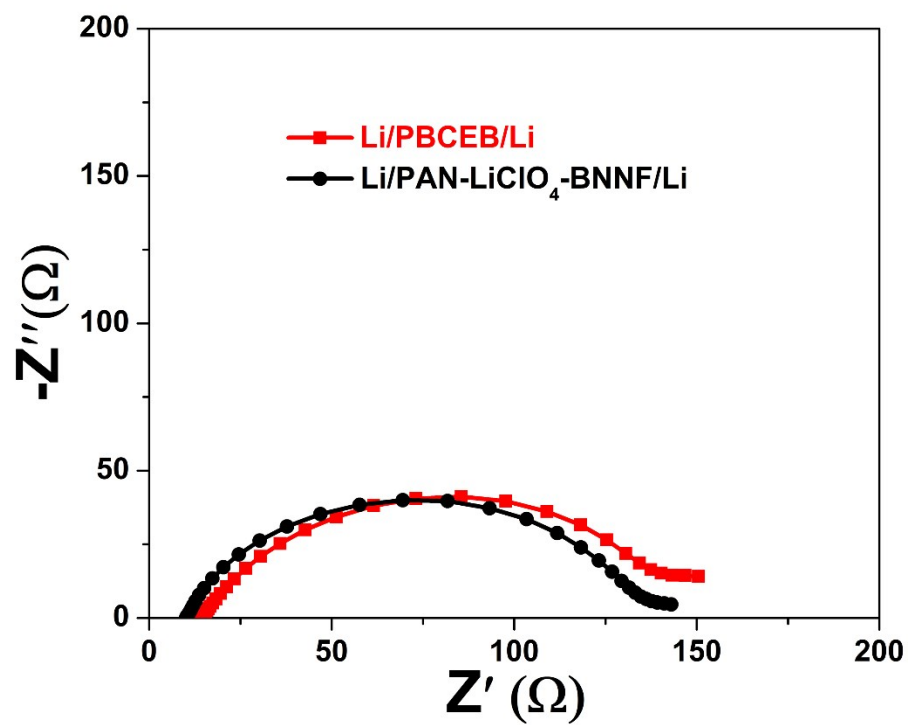


**Figure S7.** Top SEM images of the BNNF layer of PBCEB at magnifications of 30000 (left) and 80000 (right).



**Figure S8.** Cross sectional SEM image of the BNNF-PAN-LiClO<sub>4</sub>-BNNF-BNNF electrolyte.





**Figure S9.** The EIS results of the Li/PAN-LiClO<sub>4</sub>-BNNF/Li and Li/PBCEB/Li symmetric cells.