

Supporting Information

**Ethyl cyanoacrylate reinforced polyvinylidene fluoride
separators for robust lithium ion batteries**

Mengqiu Yang^{†,1}, Yuanpeng Liu^{†,1}, Botao Yuan^{†,2}, Zhaoxu Guang², Jipeng Liu¹, Liwei Dong¹, Yuanpeng Ji¹, Qun Li¹, Yifang Liang¹, Yunfa Dong², Sue Hao^{1,3}, Chunhui Yang^{1,3}, Weidong He^{*,2}

¹MIIT Key Laboratory of Critical Materials Technology for New Energy Conversion and Storage, School of Chemistry and Chemical Engineering, Harbin Institute of Technology, Harbin 150080, China.

²National Key Laboratory of Science and Technology on Advanced Composites in Special Environments, and Center for Composite Materials and Structures, Harbin Institute of Technology, Harbin 150080, China.

³State Key Laboratory of Urban Water Resource and Environment, Harbin Institute of Technology, Harbin 150080, China.

Corresponding Author

*E-mail: weidong.he@hit.edu.cn.

†These authors have contributed equally.

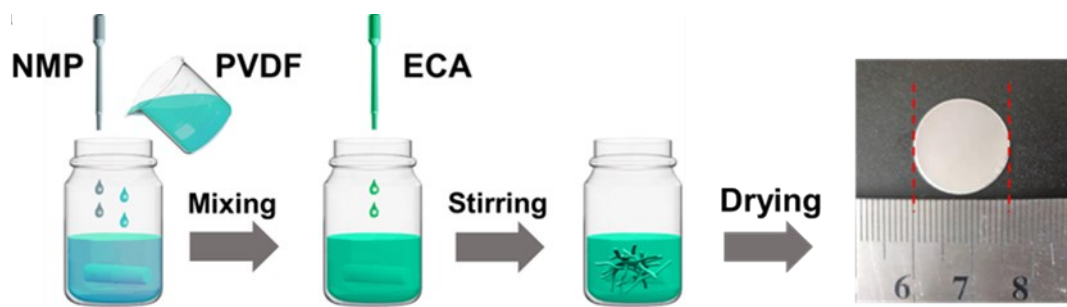


Figure S1. Illustration of the synthetic procedure and digital photo of the ECA-15 separator

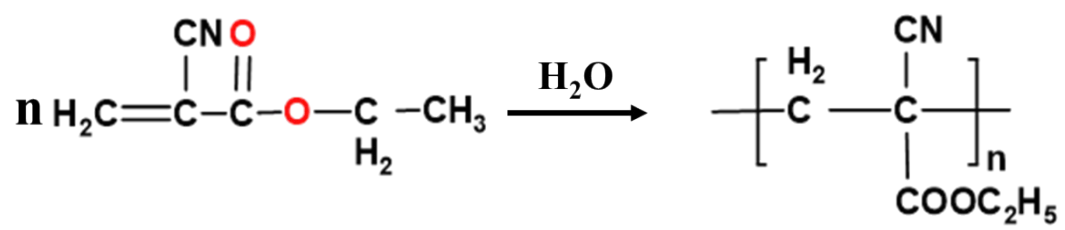


Figure S2. The anion polymerization of ECA with water molecules

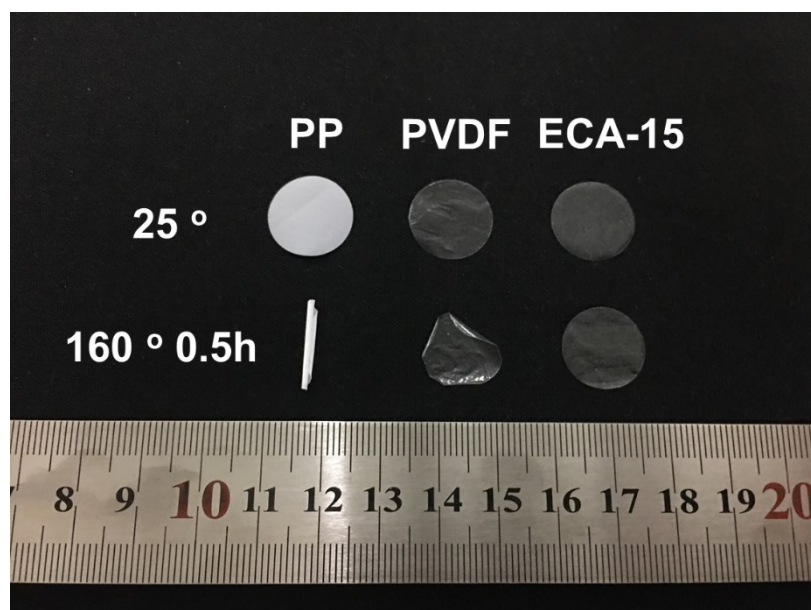


Figure S3. Optical photograph of PP, PVDF and ECA-15 separators at 160 ° after 0.5h.

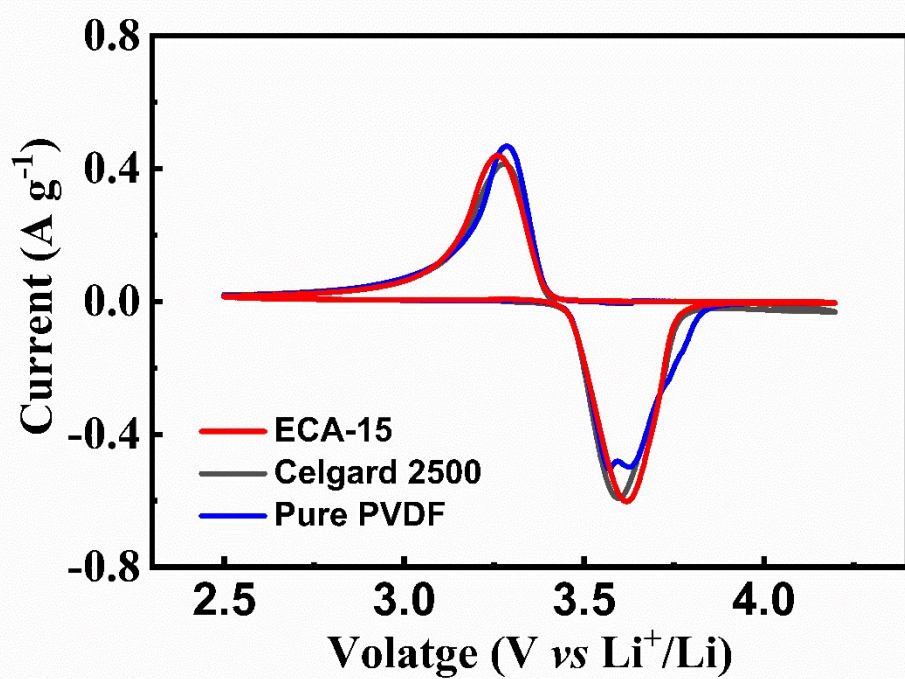


Figure S4. Cyclic voltammograms of ECA-15, Celgard 2500 and pure PVDF separators at 0.2 mV s⁻¹.

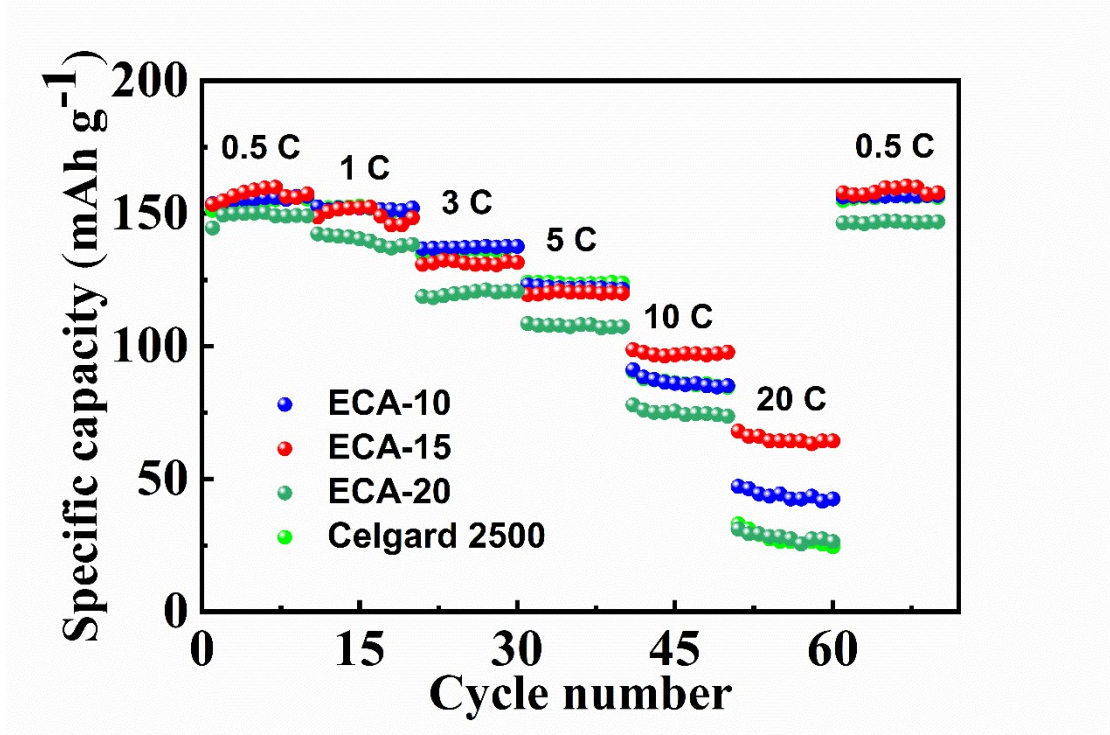


Figure S5. Rate performances of Celgard 2500, Pure PVDF and ECA-15 separators.

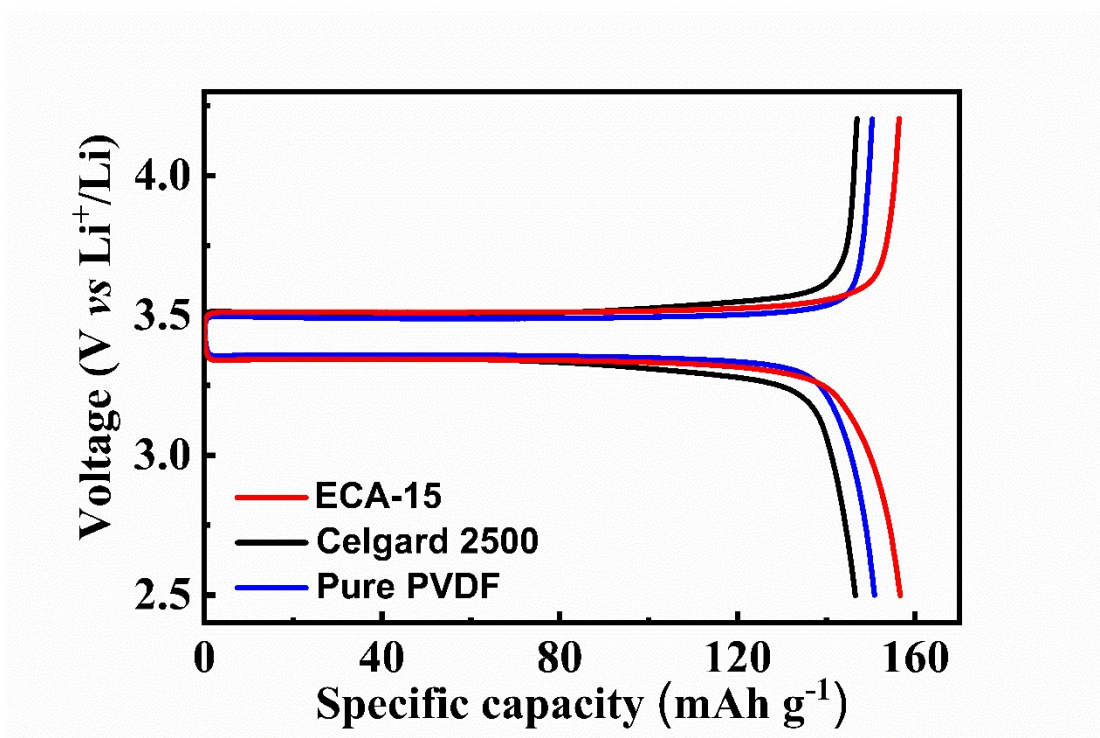


Figure S6. Charge/discharge profiles of Celgard 2500, Pure PVDF and ECA-15 separators.

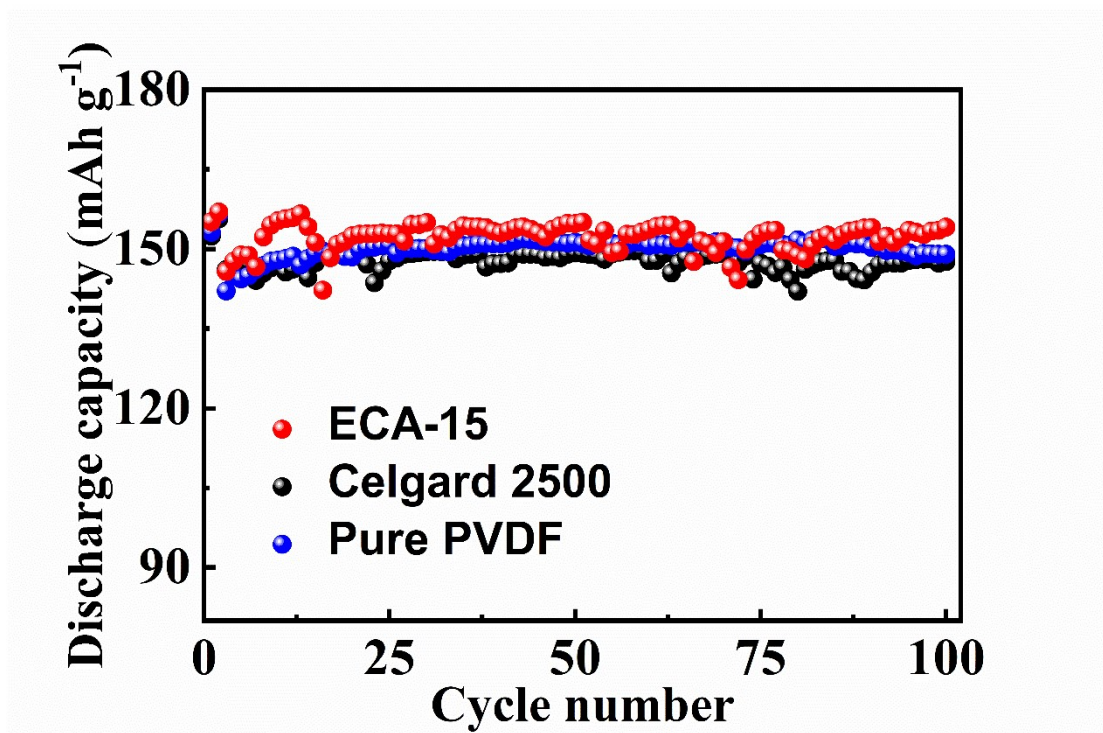


Figure S7. Cycling performances of LFP/Li with ECA-15, pure PVDF and Celgard 2500 separators.

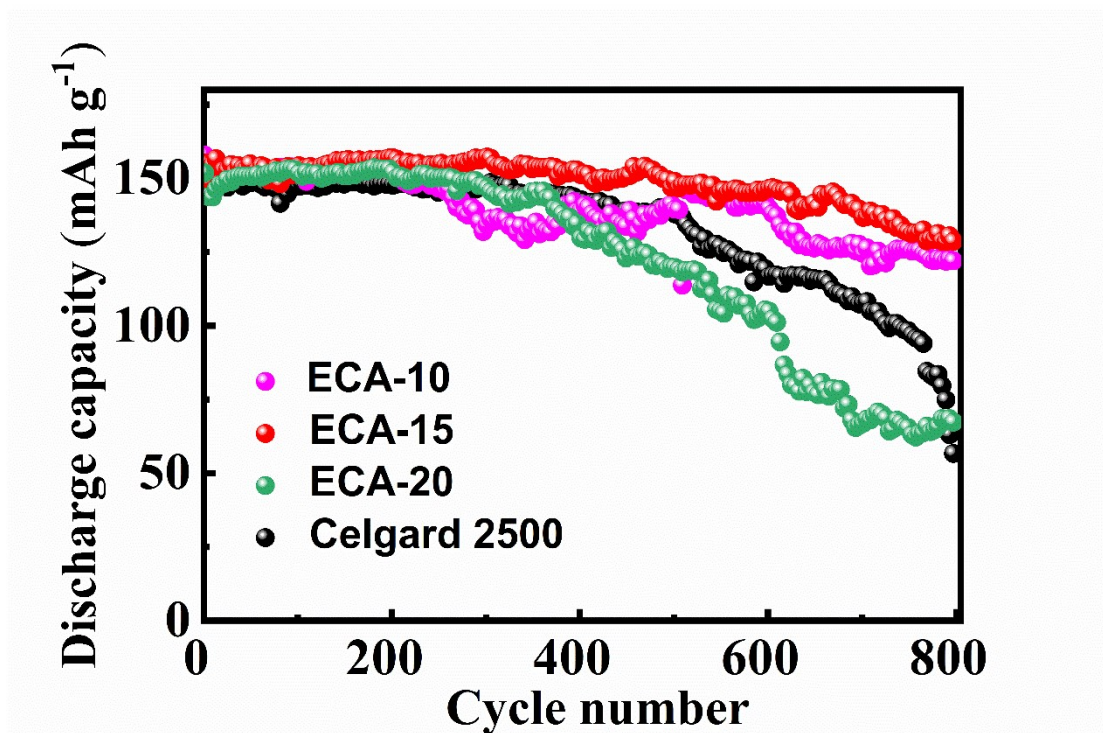


Figure S8. Cycling performances of LFP/Li with ECA-10, ECA-15, ECA-20 and Celgard 2500 separators.

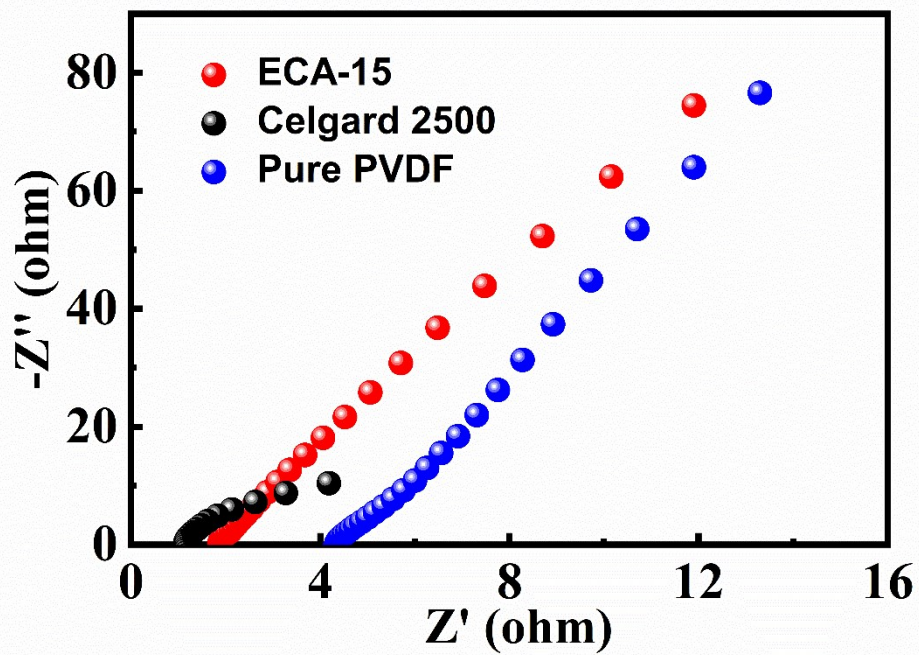


Figure S9. Electrochemical impedance spectroscopies of batteries with Celgard 2500, pure PVDF and ECA-15, respectively.

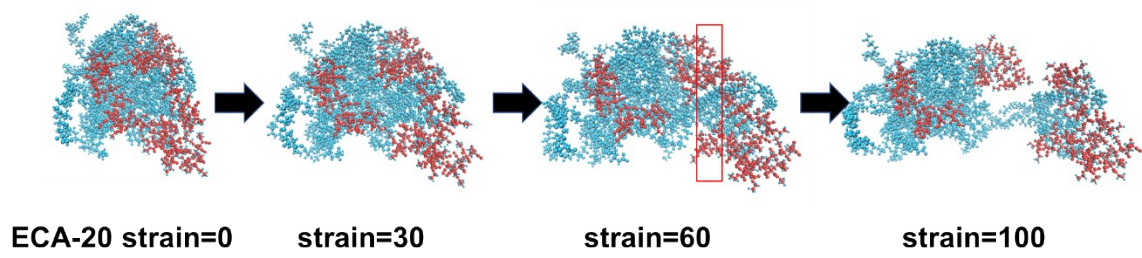


Figure S10. MD simulation of ECA-20 separator.

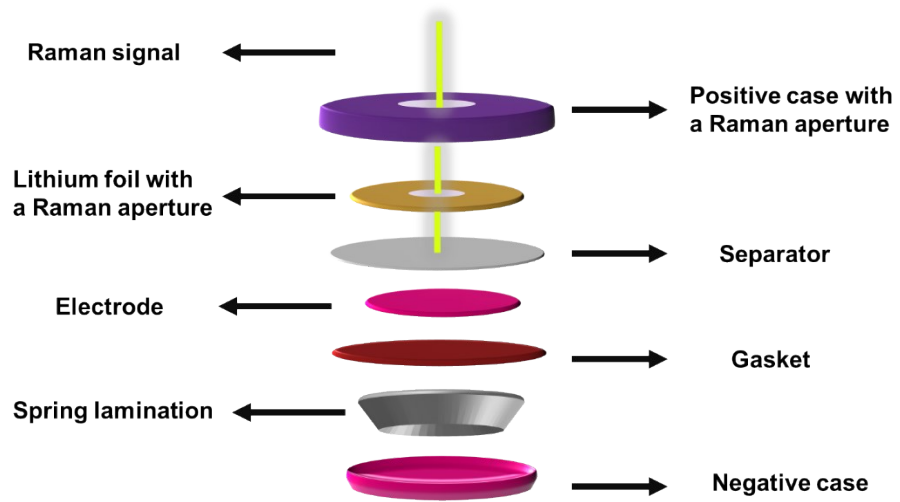


Figure S11. The cell configuration for in situ Raman spectroscopic analyze

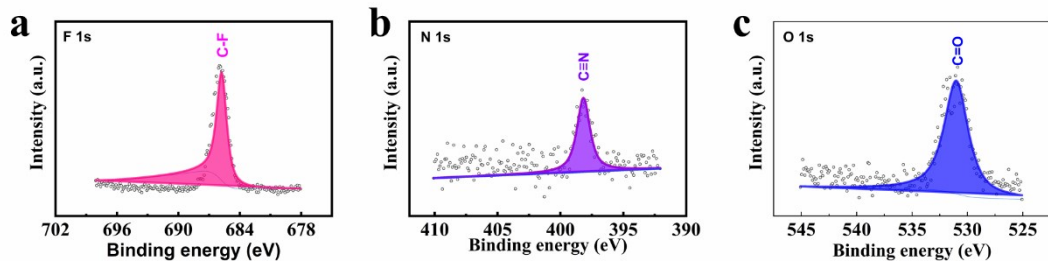


Figure S12. High-resolution XPS spectrum of F 1s, N 1s and O 1s in ECA-15 separator.