

## Supporting information

### **The effect of LLZO on the in-situ polymerization of acrylate solid state electrolyte on cathode**

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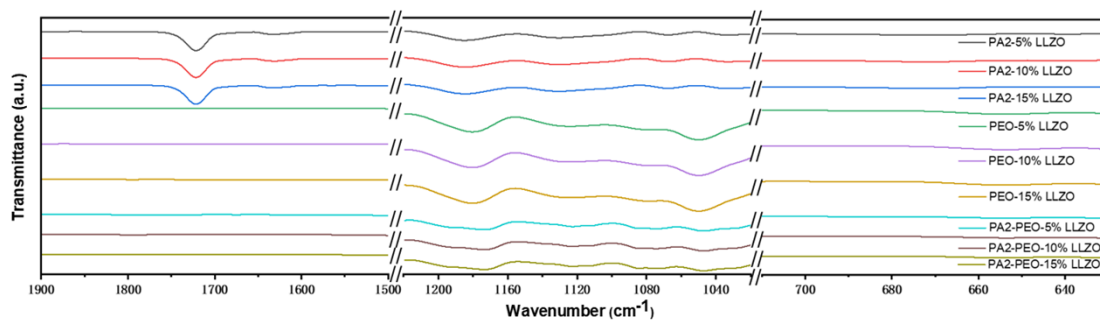
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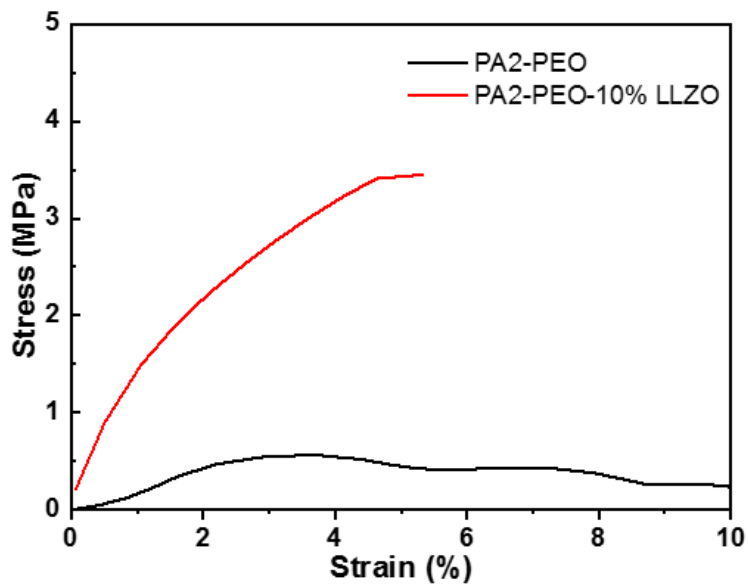
Bingkun Guo, email: guobingkun@shu.edu.cn

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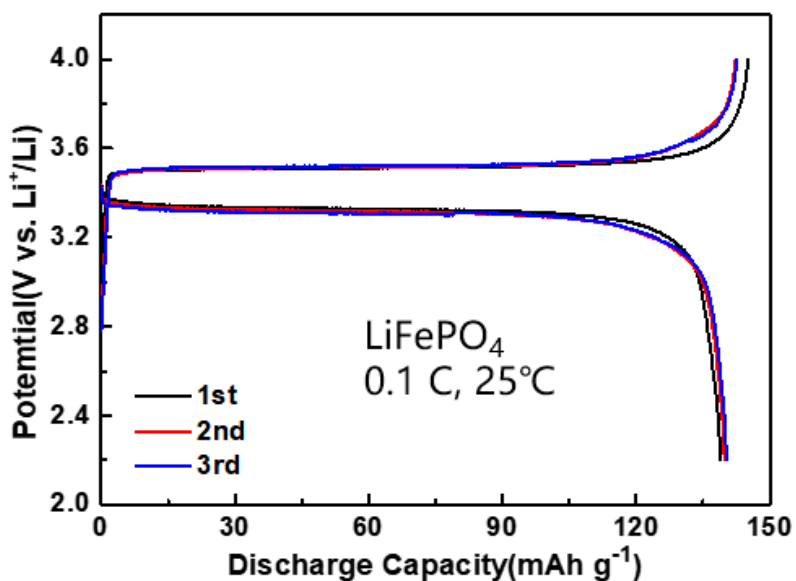
**Figure S1** FTIR of PEO, PA2, PA2-PEO samples with different contents of LLZO added.



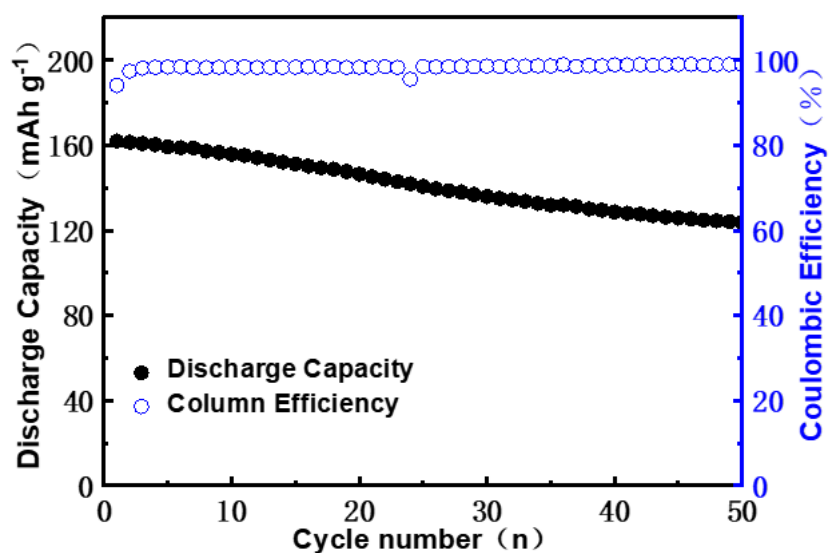
**Figure S2** DMA curves of PA2-PEO-10%LLZO and PA2-PEO at 25°C, elongation rate 3 mm min<sup>-1</sup>.



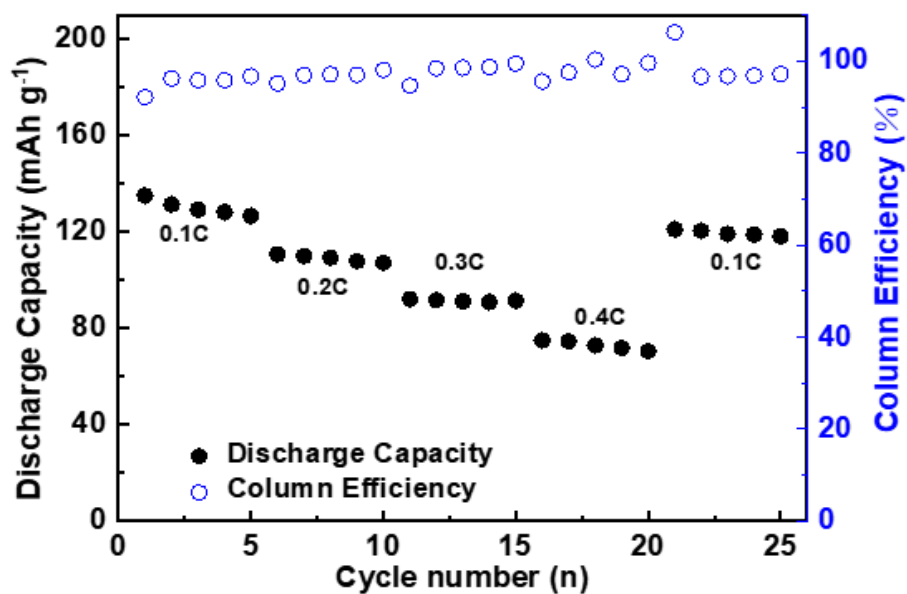
**Figure S3** The charge-discharge curves of  $\text{LiFePO}_4/\text{PA2-PEO-10\%LLZO/Li}$  cells at 0.1 C, 25 °C between 2.2-4 V vs.  $\text{Li}^+/\text{Li}$ .



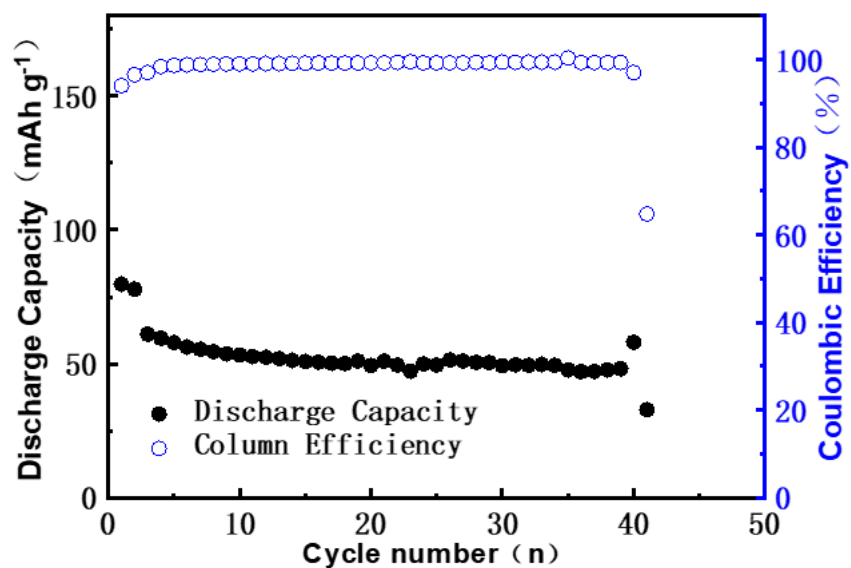
**Figure S4** The cyclic performance of  $\text{NCM111}/\text{PA2-PEO-10\%LLZO/Li}$  between 2.5-4.4 V vs.  $\text{Li}^+/\text{Li}$  at 1 C, 60 °C.



**Figure S5** The rate performance of NCM111/PA2-PEO-10%LLZO/Li cells at 60 °C between 2.5-4.2 V vs. Li<sup>+</sup>/Li.



**Figure S6** The cyclic performance of NCM111/PA2-PEO-10%LLZO/Li between 2.5-4.2 V vs. Li<sup>+</sup>/Li at 1 C, 60 °C.



**Figure S7** The cyclic performance of (a) LiFePO<sub>4</sub>/PA2-PEO-5%LLZO/Li and (b) LiFePO<sub>4</sub>/PA2-PEO-15%LLZO/Li cells at 0.1 C, 25 °C between 2.2-4 V vs. Li<sup>+</sup>/Li; (c) NCM111/PA2-PEO-5%LLZO/Li and (d) NCM111/PA2-PEO-5%LLZO/Li cells at 1 C, 60 °C between 2.5-4.2 V vs. Li<sup>+</sup>/Li.

