



Supporting Information

for

A novel all-fiber-based $\text{LiFePO}_4/\text{Li}_4\text{Ti}_5\text{O}_{12}$ battery with self-standing nanofiber membrane electrodes

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Additional experimental data

The obtained electrolyte membrane is shown in Figure S1a. The optimum thickness of the electrolyte membrane is 60–70 μm . The prepared electrolyte membrane was then punched into a disk with a diameter of 18 mm (Figure S1b).

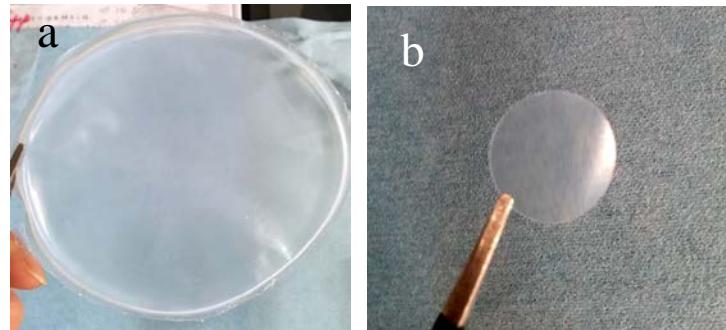


Figure S1: Pictures of the gel electrolyte.

Table S1 lists the electrochemical performance achieved in some related works. It can be seen that the flexible self-standing LiFePO_4/C fiber membrane cathode and $\text{Li}_4\text{Ti}_5\text{O}_{12}/\text{C}$ fiber membrane anode in this work show a comparable electrochemical performance. In addition, the full all-fiber-based $\text{LiFePO}_4/\text{Li}_4\text{Ti}_5\text{O}_{12}$ battery can be cycled at 1C for 800 times.

Table S1: Comparison between this work and related references.

No.	components	method	performance	reference
1	LiFePO ₄ /C short fibers	electrospinning	160 mAh/g at 0.06C for 10 cycles	<i>ACS Appl. Mater. Interf.</i> 2010 , 2, 212–218. doi:10.1021/am900656y
2	LiFePO ₄ powder and LiFePO ₄ nanofibers	solid-state blending	160 mAh/g at 0.1C for 40 cycles	<i>Ceram. Int.</i> 2015 , 41, 14.08.120
3	Li ₄ Ti ₅ O ₁₂ /C short fibers	hydrothermal and ion-exchange	109 mAh/g at 20C for 50 cycles	<i>J. Alloys Compd.</i> 2017 , 721, 545–553. doi:10.1016/j.jallcom.2017.06.035
4	carbon-coated Li ₄ Ti ₅ O ₁₂ porous fibers	sol-gel	135 mAh/g at 5C for 100 cycles	<i>Electrochim. Acta</i> 2018 , 283, 1418–1424. doi:10.1016/j.electacta.2018.07.127
5	Li ₃ V ₂ (PO ₄) ₃ /C short fibers	electrospinning	103 mAh/g at 20C for 120 cycles	<i>Solid State Ionics</i> 2017 , 305, 36–42. doi:10.1016/j.ssi.2017.04.019
6	LiMn ₂ O ₄ fibers gelled PVdF-HFP TiNb ₂ O ₇ fibers	electrospinning	116 mAh/g at 150 mA/g	<i>ACS Appl. Mater. Interfaces</i> 2014 , 6, 8660–8666. doi:10.1021/am501464d
7	LiFePO ₄ /C fiber membrane Li ₄ Ti ₅ O ₁₂ /C fiber membrane LiFePO ₄ /C fiber membrane gelled PVdF Li ₄ Ti ₅ O ₁₂ /C fiber membrane	electrospinning	135 mAh/g at 1C for 700 cycles 100 mAh/g at 1C for 800 cycles	this work

Figure S2 shows a photograph and SEM pictures of the LiFePO₄ and Li₄Ti₅O₁₂ fiber membrane electrodes after charge–discharge cycles. It can be seen that the composite electrodes still keep the 3D network structure after many cycles. This indicates that these fiber membranes possess a high structural stability during charge–discharge cycles.

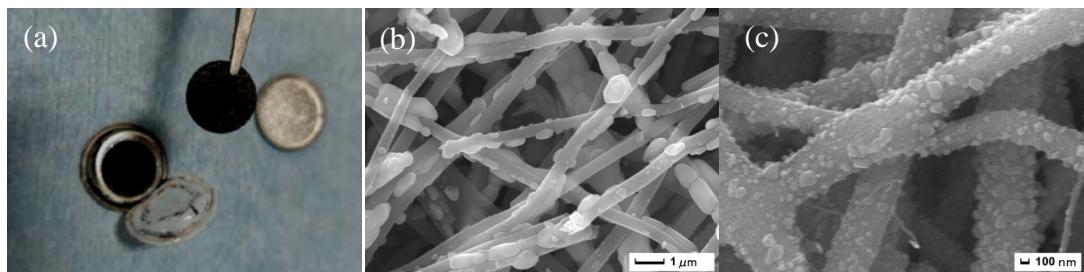


Figure S2: (a) Photograph and SEM pictures of (b) the LiFePO₄ and (c) the Li₄Ti₅O₁₂ fiber membrane electrode after 800 cycles.