

Supporting Information for

**Anhydrous proton conductivity of electrospun phosphoric
acid-doped PVP-PVDF nanofibers and composite
membranes containing MOF fillers**

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Experimental Section

The sample of membranes for taking TEM image was prepared as the following procedure: first, the electrospun membrane was soaked into the saturated lead acetate (Aladdin, Shanghai, China) water solution overnight. Then the membrane was washed with distilled water for several times and dried under vacuum. For taking TEM images, the as-treated membrane was embedded into epoxy resin in a block template and cured at ~60°C for 24 h. Finally, the blocks were cut into slices (50 ~ 90 nm thickness) and picked up on copper grids.

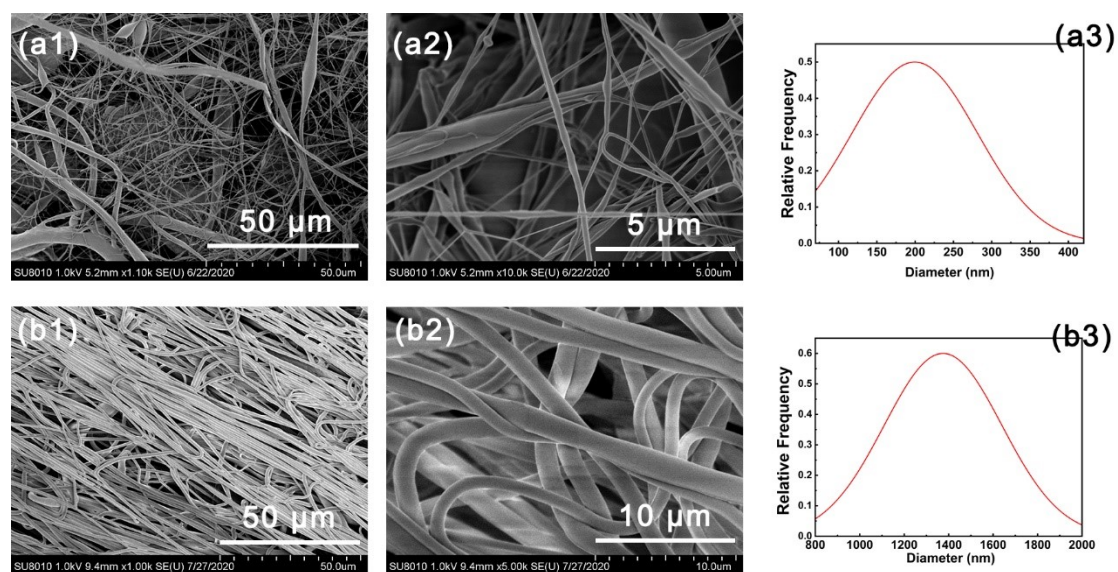


Figure S1 SEM images and diameter distribution of pristine (a) PVDF and (b) PVP

Table S1 Viscosity and conductivity of electrospinning solution

Sample	Solution Viscosity (mPa·S)	Solution Conductivity ($\mu\text{s cm}^{-1}$)
PVDF	131.5	1.598
20PVP	142.4	1.849
40PVP	167.1	2.017
60PVP	230.3	2.125
80PVP	264.5	2.674
PVP	297.6	2.984

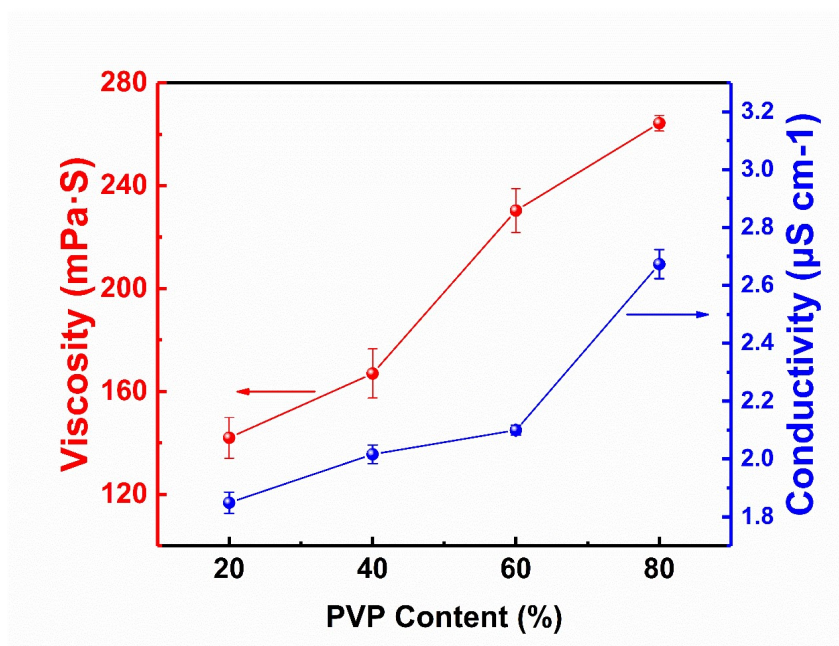


Figure S2 Relationship between electrospinning solution viscosity/conductivity and PVP content

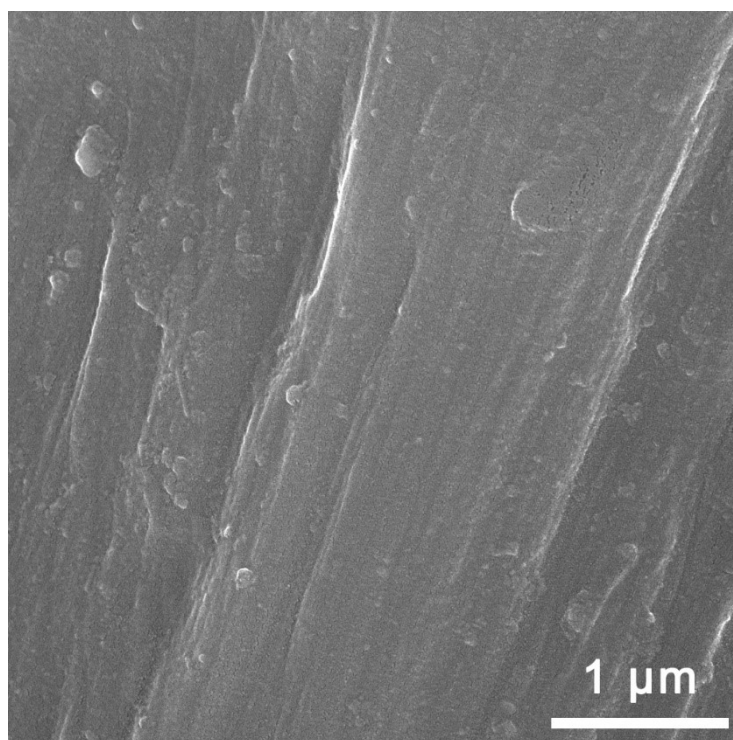


Figure S3 SEM images of 60PVP nanofiber membranes after hot pressing

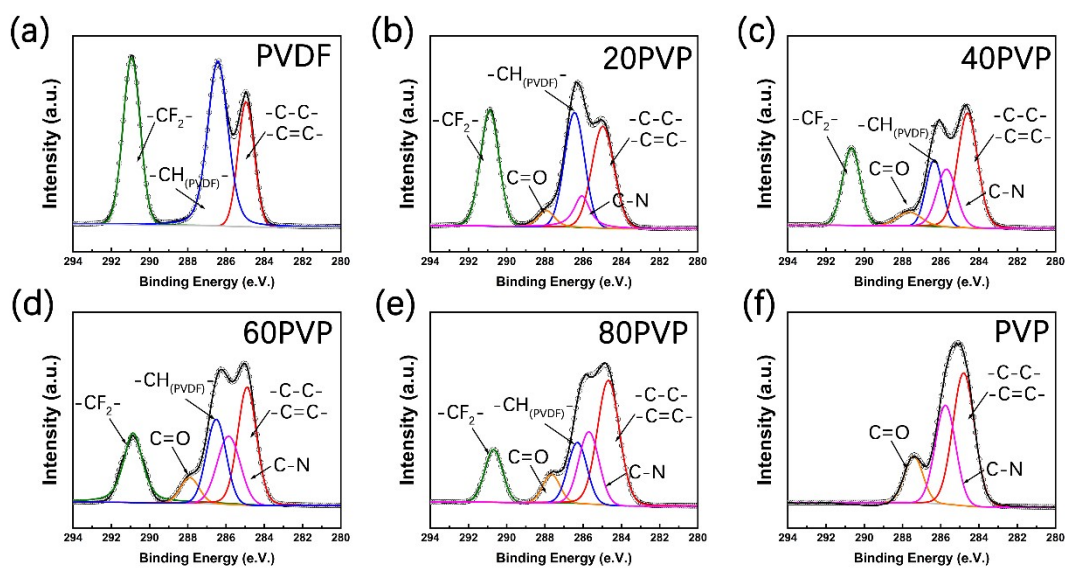


Figure S4 XPS C 1s spectrum of (a) PVDF, (b) 20PVP, (c) 40PVP, (d) 60PVP, (e) 80PVP and (f) PVP membrane.

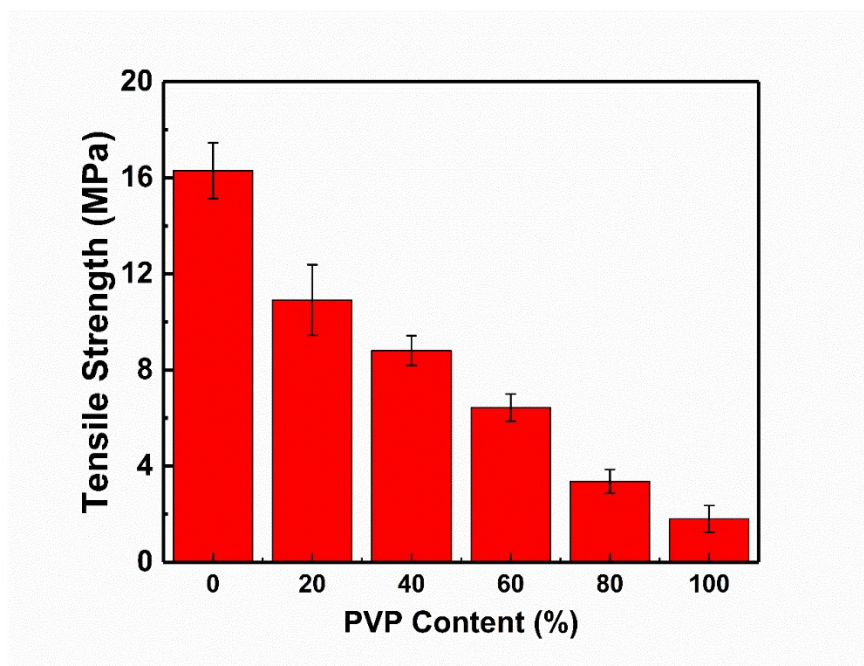


Figure S5 Mechanical strength of different PVP-PVDF blend nanofiber membranes

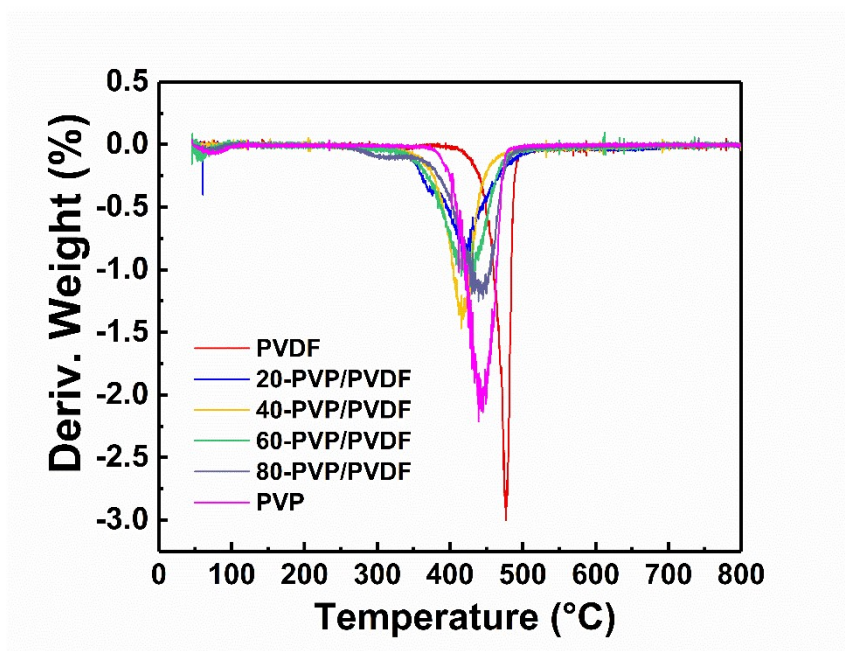


Figure S6 DTG curves of different PVP-PVDF blend nanofiber membranes

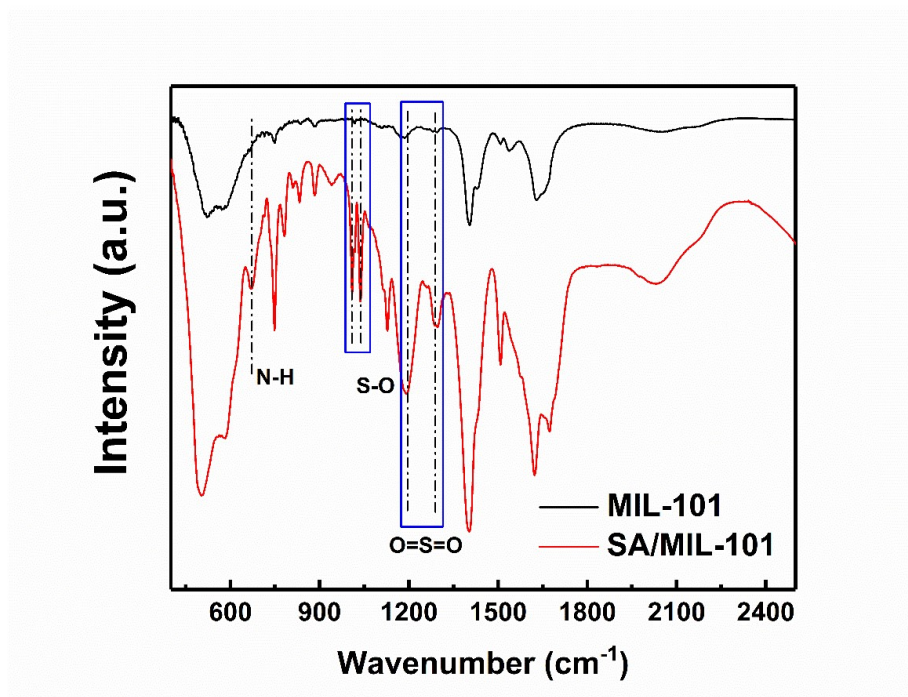


Figure S7 FT-IR spectra of MIL-101 and SA/MIL101

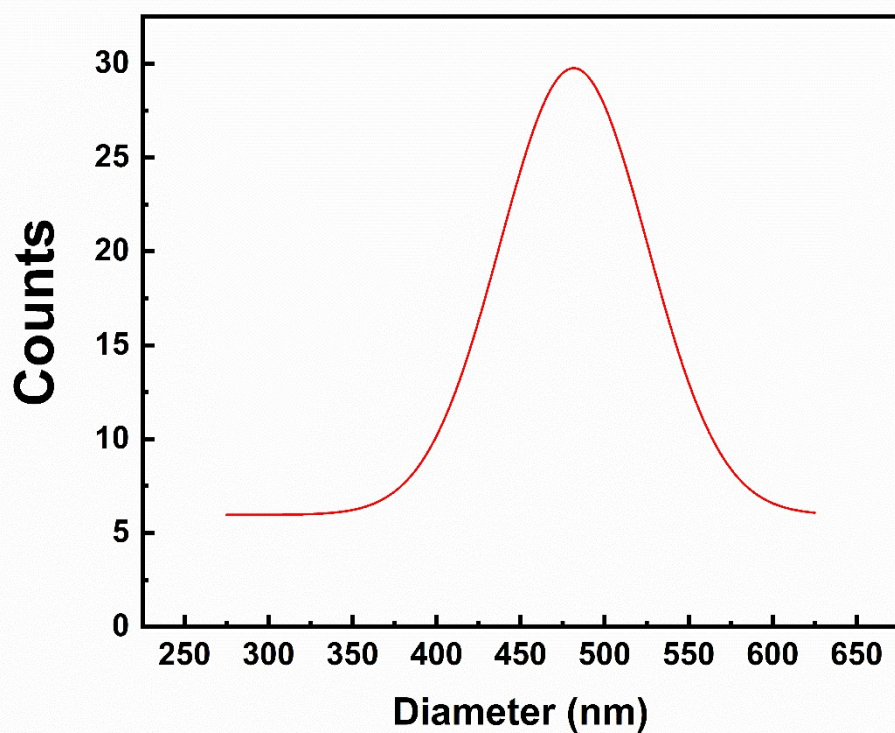


Figure S8 Diameter distribution of SA/MIL101@PVP-PVDF

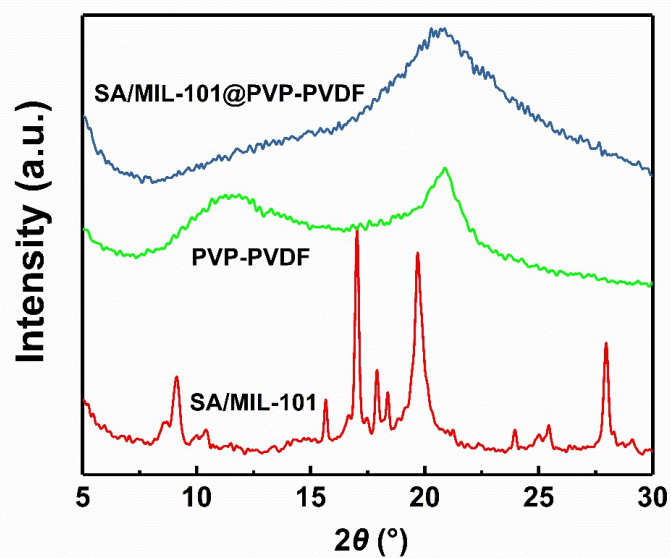


Figure S9 XRD patterns of SA/MIL101 and SA/MIL101@PVP-PVDF compared with PVP-PVDF (60PVP)

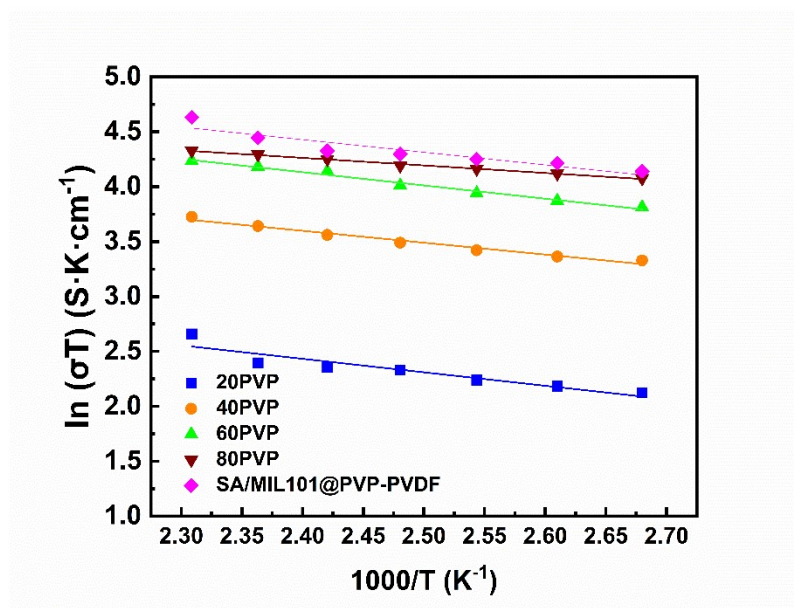


Figure S10 Arrhenius plot of PA-doped SA/MIL101@PVP-PVDF and different PVP-PVDF blend nanofiber membranes

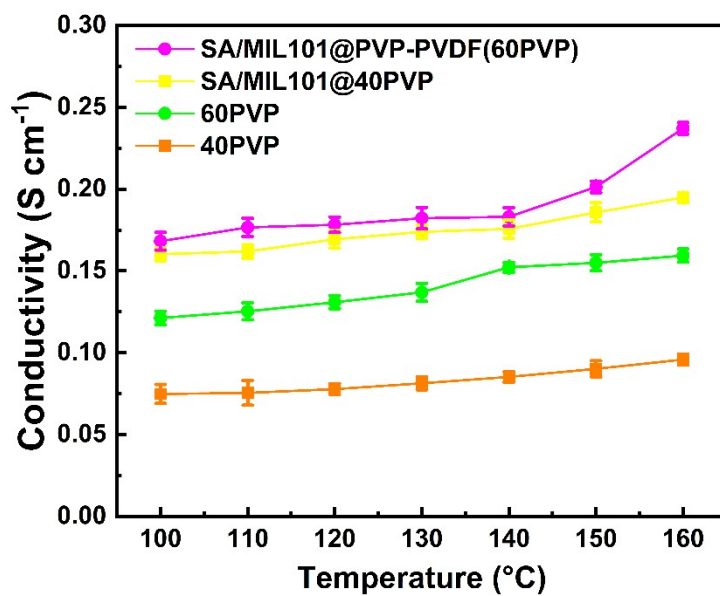


Figure S11 Proton conductivities of SA/MIL101@40PVP compared with 40PVP, 60PVP and SA/MIL101@PVP-PVDF(60PVP)