

Electronic Supplementary Information for

**Fluorinated Polyurethane Macroporous Membranes with Waterproof, Breathable and
Mechanical Performance Improved by Lithium Chloride**

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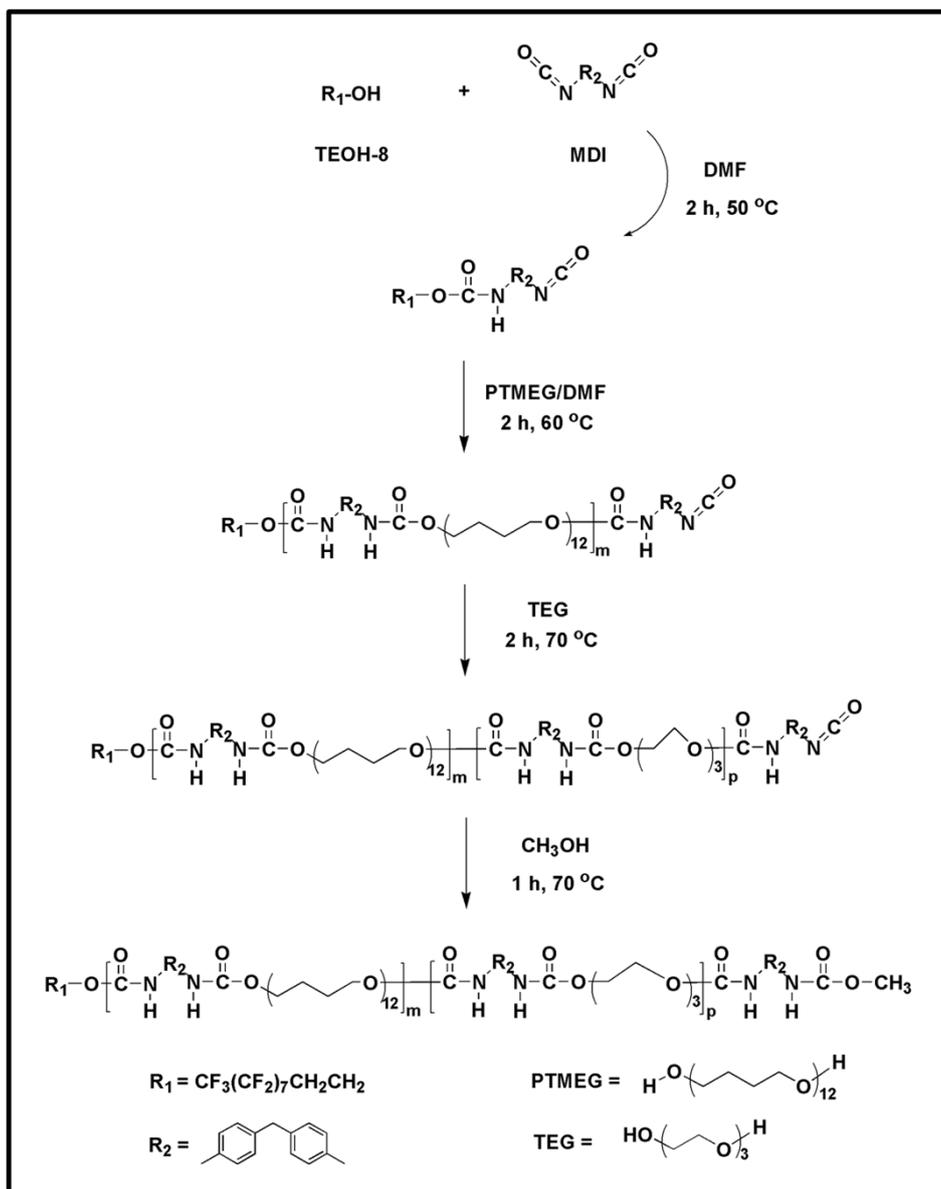


Fig. S1 Synthesis strategy of FPU.

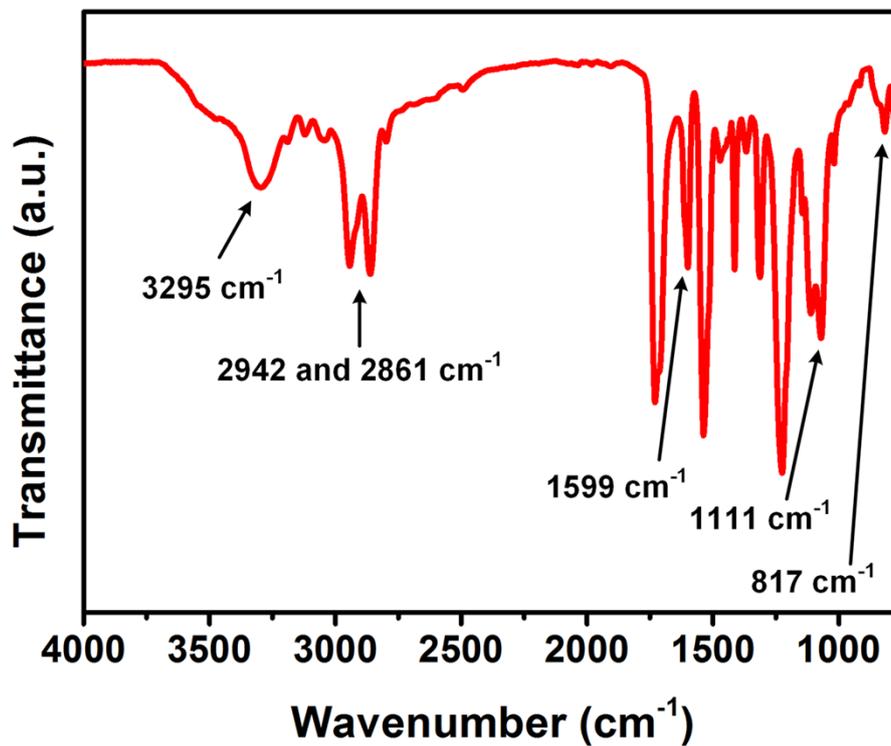


Fig. S2 FT-IR spectrum of FPU.

FT-IR spectrum of FPU is presented in Fig. S2. The typical absorption features for carbamate group are found at 3295 cm^{-1} (N-H), 1713 cm^{-1} (C=O), 1533 cm^{-1} (N-H) and 1111 cm^{-1} (C-O-C), respectively. The -CH₂- specific peak of PTMEG has given their absorption band at 2942 and 2861 cm^{-1} . The stretching vibration for aromatic ring of MDI is found at 1599 cm^{-1} . The stretching vibration from -CF₃ and deformation vibration for CF₂ are found at 1222 and 817 cm^{-1} , respectively.

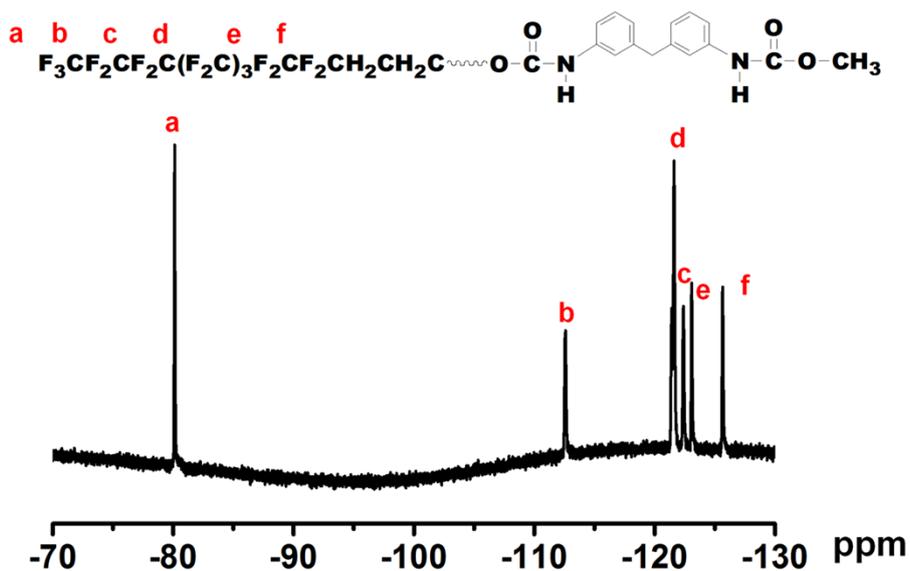


Fig. S3 ^{19}F NMR spectrum of FPU.

As show in Fig. S3, the chemical shift for terminal CF_3 appears at 79.89 ppm, while for $-\text{CF}_2-\text{CH}_2-$ appears at 126.77 ppm. The remaining $-\text{CF}_2-$ has given their chemical shift from 112.71 to 123.83 ppm. The ^{19}F NMR spectrum confirmed that the perfluoroalkyl group had grafted on the molecular chain of FPU.

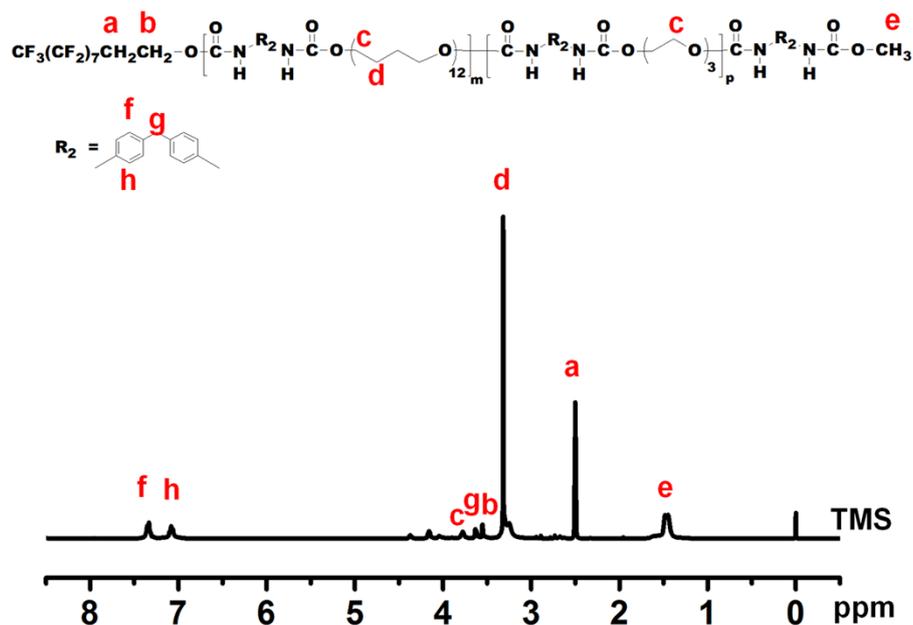


Fig S4 ¹H NMR spectrum of FPU.

Fig. S4 presents the chemical structure and ¹H NMR spectrum of FPU. The chemical shifts for -CH₂-CH₂- in terminal fluorinate segments appear at 2.48 and 3.49 ppm. For PTMEG, TEG and methanol segments, the shifts for -O-CH₂-, -CH₂-CH₂- and -CH₃ appear at 3.72, 3.33 and 1.41 ppm, respectively. The signals for aromatic protons of MDI groups appear between 7.15 to 7.35 ppm and for -CH₂- appears at 3.63 ppm.

Table S1 Composition and properties of the polymer solutions.

Concentration of PU (wt%)	Concentration of FPU (wt%)	Concentration of LiCl (wt%)	Conductivity ($\mu\text{s}/\text{cm}$)	Viscosity (cps)	Surface tension (mN/m)
14	1.75	0	0.48 \pm 0.01	1300 \pm 137	23.65 \pm 0.21
		0.002	7.23 \pm 0.04	1258 \pm 129	22.68 \pm 0.33
		0.004	15.13 \pm 0.02	1276 \pm 131	22.60 \pm 0.23
		0.006	21.05 \pm 0.05	1306 \pm 144	21.88 \pm 0.51
		0.008	27.53 \pm 0.40	1289 \pm 110	21.02 \pm 0.89
		0.010	34.28 \pm 0.42	1255 \pm 129	21.96 \pm 0.47

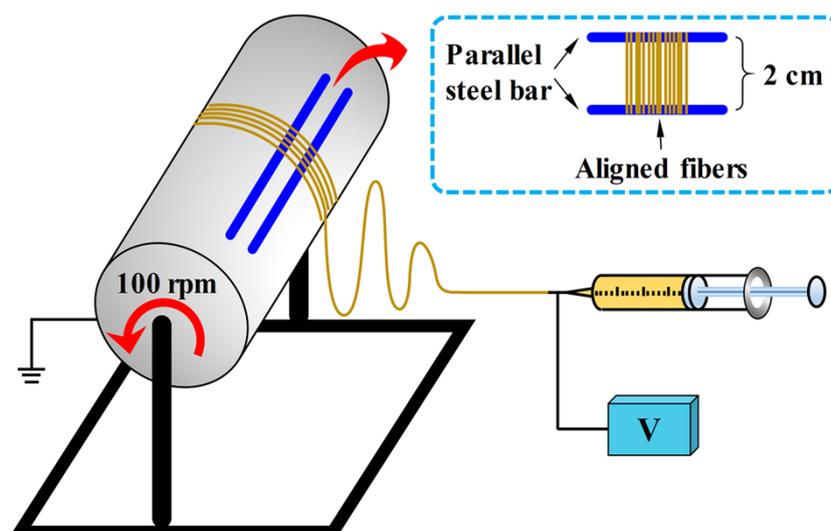


Fig. S5 Preparation methods of aligned FPU/PU fibers.

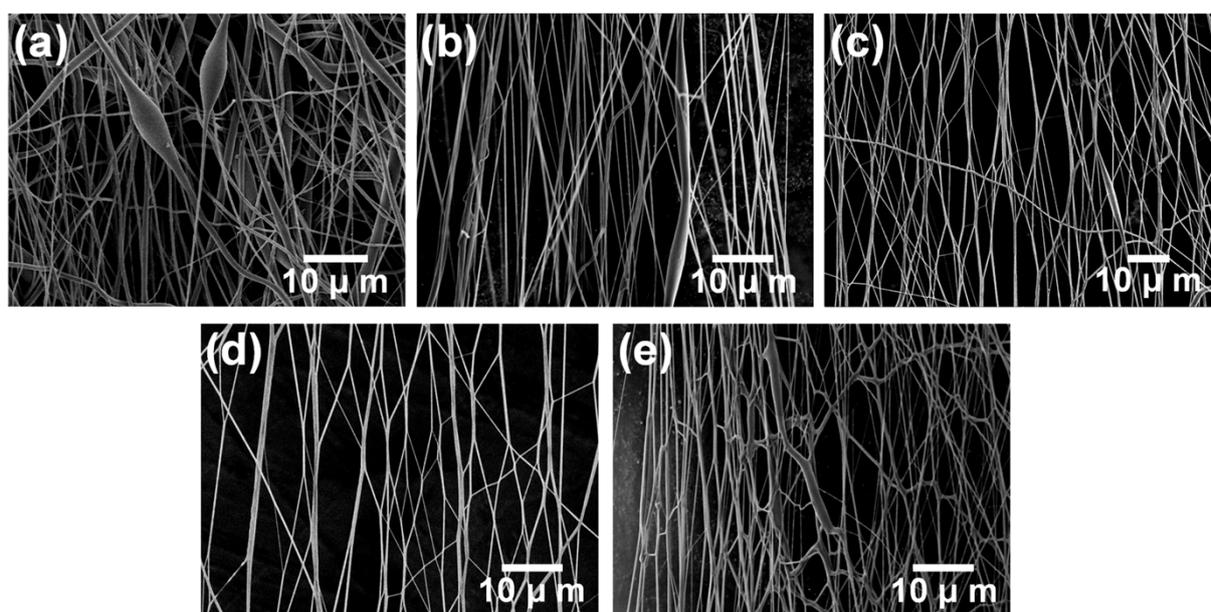


Fig. S6 FE-SEM images of aligned FPU/PU fibers obtained from from polymers solutions with various LiCl concentrations: (a) 0, (b) 0.002, (c) 0.004, (d) 0.006, and (e) 0.008 wt%, respectively.

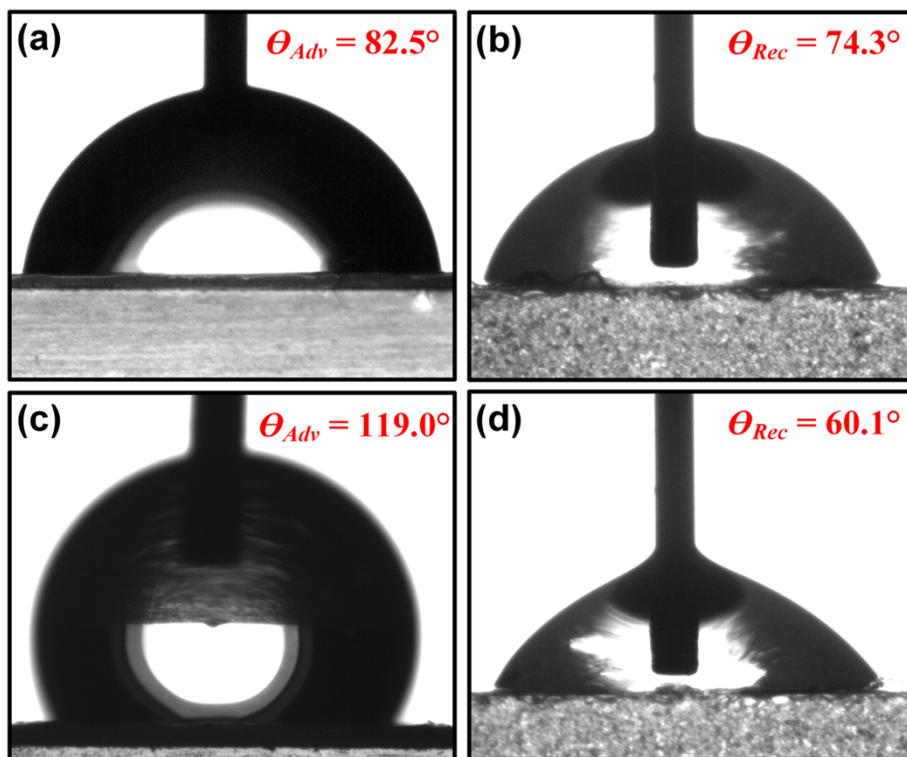


Fig. S7 Water contact angle of PU flat film: (a) θ_{adv} and (b) θ_{rec} . Water contact angle of FPU/PU flat films: (c) θ_{adv} and (d) θ_{rec} .