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Supporting Materials

Bio-inspired Adhesive Superhydrophobic Polyimide Mat with High Thermal Stability

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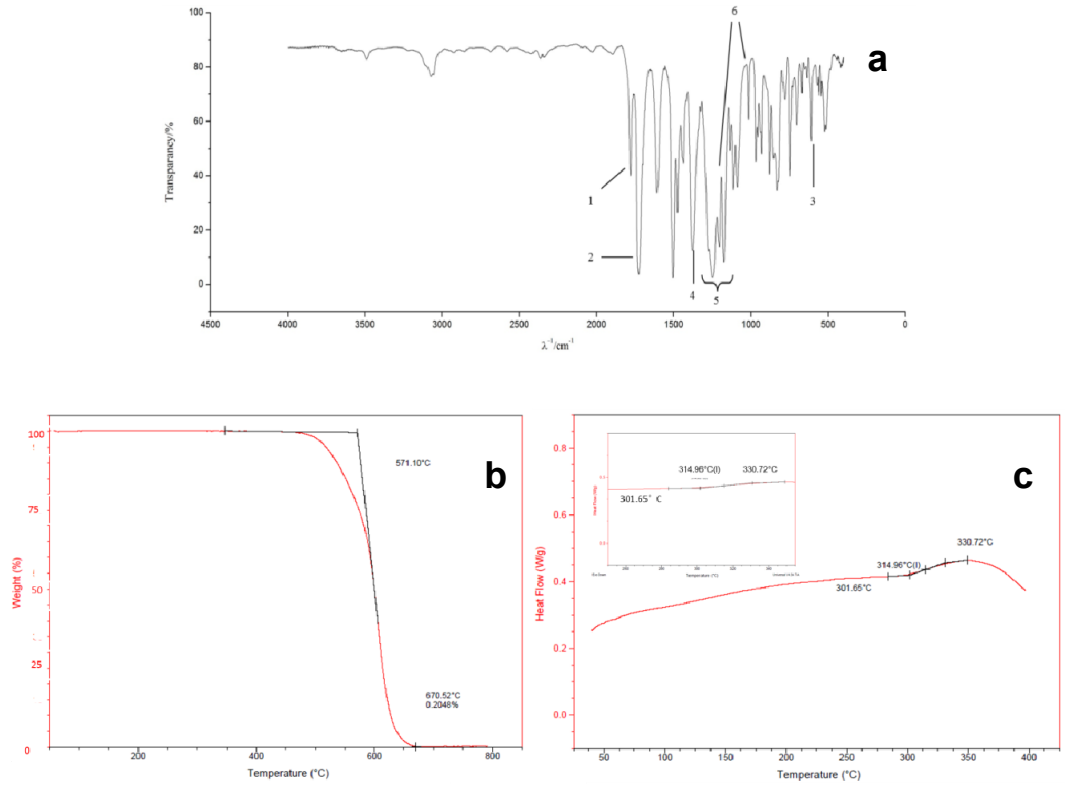

Fig. S1 (a) IR spectra of the as-prepared FPI film; 1)-3) adsorption peaks of C=O's asym. stretching, sym. stretching, bending in the five-membered aromatic imide cycles, respectively; 4) adsorption peak of C-N's stretching in the imide ring; 5) C-F's adsorption band; 6) Adsorption peaks of -O-'s asym. stretching (strong) and sym. Stretching (weak), respectively. (b) TGA of ODPA-6FBAPP, conducted in N_2 atomsphere; the 5% mass loss temperature is 517.9°C. (c) DSC of ODPA-6FBAPP, conducted in N_2 atomsphere. The thermal analysis results demonstrated the high thermal stability of FPI.

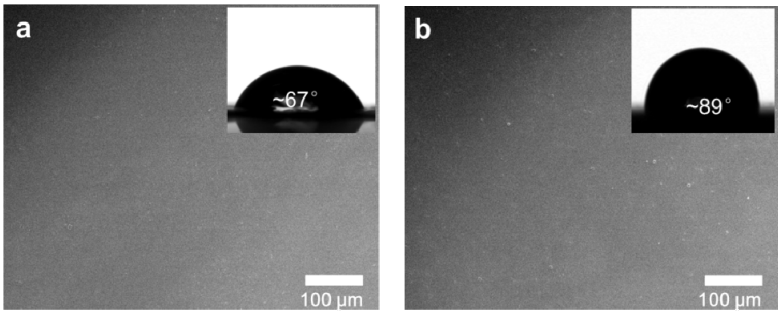

Fig.S2 SEM of (a) a casted PMDA-ODA film and (b) a casted ODPA-6FBAPP film. The insert pictures are water CAs on each sample. The water CA on the casted FPI film increased to 89°, demonstrating the surface free energy of FPI was undermined.

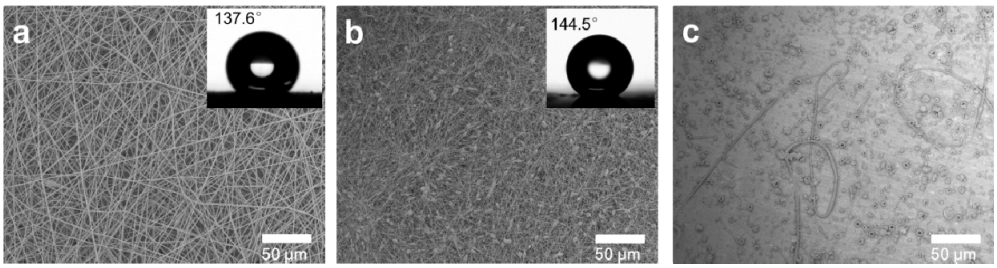

Fig.S3 Fiber morphology varies when concentration changes. (a) When concentration of FPI in DMAc is 10 wt%, there would be no beads on the fibers and the CA is low; (b) Bead-on-string morphology of the mat could be obtained by electrospinning 5 wt% FPI/DMAc solution without fracture of fibers; (c) if less than 5 wt%, fiber structures were unable to form, only with particles. Such structure was obtained from the 3 wt% FPI/DMAc. Note that (c) is a demonstration that FPI solutions with low concentration are not spin-able. So there was no CA given.

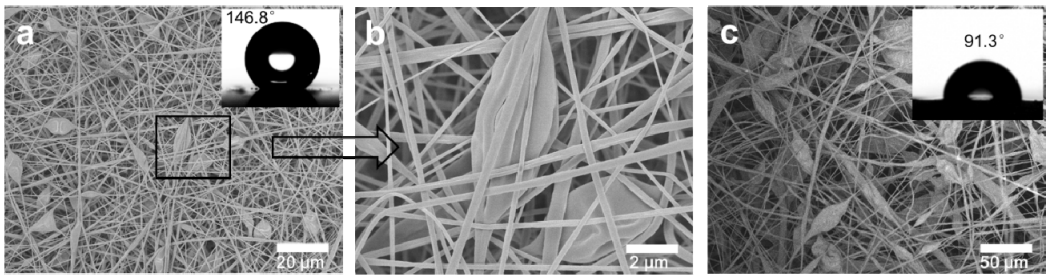

Figure S4. Excessive amount of THF is negative for the generation of ideal nano-micro composite structures. (a) As the amount of THF increased (DMAc: THF=1: 3), those nano mastoids vanished and some gully-like structure showed up and the water CA decreased. (b) Specific enlargement of (a). (c) Electrospun mat from FPI/THF solution. The morphology of this sample is bizarre and the mat is not superhydrophobic.

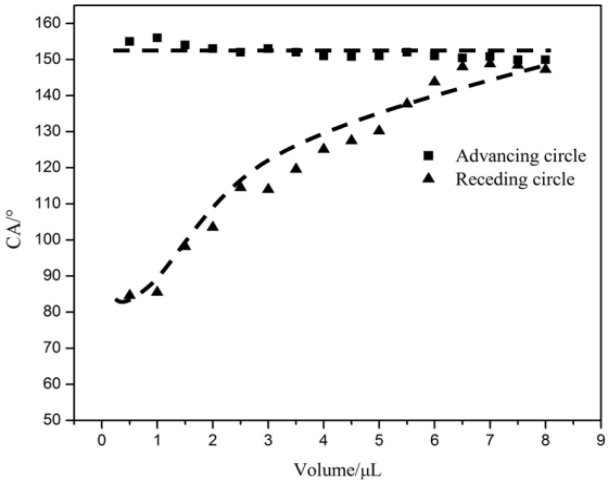

Figure S5.CA hysteresis curve of the superhydrophobic electrospun FPI mat and the water CA hysteresis is as high as 72°

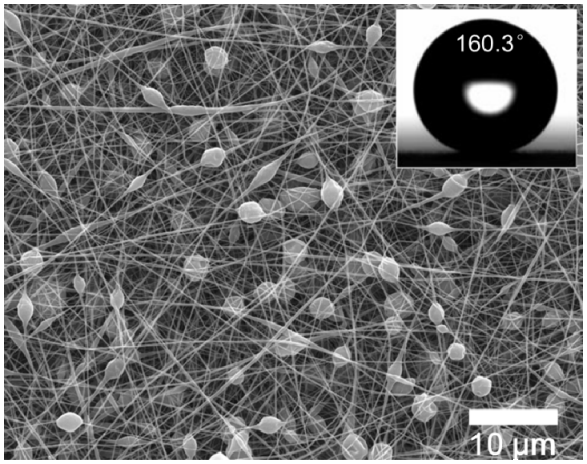

Figure S6. Surface structures and water CA of superhydrophobic electrospun PS mat.