Electronic Supplementary Material (ESI) for Environmental Science: Nano.

Supplementary Information

Manta Ray Gills Inspired Radially Distributed Nano-fibrous Membrane for Efficient and Continuous Oil-Water Separation

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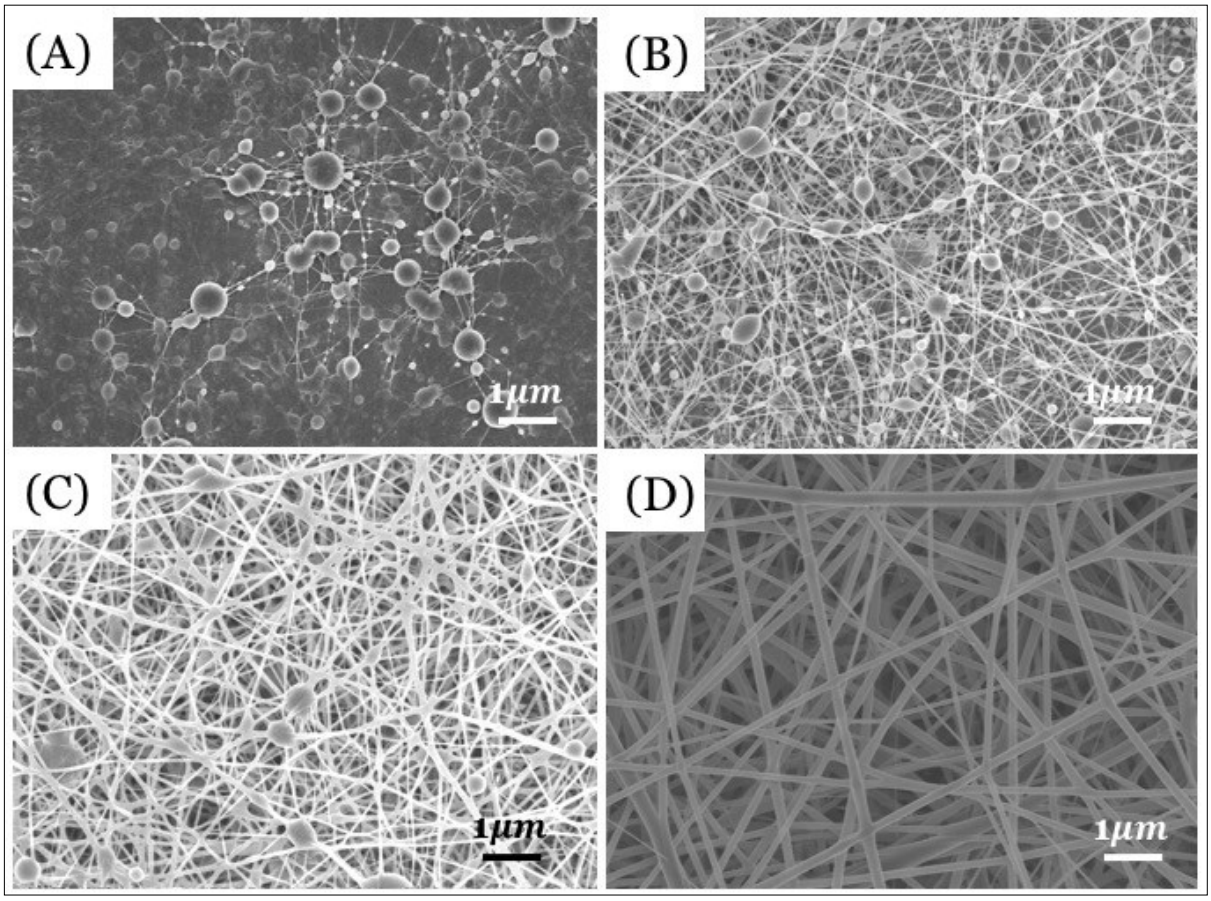

Figure S1 FESEM images of nano-fibrous silk fibroin membrane electrospun from solutions with different concentration. (A) 4%; (B) 6%; (C) 8%; (D) 10%.

Note: The preliminary electrospinning experiments were carried out at room temperature in a closed chamber. The rotating drum wrapped with aluminum foil was used as the collector. The tip collector distance was kept at 20 cm and a voltage of 24 kV was supplied. The silk fibroin solution was placed in a syringe with a blunt-tip needle (nozzle diameter of 0.7 mm). Using a micro-syringe pump, the spinning solution was pushed through the needle at a feeding rate of

0.2 mL/h. The humidity was controlled around 40%. Except the collector, all conditions were the same as the electrospinning we did in this research.

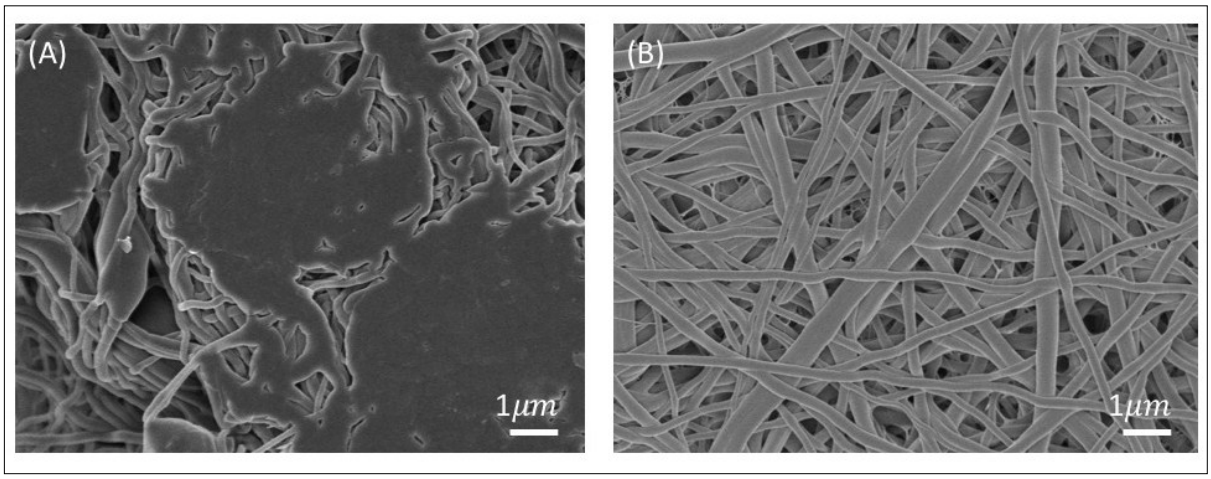

Figure S2 FESEM images of silk fibroin membrane treated in water. (a) Without any treatment, after immersing in water for 3hr, the nano-fiber structure was damaged; (B) With the treatment in ethanol, after immersing in water for 1 week, the nano-fiber structure was not influenced.

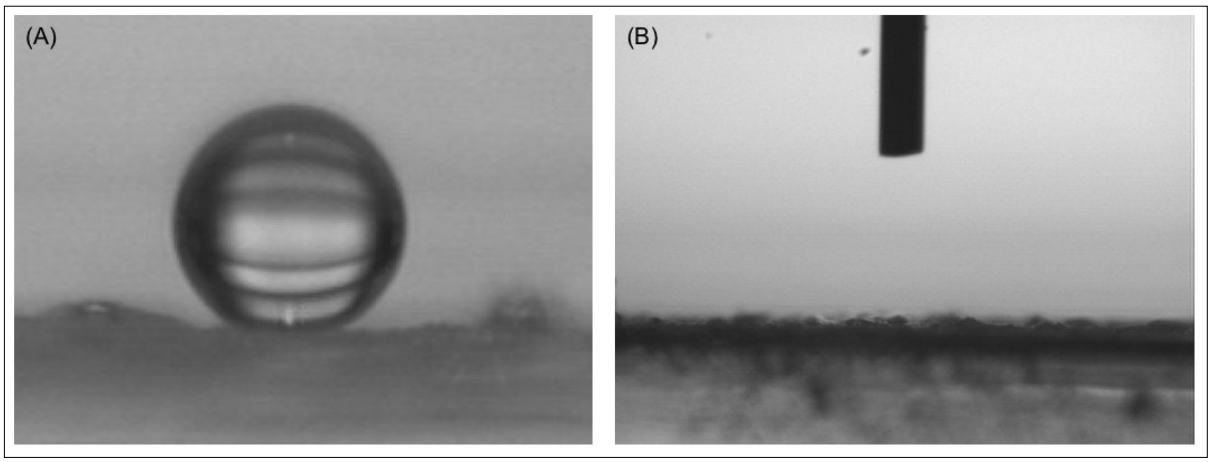

Figure S3 Contact angle of nano-fibrous silk fibroin membrane after immersing in water for 1 week. (a) Underwater oil contact angle (153°); (b) Water contact angle in air (0°).

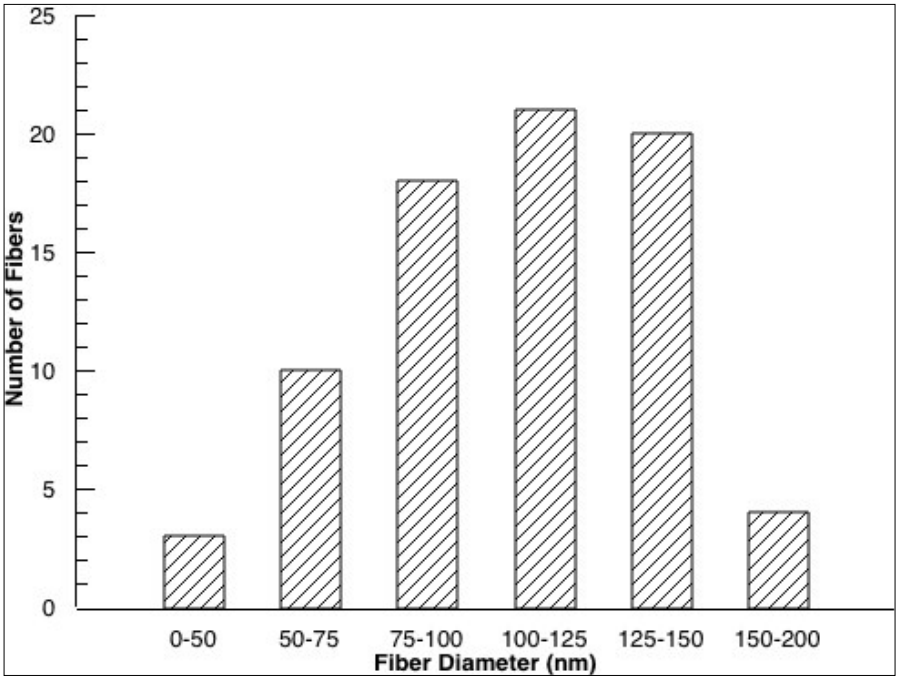

Figure S4 Fiber diameter distribution (Number of fibers = 71).