Supporting Information

Hierarchical Membranes with Size-controlled Nanopores from Photofluidization of Electrospun Azobenzene Polymer Fibers

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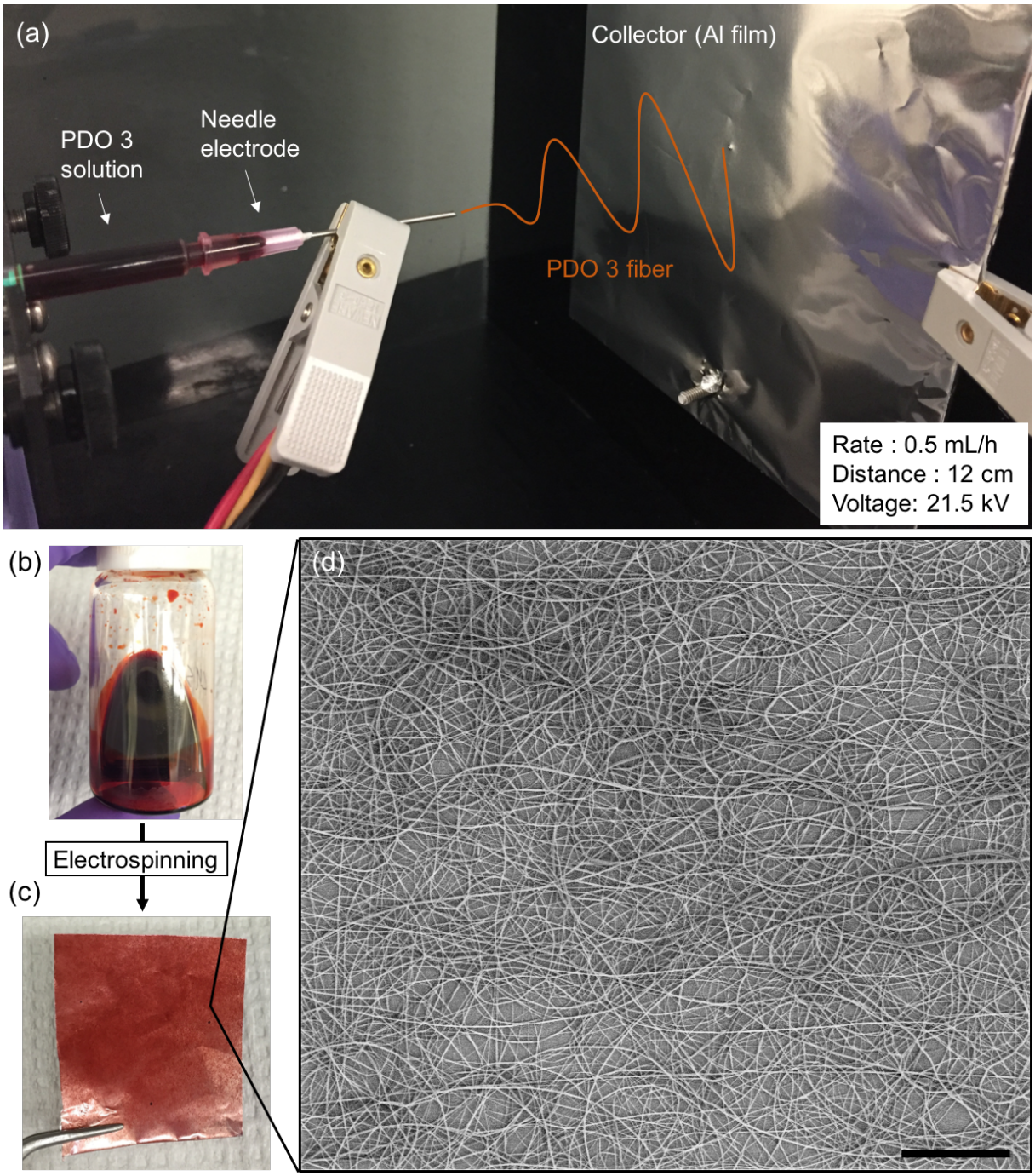

Figure S1. (a) The optical image of electrospinning setup for fabrication of PDO 3 fibers. Inset: spinning condition. (b-c) Optical images of (b) the PDO 3 40wt% solution (THF/ethanol (9:1 v/v) and SDBS, 0.2 wt%) and (c) the electrospun PDO 3 fiber mesh. (d) SEM image of PDO 3 fibers. The scale bar in (d) is 50 μm.

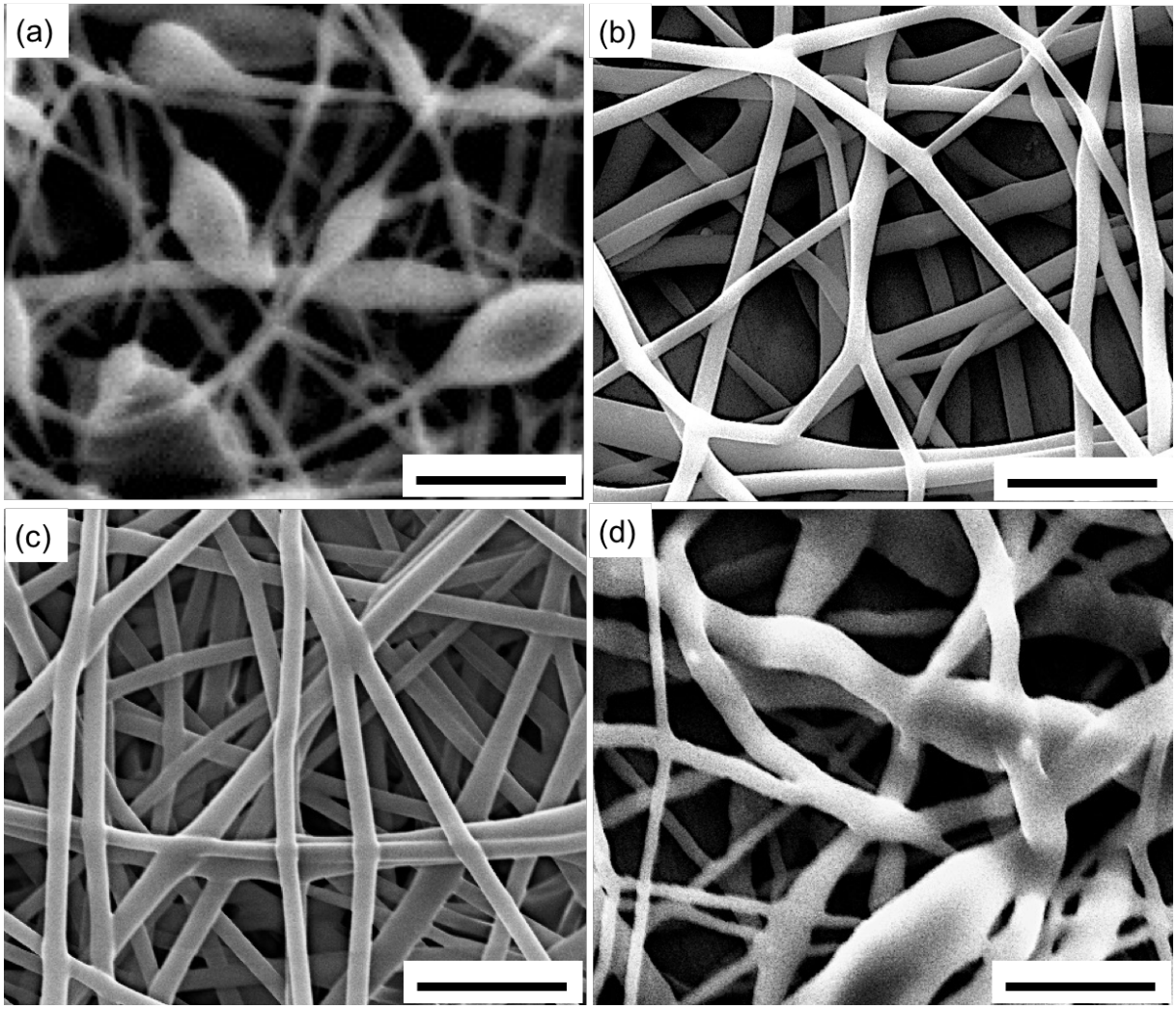

Figure S2. SEM images of electrospun PDO 3 fibers from different concentrations of PDO 3 in THF/ethanol (9:1 v/v): (a) 30 wt%, 35 wt%, 40 wt%, and 50 wt%. (c) 40 wt% is the optimized concentration for generating uniform PDO 3 fibers. Scale bars: 5 μm.

The morphology of the electrospun PDO 3 fibers prepared from different concentrations was investigated by using SEM. A bead-on-the-fiber morphology was observed from the fibers fabricated at a low concentration, 30 wt% (Figure S2a). Uneven bumpy fibers morphology was found from those at the high concentration, 50 wt% (Figure S2d), probably due to the exceeding solubility limit of PDO 3 in the solvent. A relatively uniform fiber morphology was found at the PDO 3 concentration of 40 wt% (Figure S2c).

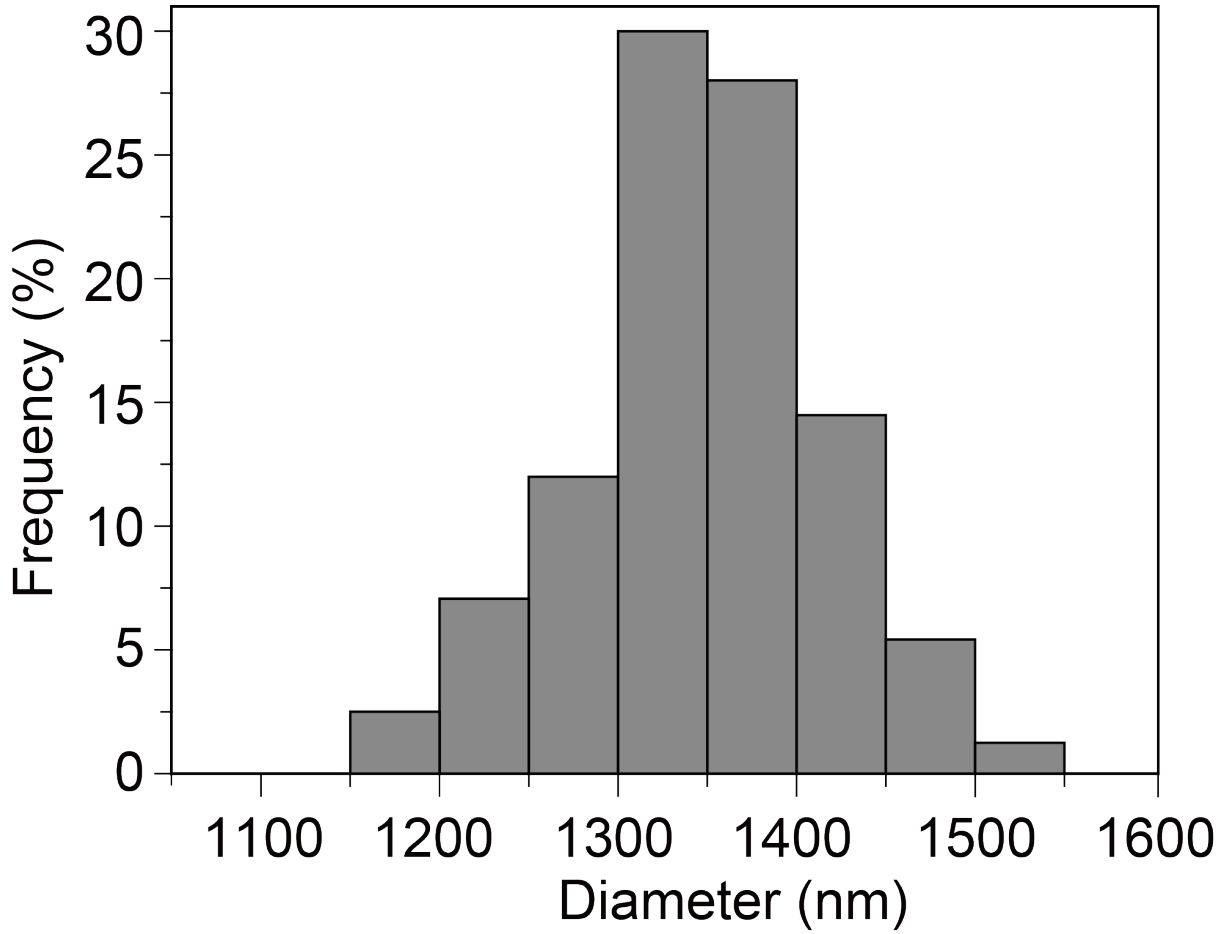

Figure S3. Size distribution of electrospun PDO 3 fibers from 40 wt% in THF/ethanol (9:1 by volume). The average diameter is 1.3 μm.

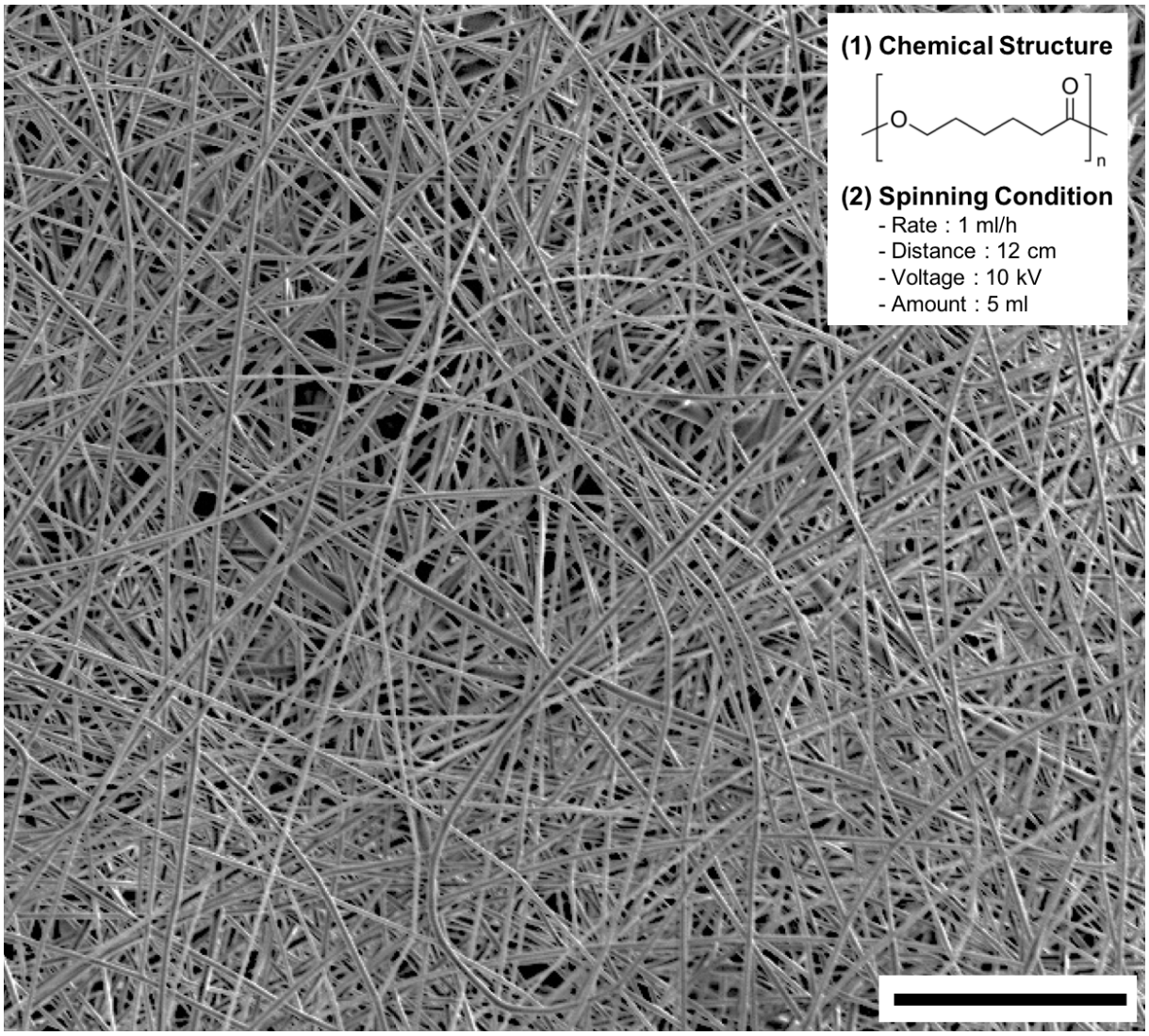

Figure S4. SEM image of electrospun PCL fibers. Inset: chemical structure and electrospinning conditions. The scale bar is 50 μm.

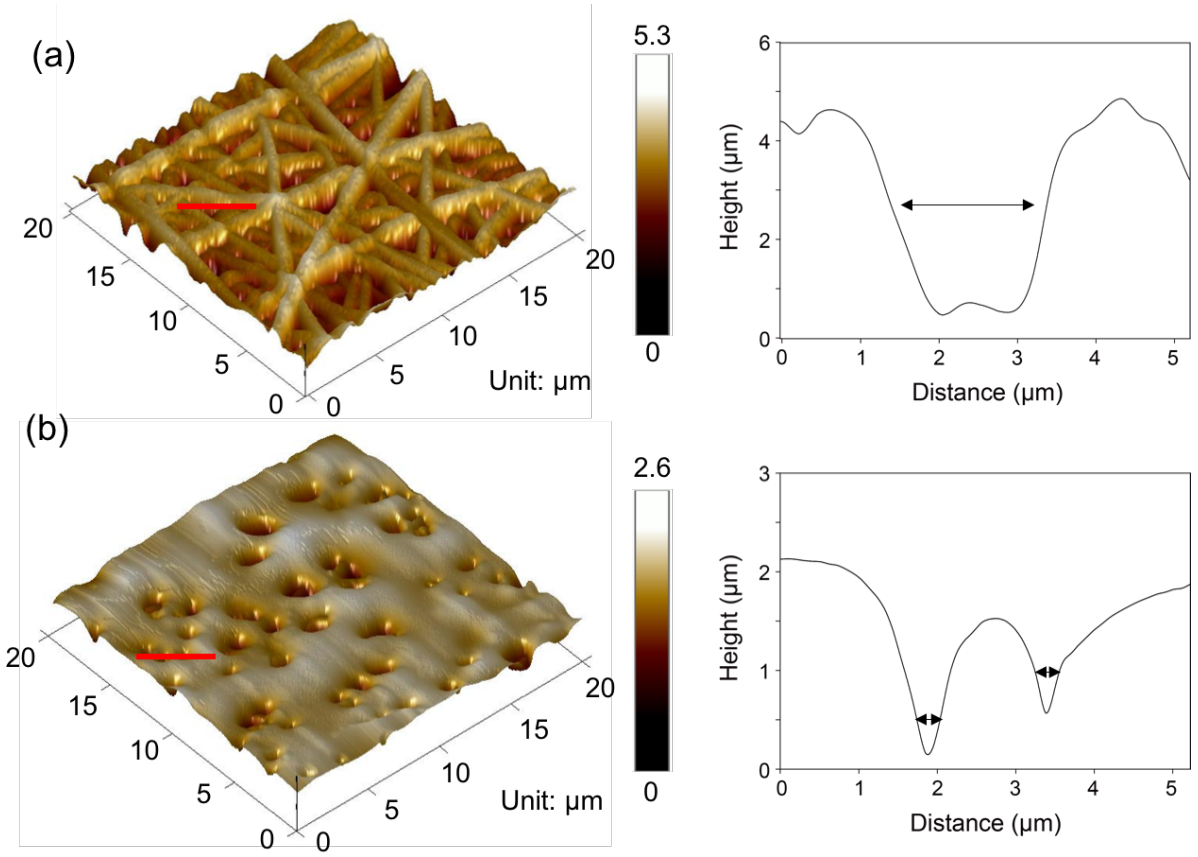

Figure S5. 3D atomic force microscopy (AFM) images and the height profiles of the PDO 3/PCL electrospun membrane (a) before and (b) after light irradiation. The pore size after light irradiation is reduced far below 1 μm.

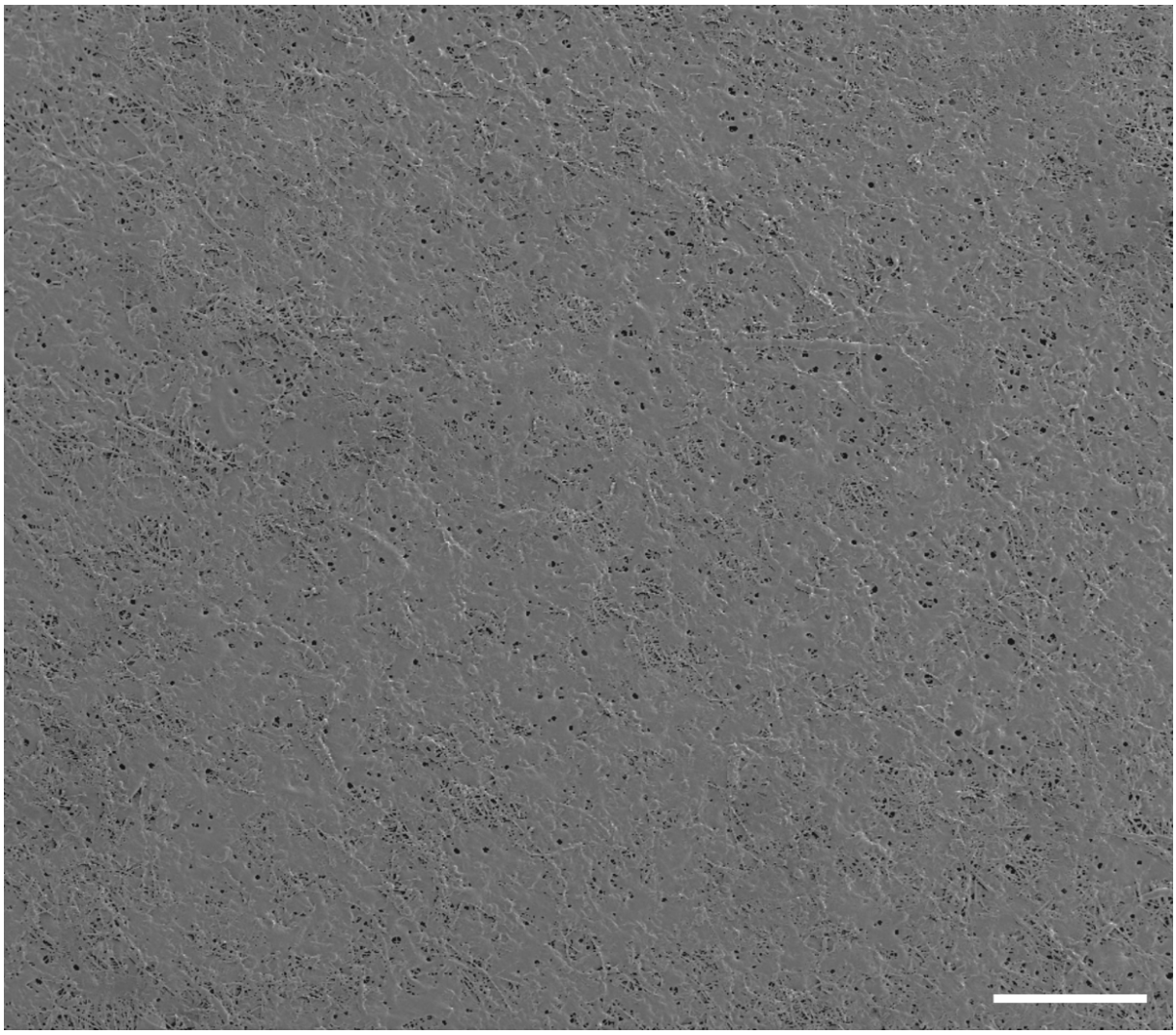

Figure S6. Large area SEM image of 20-min light irradiated PDO 3/PCL hierarchical membrane. Scale bar: 50 μm.

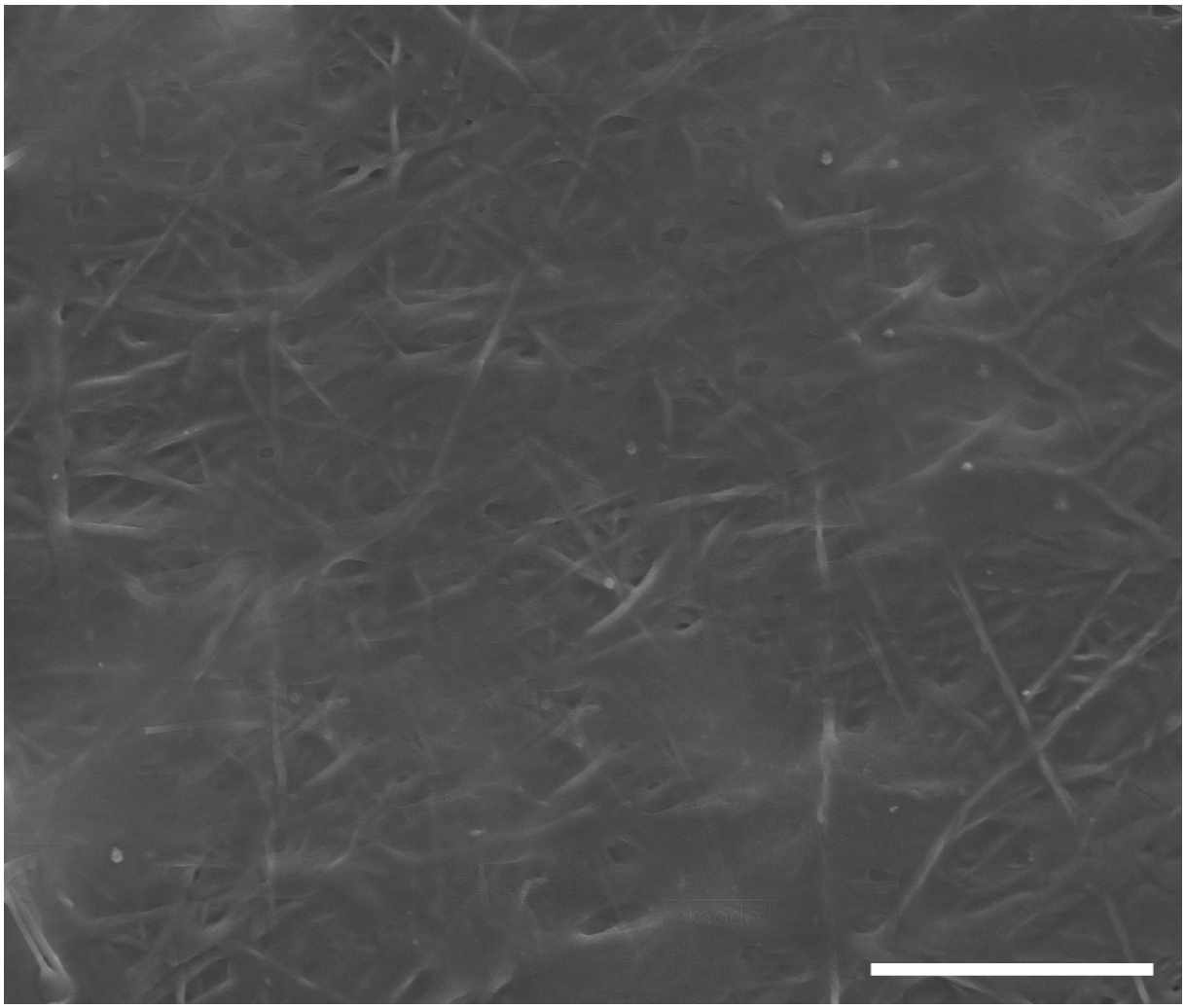

Figure S7. Large area SEM image of PDO 3/PCL hierarchical electrospun membrane irradiated for 22 min. Scale bar: 50 μm.

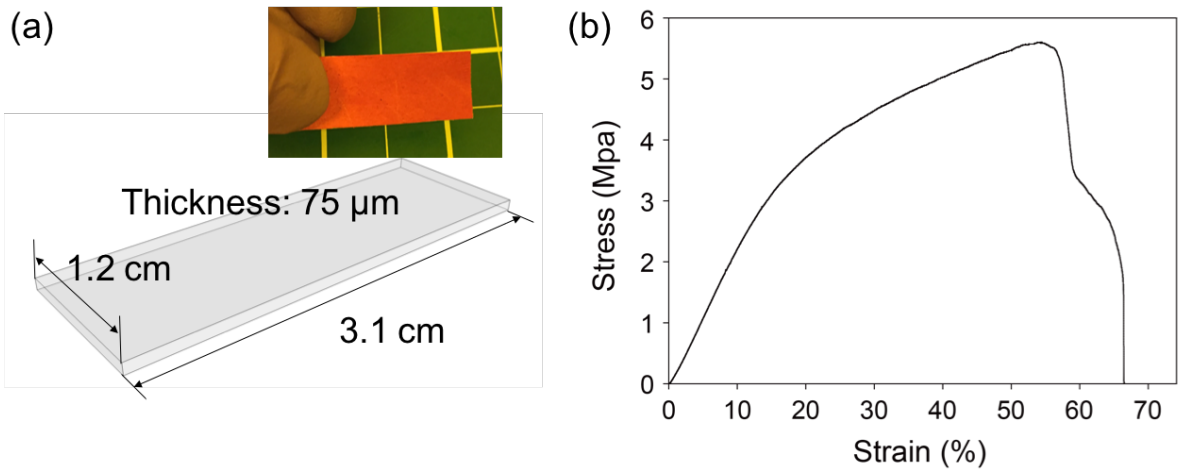

Figure S8. (a) Illustration of the sample dimension used in the Instron test. The inset is the photo of the test sample. (b) Stress–strain curve of a composite membrane under tensile force. The sample was pulled at a speed of 10 cm/min.

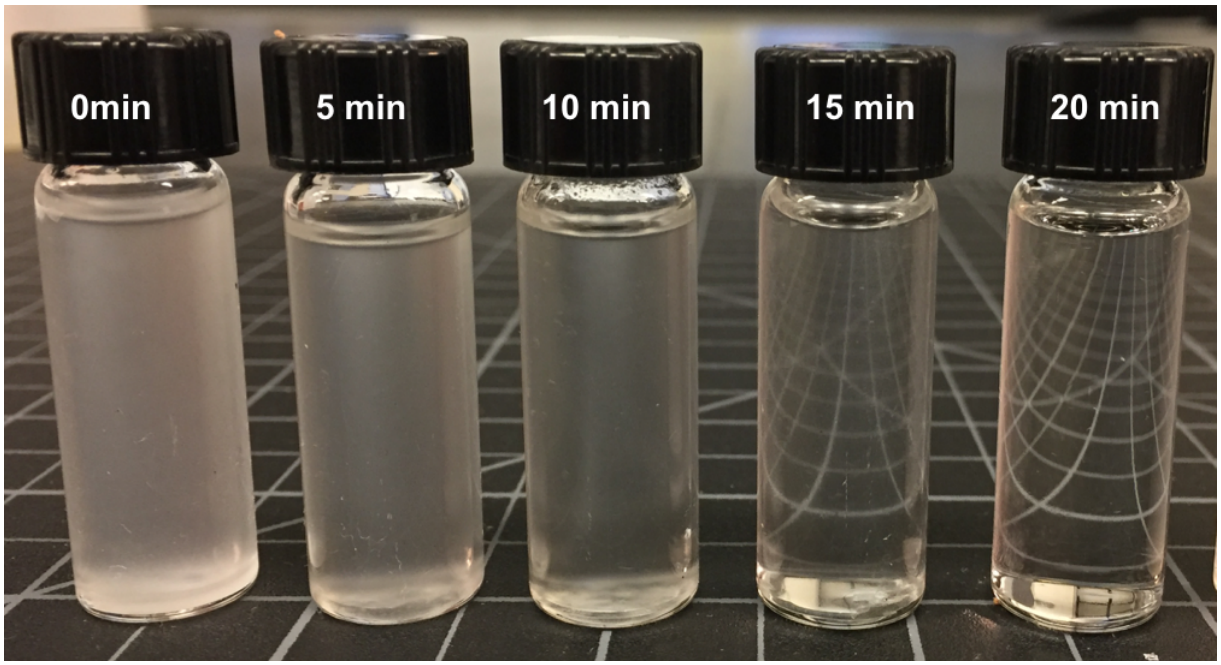

Figure S9. Optical images of surfactant-stabilized water-in-oil emulsions after filtration. Irradiation time is indicated on the cap of each vial. Increased transparency of the solutions for samples irradiated for longer time, corresponding to increase of separation efficiency.