Electronic Supplementary Material (ESI) for Lab on a Chip.

Supplementary Information

Selective and vertical microfabrication of lipid tube array on glass substrate by template-guided gentle hydration

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Confocal fluorescence images of dried lipid film on ion track-etched porous membranes

Z-stack images of lipid coated porous membranes are shown in Fig. S1, in which the pores were filled with the lipids quite uniformly as the porous membrane was plasma treated for the better wettability prior to lipid coating process. The heights of the lipid filled in the pores of each of porous membranes are ranged from ~8.8 to ~10.4 μm, which coincide with the porous membrane thickness (10 μm). In our simplified model, as described in Fig. 4, though we assumed that the dried lipid film was coated only on the exposed surface of porous membrane, the main concept was not hindered, because there was no significant mismatch in relation between the constrained stress and pressure difference. The thicknesses of

backside coated lipid on each of porous membranes were slightly different from each other, but this difference did not play any considerable role in our experiments.

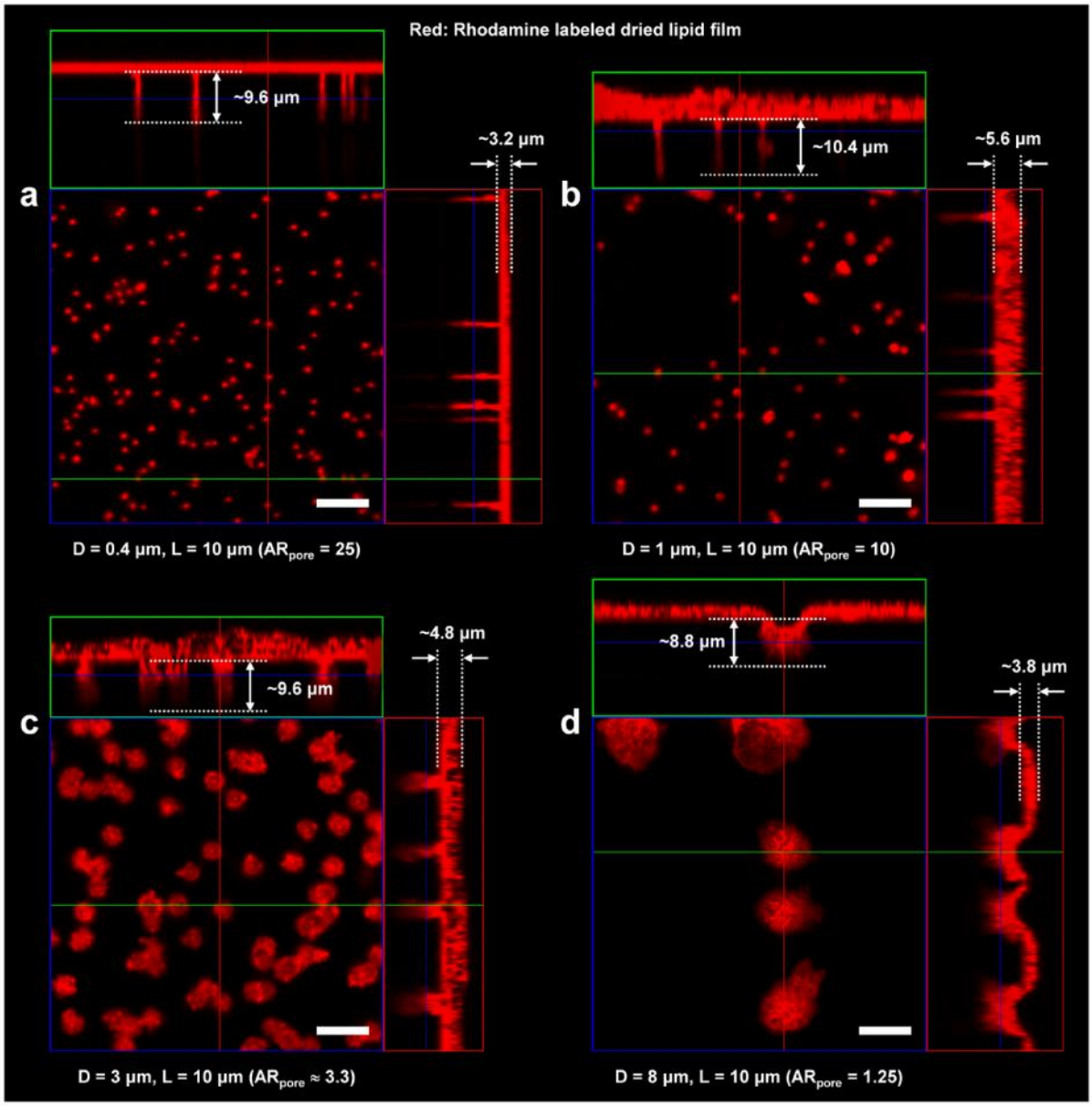

Fig. S1 Cross-section images of fluorescently-labeled dried lipid films in each of porous membranes. Blue, green, and red box show top-view, X-Z section, and Y-Z section of dried lipid films, respectively. D and L indicate pore diameter and length, respectively. Scale bars, 20 μm.

Schematic diagram for the fabrication of ordered porous membrane

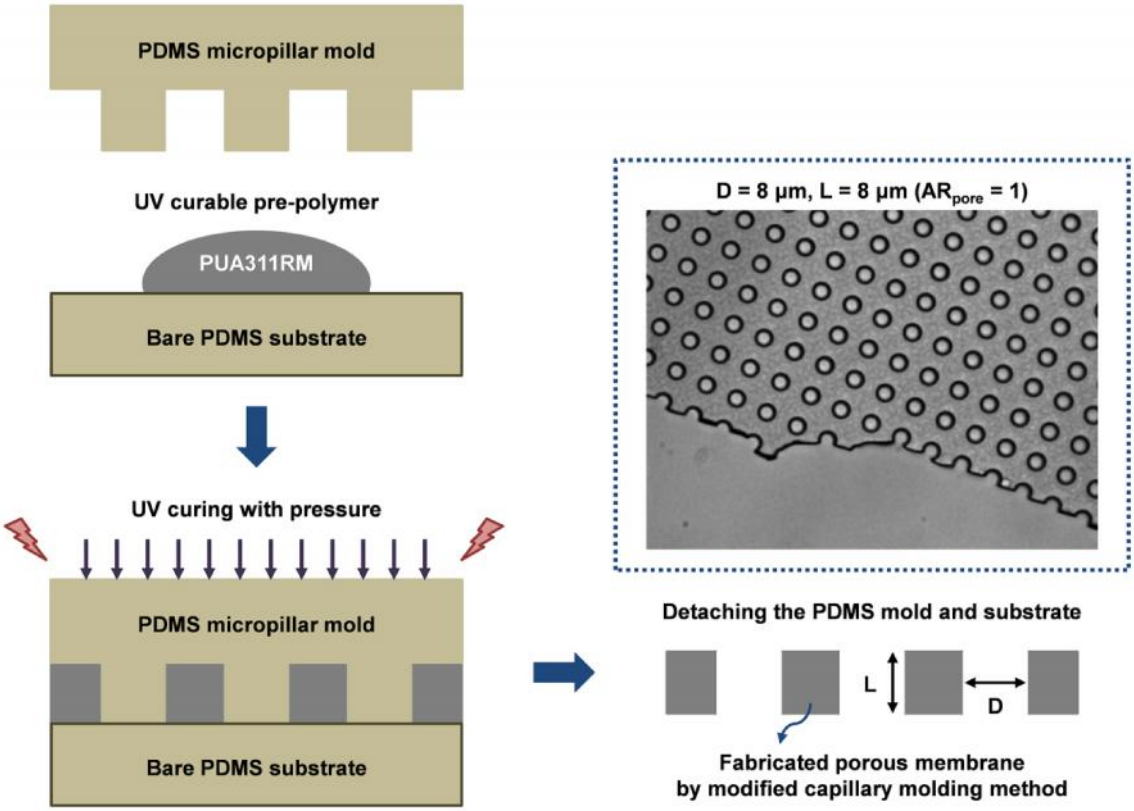

Fig. S2 Schematic diagram for the modified capillary molding method to fabricate the free-standing ordered porous membranes. First, the UV-curable PUA311RM was dropped onto bare PDMS substrates, and then positive PDMS stamps which have pillars with diameters of 3, 5, and 8 μm and heights of 5, 5, and 8 μm, respectively, were carefully placed on the polymer solution with conformal contact and cured by UV exposure for 1 min in a pressurized vacuum chamber. After UV curing, the positive PDMS stamps and bare PDMS substrates were detached to obtain the free-standing PUA membranes, which have ordered pores by dewetting of the PUA polymer between two hydrophobic PDMS surfaces.

Contact angle measurement data of PUA ordered porous membrane and PET ion track-etched porous membrane

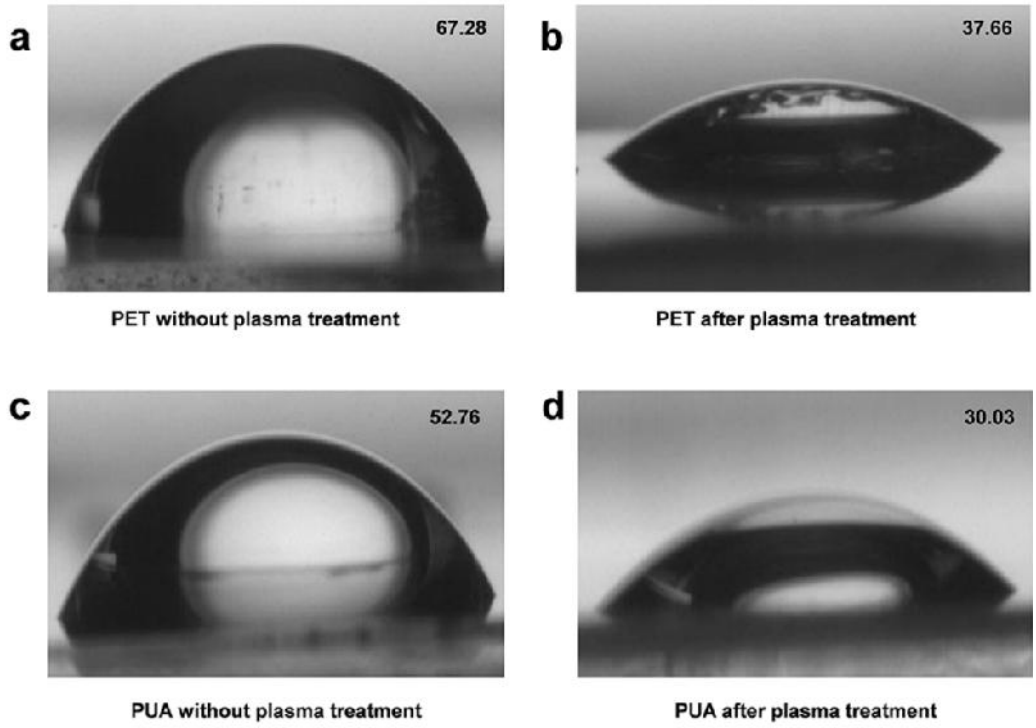

Fig. S3 Images showing contact angle measurement of PET and PUA porous membranes before and after plasma treatment. After plasma treatment, the porous membranes changed to hydrophilic surface having contact angle of around 30-38 degree, which indicates there is no meaningful difference in surface property between the two kinds of porous membrane.

Fluorescein entrapment into the lipid tube

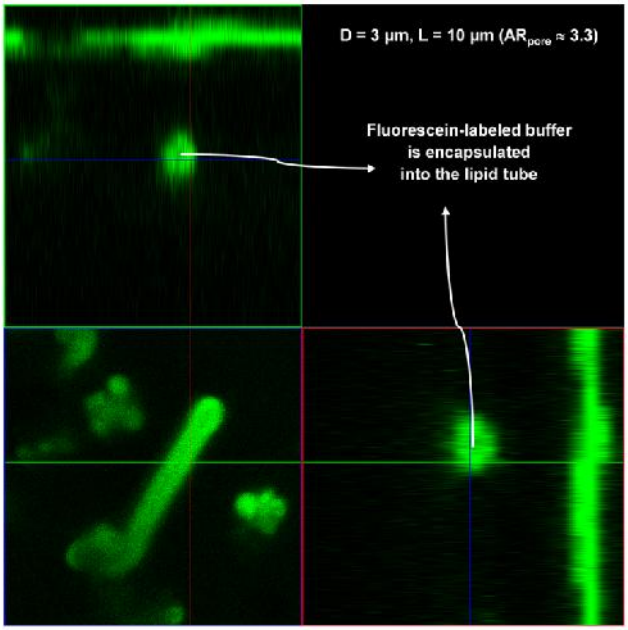

Fig. S4. X-Z and Y-Z cross-section images of a lipid tube in a 3-μm transwell porous membrane. Z section is adjusted to the mid of lipid tube which shows the encapsulation of fluorescein-labeled buffer. Green color represents fluorescein.