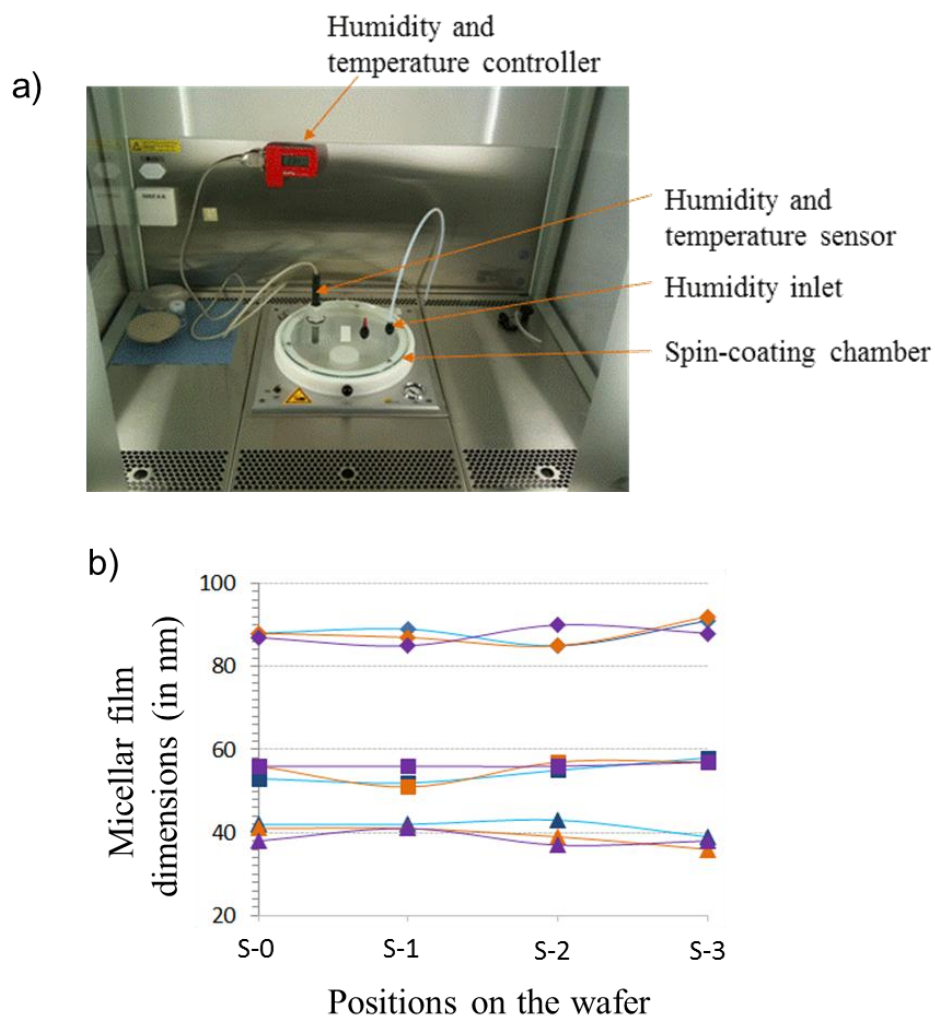


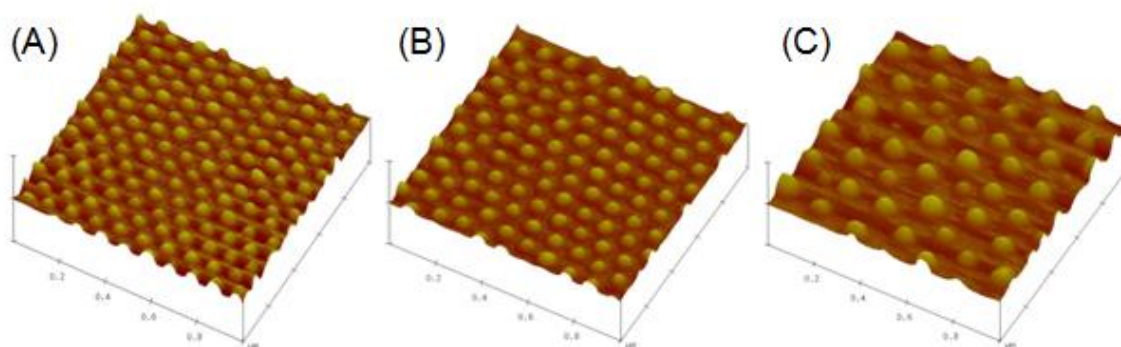
## **Electronic Supplementary Information**

Molecular Transport Through Nanoporous  
Silicon Nitride Membranes produced from  
Self-Assembling Block Copolymers

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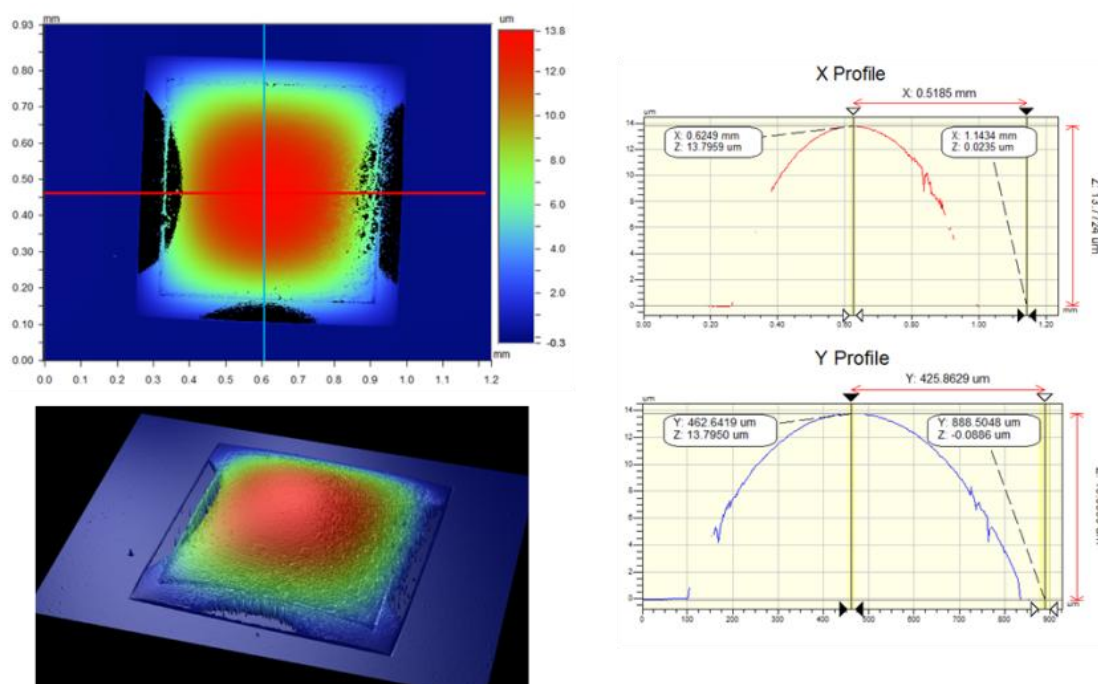


**Fig. S1.** Reproducible and homogeneous deposition of BCP micellar films on 4 in. silicon wafers. a) The spin-coating chamber was integrated in a laminar flow cabinet to work in a dust free environment. Micellar films were spin-coated on silicon wafers in an atmosphere of controlled temperature and humidity. b) Quality control of the micellar film homogeneity was performed on three wafers of a same batch (wafer 1 in blue, wafer 2 in orange and wafer 3 in violet). The graph shows the variability of micelle diameters ( $\blacklozenge$ , in nm), heights ( $\blacksquare$ , in nm) and densities ( $\blacktriangle$ , in micelle/ $\mu\text{m}^2$ ). The micellar film dimensions were obtained from topography AFM measurements taken at four different positions on each wafer, from the center to the edge, S-0) wafer center, S-1) center + 1 cm, S-2) center + 2 cm and S-3) center + 4 cm.

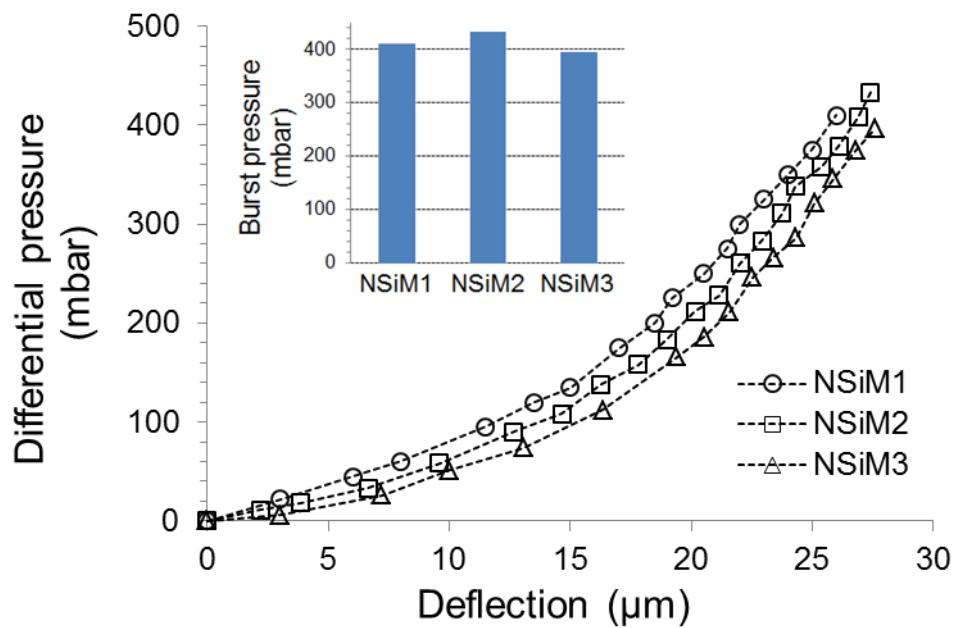


BCP Mw (Kg.mol <sup>-1</sup> )	solvent	d (nm)	p (nm)	h (nm)
57-57	m-xylene	45	90	30
102-97	o-xylene	53	102	21
190-190	o-xylene/toluene	78	157	45

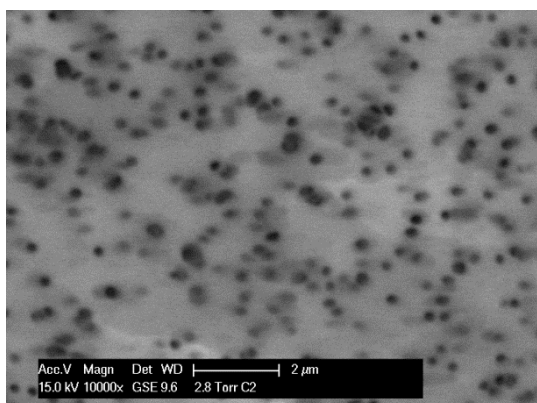
**Fig. S2.** Possible tuning of the micellar film dimensions by varying the PS-*b*-P2VP molecular weight and solvent nature. Here, we show topography AFM images (scan size: 1×1 μm, z scale: 150 nm) of reverse PS-*b*-P2VP copolymer micelles spin-coated on silicon nitride substrates at 4000 rpm from (A) 0.5 wt% PS-*b*-P2VP (57-57 kg.mol<sup>-1</sup>, Polymer Source) solution in m-xylene, (B) 0.5 wt% PS-*b*-P2VP (102-97 kg.mol<sup>-1</sup>, Polymer Source) solution in o-xylene and (C) 0.5 wt% PS-*b*-P2VP (190-190 kg.mol<sup>-1</sup>, Polymer Source) solution in o-xylene/toluene. Average micelle diameters (d), periodicities (p) and heights (h) are given in the table below the AFM images. In this example, the micelle diameter and film periodicity vary at the same time. Alternatively, the film periodicity can be adjusted while maintaining a constant micelle diameter by adjusting the spin coating speed or the micellar concentration. In conclusion, since the nanopores reflect the dimensions of the parent BCP micelles, the membrane specifications in terms of pore size and density can be adjusted by varying the micellar film properties



**Fig. S3.** Study of the mechanical stability of NSiMs using the bulge test method. (Left) Reconstructed images showing a free-standing NSiM when exposed to a differential pressure ( $\Delta P$ ) of 100 mbar. The dark areas on the membrane edges are optical artifacts generated by the interferometer microscope during the image reconstruction. (Right) the maximum bulge heights are measured in x and y scales at the center of the membrane, and the average values plotted versus  $\Delta P$  to obtain pressure-deflection curves, shown in Figure 5. Measurements were conducted in both pressure loading and unloading modes by increments of  $\sim 25$  mbar.

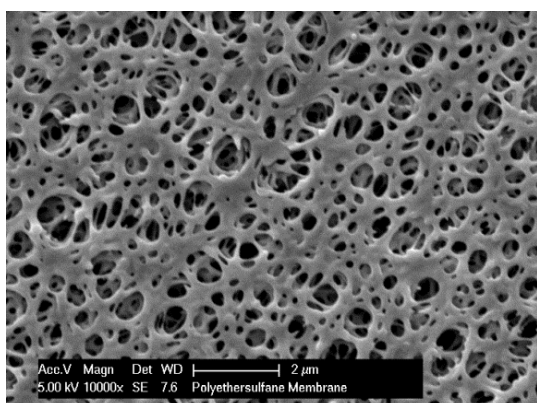


**Fig. S4.** Pressure-deflection loading curves for three (800/600) NSiMs. The insert graph shows the consistency of the burst pressures measured for the three membranes at ~ 400 mbar.



Nuclepore track-etched membrane (Whatman)

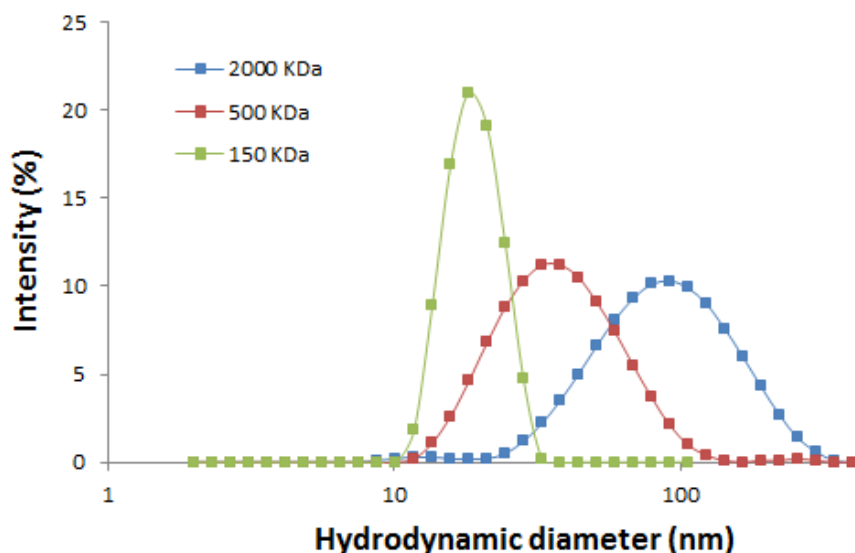
nature: polycarbonate  
nominal pore size: 200 nm  
thickness: not given



PES membranes (Sartorius)

nature: Polyethersulfone  
average pore size: 100 nm  
pore density: not given  
thickness: 150 μm

**Fig. S5.** Surface morphologies of polycarbonate track-etched (PCTE) and polyethersulfone (PES) membranes by SEM. The membrane specifications were given by the manufacturer.



Molecular dimensions of dextrans (manufacturer data)		Dh (mean) by DLS (in nm)
Domain of Mw in KDa (by SEC)	Mw (mean, in KDa)	
140-160	150	18
400-600	500	35
Not given	2000	100

**Fig. S6.** Distribution of hydrodynamic diameters (Dh) for 150 KDa, 500 KDa and 2000 KDa FITC-dextrans determined by dynamic light scattering (DLS). Analyses were conducted at C (dextran) of 1 mg/ml in 200 mM NaCl, pH ~7. The results indicated that dextran molecules were rather broadly distributed and exhibited a tail in the distribution at high values of Dh (especially observed for 500 KDa and 2000 KDa FITC-dextrans).