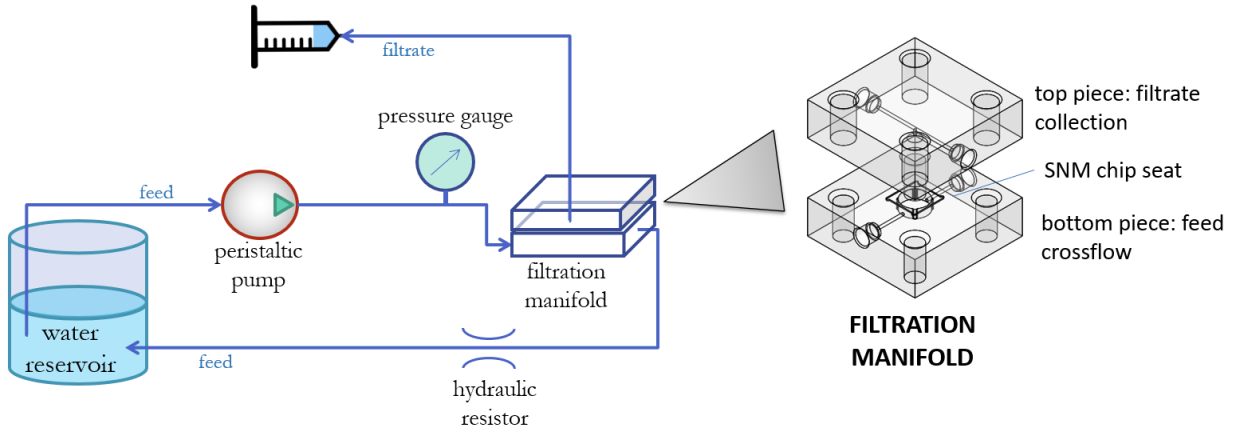
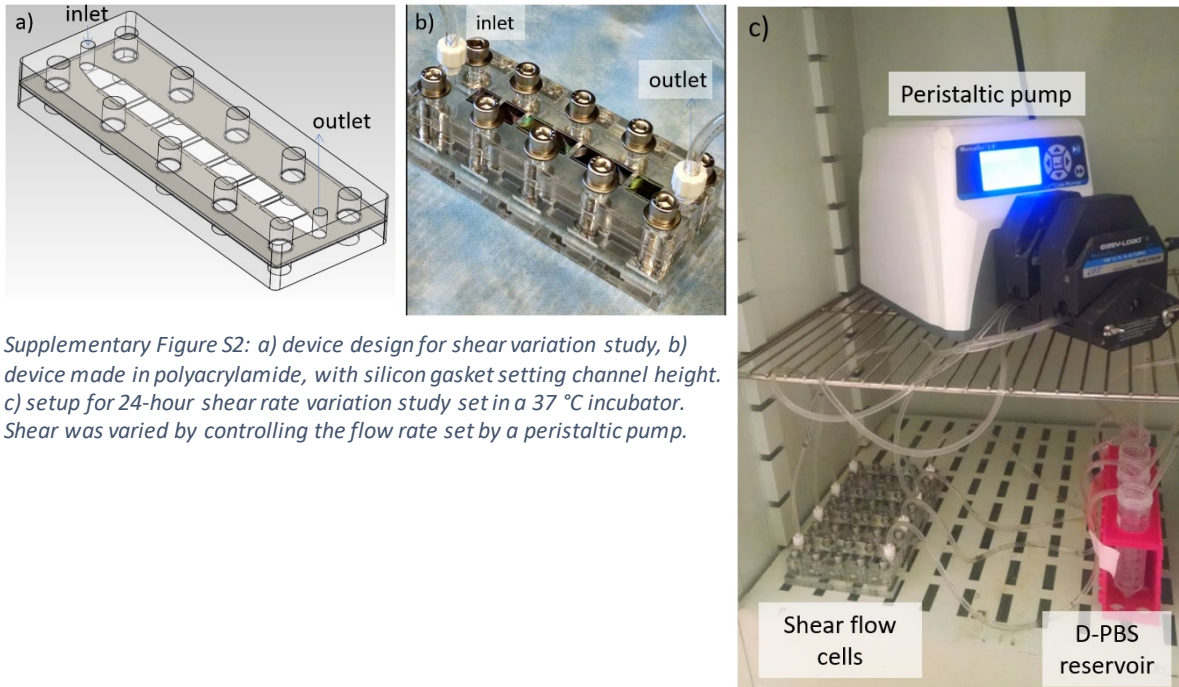


Supplementary information



**Supplementary Figure S1:** Schematic of hydraulic permeability measurement setup. A peristaltic pump draws water from the reservoir and maintains a constant flow rate. A pressure gauge measures the pressure immediately before flow reaches filtration manifold, where SNM is positioned for filtration. The feed crossflow is returned to the water reservoir, while the filtrate volume is measured using a syringe over time.



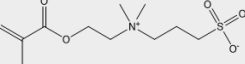
**Supplementary Figure S2:** a) device design for shear variation study, b) device made in polyacrylamide, with silicon gasket setting channel height. c) setup for 24-hour shear rate variation study set in a 37 °C incubator. Shear was varied by controlling the flow rate set by a peristaltic pump.

**Supplementary Table S1:** Effect of shear on ultrathin film pSBMA. a) Table shows changes in elemental composition for unmodified silicon, b) table shows changes in elemental composition for pSBMA-silicon.

a)

Sample	Shear	% Elemental Composition								
		Si (2p)	O (1s)	C (1s)	N (1s)	Contaminants (F, Cu)	Carbon Composition Breakdown (High Resolution)			
							C-C, C-H	C-O, C-N	O-C-O, C=O	O-C=O
Unmodified Silicon	500/s	47.6 ± 0.3	35.3 ± 0.2	16.3 ± 0.5	0.8 ± 0.1		8.7 ± 0.5	6.2 ± 0.2	1.0	0.9 ± 0.1
	1000/s	43.0 ± 0.2	38.2 ± 0.6	17.7 ± 0.8	1.2 ± 0.1		9.0 ± 0.1	7.1 ± 0.5	1.0	1.1 ± 0.3
	1500/s	44.2 ± 0.4	31.5 ± 0.2	23.7 ± 0.5	0.6 ± 0.1		14.4 ± 0.8	6.3 ± 0.1	1.2	2.4 ± 0.0
	2000/s	45.3 ± 0.9	34.5 ± 0.4	19.1 ± 1.0	1.1 ± 0.0		9.3 ± 0.2	7.4 ± 0.3	1.1 ± 0.2	1.3 ± 0.1
	Dry, No PBS	58.3 ± 1.5	28.1 ± 0.3	9.8 ± 0.6	0.4 ± 0.1	3.4 ± 1.4	6.0 ± 0.2	2.9 ± 0.1		0.9 ± 0.1

b)

Sample	Shear	% Elemental Composition									
		Si (2p)	O (1s)	C (1s)	N (1s)	S (2s)	Br (3d)	Contaminants (P)	Carbon Composition Breakdown (High Resolution)		
									C-C, C-H	C-O, C-N	O-C=O
<p>pSBMA on Silicon</p> 	500/s	33.0 ± 3.1	27.0 ± 0.4	34.4 ± 2.6	3.0 ± 0.3	1.7 ± 0.3	0.6 ± 0.0	0.4 ± 0.0	14.7 ± 0.3	16.7 ± 0.3	2.9 ± 0.0
	1000/s	30.8 ± 1.6	27.0 ± 0.4	36.2 ± 1.8	3.1 ± 0.0	1.9 ± 0.2	0.5 ± 0.0	0.3 ± 0.1	15.4 ± 0.5	17.9 ± 0.7	3.0 ± 0.2
	1500/s	31.1 ± 0.8	26.5 ± 0.6	36.9 ± 0.8	3.0 ± 0.2	1.7 ± 0.1	0.5 ± 0.0	0.3 ± 0.0	15.6 ± 1.2	17.9 ± 1.2	3.4 ± 0.0
	2000/s	32.1 ± 1.4	26.9 ± 0.2	35.4 ± 1.5	3.0 ± 0.2	1.7 ± 0.1	0.6 ± 0.0	0.3 ± 0.1	15.0 ± 0.3	17.6 ± 0.3	2.8 ± 0.0
	Dry, No PBS	12.6 ± 0.8	25.0 ± 0.3	56.9 ± 0.6	2.6 ± 0.1	2.2 ± 0.2	0.3 ± 0.0	0.3 ± 0.1	23.8 ± 0.2	29.5 ± 0.0	3.7 ± 0.2

**Supplementary Figure S3:** Effect of shear on ultrathin film pSBMA. Graphs (from left to right) represents the changes due to varying shear in contact angle, coating thickness and protein adsorption from single protein solution of human serum albumin. Data shows that while surface characteristics have changed for pSBMA, overall performance of protein resistance is maintained following 24-hour shear ranging from 500-2000/s under physiologic conditions.

