Supplementary Information

Near-Superhydrophobic Surface Reduces Hemolysis of Blood Flow in Tubes

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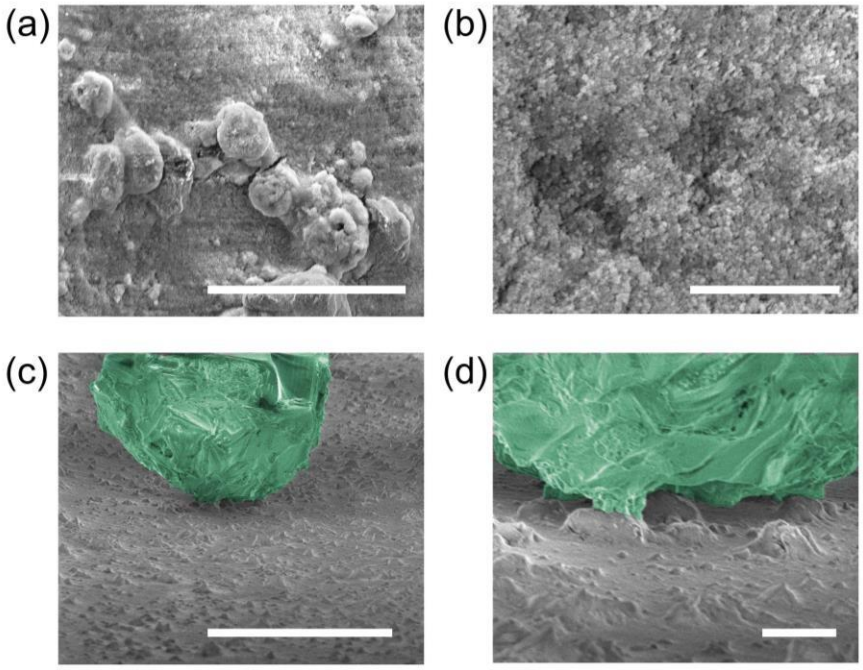

Figure S1: SEM images of the top view of (a) micro-particles and (b) nano-particles of the liquid repellent coating. (c) Side view of a precipitate of NaCl (green) on the liquid repellent coating. (d) Magnified view of the base of the NaCl precipitate (green) that was suspended above the near-superhydrophobic surface by the micro-particles in the

liquid repellent coating. The scale bar represents 100 µm in (a) and (d), 5 µm in (b) and 1 mm in (c). False color was added to the NaCl precipitate in (c) and (d) to enhance clarity.

The SEM images of the micro- and nano- particles of the liquid repellent coating are shown in Fig. S1a and S1b respectively while the SEM image of a regular PVC surface can be found in Ref. 1 for comparison. To verify the occurrence of the Cassie-Baxter state on the liquid repellent coating, 1 µl of saturated NaCl solution was deposited onto the coating and placed in an oven that was pre-heated to 90°C for 2 minutes so that the NaCl precipitation could take place. If the droplet of saturated NaCl solution did not trap a layer of air in the Cassie-Baxter state but instead, had seeped in between the micro- and nano-particles, the NaCl precipitate would be in contact with the sides and bottom of the particles, as shown from previous reports[2]. However, from Fig. 1c and 1d, it can be seen that the NaCl salt hovered above the surface at a distance of 56.9 ± 9.5 µm, and was only in contact with the top of the microstructures, clearly indicating that the deposited droplet had indeed adopted the Cassie-Baxter state before evaporation.

Table S1: Tabulated results of ΔH with respect to time and flow setting, as shown in Fig. 4b of main text.

(a) Near – Superhydrophobic Surface

Flow setting/ Time (min)	I	II	III	IV	V	VI
0	0.00 ±	0.00 ±	0.00 ±	0.00 ±	0.00 ±	0.00 ±

	0.01	1.05	6.27	0.57	1.01	9.77
30	-0.02 ± 0.03	1.58 ± 3.48	4.11 ± 3.41	9.950 ± 3.69	7.21 ± 1.17	32.50 ± 9.23
60	-0.03 ± 0.00	3.70 ± 1.08	9.27 ± 1.87	15.27 ± 1.43	11.47 ± 2.50	38.11 ± 8.99
90	-0.01 ± 0.02	5.31 ± 2.42	7.20 ± 4.56	21.78 ± 2.17	18.98 ± 0.39	42.78 ± 2.74

(b) PVC Surface

Flow setting/ Time (min)	I	II	III	IV	V	VI
0	0.00 ± 0.03	0.00 ± 3.48	0.00 ± 6.51	0.00 ± 4.02	0.00 ± 1.18	0.00 ± 1.28
30	-0.01 ± 0.01	5.08 ± 3.37	2.67 ± 3.12	13.34 ± 2.82	13.61 ± 0.82	21.32 ± 0.92
60	-0.03 ± 0.00	4.61 ± 7.42	6.11 ± 3.01	23.33 ± 8.14	22.42 ± 2.63	45.71 ± 1.30
90	-0.021 ± 0.00	10.02 ± 4.23	15.16 ± 5.91	27.54 ± 4.26	27.71 ± 2.88	71.45 ± 4.49

Pressure Measurements

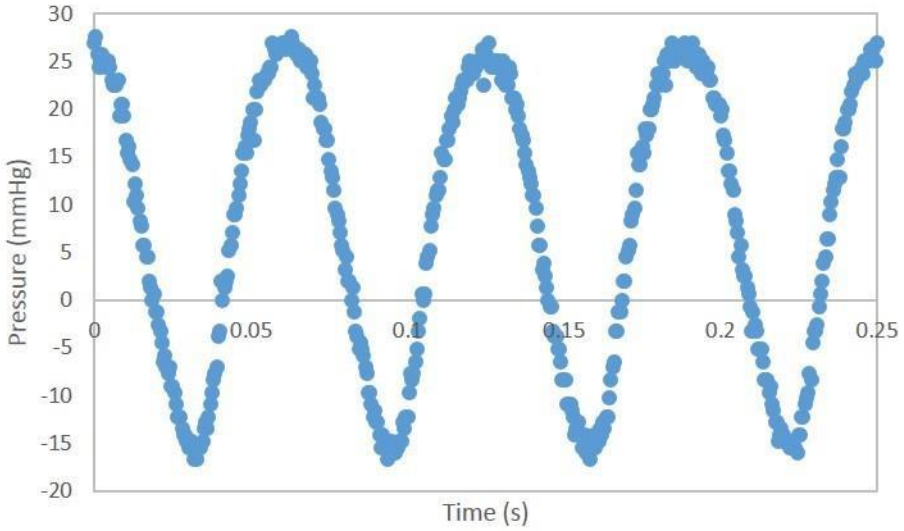

Figure S2: Plot of pressure vs. time for flow through a regular PVC pipe at flow setting VI. The value of pressure shown here is relative to atmospheric pressure.

To measure the maximum pressure in the flow circuit, a syringe needle was first pierced into the silicone tubing next to the exit of the pump, where the flow pressure is greatest. A silicone sealant was used to secure the needle to the silicone tube and prevent any possible leakage. The syringe was connected to a pressure transducer (Memscap, SP844) which, in turn, was connected to an amplifier (Transbridge, TBM 4M) and data acquisition unit (National Instruments, USB X series). The pressure of the flow was then sampled at 2000 Hz.

As can be seen from the representative plot of pressure vs. time in Fig. S2, the pressure waveform in the circuit is sinusoidal, which qualitatively matches the waveform of the flow rate. It should be noted, however, that flow rate is quantitatively related to the pressure drop across the circuit (i.e. pressure difference between the flow exiting the pump and flow entering the pump), and not the absolute pressure of the flow exiting the pump,

which is the quantity measured here. Table S2 shows the maximum values of the pressure waveforms measured for each flow setting and surface.

Table S2: Table of the maximum absolute pressure, relative to atmospheric pressure, of the flow for each pump setting and surface.

Flow setting/ Surface	I	II	III	IV	V	VI
PVC (mmHg)	0.0	45.6	22.4	23.7	31.4	27.6
N.S.H. (mmHg)	0.0	50.1	23.7	25.0	34.0	34.0

Microscopy Images

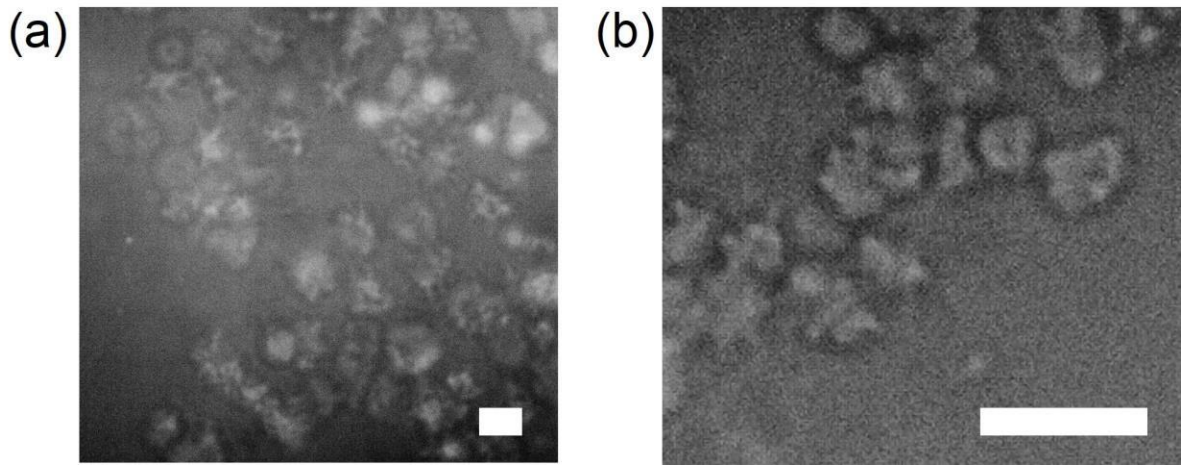

Figure S3: Bright field optical microscopy images of red blood cells after being subjected to 60 min of extracorporeal pumping through a regular PVC pipe at flow setting VI. Scale bars represent 10μm.

REFERENCES

1. Rożej, A., Cydzik-Kwiatkowska, A., Kowalska, B. & Kowalski, D. Structure and microbial diversity of biofilms on different pipe materials of a model drinking water distribution systems. *World J. Microbiol. Biotechnol.* **31,** 37–47 (2014).
2. Lai, C. Q. & Choi, W. K. Unidirectional Wetting in the Hydrophobic Wenzel Regime. *Adv. Mater. Interfaces* **2,** 1400444 (2015).