PCR-like Performance of Rapid Test with Permselective Tunable Nanotrap

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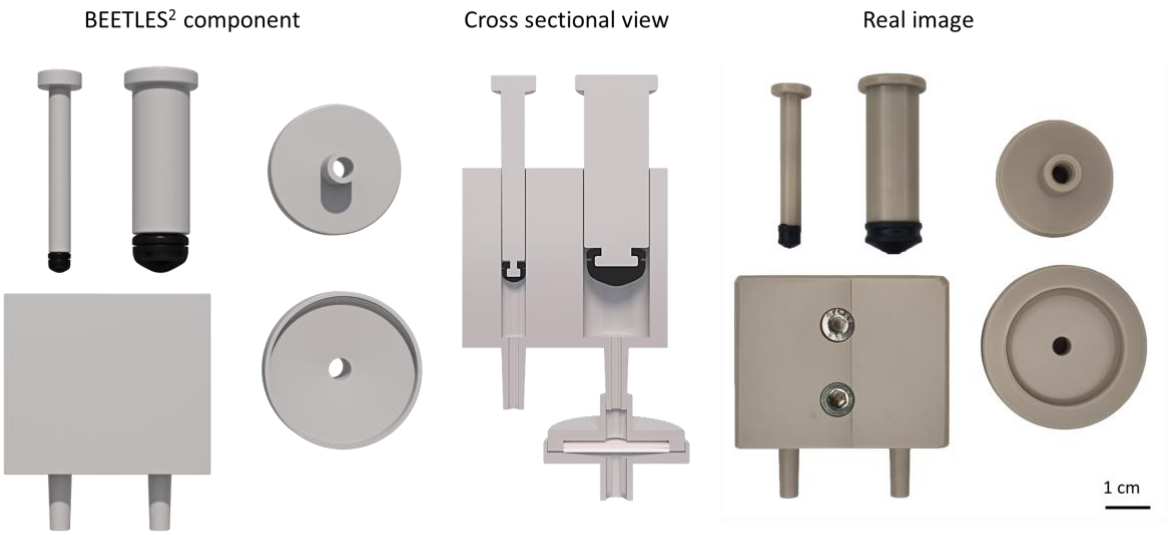
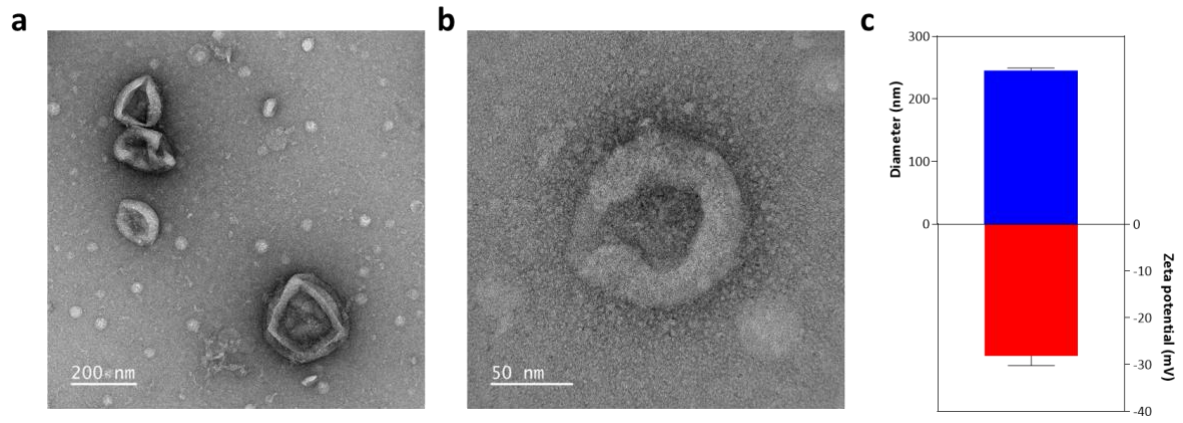
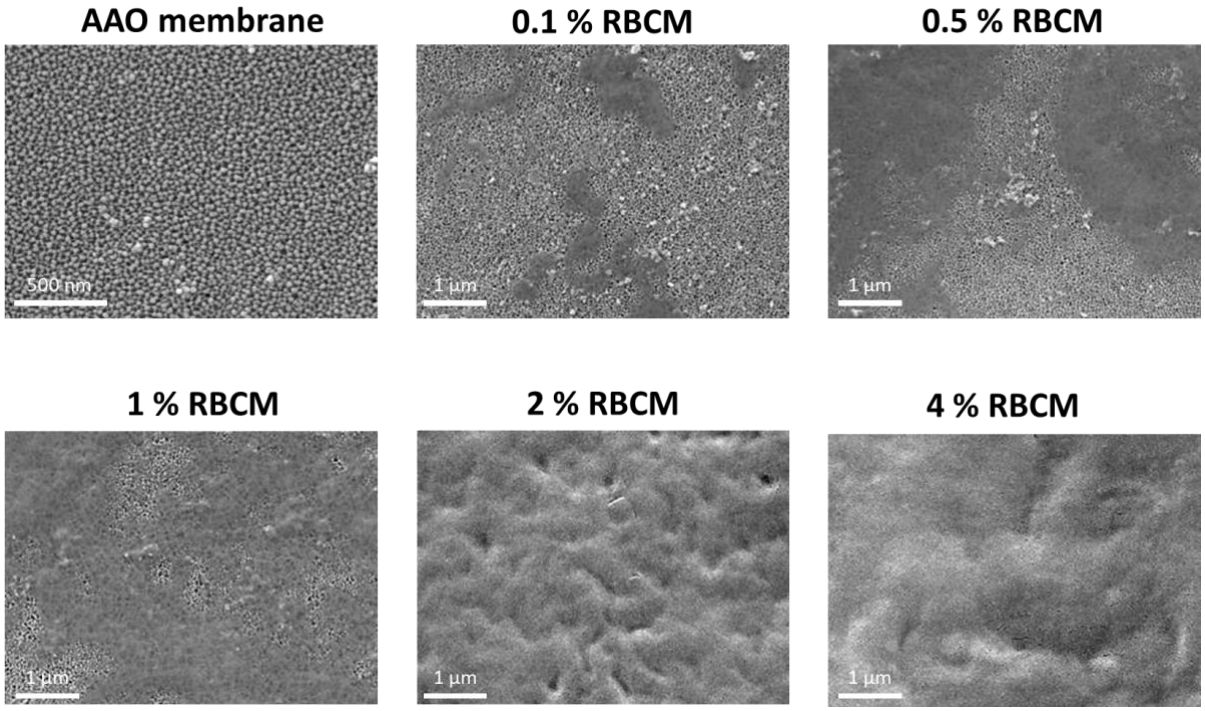


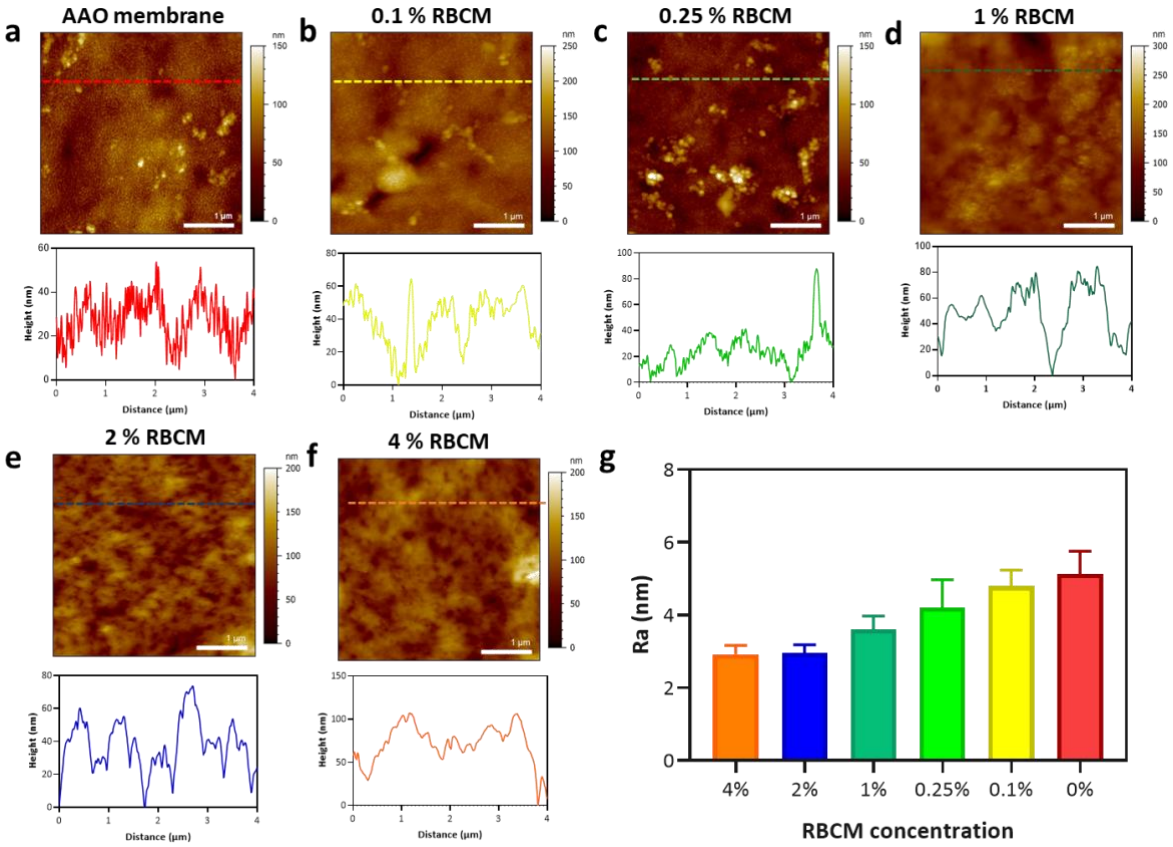
Supplementary Fig. S1. Prototype for POCT sample preparation. POCT, point-of-care test.



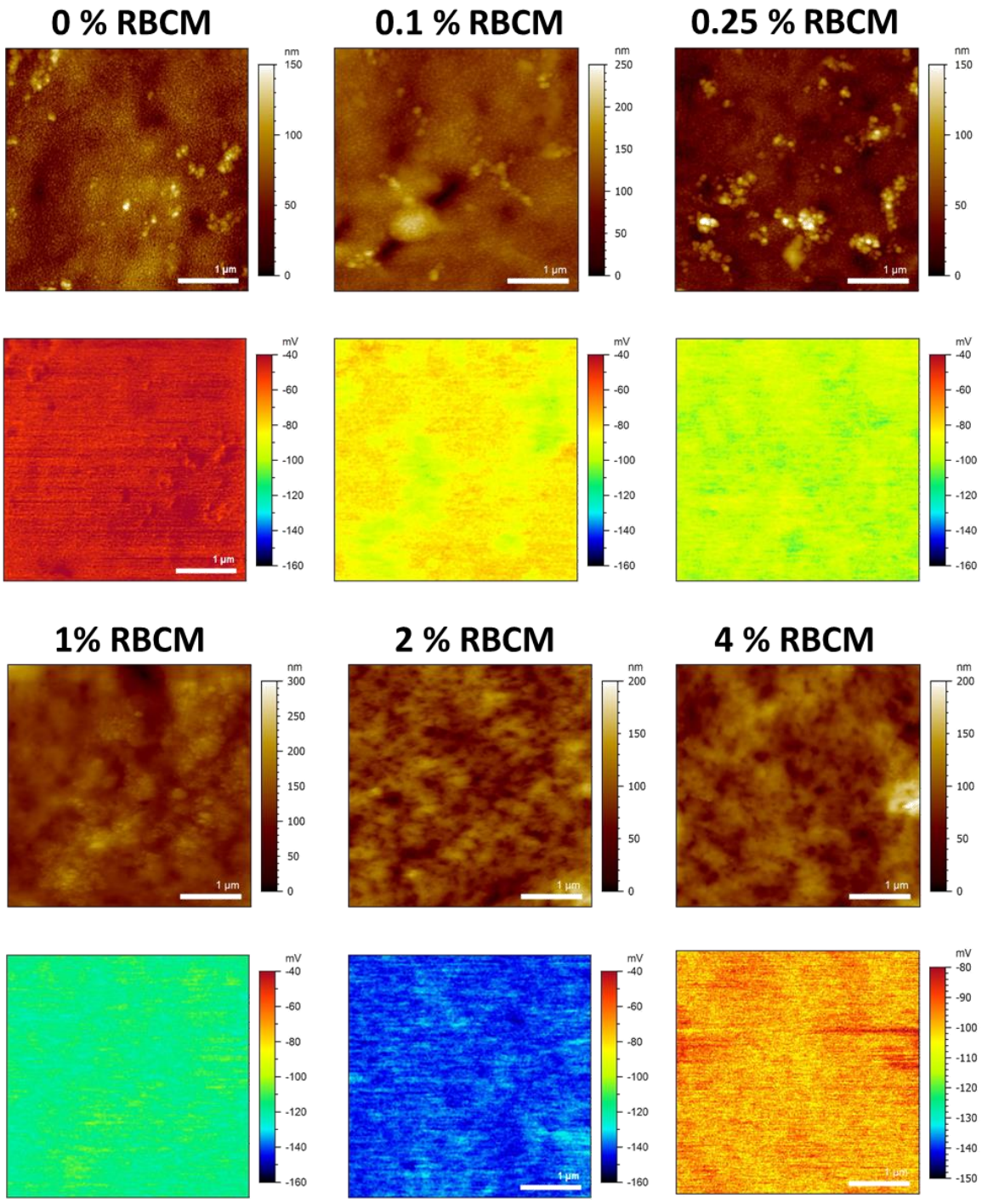
Supplementary Fig. S2. (a-b) Images of the extracted RBCM vesicles. (c) Hydrodynamic size (diameter of nm) and zeta potentials (mV) of the extracted RBCM vesicles. RBCM, red blood cell membrane.



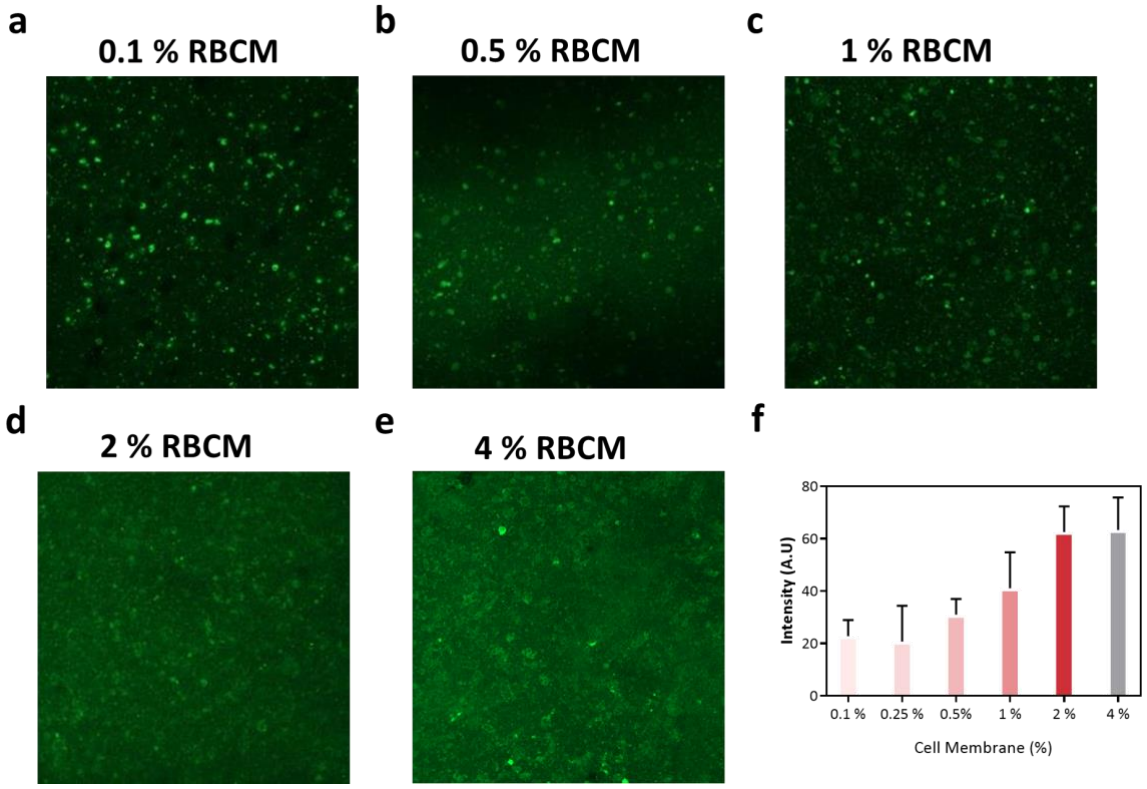
Supplementary Fig. S3. SEM images of bare and BEETLES^2 membrane with various RBCM concentrations (0-4% (v/v)). SEM, scanning electron microscopy; BEETLES^2, bioengineered enrichment tools for the LFA with enhanced sensitivity and selectivity; LFA, lateral flow assay; RBCM, red blood cell membrane.



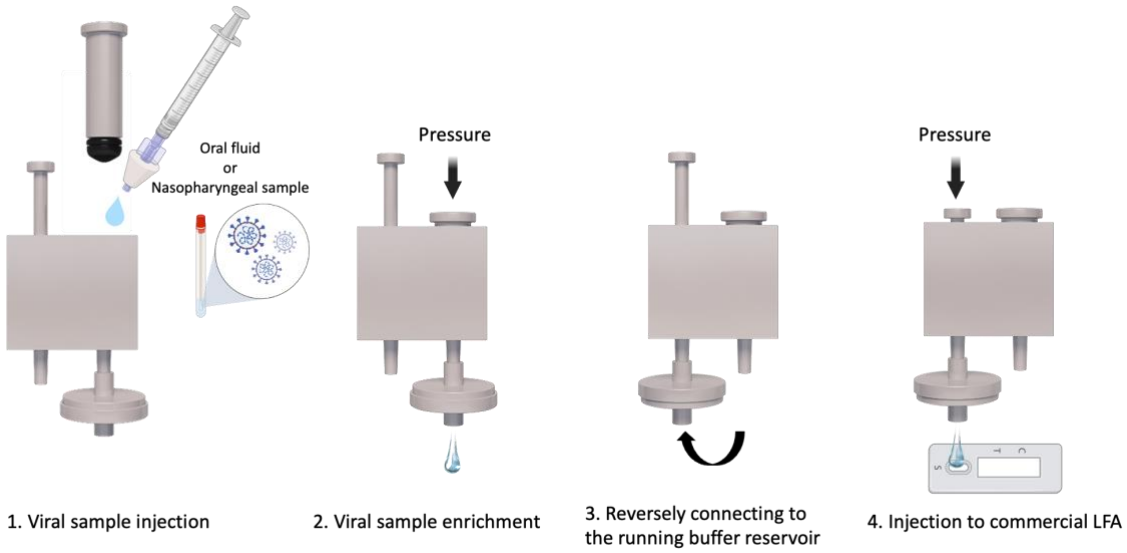
Supplementary Fig. S4. (a–f) Topological images and their cross-sectional profiles of bare AAO and BEETLES^2 membrane with various RBCM concentrations (0-4% (v/v)). (g) Surface roughness analysis with various RBCM concentrations, indicating that 2% RBCM is the optimal concentration for the fabrication of BEETLES^2. BEETLES^2, bioengineered enrichment tools for the LFA with enhanced sensitivity and selectivity; LFA, lateral flow assay; RBCM, red blood cell membrane; AAO, anodic aluminum oxide.



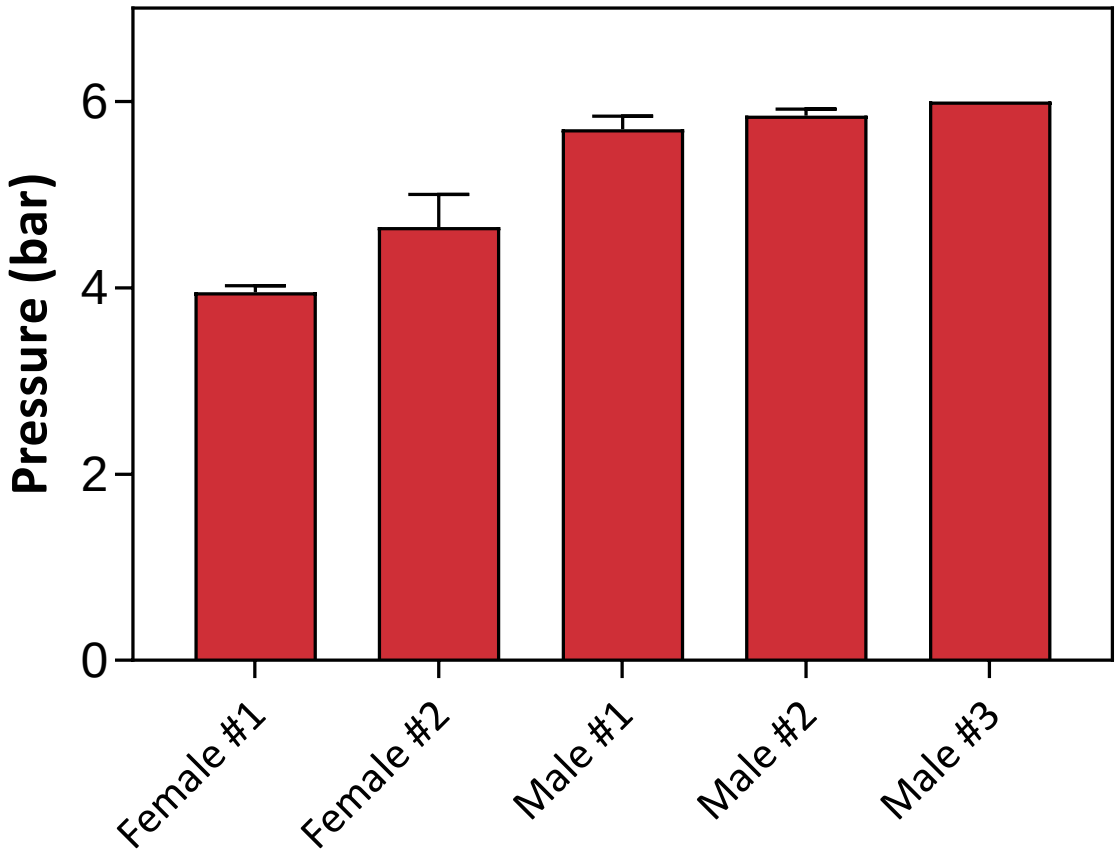
Supplementary Fig. S5. Surface potential mapping by KPFM with various RBCM concentrations (0-4% (v/v)), showing that BEETLES^2 membrane is negatively charged because of the negatively charged phospholipids in RBCM. KPFM, Kelvin probe force microscopy; BEETLES^2, bioengineered enrichment tools for the LFA with enhanced sensitivity and selectivity; LFA, lateral flow assay; RBCM, red blood cell membrane.



Supplementary Fig. S6. (a–e) Fluorescent images of BEETLES^2 with various RBCM concentrations (0-4% (v/v)). (f) Quantitative analysis of the fluorescent intensity depending on various RBCM concentrations, indicating that the RBCM deposition is saturated in 2% RBCM. BEETTLES^2, bioengineered enrichment tools for the LFA with enhanced sensitivity and selectivity; LFA, lateral flow assay; RBCM, red blood cell membrane.



Supplementary Fig. S7. Assay process of a hand-powered portable gadget integrated with BEETLES^2. The system contains two reservoirs: sample reservoir and commercially available running buffer reservoir. BEETTLES^2, bioengineered enrichment tools for the LFA with enhanced sensitivity and selectivity; LFA, lateral flow assay.



Supplementary Fig. S8. Averaged hand-powered pressure from five individuals (3 men and 2 women) as of 5 ± 1 bar.