

Supplementary Information

Paper-Based Passive Pumps to Generate Controllable Whole Blood Flow through Microfluidic Devices

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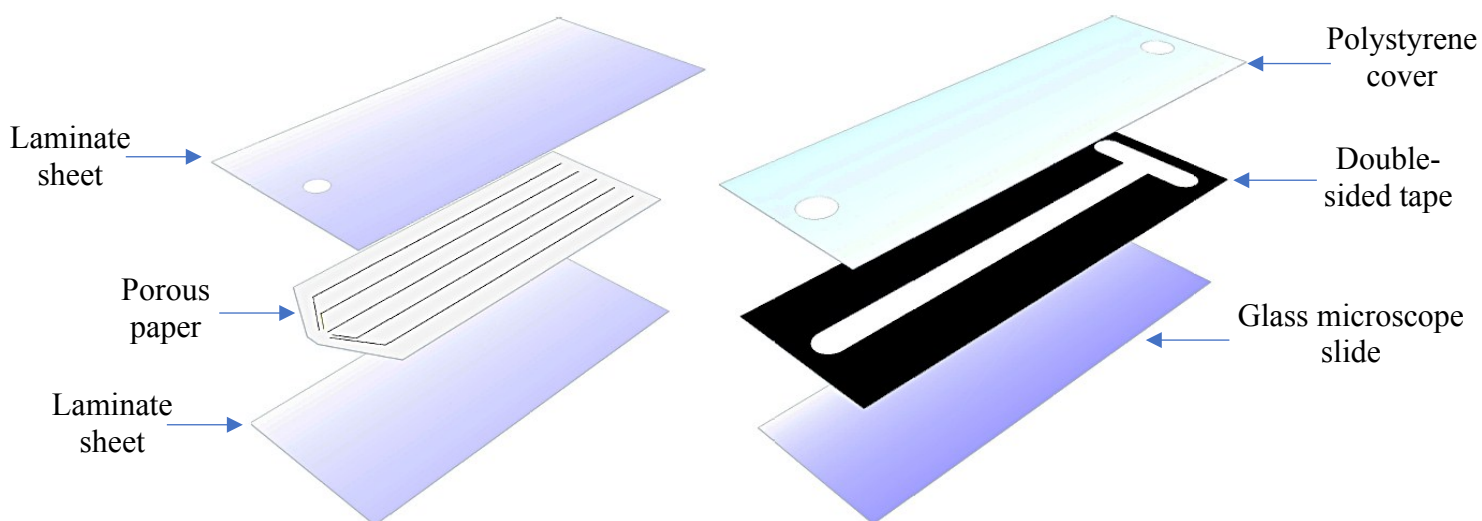


Figure S1: Paper pump components (left) and microfluidic chip components (right).

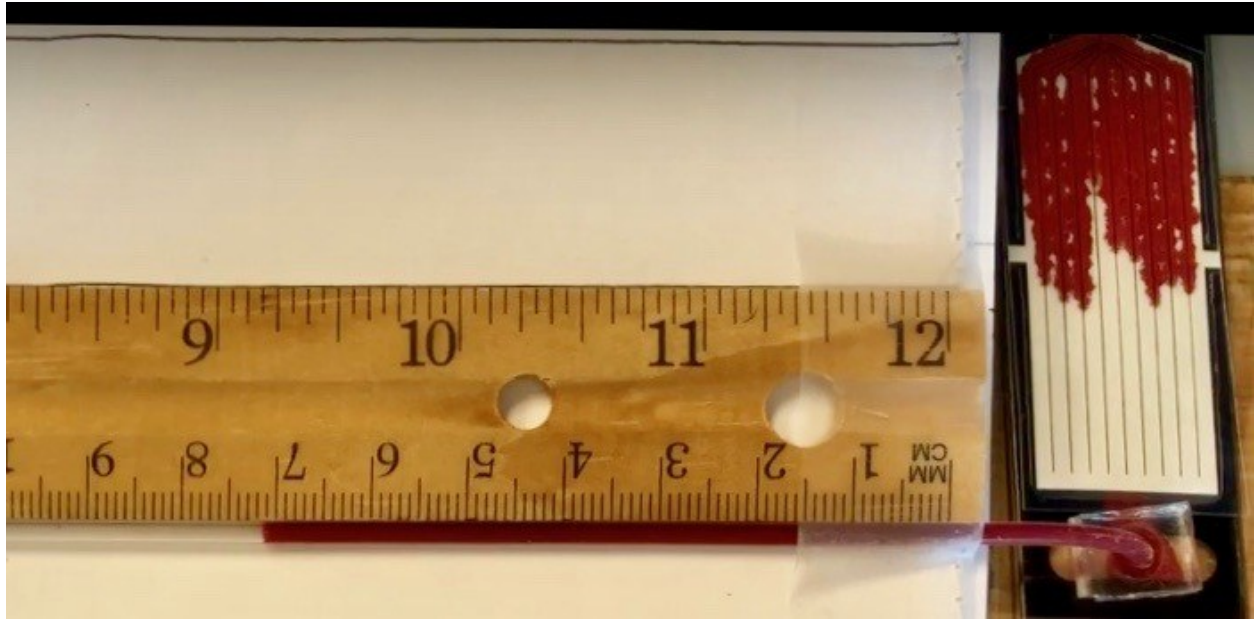


Figure S2: Representative image of an experimental setup to measure volumetric flow rate in the pumps. The inner diameter of the silicone tube is 1.57 mm and blood samples were deposited in the tube by using a needle and syringe. A MATLAB program was used to calculate the change in position of the blood meniscus in the tube over time once the wicking action was initiated by the paper pump.

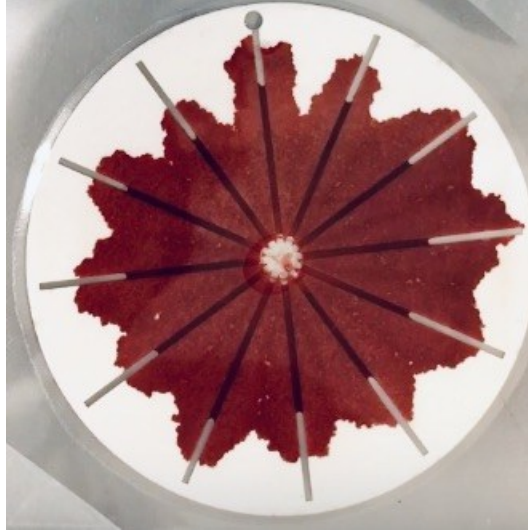


Figure S3: Image of a circular paper pump with radially oriented grooves transporting whole blood samples.

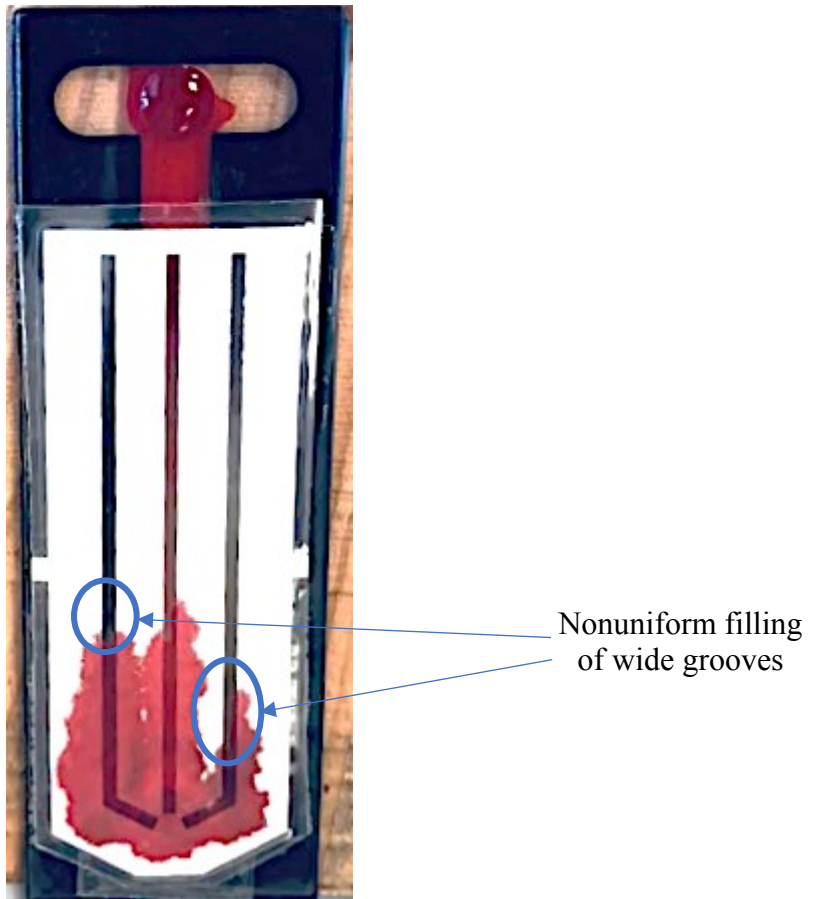


Figure S4: Image of a paper pump with grooves width of 1000 μm showing inconsistent filling of blood inside the grooves.



Figure S5: Demonstration of the grooved paper pumps attached to the commercially available microfluidic immunoassay cartridges (MBio Diagnostics, Inc., Boulder, CO, USA). The proposed pumps successfully transported (3-day old) human blood samples inside the cartridges.

Description of Movies

G1-1: Representative pumping in a pump with one groove of width 130 μm .

G1-2: Representative pumping in a pump with three grooves of width 130 μm .

G1-3: Representative pumping in a pump with five grooves of width 130 μm .

G1-4: Representative pumping in a pump with nine grooves of width 130 μm .

G2-1: Representative pumping in a pump with one groove of width 250 μm .

G2-2: Representative pumping in a pump with three grooves of width 250 μm .

G2-3: Representative pumping in a pump with five grooves of width 250 μm .

G2-4: Representative pumping in a pump with nine grooves of width 250 μm .