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Microfluidic Experimental Setup for Adhesion and Recovery Measurements of Red Blood Cells in Sickle Cell Disease

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Abstract

Current microfluidic assays, which aim at quantifying mechanical properties of sickle cell red blood cells (SS-RBCs), suffer from a number of drawbacks in functionalization and flow control. Specifically, physical adsorption functionalization techniques produce inconsistent functional surfaces, and common volumetric flow pumps cannot be used to adjust the flow inside microchannels with minimal delay. We have designed an experimental setup that alleviates these complications by implementing aspiration for microchannel assembly that enables the use of most functionalization techniques and a pressure controller that allows instant and precise changes in the microchannel flow. Utilizing this setup, we have quantified SS-RBC adhesion to

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