Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Continuous blood fractionation using an array of slanted grooves JORGE A. BERNATE, CHEMBE JHU, LIU CHENGXUN, LIESBET LAGAE, IMEC - SSET/FNS, GERMAN DRAZER, CHEMBE JHU — Blood is a complex fluid having different specialized biological functions and containing a plethora of clinical information. The separation of different blood components is a crucial step in many research and clinical applications. In this work we take advantage of the flow characteristics in microfluidic devices in which the bottom surface is patterned with slanted rectangular grooves to continuously fractionate blood. We exploit the flow in the vicinity of the patterned surface when the dimensions of the grooves are much smaller than the dimensions of the main channel. In these devices, we observed that the grooves act as open channels guiding flow along them with the flow over them being in the direction of the main channel. We present experiments in which the different blood components are deflected laterally to a different extent by the flow along the grooves depending on their sedimentation velocity, which allows their continuous fractionation. In particular, the heavier red blood cells experience the largest deflection while the lighter white blood cells deflect the least, allowing their passive and minimally invasive isolation. In addition, this fluidic platform can also be used to separate magnetically labeled circulating cancer cells which can be retained in the flow along the grooves using a sufficiently strong magnetic force.

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Date submitted: 13 Aug 2011 Electronic form version 1.4