A hybrid fabrication method able to perform separation of cells from plasma

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ABSTRACT

One of most popular and traditional method to fabricate microfluidic devices is the soft-lithography technique with polydimethylsiloxane (PDMS) [1, 2]. By using this fabrication technique several researchers [3-5] have demonstrated that the cell free layer could be enhanced by using a microchannel containing a constriction followed by sudden expansion to separate plasma from the whole in vitro blood. Although the results are extremely encouraging, the high costs and time-consuming involved in the traditional photolithography process is currently slowing down the interest of the industrial community to commercialize microfluidic devices for engineering and biomedical applications. Hence, it is crucial to develop simple, rapid and low-cost alternative technique to fabricate microfluidic systems. Recently, Pinto et al. [6] have used a nonlithographic technique, known as xurography, to perform blood flow studies in bifurcations and confluences. However, by using this method it was not possible to fabricate microchannels less than 100 µm width and as a result blood flow studies were limited to geometries bigger than 100 µm. In this work, we present a hybrid method able to perform in vitro blood flow studies in microchannels smaller than 100 µm. The proposed method comprises the use of glass capillaries combined with the xurography technique. The preliminary results show that by using this method it is possible to perform separation of red blood cells from plasma.

Keywords: Nonlithographic technique; xurography; red blood cells; cell free layer.

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