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Increase of Sensitivity in 3D Suspended Polymeric Microfluidic Platform through Lateral Misalignment

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Abstract : In the present study, a design of the suspended polymeric microfluidic platform is introduced that is fabricated with three polymeric layers. Changing the microchannel plane to be perpendicular to microcantilever plane, drastically decreases moment of inertia in that direction. In addition, the platform is made of polymer (around five orders of magnitude less compared to silicon). It causes significant increase in the sensitivity of the cantilever deflection. Next, although the dimensions of this platform are constant, by misaligning the embedded microchannels laterally in the suspended microfluidic platform, the sensitivity can be highly increased. The investigation is studied on four fluids including water, seawater, milk, and blood for flow ranges from low rate of 5 to 70 µl/min to obtain the best design with the highest sensitivity. The best design in this study shows the sensitivity increases around 50% for water, seawater, milk, and blood at the flow rate of 70 µl/min by just misaligning the embedded microchannels in the suspended polymeric microfluidic platform.

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