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Continuous size separation of micro/nano particles using ridged microchannel by controlling particle position in the z-direction BUSHRA TASADDUQ, GONGHAO WANG, WENBIN MAO, WILBUR LAM, ALEXANDER ALEXEEV, ALI FATIH SARIOGLU, TODD SULCHEK, Georgia Institute of Technology — In the last meeting we presented results that demonstrated that the particle trajectories depend on their z-position inside a microchannel with diagonal ridges. The phenomenon arises due to vortices created by the diagonal ridges that transport the fluid at the channel center in the negative y-direction, whereas the fluid located near the bottom channel walls moves in the positive y-direction. This effect is harnessed to improve the separation of particles by size. We have incorporated a vertical sheath to improve the z focusing of particles in our device and operated the device at an optimized sample to vertical sheath flow rates. As the vertical sheath flow velocity increases, the sample flow streamlines are pushed towards the bottom channel wall. Due to vortices created by diagonal ridges the small particles are pushed towards the bottom channel and move with positive y-trajectories. Large particles also are pushed towards the bottom of the channel, yet due to their larger sizes and close to the gap size they experience a net negative y-trajectory. We are able to improve the purity of large particle enrichment by over 5 times as compare to our previous work.

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