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**Particle Motion under Shear-Induced Migration in Square-PDMS Microchannels** YOUNG WON KIM, JUNG YUL YOO, Seoul National University — An experimental study has been conducted to quantitatively characterize particle motion under shear-induced migration in square-PDMS microchannels by applying $\mu$-PTV technique. It is shown that particles are accumulated at the equilibrium position of $0.67H$, with $H$ being a half width of the channel, which is analogous to what is observed in circular tube flow in macro scale. Since high shear rate can be induced due to the scale effect, particle migration occurs markedly even at low Reynolds number ranging from 4 to 57 while this phenomenon dose not typically occur at this range of the Reynolds number in macro scale. At $Re = 57$, it is found that particles are nearly absent around the center of the channel, which is coincident with previous numerical result obtained for a square duct at $Re = 100$. The outermost edge of particle cluster is in good agreement with previous study. It is rapidly converging to about $y/H = 0.7$ at $L_3 = 1$, where $L_3 = (0.5d_p/H)^3(l/2H)Re$ is the reduced tube length, $d_p$ is the diameter of the spherical particle and $l$ is the measurement position from channel inlet. Since the thickness of particle-free layer is largest at $L_3 = 1$, it is indicated that plasma selectivity and total amount of plasma separated can be maximized at this value of $L_3$ when serum from the whole blood is separated into side channels in lab-on-a-chip systems, by minimizing the clogging of RBCs (Red Blood Cells). The present study is expected to give optimum factors for designing of microfluidic systems.

Young Won Kim

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