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Compliant synthetic cilia induce deposition of solid particles[1] JACLYN BRANSCOMB, ALEXANDER ALEXEEV, Georgia Institute of Technology — Using computational modeling, we examine flow of neutrally buoyant micrometer-sized particles in a fluid-filled microchannel lined with regularly-spaced compliant cilia. The flow is driven by a pressure gradient along the channel. Our simulations reveal that non-motile synthetic cilia can be harnessed to regulate deposition of solid particles. We show that elastic cilia, deflected by the flow, create circulatory secondary flows that direct solid particles towards the ciliated channel wall, thereby inducing their rapid deposition. Our results suggest that synthetic ciliated surfaces could be harnessed for hydrodynamic separation, trapping, and filtration of microscopic biological and synthetic particles in microfluidic devices. The results are also useful for the understanding of the function of certain suspension-feeders that use ciliary filters to capture food particles from streaming water.

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