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Stokes Trap: Multiplexed particle trapping and manipulation using fluidics ANISH SHENOY, CHARLES SCHROEDER, University of Illinois at Urbana-Champaign — We report the development of the Stokes Trap, which is a multiplexed microfluidic trap for control over an arbitrary number of small particles in a microfluidic device. Our work involves the design and implementation of "smart" flow-based devices by coupling feedback control with microfluidics, thereby enabling new routes for the fluidic-directed assembly of particles. Here, we discuss the development of a new method to achieve multiplexed microfluidic trapping of an arbitrary number of particles using the sole action of fluid flow. In particular, we use a Hele-Shaw microfluidic cell to generate hydrodynamic forces on particles in a viscous-dominated flow defined by the microdevice geometry and imposed peripheral flow rates. This platform allows for a high degree of flow control over individual particles and can be used for manufacturing novel particles for fundamental studies, using fluidic-directed assembly. From a broader perspective, our work provides a solid framework for guiding the design of next-generation, automated on-chip assays.

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