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Multiphase ferrofluid flows for micro-particle sorting RAN ZHOU, CHENG WANG, Missouri University of Science and Technology — Utilizing negative magnetophoresis, ferrofluids have demonstrated great potential for sorting non-magnetic micro-particles by size. Most of the existing techniques use single phase ferrofluids by pushing micro-particles to channel walls; the sorting speed is thus hindered. We demonstrate a novel sorting strategy by co-flowing a ferrofluid and a non-magnetic fluid in microchannels. Due to the magnetic force, the particles migrate across the ferrofluid stream at size-dependent velocities as they travel downstream. The laminar interface between the two fluids functions as a virtual boundary to accumulate particles, resulting in effective separation of particles. A stable and sharp interface is important to the success of this sorting technique. We investigate several factors that affect sorting efficiency, including magnetic field, susceptibility difference of the fluids, flow velocity, and channel geometry.

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