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Viscoelastic focusing and separation of bioparticles in straight microchannels[1] GUOQING HU, CHAO LIU, LNM, Institute of Mechanics, Chinese Academy of Sciences — Viscoelasticity-induced particle migration has recently received increasing attention due to its ability to obtain high-quality focusing over a wide range of flow rates. However, its application is limited to low throughput regime since the particles can defocus as flow rate increases. Using an engineered carrier medium with constant and low viscosity and strong elasticity, the sample flow rates are improved to be one order of magnitude higher than those in existing studies. Utilizing differential focusing of particles of different sizes, here we present sheathless particle/cell separation in simple straight microchannels that possess excellent parallelizability for further throughput enhancement. The present method can be implemented over a wide range of particle/cell sizes and flow rates. We successfully separate small particles from larger particles, MCF-7 cells from red blood cells (RBCs), and *Escherichia coli* (*E. coli*) bacteria from RBCs in different straight microchannels. We recommend further study on engineering rheological properties of carrier media for improving the separation performance of viscoelasticity-based microfluidic devices.

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