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Continuous separation of micropaticles by size in ridged microchannels[1] WENBIN MAO, GONGHAO WANG, TODD A. SULCHEK, ALEXANDER ALEXEEV, Georgia Institute of Technology — Size-based separation and sorting are widely used for biomedical research and clinical application. We design a microfluidic channel with periodically arranged diagonal ridges that separate micrometer-sized particles by size. We use a hybrid numerical method that combines the lattice Boltzmann model (LBM) and lattice spring model (LSM) to examine the dynamics of suspended particles in such channels. Our simulations reveal that particles with different sizes follow distinct trajectories and separate in the lateral direction inside ridged microchannels. The trajectories are determined by the particle equilibrium position in narrow constrictions formed diagonal ridges. We characterize the separation performance by analyzing the effects of ridge geometry and compare our simulation results with experimental data. This microfluidic system can be employed for high throughput sorting and separation of biological cells and synthetic microcapsules.

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