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Gravity driven separation based on lateral displacement in anisotropic microfluidic media RAGHAVENDRA DEVENDRA, GERMAN DRAZER, Department of Chemical and Biomolecular Engineering, Johns Hopkins University, Baltimore MD 21218 — We designed an anisotropic periodic array of rectangular obstacles and directly measured the Brownian motion of particles in the absence of an external field. Earlier, we established that in the limit of small driving forces, particle-wall hydrodynamic interactions, coupled with geometric confinement, lead to non- linear effects in the mobility of rigid spherical particles in the periodic array. We further proposed that such anisotropic media could be used for continuous size-based separation of particles in microfluidic devices. Here, we show that such anisotropic systems could also lead to separation in the deterministic limit of high Peclet numbers. We use gravity as the driving force and investigate the effect of the orientation of the force with respect to the media. We observe directional locking in the motion of the particles, analogous to that observed in macroscopic systems and discuss the role of irreversible particle-obstacle interactions in the observed behavior. We report the average migration angles for different sizes of particles and confirm the utility of these anisotropic arrays to create microdevices for continuous particle sorting.

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