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Microchannels with adhesive posts trap cells with specific mechanical properties GUANGDONG ZHU, ALEXANDER ALEXEEV, ANNA BALAZS, Chemical Engineering Department, University of Pittsburgh — In order to perform various biological assays and tissue engineering studies, there is a critical need for microfluidic devices that can be used to trap cells with specific mechanical properties. Here, we model cells as fluid filled elastic shells, which also represent polymeric microcapsules. Using a combined approach based on lattice Boltzmann and lattice spring models, we study the motion of cells within a channel with two adhesive posts on the opposite walls. The distance between the posts is comparable to the diameter of the cell. The cells are driven to move through the channel by an imposed pressure gradient. We probe the effect of post compliance and the adhesion strength on the dynamics of the cells. We isolate the conditions at which all cells with shell stiffness lying within a specified range can be trapped in between the posts. Thus, our study can facilitate the design of simple and robust devices for analyzing mechanical properties of biological cells and synthetic microcapsules.

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