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Microfluidic mixing using orbiting magnetic microbeads[1]
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Using three-dimensional simulations and experiments, we examine mixing in a microfluidic channel that incorporates a hybrid passive-active micromixer. The passive part of the mixer consists of a series of angled parallel ridges lining the top microchannel wall. The active component of the mixer is made up of microbeads rotating around small pillars on the bottom of the microchannel. In our simulations, we use a binary fluid lattice Boltzmann model to simulate the system and characterize the microfluidic mixing in the system. We consider the passive and active micromixers separately and evaluate their combined effect on the mixing of binary fluids. We compare our simulations with the experimental results obtained in a microchannel with magnetically actuated microbeads. Our findings guide the design of an efficient micromixer to be used in sampling in complex fluids.

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