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**Strategic obstacle placement reduces drop breakup probability in concentrated emulsion flowing into a constriction** JIAN WEI KHOR, Department of Mechanical Engineering, Stanford University, YU HUA, Undergraduate Visiting Research Program, School of Engineering, Stanford University, ALISON BICK, SINDY TANG, Department of Mechanical Engineering, Stanford University
— In this study, we investigate the effect of an obstacle on the breakup probability of droplets within a concentrated emulsion flowing into a constriction. We introduce a concentrated emulsion as a 2D monolayer through a tapered channel into a narrow constriction. This geometry is commonly used for the serial interrogation of droplet content in droplet microfluidics applications. We found that certain drop-drop interactions near the constriction entrance lead to the breakup of these drops at a high flow rates. Such breakup sets the upper limit for the droplet interrogation throughput. Incidentally, previous findings have shown that strategic placement of a circular post near a narrow exit can reduce the conflict from the interactions among living organisms (humans, ants, and sheep) or a cluster of particles when entering a narrow exit. Inspired by these results, we modify the tapered channel by placing a circular post in a strategic location near the constriction entrance in order to reduce catastrophic drop-drop interactions and to avoid breakup. Preliminary work shows that the circular posts can reduce the breakup fraction of drops by up to 17%. The optimization of the location and size of the obstacle is expected to further reduce the breakup fraction.

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