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A passive approach for upgrading the uniformmity of droplet array in the microfluidic trapping network[1] LONGXIANG ZHANG, ZHAOMIAO LIU, YAN PANG, MENGQI LI, Beijing Univ of Technology — Droplet-based microfluidics has shown much promise in protein crystallization, material synthesis and blood detection, due to its unique advantages including no cross-contaminations and reduced amounts of reagents. To monitor the kinetic characteristics of biochemical reactions inside the sample chambers, it is necessary to store the moving drop train at a certain position within the device. A noval approach, which utilizes the unique physical properties of bubble, is proposed to trap the drops in a microfluidic trapping network. The trapping mode diagram of drop train with and without a guiding bubble is specifically concentrated on in this work. The trapping mode of drops with the bubble leading transitions from sequentially uniform trapping for smaller drops in a narrow range, to nonuniform trapping induced by breakup and collision for larger drops. Disordered trapping is heavily attributed to the instability of drop speed and spacing in the bypass, while the flow region of desired uniform trapping is broadened by introducing the bubble. This investigation is beneficial to enhance the applicability of microfluidic chips for passively trapping drops.

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