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Trapping, focusing, and sorting of microparticles through bubble streaming CHENG WANG, SHREYAS JALIKOP, SASCHA HILGENFELDT, Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign — Ultrasound-driven oscillating microbubbles can set up vigorous steady streaming flows around the bubbles. In contrast to previous work, we make use of the interaction between the bubble streaming and the streaming induced around mobile particles close to the bubble. Our experiment superimposes a unidirectional Poiseuille flow containing a well-mixed suspension of neutrally buoyant particles with the bubble streaming. The particle-size dependence of the particle-bubble interaction selects which particles are transported and which particles are trapped near the bubbles. The sizes selected for can be far smaller than any scale imposed by the device geometry, and the selection mechanism is purely passive. Changing the amplitude and frequency of ultrasound driving, we can further control focusing and sorting of the trapped particles, leading to the emergence of sharply defined monodisperse particle streams within a much wider channel. Optimizing parameters for focusing and sorting are presented. The technique is applicable in important fields like cell sorting and drug delivery.

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