

Abstract Submitted  
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**Microparticle separation in moving droplets using traveling surface acoustic wave**<sup>1</sup> KWANGSEOK PARK, JINSOO PARK, JIN HO JUNG, GHULAM DESTGEER, HUSNAIN AHMED, RAHEEL AHMAD, HYUNG JIN SUNG, Korea Adv Inst of Sci Tech — In droplet-based microfluidics systems, in-droplet separation of sample mixture is one of strategic prerequisites for purification, enrichment and detection signal improvement of targets in droplet-based microfluidic systems. There have been a few studies on separation in a moving droplet; however, they have limitations such as a time-consuming mechanism and a need of targets with electric or magnetic properties. In this study, we demonstrated the lateral position control of 5 and 10  $\mu\text{m}$  polystyrene particles inside a moving water-in-oil droplet using traveling surface acoustic waves (TSAWs). Microparticles affected by an acoustic radiation force (ARF) of TSAW are laterally moved in the direction of TSAW propagation. The ARF of first 135 MHz TSAW acts on both particles inside the droplet while that of 95 MHz TSAW in the opposite propagating direction to that of 135 MHz TSAW affects the bigger size. Thus, lateral positions of the microparticles inside the droplet differ depending on the particle size. In-droplet separation is complete after droplet splitting at a bifurcation zone. Compared to previous studies, our system enables a label-free and on-demand control. Furthermore, it is the first time to realize the separation of different-sized microobjects in the moving droplets.

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