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Acoustophoretic contactless transport and handling of matter[1]
DANIELE FORESTI, MAJID NABAVI, MIRKO KLINGAUF, ALDO FERRARI, DIMOS POULIKAKOS, Laboratory of Thermodynamics in Emerging Technologies, ETH Zurich — Levitation and controlled motion of matter in air, has a wealth of potential applications ranging from materials processing to biochemistry and pharmaceuticals. We present a novel acoustophoretic concept, for the contactless transport and handling of matter in air. Spatiotemporal modulation of the levitation acoustic field allows continuous planar transport and processing of multiple objects (volume 0.1-10 μl). The independence of the handling principle from special material properties (magnetic, optical or electrical) is illustrated with a wide palette of application experiments, such as contactless droplet coalescence and mixing, solid-liquid encapsulation, absorption, dissolution, and DNA transfection. The dynamics of droplets and particles collision is studied numerically and experimentally. The findings show that the secondary acoustic force gives a significant contribution to the samples impact velocity.

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