Duke TRANSLATION & COMMERCIALIZATION

Method to trap and transport small particles with acoustic forces

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External Link(s)

- Dr. Steven Cummer's research website

Value Proposition

Acoustic tweezers use ultrasound to create radiation force potential wells that enable precise and contact-free manipulation of physical and biological objects across a broad object size range. It is a fast-developing platform that finds applications in a wide range of fields, including chemical reaction control, microrobotics, drug delivery, and cell and tissue engineering.

To date, the vast majority of acoustic tweezers in microfluidic chambers rely on arrays of transducers that surround the chamber to generate standing waves that form acoustic traps in a periodic pattern. Such standing waves not only preclude particle selectivity by generating a large number of stable trapping points but also substantially constrain the overall spatial distribution of trapping points. The ability to better control the forces inside the chamber to form more complex or arbitrary particle trapping patterns in a selective manner with acoustic tweezers is highly desirable.

Technology

A new Duke technology has demonstrated spatially complex particle trapping and manipulation inside a boundary-free chamber using a single pair of sources and an engineered structure outside the chamber that called a shadow waveguide. The technology uses shadow waveguide to create a tightly confined, spatially complex acoustic field inside the chamber without requiring any interior structure that would interfere with net flow or transport.

Advantages

- Contact and label-free; no interior structure to interfere with particles
- Biocompatible
- Highly precise manipulation of nanoparticles