New technique for sorting micro-particles uses sound waves

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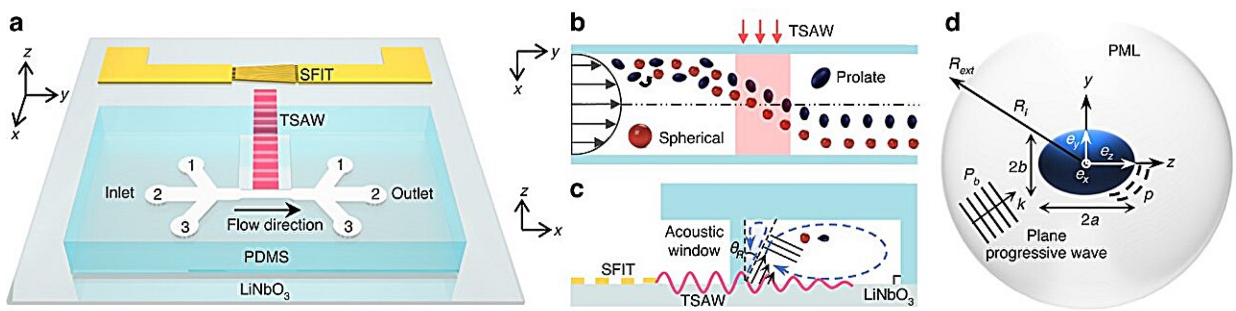

Schematic diagram of an acoustofluidic chip for shape-based separation. a A schematic diagram of the proposed acoustofluidic device. b Top-view of the midstream microchannel. c Cross-sectional view of the midstream microchannel. d A rigid ellipsoid modeled system exposed to incident plane progressive waves. Credit: *Microsystems & Nanoengineering* (2024). DOI: 10.1038/s41378-023-00636-7

Thanks to the rapid progress in tiny tech, we've been mainly using microfluidics to sort tiny particles by size. But now, there's a new way to sort them by shape, which could be a big deal for medical tests and chemistry. A recent study introduces a new method using sound waves to separate oddly shaped particles from round ones without needing any labels. This breakthrough could lead to better ways to deliver drugs or diagnose diseases by offering a smarter approach to sorting these tiny particles.

In the realm of microfluidics, separating micro-particles based solely on size has been the norm. However, distinguishing these particles by shape is crucial for advancing biomedical and chemical analyses. This approach requires innovative techniques capable of identifying and separating micro-objects with subtle shape differences, moving beyond traditional size-based separation methods.

This shift towards shape-based separation opens up new possibilities for more precise and efficient biomedical research, diagnostics, and various applications in chemical assays, highlighting the need for advancements in microfluidic technology to explore this untapped potential.

A recent study in *Microsystems & Nanoengineering* has introduced a novel acoustofluidic method capable of separating micro-objects based on shape, using surface acoustic waves. This label-free technique marks a significant advancement in microfluidic technologies.

In the study, researchers have made a significant breakthrough in microfluidics, introducing an innovative acoustofluidic technique that distinguishes and separates micro-particles based on their shape rather than size. This method, utilizing surface acoustic waves, skillfully manipulates prolate ellipsoids and spherical microparticles, enabling their separation with unprecedented accuracy.

This advancement stems from the realization that shape, a critical property often overlooked, can provide more nuanced insights in various applications. By focusing the acoustic waves, the team has successfully demonstrated that non-spherical objects can be aligned and separated, achieving high purity and efficiency. This research not only challenges conventional separation methods but also sets a new standard for precision in micro-object manipulation.

Dr. Jinsoo Park, lead researcher of the study, says, "This method not only enhances the precision in micro-object separation but also opens up new avenues in biomedical research and diagnostics, enabling more accurate and efficient analyses."

This research has broad potential, covering everything from enhancing drug delivery to pinpointing specific cells for diagnosis. With further development, it could revolutionize fields like biomedical engineering and environmental science, offering deeper insights and management of the microscopic realm.

More information: Muhammad Soban Khan et al, Acoustofluidic separation of prolate and spherical micro-objects, *Microsystems & Nanoengineering* (2024). DOI: 10.1038/s41378-023-00636-7

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