

System for Transporting, Sorting, and Assembling Nanoscale Objects

Summary

Vanderbilt researchers have developed a new system for transporting and sorting nanoscale and mesoscale particles and biomolecules. The system is able to achieve size-based sorting and captures/arranges the particles within a few seconds, which is significantly faster than the existing method of diffusion-based transport.

Applications of the Technology

There are numerous applications for this technology including 1) on-chip concentration of biological molecules such as viruses and bacteria for detection at low concentrations; 2) size-based sorting of colloids or biological particles; and 3) assembling and building new metamaterials.

Unique Features

- ◇ Ability to assemble, capture, and/or reject particles based on size
- ◇ Particles can be sorted much faster than diffusion-based transport
- ◇ System can assemble particles into structures or metamaterials based on size

Technology Development Status

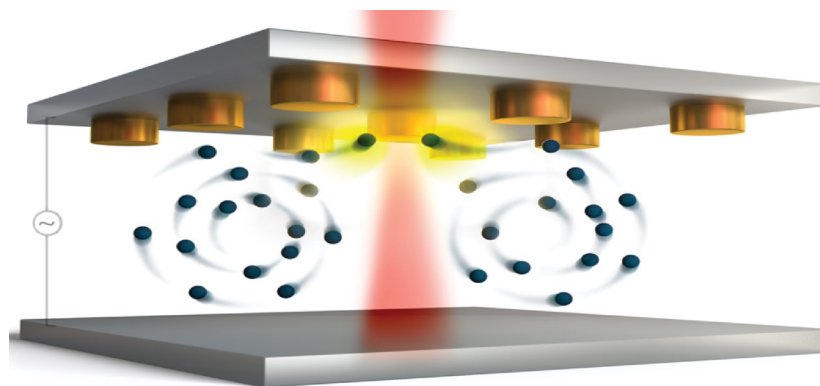
The system has been validated in benchtop studies that include the rapid concentration of particles within a few seconds and the assembly of particles.

Technology Development Status

Ongoing work includes the ability to transport, sort, and assemble particles based on material type as well as shape. The development of biological sensors for rapid detection of bacteria and/or viruses in a fluid medium is also planned.

Intellectual Property Status

Issued US patent [10,656,311](#)



A conceptual drawing of the system for transporting, sorting, and assembling nanoscale objects is shown here [1].

[1] JC Ndukaife, VM Shalae, and A Boltasseva. "Plasmonics—turning loss into gain." *Science* 351.6271 (2016): 334-335.

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