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Microfluidic Pumping Based on Dielectrophoresis

A novel dielectrophoresis-based microfluidic pumping technology enables precise, low-voltage, and highly reliable fluid delivery for enhanced electronics cooling and biological analysis.

Present micropumping technologies, e.g., electroosmotic (EOF), electrohydrodynamic (EHD), and ferrohydrodynamic micropumps, suffer from requirements of very high working voltages, a gradient in the electrical property of the working fluids, or ferromagnetic fluids with high conductivities. New technology is needed to realize effective fluid delivery for electronics cooling and general microfluidic applications.

Researchers at Purdue University have developed a novel microfluidic pumping scheme based on dielectrophoresis, which enables precise flow actuation and control for applications in electronics cooling and biological analysis. It involves no moving parts and is reliable over long-term usage. When this technique is used in combination with nanofluids, the nanoparticles act as a fluid mover and the superior thermal transport properties of the nanofluids can be utilized to enhance heat transfer simultaneously.

Advantages:

-Does not require high working voltages to function

-Very reliable over long-term use

Potential Applications:

-Microelectronics

-Nanoelectronics

TRL: 5

Intellectual Property:

Technology ID
64851

Category
Materials Science & Nanotechnology/Nanomaterials & Nanostructures
Semiconductors/Thermal Management & Cooling Technologies
Biotechnology & Life Sciences/Analytical & Diagnostic Instrumentation

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