

Why are Microfluidic Technologies so attractive? What are the real advantages? What are the future opportunities for Microfluidics?

Successes and Challenges of Microfluidics

Principles

- Laminar flow and efficient heat and mass transfer at microscale allow well-controlled manipulation of fluid
- Compartmentation of pico-/nano-liter fluid enables analysis on single-cell/molecule level
- Large surface-area-to-volume ratio ensures homogeneous reaction condition

Benefits

- Decreased sample and reagent consumption
- High throughput
- Shortened reaction time
- Increased sensitivity of analysis
- Mimicking physiologic systems

Challenges

- Disconnection between technology and applications
- Material limitation for mass production
- Low programmability hampered by generalizability and reliability

Promising Areas of Applications of Microfluidics



Diagnostics

Rapid and cost-effective testing
Antibiotic susceptibility testing
Genomic screening

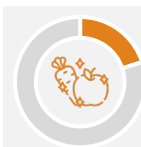
Selected providers



Therapeutics

Organ-on-a-chip
Antibody discovery
Lipid nanoparticles

Selected providers



Consumer Product Safety

Detection of mislabeled foods
Identification of foodborne bacteria
Determination of micronutrition

Selected providers



Materials Production

Synthesis of novel nanomaterials
Production of active pharmaceutical ingredients
Continuous flow synthesis of toxic chemicals

Selected providers

