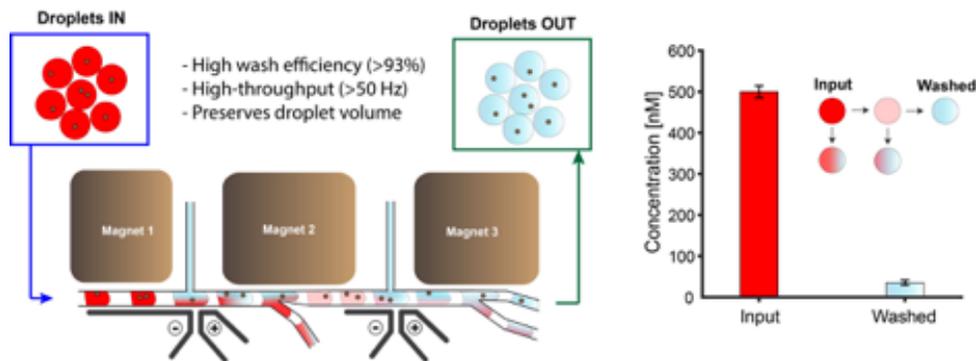


DROPLET MICROFLUIDIC WASHING FOR HIGH-THROUGHPUT BIOASSAYS

BACKGROUND

Selection of biomolecules in the lab typically involves binding species of interest to a solid support (often magnetic microparticles) and subsequent washing steps to remove unwanted contaminants or background species. Droplet microfluidics has emerged as a technology that can be used to scale this approach beyond the benchtop into very high throughput regimes. Manipulation of nanoliter volumes permits massively-parallel chemical and molecular biological reactions with decreased reagent use and reaction times. Droplet microfluidic operations such as droplet generation, sorting, and fluid addition are well established; however, fluid exchange (i.e. washing) is challenging to implement at high throughput.



DESCRIPTION

Dr. William Stephenson in the NYGC Technology Innovation Lab has developed a microfluidic system that combines picoinjection and droplet splitting simultaneously with magnetic microparticle positioning to achieve in-droplet washing. This approach preserves droplet volume making it ideal for use in multi-step droplet microfluidic workflows. Furthermore, this technique is amenable to miniaturization as it does not rely on bulky off-chip components.

BENEFITS

- High throughput (>50Hz)
- High wash efficiency (>93%)
- High magnetic microparticle retention rates (97%) in a dual-stage device
- Method can be serialized to achieve desired level of wash stringency

APPLICATIONS

- In-droplet target enrichment or depletion
- Single cell genomics (scRIP-seq, scChIP-seq, single cell Ribosome footprinting)
- Nanoliter diagnostics (SERS)
- Lab on a chip technologies

MEDIA LINK

https://static-content.springer.com/esm/art%3A10.1186%2F940486-018-0065-2/MediaObjects/40486_2018_65_MOESM3_ESM.mp4

RELATED PUBLICATIONS

W Stephenson, *Micro and Nano Sys Lett*, 2018

PATENT INFORMATION

Patent Application#: PCT/US2018/043365

The New York Genome Center (NYGC) is an independent, nonprofit academic research institution focused on furthering genomic research that leads to scientific advances and new insights and therapies for patients with neurodegenerative disease, neuropsychiatric disease, and cancer, leveraging our strengths in whole genome sequencing, genomic analysis, and development of genomic tools.

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