

Innovation and Commercialization



Magnetic bead free DNA isolation for genomics application enabled by EWOD Digital Microfluidics

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TECHNOLOGY NEED

DNA isolation has traditionally been done using particle-based systems or membrane-based filtration process. Several automated benchtop instruments have been commercialized making use of the particle-based system for DNA isolation. These instruments are bulky and make use of robotic arms and many arrays of test tubes for multiple and consecutive separations. Commercial kits are available based on the membrane technology, but they are expensive and time consuming. Although a growing number of scientific reports have been published for alternative methods (two phase liquid-liquid extraction) for DNA isolation, these methods have not been adopted on macro scale instruments and digital microfluidic device platforms. Researchers have found it too difficult to control a two-phase liquid system in the macro scale instruments. Solid phase extraction (SPE) is the most widely used method for DNA isolation. However the costs involved in this technique is high, with magnetic beads often being used as the solid phase particles.

INVENTION DESCRIPTION/SOLUTION

We have developed a novel droplet-based digital microfluidic platform capable of performing two phase liquid-liquid extraction-based DNA isolation. This technology utilizes liquid-liquid micro-extraction enabled by electro wetting on dielectric (EWOD) digital microfluidics for the separation of DNA from the sample and encapsulate in a drop which can go for further on chip or off chip downstream processes. This invention has two immiscible liquids used for liquid-liquid extraction (LLE) methodology to extract the interfering molecules and, in order to detect the molecules it uses the absorption principle. One immiscible liquid has affinity for the interfering biomolecule and other does not. This technology also avoids the usage of magnetic bead particles for DNA extraction. We also propose to further expand this technology for the extraction of DNA in the presence of other interfering protein molecules in the sample.

APPLICATIONS

- DNA isolation and extraction
- Microfluidics based sequencing
- Single cell omics
- Genomics based applications

KEY BENEFITS

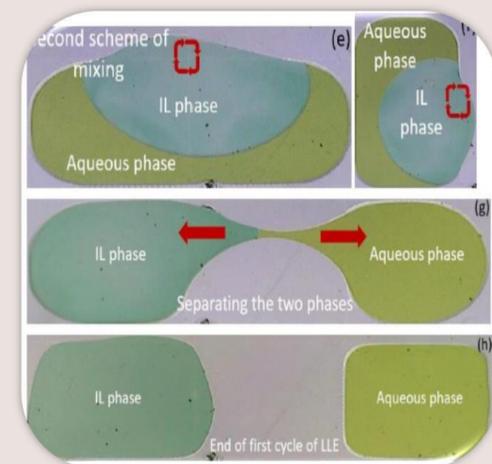
- Magnetic bead free
- Standalone device
- Reduced sample consumption
- Automated and hands free

STAGE OF DEVELOPMENT

Prototype
Extensive tests done

INTELLECTUAL PROPERTY STATUS

Provisional



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