

Digital Meter-On-Chip with Microfluidic Flowmetry

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ABSTRACT

Researchers at the University of California, Davis have developed a microfluidic flowmetry technology that achieves on-chip measurement with ultrahigh precision across a wide tunable range.

FULL DESCRIPTION

Accurate monitoring and control of liquid flows at very low rates is essential in a wide range of applications – including biomedical analytics and industrial monitoring. Current technologies employ mostly thermal flowmeters, which use calorimetric sensing mechanisms. While common, these thermal flowmeters present drawbacks that include additional calibration/compensation steps, potential fluid contamination and thermally-induced changes to the molecular properties of the fluids being analyzed. Thus, innovations in microfluidic sensors that measure accurately and precisely are highly desired.

This device is the first, on-chip, digital, flow-measuring device – frequently referred to as a digital meter-on-chip (DMC). The device's simple architecture permits the digitization of flow governed by capillary action - without relying on gravity, requiring external energy use, or bulky control equipment. Additionally, a convenient, non-contact, wireless, optical detection scheme using a smartphone can be deployed as the readout module in conjunction with the DMC. This technology can be easily incorporated into existing microfluidic designs. It offers a versatile, low-cost option for drug delivery, biomedical analysis, and a variety of other applications.

APPLICATIONS

- ▶ On-chip and local microflow assessments deployable across multiple medical and other fields
- ▶ Enables continuous flow into countable transferred liquid units at consistent quantifiable volumes

FEATURES/BENEFITS

- ▶ On-chip and localized microflow measurement with ultrahigh precision and wide tunable range
- ▶ Use of capillary action, instead of gravity, drop
- ▶ Integrates with a wide array of current fluidic devices
- ▶ Ultrahigh flow-to-frequency sensitivity and volume resolution (over 50 times the highest reported value with similar digital principle targeting ultralow flowrates)
- ▶ Highly compatible with and adaptive to conventional, PDMS-based, microfluidic devices

PATENT STATUS

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OTHER INFORMATION

KEYWORDS

flowmetry, measurement, microflow, microfluidic, digital meter-on-chip, capillary action

CATEGORIZED AS

- ▶ **Energy**
- ▶ Other
- ▶ **Medical**
- ▶ Diagnostics
- ▶ **Sensors & Instrumentation**
- ▶ Analytical
- ▶ Medical

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