

Request Information

Permalink

Microfluidic Peristaltic Pump with Integrated Pneumatic Digital Logic Controller

Tech ID: 23082 / UC Case 2013-232-0

BRIEF DESCRIPTION

Researchers at the University of California, Irvine have developed a microfluidic peristaltic pump that does not require off-chip controllers for actuation, but rather is driven by on-chip pneumatic circuitry.

FULL DESCRIPTION

Currently, microfluidic devices often require unwieldy off-chip pneumatic and electronic components to control the actuation of valves and pumps on-chip. These components interface to the chip through a maze of tubing and wiring. While effective in laboratory settings, this approach is disadvantageous in applications where simplicity and portability are key, such as point-of-care diagnostics.

This invention allows pumping to be controlled by an on-chip circuit, negating the need for off-chip controllers. In many cases, the only off-chip connection required is a single line to a static vacuum source to provide power. Multiple pumps can be combined on chip with additional logic circuitry to create integrated liquid-handling systems capable of executing metering, mixing, incubating, and washing operations, under the control of on-board pneumatic digital logic circuitry.

The system consists of a self-oscillating circuit that provides a set of synchronized periodic waveforms, which in turn drive a bank of valves in specific patterns to achieve fluid pumping.

SUGGESTED USES

This pump can be used to control liquid handling on point-of-care medical diagnostic devices. It can also be used to provide recirculation within flow chambers for DNA hybridization or antibody binding. This may be useful, for example, in DNA sequencing machines.

ADVANTAGES

In contrast to typical microfluidic systems that require both the microfluidic chip and external control machinery, this invention enables the microfluidic chip to function autonomously without external controllers. This achieves simpler and more portable systems that may also have a significant advantage in manufacturing cost due to monolithic integration.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,784,258	10/10/2017	2013-232
United States Of America	Published Application	20210379592	12/09/2021	2013-232
United States Of America	Published Application	20190153376	05/23/2019	2013-232

CONTACT

Alvin Viray
aviray@uci.edu
tel: 949-824-3104.



OTHER INFORMATION

KEYWORDS

Microfluidics, Pneumatic, Digital Logic

CATEGORIZED AS

- » **Biotechnology**
- » Other
- » **Medical**
- » Devices
- » Diagnostics
- » **Engineering**
- » Other
- » Robotics and Automation

RELATED CASES

2013-232-0

STATE OF DEVELOPMENT

Prototype pumps as well as an integrated chip that can perform metering, mixing, incubation, and washing operations have been successfully demonstrated.

UCI Beall
Applied Innovation

5270 California Avenue / Irvine, CA
92697-7700 / Tel: 949.824.2683



© 2013 - 2019, The Regents of the University of
California
[Terms of use](#)
[Privacy Notice](#)