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Fluidic Control Elements in Paper Networks for Signal Enhancement

A novel two-dimensional paper network streamlines multistep diagnostic assays, reducing reaction time to under 10 minutes with controlled delivery and improved signal enhancement for biomarkers.

Two-dimensional paper networks (2DPNs) are a microfluidic format for performing multistep biological assays while retaining the positive aspects of conventional flow tests, e.g., pregnancy tests, for point-of-care diagnostics, e.g., detecting protein, DNA, and small molecule biomarkers of disease. A major shortcoming of 2DPNs include a lack of control over the timing and delivery of a given sample, leading to limited detection capabilities. In addition, first generation 2DPNs take about 35 minutes and 2DPNs with linear channels take about 60 minutes, which is not amenable to point-of-care diagnostics.

Researchers at Purdue University have developed a 2DPN that incorporates valves and mixing elements. The 2DPN's design uses shorter channels for reagent mixing, resulting in an even, well-mixed delivery of all reagents while reducing the overall signal amplification reaction time to less than 10 minutes. The result is an easy-to-use 2DPN with improved detection and signal enhancement of biomarkers.

To view a video related to this technology, click this link: https://www.youtube.com/watch?v=0-PNdFxdVGI&feature=youtu.be

Advantages:

-Easy-to-use

-Controlled delivery

-Improved sample detection

-Signal enhancement

-Faster

Technology ID

2017-LINN-67688

Category

Biotechnology & Life Sciences/Biomarker Discovery & Diagnostics

Biotechnology & Life Sciences/Analytical & Diagnostic Instrumentation

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View online

-Retains positive aspects of conventional lateral flow tests

Potential Applications:

-DNA tests

-Disease diagnostics

-Point-of-care diagnostics

TRL: 3

Intellectual Property:

Provisional-Patent, 2017-01-19, United States | Utility Patent, 2018-01-19, United States | CON-Patent, 2021-06-02, United States

Keywords: Two-dimensional paper networks, 2DPNs, microfluidic format, multistep biological assays, point-of-care diagnostics, protein detection, DNA detection, small molecule biomarkers, valves and mixing elements, signal enhancement