Spatiotemporal Control of Microenvironment Using Oscillating Bubbles

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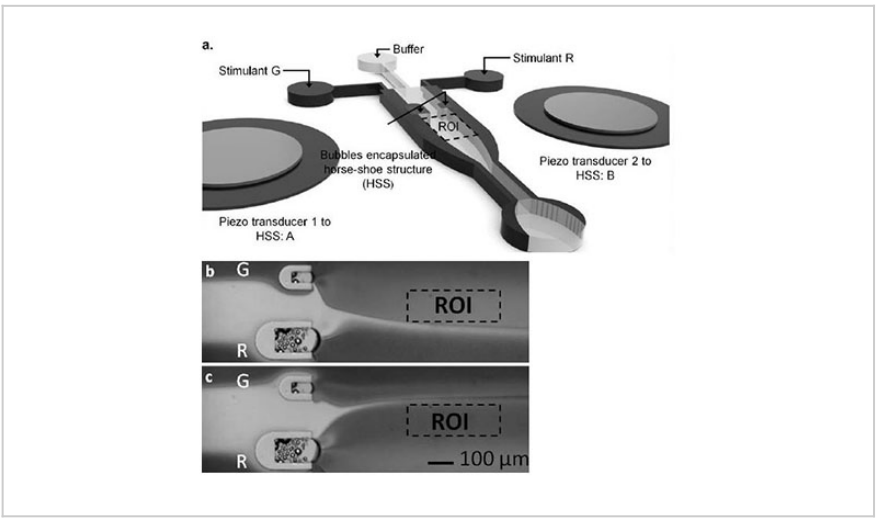

Embodiment of the Invention

Technology Summary

The invention is a newly developed microfluidic tool that generates temporal wave forms for investigating biochemical processes. By creating a chemical gradient, the invention maps electrical signals and chemical concentrations in relation to time occurring in biological structures. A chemical gradient is generated by introducing different fluid flows, such as biological matter and a buffer, into a flow channel. A horse-shoe support structure is located within the flow channel, configured to support bubbles within the flow channel when fluid flow passes through. An acoustic transducer transmits acoustic waves to excite the bubbles. Frictional forces form between the bubbles and the surrounding medium, so when fluid flows are introduced, mixing occurs generating a chemical gradient. One can program the timings and frequencies of bubble activation to generate different waveforms.

Application & Market Utility

The technology allows researchers to characterize biological structures such as cells, platelets, or proteins. The invention can help study the biological and chemical processes involved in cellular systems (cell migration, differentiation, apoptosis). The invention generates waveforms in continuous flow for measuring the kinetics of fast enzymatic reactions, explaining the specificity and efficiency of gene expression, and developing time-release drugs.

Next Steps

The invention is protected under United States Patent No. 9,757,699. A demo device is readily available.

TECHNOLOGY READINESS LEVEL 4-7

Seeking

Investment | Licensing | Research

Keywords

- microfluidic devices
- waveforms
- time-release drugs
- ezymatic reactions
- gene expression

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