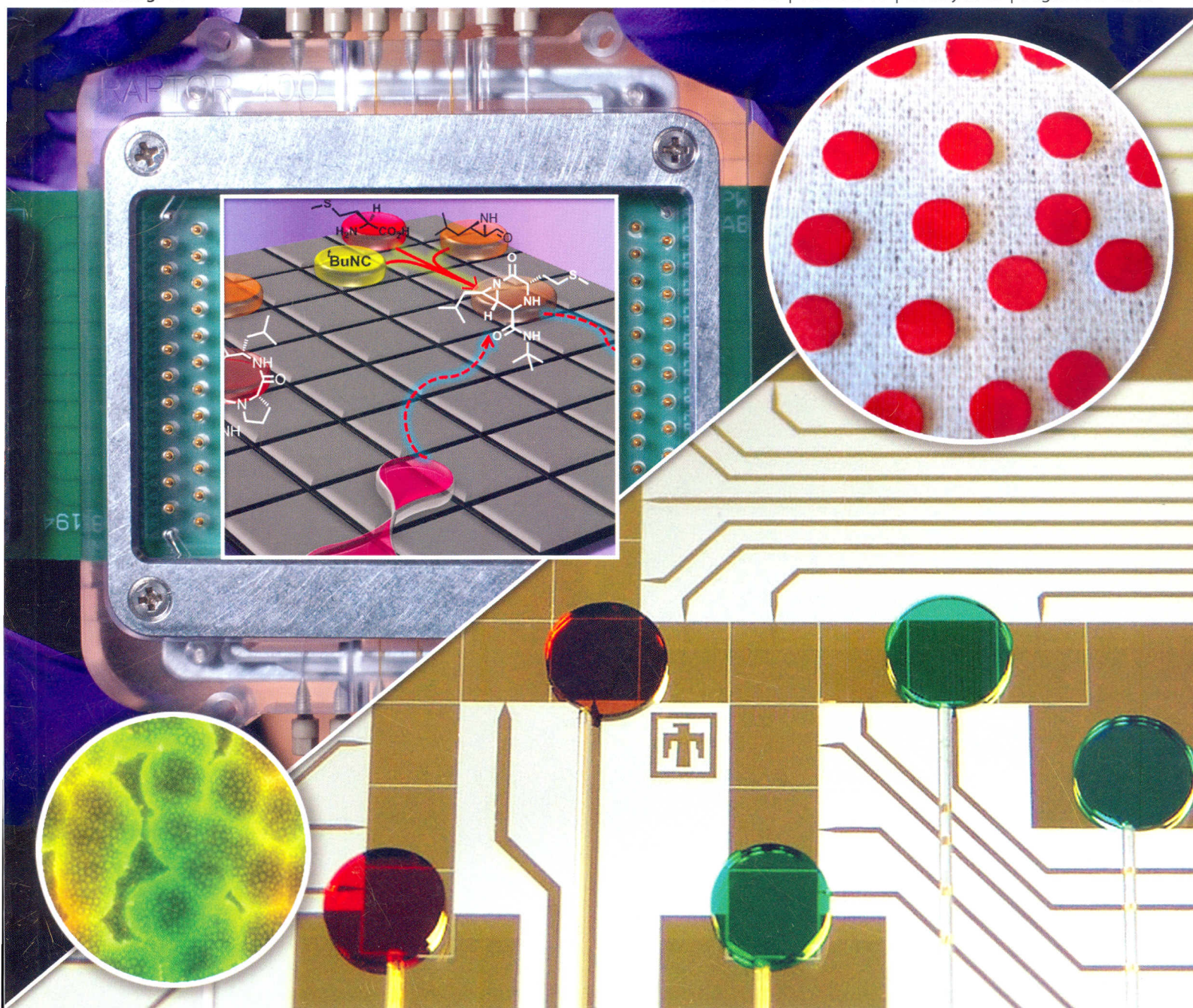


# Lab on a Chip

Miniaturisation for chemistry, physics, biology, materials science and bioengineering

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**CRITICAL REVIEW**

Kamlesh D. Patel *et al.*

Digital microfluidics: a versatile tool for applications in chemistry, biology and medicine



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See Kamlesh D. Patel *et al.*,  
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*Lab Chip*, 2012, 12, 2487.

## EDITORIAL

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### Riding the waves

Albert van den Berg

Albert van den Berg introduces this 150th issue of *Lab on a Chip*.



## HIGHLIGHT

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### Research highlights

Šeila Selimović, Mehmet R. Dokmeci and  
Ali Khademhosseini\*

“Fluidic batteries” and self-powered paper microfluidic chips –  
Device fabrication *via* rolling hot embossing – Detecting the  
onset of tumor metastasis on a chip.

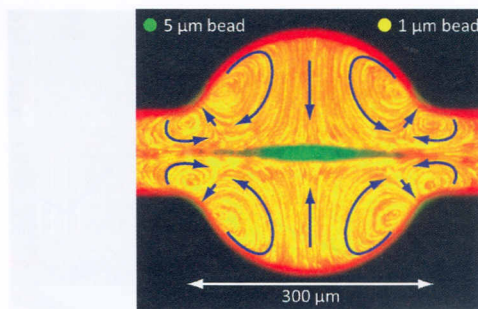


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### Acoustofluidics 14: Applications of acoustic streaming in microfluidic devices

Martin Wiklund,\* Roy Green\* and Mathias Ohlin

We discuss the principles and applications of acoustic streaming in lab-on-a-chip devices, including streaming driven by boundary layer losses, bulk dissipation and cavitation.



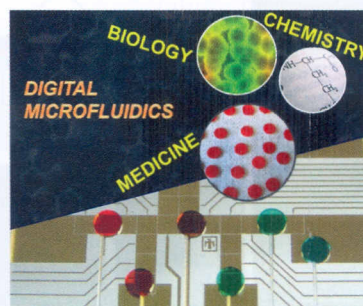
### CRITICAL REVIEWS

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### Digital microfluidics: a versatile tool for applications in chemistry, biology and medicine

Mais J. Jebrail, Michael S. Bartsch and Kamlesh D. Patel\*

In this review, we discuss the most recent developments in digital microfluidics with particular attention to the potential benefits and outstanding challenges for applications in chemistry, biology, and medicine.

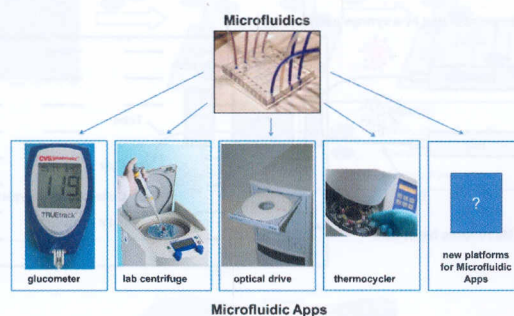


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### Microfluidic Apps for off-the-shelf instruments

Daniel Mark,\* Felix von Stetten and Roland Zengerle

This article promotes the idea of “Microfluidic Apps”; microfluidic chips that are designed to extend the functionality of existing instruments.



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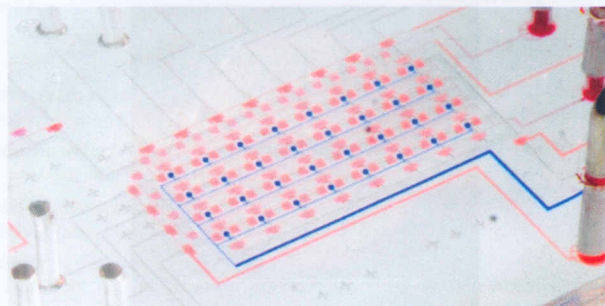
### Isothermal nucleic acid amplification technologies for point-of-care diagnostics: a critical review

Pascal Craw\* and Wamadeva Balachandran

An up-to-date review of existing isothermal nucleic acid amplification technologies and their implementation in point-of-care diagnostic instrumentation.



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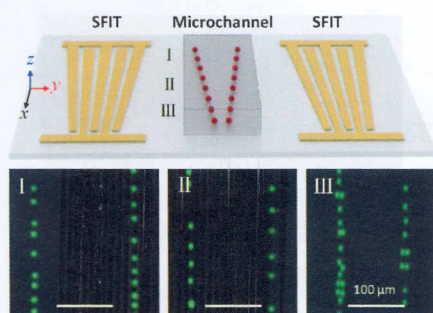
### High-throughput immunoassay through in-channel microfluidic patterning

Chunhong Zheng, Jingwen Wang, Yuhong Pang, Jianbin Wang, Wenbin Li, Zigang Ge\* and Yanyi Huang\*

Pneumatic button valves enable surface patterning inside microfluidic channels and facilitate highly sensitive and robust immunoassays.

## PAPERS

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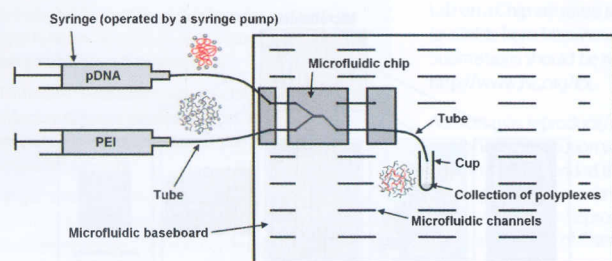


### Tunable patterning of microparticles and cells using standing surface acoustic waves

Xiaoyun Ding, Jinjie Shi, Sz-Chin Steven Lin, Shahrzad Yazdi, Brian Kiraly and Tony Jun Huang\*

A novel tunable cell-patterning technique using standing surface acoustic waves, which enables 1D & 2D cell-cell interaction studies in a simple microfluidic device.

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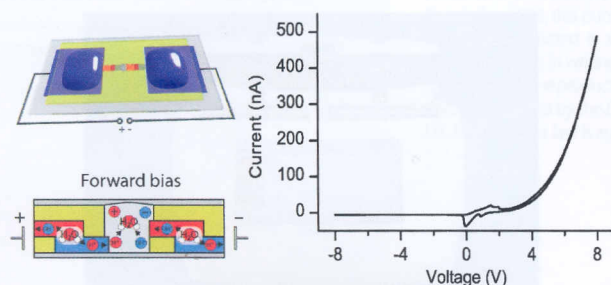


### Optimized preparation of pDNA/poly(ethylene imine) polyplexes using a microfluidic system

Heiko Debus, Moritz Beck-Broichsitter and Thomas Kissel\*

A microfluidic method for polyplex formation with poly(ethylene imine) and nucleic acids was compared with the standard pipetting method.

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### Ion diode logics for pH control

Erik O. Gabriellsson, Klas Tybrandt and Magnus Berggren\*

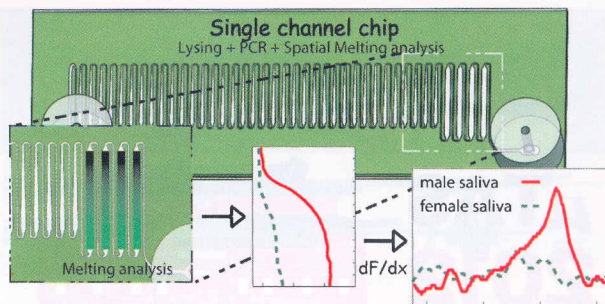
Micro-fabricated ion diodes based on bipolar membranes showing low hysteresis are used as components in an ionic circuit for pH control.

2514

### Genotyping from saliva with a one-step microdevice

Ilija Pjescic and Niel Crews\*

Genetic results can be obtained directly from saliva within twenty minutes using microfluidics for simultaneous PCR and DNA melting analysis.

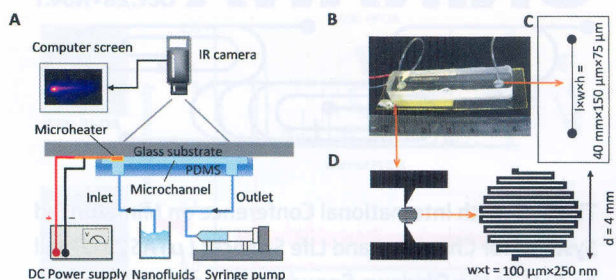


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### Thermal analysis of nanofluids in microfluidics using an infrared camera

Pyshar Yi,\* Aminuddin A. Kayani, Adam F. Chrimes, Kamran Ghorbani, Saeid Nahavandi, Kourosh Kalantar-zadeh\* and Khashayar Khoshmanesh\*

We present the thermal analysis of liquid containing  $\text{Al}_2\text{O}_3$  nanoparticles in a microfluidic platform using an infrared camera.

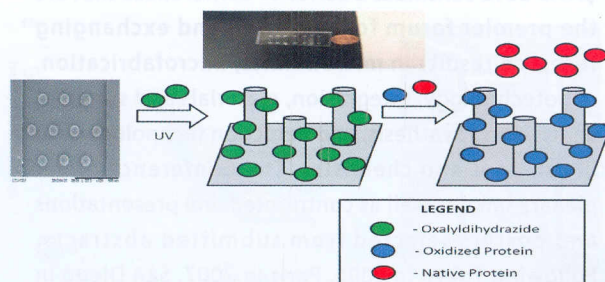


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### Enriching carbonylated proteins inside a microchip through the use of oxalyldihydrazide as a crosslinker

Bryant C. Hollins, Steven A. Soper and June Feng\*

This report demonstrates the use of oxalyldihydrazide as a novel crosslinker for enrichment of carbonylated proteins inside a disposable, polymeric microfluidic device.

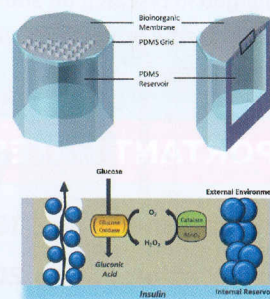


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### In vitro and in vivo testing of glucose-responsive insulin-delivery microdevices in diabetic rats

Michael K. L. Chu, Jian Chen, Claudia R. Gordijo, Simon Chiang, Alexander Ivovic, Khajag Koulajian, Adria Giacca,\* Xiao Yu Wu\* and Yu Sun\*

We have developed an implantable, glucose-responsive microdevice that shows rapid *in vitro* and *in vivo* efficacy in a diabetic rat model.

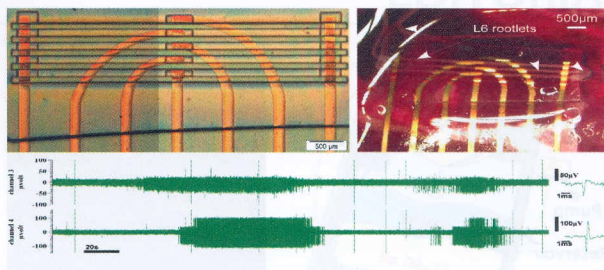


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### Concurrent recordings of bladder afferents from multiple nerves using a microfabricated PDMS microchannel electrode array

Evangelos Delivopoulos,\* Daniel J. Chew, Ivan R. Mineev, James W. Fawcett and Stéphanie P. Lacour

We present a compliant neural interface to record bladder afferent activity from L6 and S1 dorsal rootlets of an anaesthetized rat.

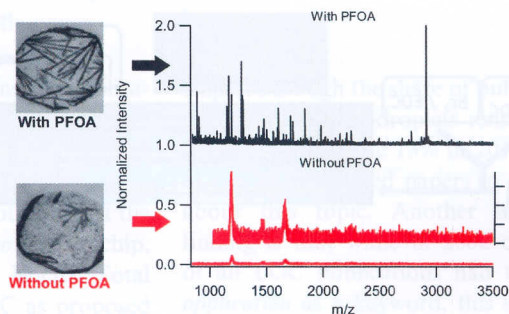


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### Fluorinated liquid-enabled protein handling and surfactant-aided crystallization for fully *in situ* digital microfluidic MALDI-MS analysis

Andrew P. Aijian, Debalina Chatterjee and Robin L. Garrell\*

Complete *in situ* peptide mass fingerprinting is performed on a digital microfluidic device using fluorinated liquid encapsulation to facilitate movement of the protein droplet and a fluorinated surfactant (PFOA) to enhance matrix co-crystallization and MALDI-MS spectral quality.

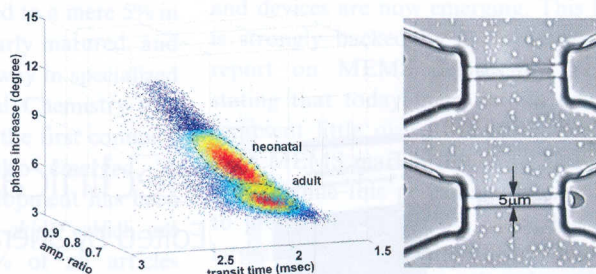


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### High-throughput biophysical measurement of human red blood cells

Yi Zheng, Ehsan Shojaei-Baghini, Azar Azad, Chen Wang\* and Yu Sun\*

This paper describes a microfluidic system for biophysically characterizing and classifying human RBCs at a speed of  $\sim 120$  cells  $s^{-1}$ .

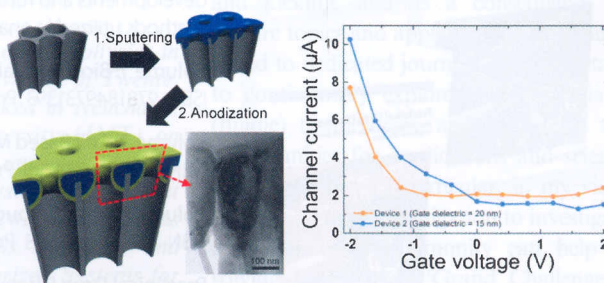


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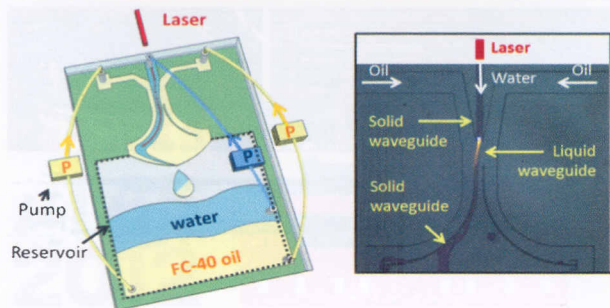
### A facile route for the fabrication of large-scale gate-all-around nanofluidic field-effect transistors with low leakage current

Sangwoo Shin, Beom Seok Kim, Jiwoon Song, Hwanseong Lee and Hyung Hee Cho\*

We report a rapid, cost-effective route for the fabrication of large-scale nanofluidic field-effect transistors using a simple, lithography-free two-step fabrication process that consists of sputtering and barrier-type anodization.



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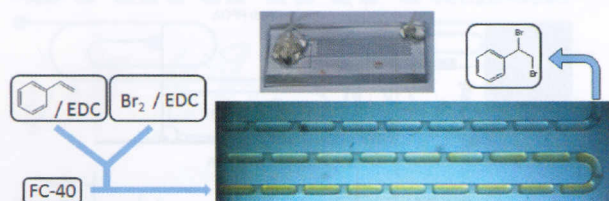


### Continuous operation of a hybrid solid-liquid state reconfigurable photonic system without resupply of liquids

Erica Eunjung Jung and David Erickson\*

This paper describes an optofluidically reconfigurable photonic system without the need for continuous resupply of liquids during the operation.

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### Polyethyleneimine coating renders polycarbonate resistant to organic solvents

Paweł Jankowski, Dominika Ogończyk, Wojciech Lisowski and Piotr Garstecki\*

Polyethyleneimine coating of polycarbonate microfluidic chips allows for handling of organic reactions in toluene, benzene, acetonitrile, tetrahydrofuran, dioxane, acetone, THF, ethyl acetate and ethylene dichloride.

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