

Lab on a Chip

Micro- & nano- fluidic research for chemistry, physics, biology, & bioengineering

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Ozcan *et al.*
Lensfree microscopy

van den Berg *et al.*
Lithium in blood

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Lab on a Chip

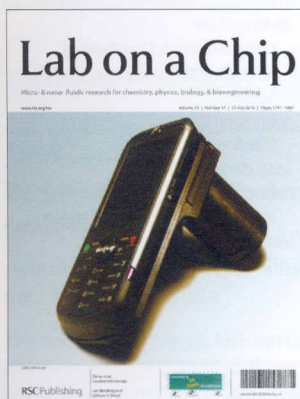
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IN THIS ISSUE

ISSN 1473-0197 CODEN LCAHAM 10(14) 1741–1880 (2010)



Cover

See Ozcan *et al.*, pp. 1787–1792. A compact and cost-effective lensless digital microscope installed on a regular cellphone is illustrated.

Image reproduced by permission of Derek Tseng, Onur Mudanyali, Cetin Oztoprak, Serhan O. Isikman, Ikbâl Sencan, Oguzhan Yaglidere and Aydogan Ozcan from *Lab Chip*, 2010, **10**, 1787.



Inside cover

See Takei *et al.*, pp. 1781–1786. A plate floating on a droplet is rotated at 720 rpm by changing the droplet shape continuously by electrowetting.

Image reproduced by permission of Atsushi Takei, Kiyoshi Matsumoto and Isao Shomoyama from *Lab Chip*, 2010, **10**, 1781.

HIGHLIGHT

1755

Research Highlights

Petra S. Dittrich*

Petra Dittrich reviews the current literature in miniaturisation and related technologies.



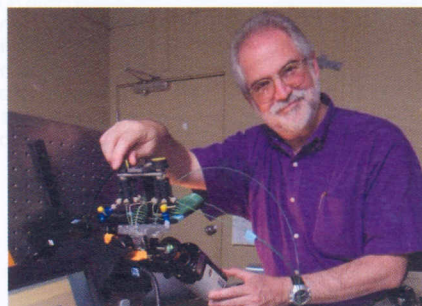
VIEWPOINT

1757

Cutting Edge: A prefilled, ready-to-use electrophoresis based lab-on-a-chip device for monitoring lithium in blood

Paul Yager

Paul Yager provides a perspective on Floris *et al.*'s paper describing a ready-to-use lab-on-a-chip device for monitoring lithium in blood.

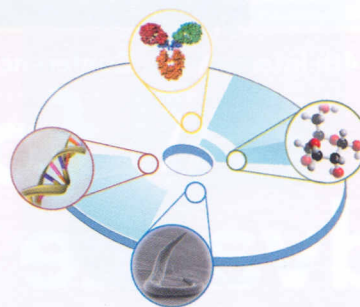


1758

Centrifugal microfluidics for biomedical applications

Robert Gorkin, Jiwoon Park, Jonathan Siegrist, Mary Amasia, Beom Seok Lee, Jong-Myeon Park, Jintae Kim, Hanshin Kim, Marc Madou and Yoon-Kyoung Cho*

This paper presents an in-depth review of the centrifugal microfluidic platform for biomedical applications, while highlighting recent progress in the field and outlining the potential for future applications.



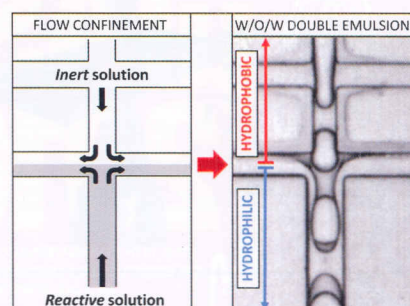
COMMUNICATIONS

1774

Patterning microfluidic device wettability using flow confinement

Adam R. Abate, Julian Thiele, Marie Weinhart and David A. Weitz*

We spatially pattern the surface properties of microfluidic devices using a flow-confinement technique. This requires only basic equipment and allows patterning of a wide range of surface treatments.

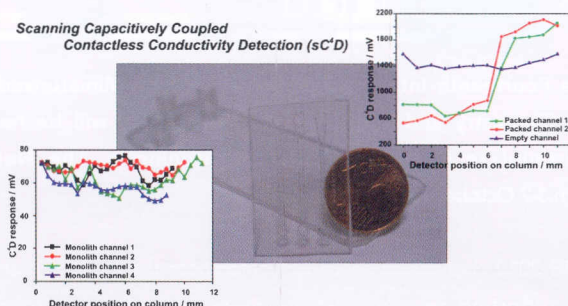


1777

The use of scanning contactless conductivity detection for the characterisation of stationary phases in micro-fluidic chips

Zarah Walsh, Mercedes Vázquez,* Fernando Benito-Lopez, Brett Paull, Mirek Macka, Frantisek Svec and Dermot Diamond

The use of scanning capacitively coupled contactless conductivity detection (sC²D) for the evaluation of the structural homogeneity and density of both packed and monolithic stationary phases in micro-fluidic chips is presented here for the first time.



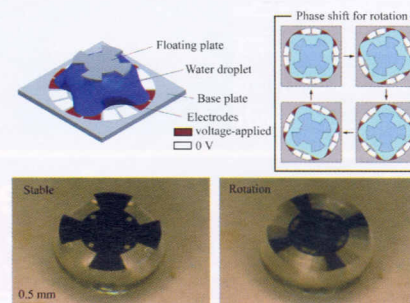
PAPERS

1781

Capillary motor driven by electrowetting

Atsushi Takei,* Kiyoshi Matsumoto* and Isao Shomoyama*

We present a micro motor using capillary force. A plate is floated on a water droplet. By electrowetting, the droplet shape is changed and the floating plate is rotated. We achieved a rotational motion of 720 rpm at maximum.



1787

Lensfree microscopy on a cellphone

Derek Tseng, Onur Mudanyali, Cetin Oztoprak, Serhan O. Isikman, Ikbal Sencan, Oguzhan Yaglidere and Aydogan Ozcan*

We demonstrate lensfree digital microscopy on a cellphone. This compact and light-weight holographic microscope attached to a cellphone does not utilize any lenses, lasers or other bulky optical components and it may offer a cost-effective tool to address various global health problems.

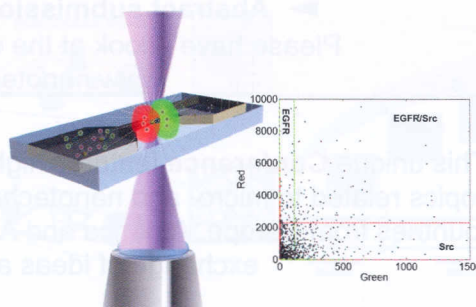


1793

High speed digital protein interaction analysis using microfluidic single molecule detection system

Chao-Kai Chou, Nan Jing, Hirohito Yamaguchi, Pei-Hsiang Tsou, Heng-Huan Lee, Chun-Te Chen, Ying-Nai Wang, Sungmin Hong, Chin Su, Jun Kameoka* and Mien-Chie Hung*

Single protein complex detection can provide important information for signal transduction research. We have developed a microfluidic single molecule detection system to investigate the protein interaction ratios.

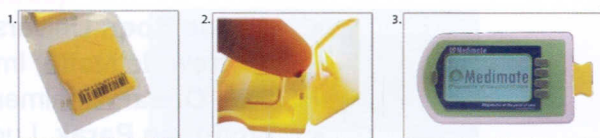


1799

A prefilled, ready-to-use electrophoresis based lab-on-a-chip device for monitoring lithium in blood

Arjan Floris, Steven Staal, Stefan Lenk, Erik Staijen, Dietrich Kohlheyer, Jan Eijkel and Albert van den Berg

The first self-test device based on capillary electrophoresis is presented. It employs a handheld reader and disposable glass chip. The chip contains a number of innovations, amongst others sealed electrode reservoirs. Accurate and precise measurement of lithium in blood by untrained operators is demonstrated.

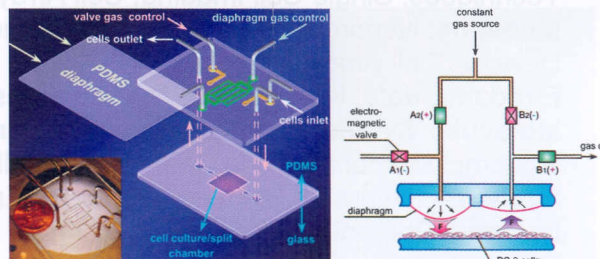


1807

A microfluidic device for continuous cancer cell culture and passage with hydrodynamic forces

Liyu Liu, Kevin Loutherbach, David Liao, David Yeater, Guillaume Lambert, André Estévez-Torres, James C. Sturm, Robert H. Getzenberg and Robert H. Austin*

We demonstrate a microfluidic chip which combines functions of continuous culture and output of prostate cancer cells with hydrodynamic shear forces. The chip is a durable design suitable for long-term cell output.

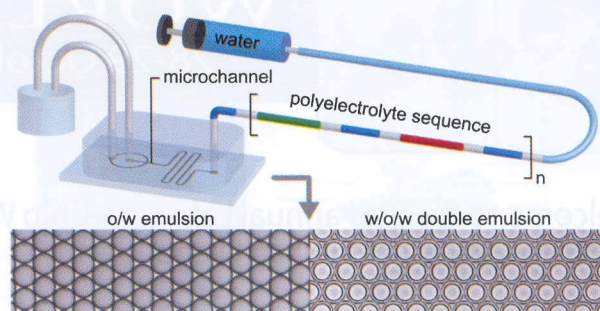


1814

Hydrophilic PDMS microchannels for high-throughput formation of oil-in-water microdroplets and water-in-oil-in-water double emulsions

Wolfgang-Andreas C. Bauer, Martin Fischlechner, Chris Abell and Wilhelm T. S. Huck*

We developed an extremely convenient, largely automated surface modification technique for the production of long-term stable hydrophilic channel walls inside PDMS-based microfluidic devices and applied it successfully for the high-throughput generation of highly monodisperse o/w droplets and w/o/w double emulsions.

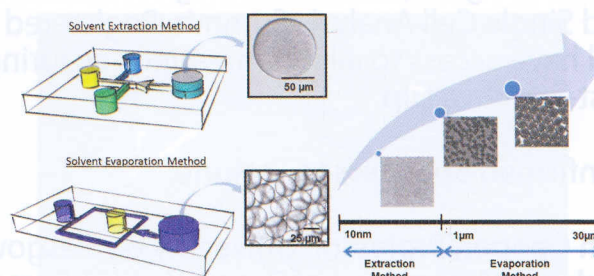


1820

PLGA micro/nanosphere synthesis by droplet microfluidic solvent evaporation and extraction approaches

Lung-Hsin Hung, Shia-Yen Teh, James Jester and Abraham P. Lee*

We present microfluidic solvent extraction and evaporation methods for the formation of biodegradable polymer particles of tunable nanometre to micrometre sizes. Release profile analysis and imaging was conducted through the encapsulation of a model drug within these particles.

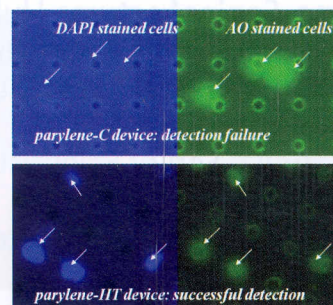


1826

A study of the autofluorescence of parylene materials for μ TAS applications

Bo Lu,* Siyang Zheng, Brandon Quoc Quach and Yu-Chong Tai

We report a study of the autofluorescence behaviors and mechanisms of parylene materials (parylene-C, -D, -N, -HT) for μ TAS applications. Given its better autofluorescence performance, parylene-HT can be a useful alternative to the widely used parylene-C if low autofluorescence is required.

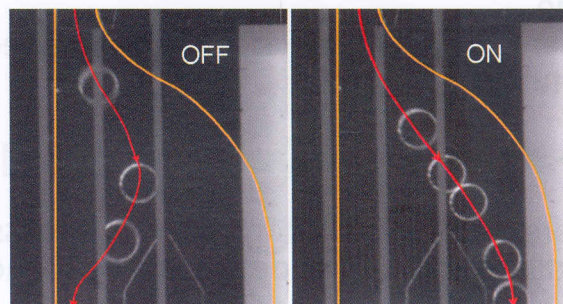


1835

Thermocapillary actuation by optimized resistor pattern: bubbles and droplets displacing, switching and trapping

Bertrand Selva,* Vincent Miralles, Isabelle Cantat* and Marie-Caroline Jullien*

We report a novel method for bubble or droplet displacement, capture and switching within a bifurcation channel for applications in digital microfluidics based on the Marangoni effect.

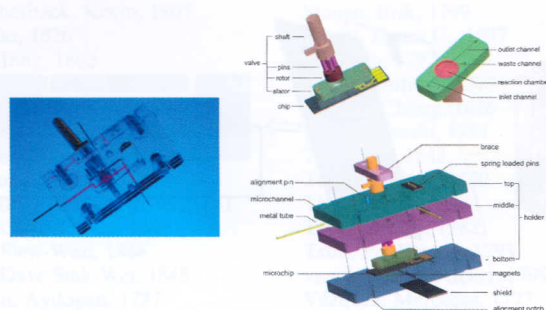


1841

Integration of a zero dead-volume PDMS rotary switch valve in a miniaturised (bio)electroanalytical system

Neus Godino, Francisco Javier del Campo, Francisc Xavier Muñoz, Mikkel Fougth Hansen, Jörg P. Kutter and Detlef Snakenborg*

The integration of a reaction chamber in the valve brings important benefits: it allows the performance of complete bioassays, and it makes the assays more efficient by eliminating dead volume.

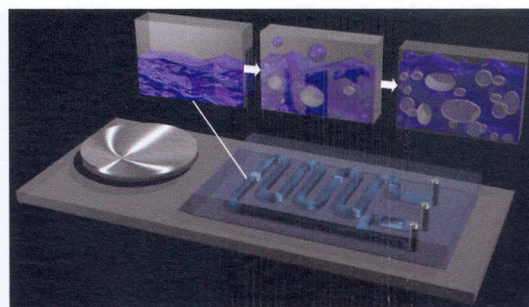


1848

Creation of cavitation activity in a microfluidic device through acoustically driven capillary waves

Tandiono, Siew-Wan Ohl, Dave Siak-Wei Ow, Evert Klaseboer, Victor V. T. Wong, Andrea Camattari and Claus-Dieter Ohl*

Intense inertial cavitation in PDMS based microfluidics is achieved from gas bubble entrapment of strongly driven capillary waves.

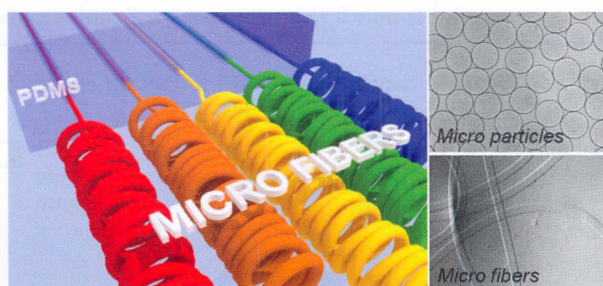


1856

Novel PDMS cylindrical channels that generate coaxial flow, and application to fabrication of microfibers and particles

Edward Kang, Su-Jung Shin, Kwang Ho Lee and Sang-Hoon Lee*

We demonstrate a novel method for fabrication of a coaxial microchannel to produce microparticles and microfibers, and integration of a coaxial flow channel with pseudo rectangular microfluidic mixing channel.

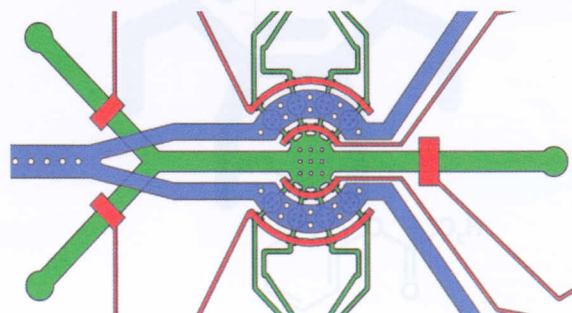


1862

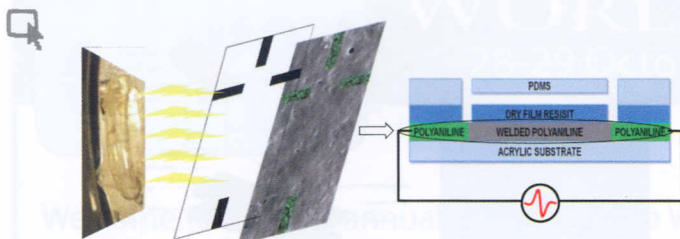
Long-term high-resolution imaging and culture of *C. elegans* in chip-gel hybrid microfluidic device for developmental studies

Jan Krajniak and Hang Lu*

We present a novel method to repeatedly immobilize *C. elegans* at physiological conditions. The microfluidic device also allows for long term culture and facilitates many long-term developmental studies.



1869

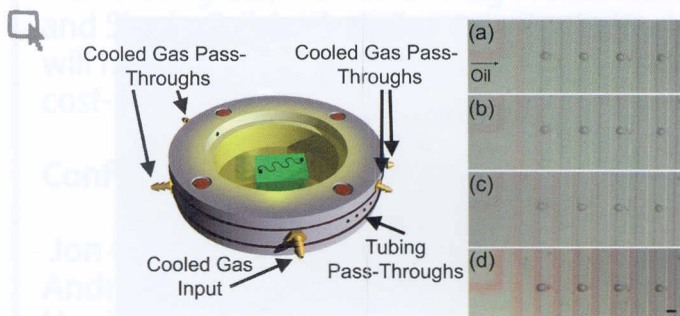


Manufacturing and application of a fully polymeric electrophoresis chip with integrated polyaniline electrodes

Rowan D. Henderson, Rosanne M. Guijt, Paul R. Haddad, Emily F. Hilder, Trevor W. Lewis and Michael C. Breadmore*

This communication describes a new, simple, rapid and inexpensive manufacturing technique for the fabrication of polymer devices with integrated polyaniline electrodes and their application in electrophoretic separation.

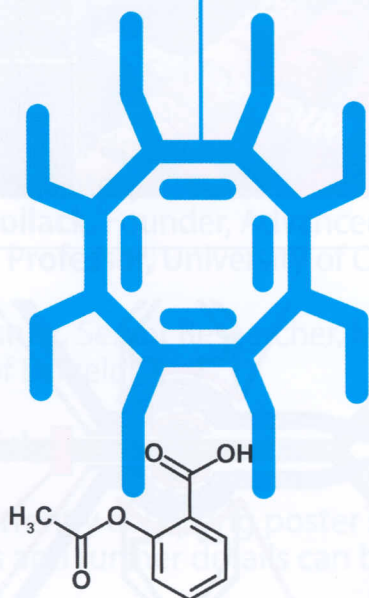
1873



Droplet freezing, docking, and the exchange of immiscible phase and surfactant around frozen droplets

Allyson E. Sgro and Daniel T. Chiu*

We describe a platform for cooling microfluidic chips so as to freeze aqueous droplets flowing in oil. Droplet docking and immiscible phase exchange are also demonstrated.



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