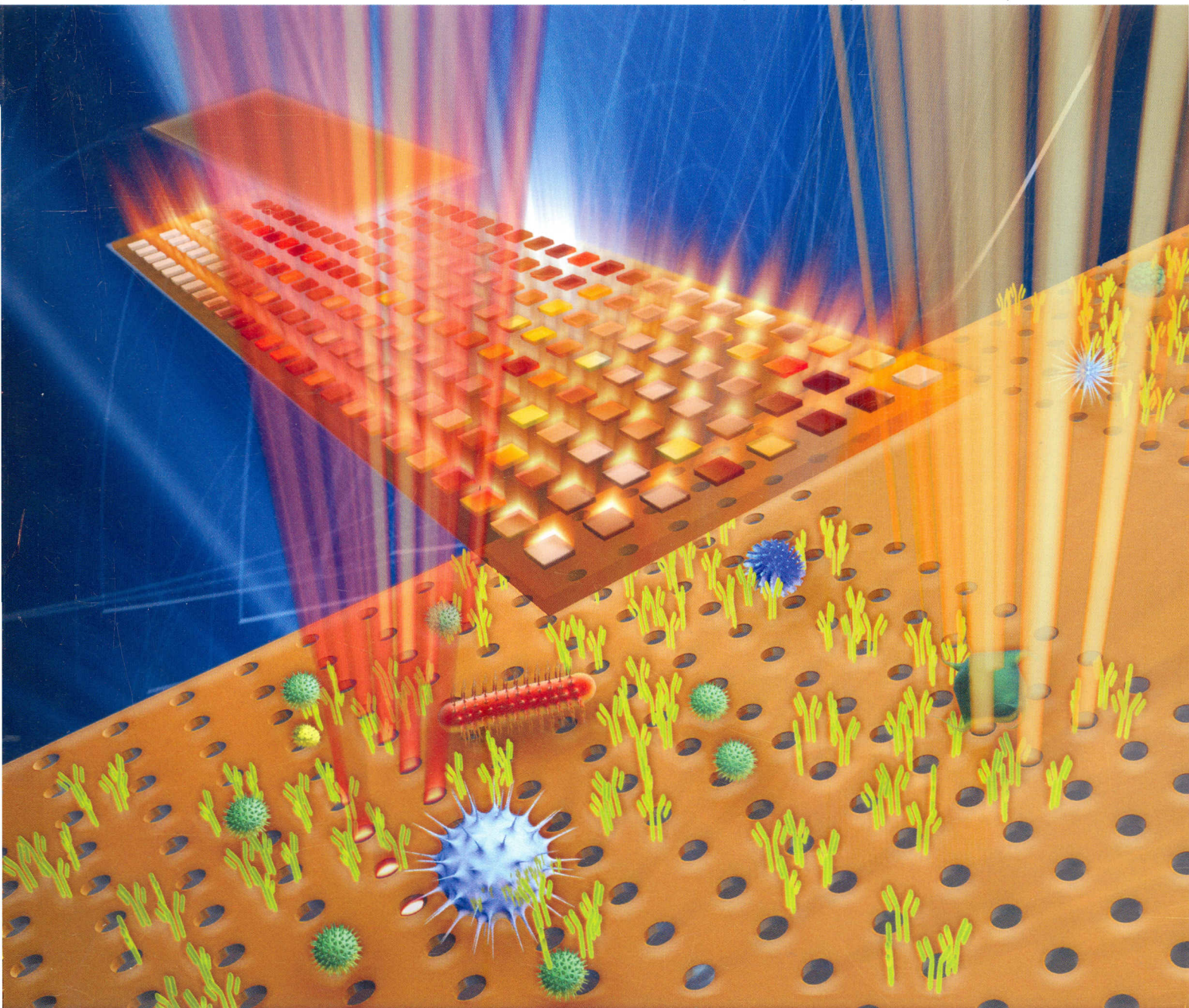


# Lab on a Chip

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

[www.rsc.org/loc](http://www.rsc.org/loc)

Volume 11 | Number 21 | 7 November 2011 | Pages 3567–3726



ISSN 1473-0197

RSC Publishing

PAPER

Hatice Altug *et al.*

Large-scale plasmonic microarrays for label-free high-throughput screening



1473-0197 (2011) 11:21;1-2



# Lab on a Chip

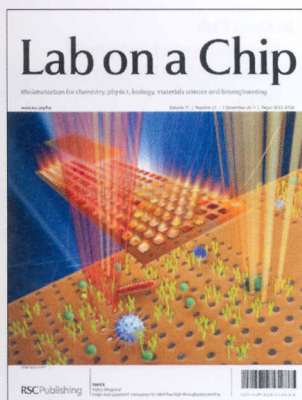
Miniaturisation for chemistry, physics, biology, materials science and bioengineering

[www.rsc.org/loc](http://www.rsc.org/loc)

RSC Publishing is a not-for-profit publisher and a division of the Royal Society of Chemistry. Any surplus made is used to support charitable activities aimed at advancing the chemical sciences. Full details are available from [www.rsc.org](http://www.rsc.org)

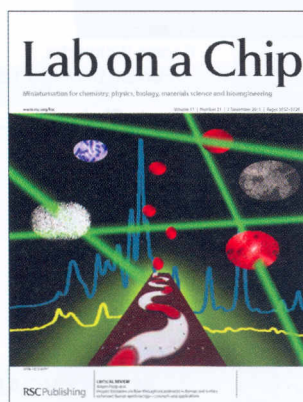
## IN THIS ISSUE

ISSN 1473-0197 CODEN LCAHAM 11(21) 3567–3726 (2011)



### Cover

See Hatice Altug *et al.*, pp. 3596–3602.  
Image reproduced by permission of Hatice Altug from *Lab Chip*, 2011, **11**, 3596.



### Inside cover

See Jürgen Popp *et al.*, pp. 3584–3592.  
Image reproduced by permission of Jürgen Popp from *Lab Chip*, 2011, **11**, 3584.

## EDITORIAL

3579

### Forthcoming *Lab on a Chip* tutorial series on acoustofluidics: Acoustofluidics—exploiting ultrasonic standing wave forces and acoustic streaming in microfluidic systems for cell and particle manipulation

Henrik Bruus, Jurg Dual, Jeremy Hawkes, Martyn Hill, Thomas Laurell, Johan Nilsson, Stefan Radel, Satwinder Sadhal and Martin Wiklund

An introduction to the forthcoming tutorial series on acoustofluidics.



## HIGHLIGHT

3581

### Research highlights

Šeila Selimović and Ali Khademhosseini\*

High-throughput nanoparticle measurement - Microfluidic barcoding - Thiol-ene soft lithography.

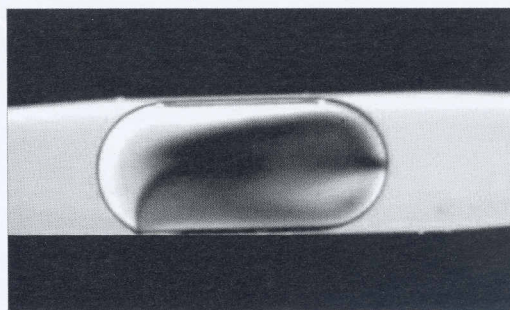


3584

### Droplet formation *via* flow-through microdevices in Raman and surface enhanced Raman spectroscopy—concepts and applications

Anne März, Thomas Henkel, Dana Cialla, Michael Schmitt and Jürgen Popp\*

The review outlines concepts and applications of droplet-based flow-through Raman and SERS spectroscopy.



## COMMUNICATION

3593

### Automated high-throughput generation of droplets

Jan Guzowski, Piotr M. Korczyk, Slawomir Jakiela and Piotr Garstecki\*

We report a microfluidic technique for generation of droplets in parallel channels with online control of the volumes, volume fraction and distribution of volumes with the use of two external valves.



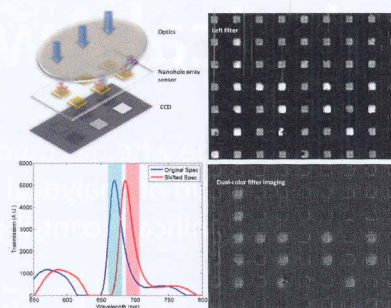
## PAPERS

3596

### Large-scale plasmonic microarrays for label-free high-throughput screening

Tsung-Yao Chang, Min Huang, Ahmet Ali Yanik, Hsin-Yu Tsai, Peng Shi, Serap Aksu, Mehmet Fatih Yanik\* and Hatice Altug\*

We demonstrate for the first time a large-scale plasmonic microarray technology with over one million sensors on single microscope slide.

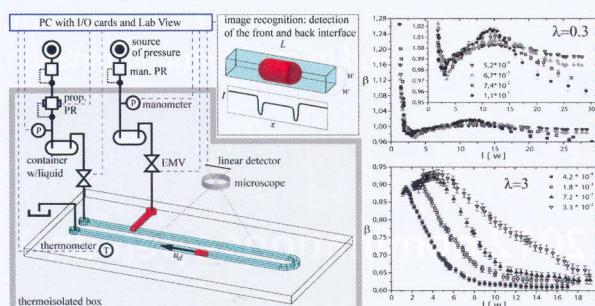


3603

### Speed of flow of individual droplets in microfluidic channels as a function of the capillary number, volume of droplets and contrast of viscosities

Slawomir Jakiela, Sylwia Makulska, Piotr M. Korczyk and Piotr Garstecki\*

The results show quite a complex landscape of functional dependence of the mobility of droplets on the values of parameters.



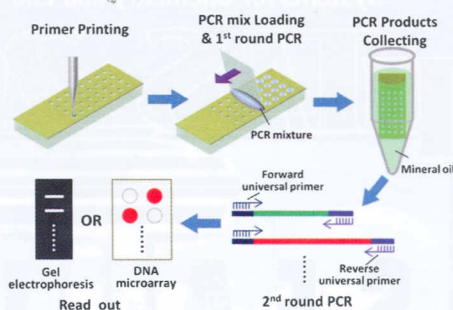


3609

### A universal multiplex PCR strategy for 100-plex amplification using a hydrophobically patterned microarray

Yang Li, Shu-Juan Guo, Ning Shao, Shun Tu, Miao Xu, Zhao-Rui Ren, Xing Ling, Guo-Qing Wang, Zhi-Xin Lin and Sheng-Ce Tao\*

We present a universal Multiplex PCR strategy termed "Multiplex PCR on a Hydrophobically and Hydrophilically Patterned Microarray" and enable over 100-plex amplification with high specificity, sensitivity and flexibility.

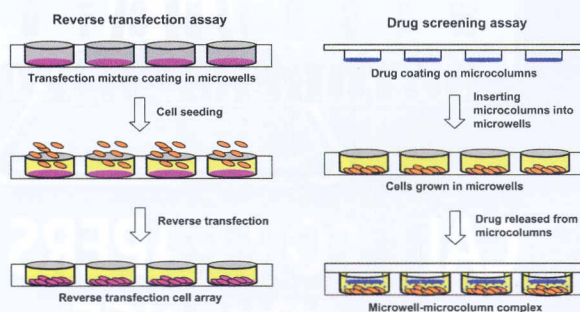


3619

### MEMS microwell and microcolumn arrays: novel methods for high-throughput cell-based assays

Po-Cheng Chen, Yi-You Huang\* and Jyh-Lyh Juang\*

A new on-chip cell-based assay integrates MEMS-fabricated microwell and microcolumn arrays for gene function analysis and drug screening.

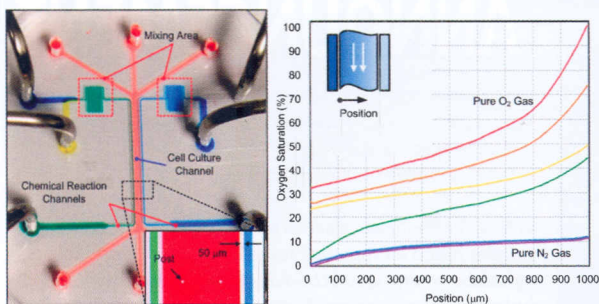


3626

### Generation of oxygen gradients in microfluidic devices for cell culture using spatially confined chemical reactions

Yung-Ann Chen, Andrew D. King, Hsiu-Chen Shih, Chien-Chung Peng, Chueh-Yu Wu, Wei-Hao Liao and Yi-Chung Tung\*

A single-layer PDMS microfluidic cell culture device capable of generating stable oxygen gradients using spatially confined oxygen generation or scavenging chemical reactions.

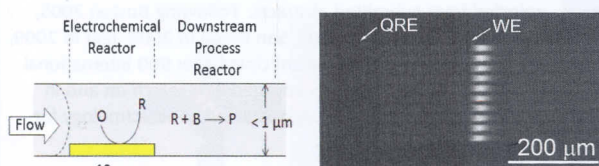


3634

### Electrolysis in nanochannels for *in situ* reagent generation in confined geometries

Nicholas M. Contento, Sean P. Branagan and Paul W. Bohn\*

The *in situ* electrochemical production of dissolved hydrogen, a reagent of interest, is monitored in a nanochannel array via a pH-sensitive fluorescent dye.

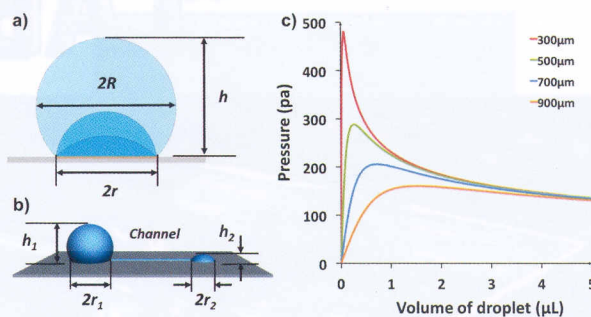


3642

### Droplet-driven transports on superhydrophobic-patterned surface microfluidics

Siyan Xing, Ryan S. Harake and Tingrui Pan\*

In this paper, we present a comprehensive theoretical and experimental investigation of unconventional droplet-based motions on a superhydrophobic-patterned surface microfluidic ( $S^2M$ ) platform.

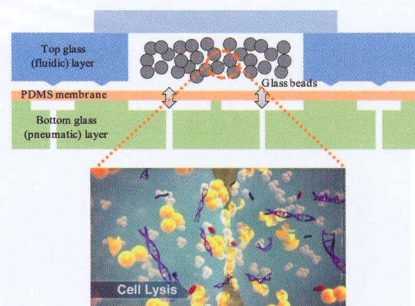


3649

### Miniaturized bead-beating device to automate full DNA sample preparation processes for Gram-positive bacteria

Kyu-Youn Hwang, Sung Hong Kwon, Sun-Ok Jung, Hee-Kyun Lim, Won-Jong Jung, Chin-Sung Park, Joon-Ho Kim,\* Kahp-Yang Suh\* and Nam Huh

We present a miniaturized bead-beating device to automate nucleic acids extraction from Gram-positive bacteria for molecular diagnostics.

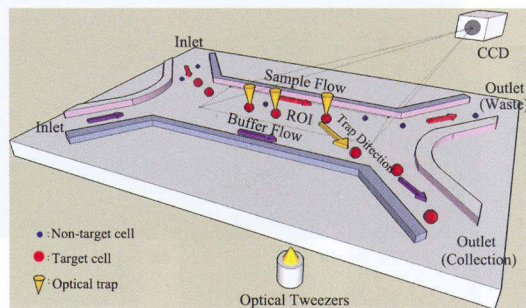


3656

### Enhanced cell sorting and manipulation with combined optical tweezer and microfluidic chip technologies

Xiaolin Wang, Shuxun Chen, Marco Kong, Zuankai Wang, Kevin D. Costa, Ronald A. Li\* and Dong Sun\*

A generic single-cell manipulation tool integrating optical tweezers and microfluidic technologies for handling small cell population sorting with high accuracy.

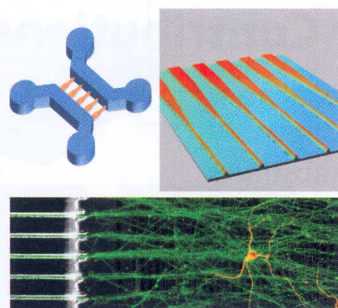


3663

### Axon diodes for the reconstruction of oriented neuronal networks in microfluidic chambers

Jean-Michel Peyrin,\* Bérangère Deleglise, Laure Saias, Maéva Vignes, Paul Gougis, Sebastien Magnifico, Sandrine Betuing, Mathéa Pietri, Jocelyne Caboche, Peter Vanhoutte, Jean-Louis Viovy\* and Bernard Brugg\*

A novel microfluidic device using asymmetric micro-channels allowing the *in vitro* reconstruction of oriented neuronal networks, with a specific fluidic access to various cellular subcompartments within these networks.



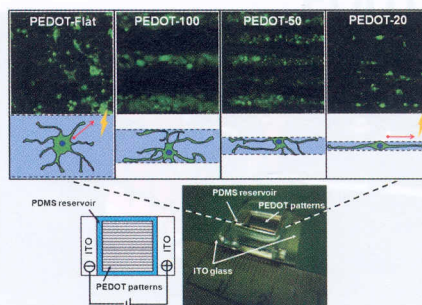


3674

### Manipulating location, polarity, and outgrowth length of neuron-like pheochromocytoma (PC-12) cells on patterned organic electrode arrays

Yu-Sheng Hsiao, Chung-Chih Lin, Hsin-Jui Hsieh, Shih-Min Tsai, Chiung-Wen Kuo, Chih-Wei Chu and Peilin Chen\*

A biocompatible organic electrode system was demonstrated to regulate the neuron type, location, polarity, and outgrown length of neuron-like cells (PC-12).

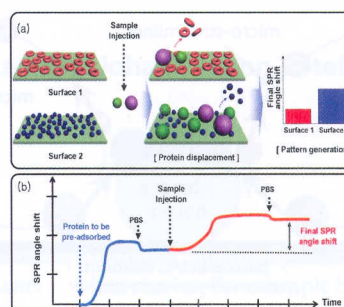


3681

### Monitoring protein distributions based on patterns generated by protein adsorption behavior in a microfluidic channel

Seokheun Choi,\* Shuai Huang, Jing Li and Junseok Chae

We report a unique monitoring technique of protein distributions based on distinctive patterns generated by protein adsorption behavior on a solid surface in a microfluidic channel.

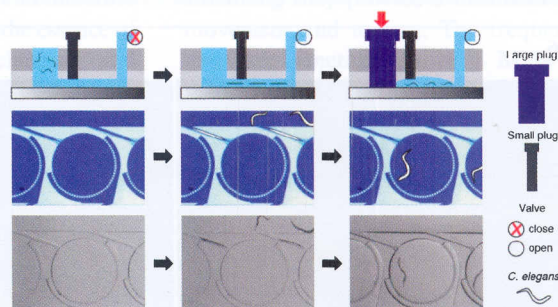


3689

### Microfluidic chamber arrays for whole-organism behavior-based chemical screening

Kwanghun Chung, Mei Zhan, Jagan Srinivasan, Paul W. Sternberg, Emily Gong, Frank C. Schroeder and Hang Lu\*

Here we report a microfluidic device that allows for the behavior tracking of single worms and delivery of stimuli with precise temporal control.



3698

### Fluorescence microscopy imaging with a Fresnel zone plate array based optofluidic microscope

Shuo Pang,\* Chao Han, Lap Man Lee and Changhui Yang

We report the implementation of an on-chip microscope system, fluorescence optofluidic microscope (FOFM), which employs an array of Fresnel zone plates (FZP) to generate an array of focused light spots within a microfluidic channel. As a demonstration, we show that such a system can be used to image fluorescent labeled HeLa cells.

