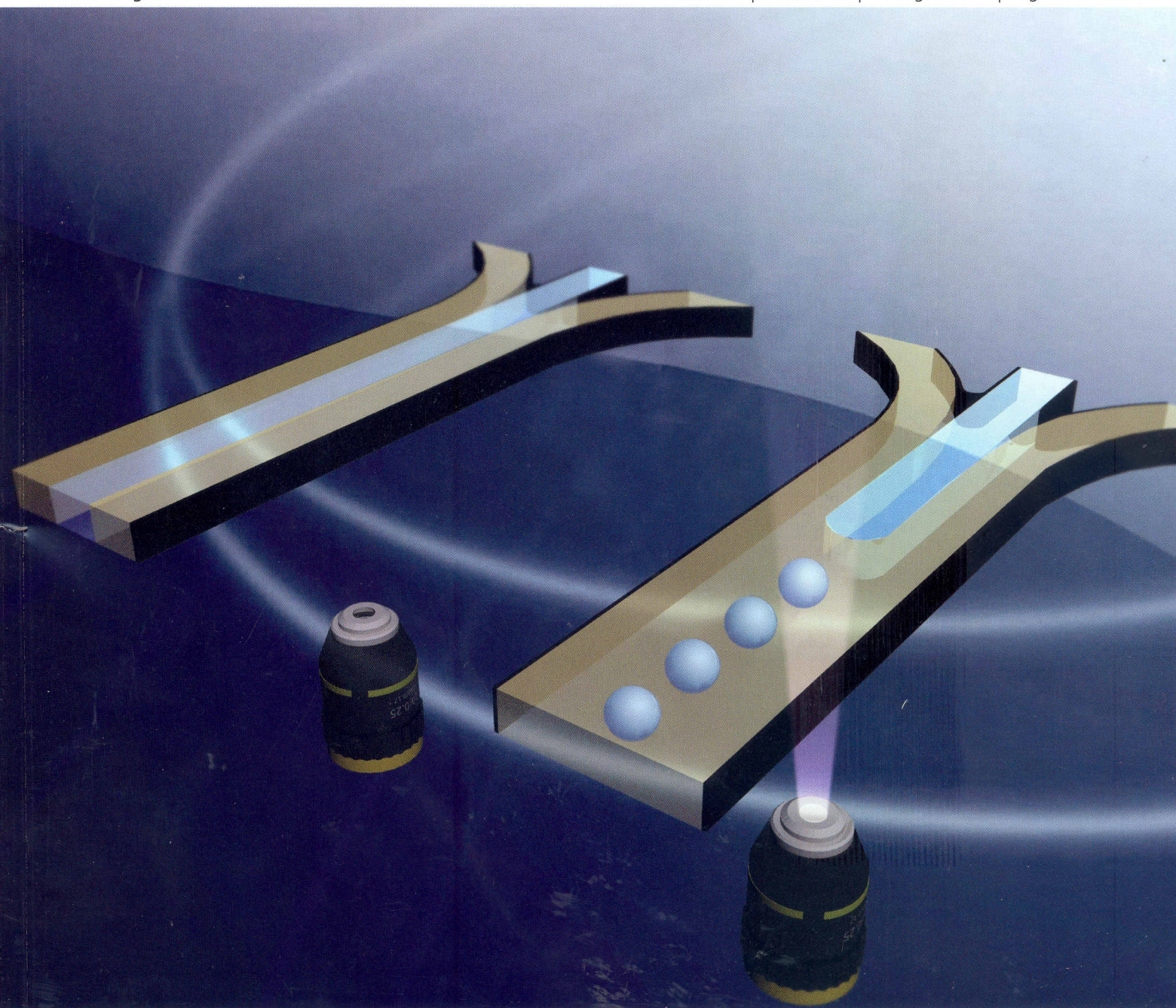


# Lab on a Chip

Miniaturisation for chemistry, physics, biology and bioengineering

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**COMMUNICATION**

Baigl *et al.*

Photoreversible fragmentation of a liquid interface for micro-droplet generation by light actuation



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## IN THIS ISSUE

ISSN 1473-0197 CODEN LCAHAM 11(16) 2639–2796 (2011)



### Cover

See Baigl *et al.*, pp. 2666–2669.  
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### Inside cover

See Singh *et al.*, pp. 2673–2679.  
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*Lab Chip*, 2011, **11**, 2673.

## HIGHLIGHT

2651

### Research highlights

Šeila Selimović and Ali Khademhosseini\*

Šeila Selimović and Ali Khademhosseini review the current literature in miniaturisation and related technologies.



## FOCUS

2653

### Massively parallel sequencing platforms using lab on a chip technologies

Afshin Ahmadian and Helene Andersson Svahn

Afshin Ahmadian and Helene Andersson Svahn discuss massively parallel sequencing platforms – Part of a series of Focus articles elucidating bio-related issues that impact on lab on a chip and microfluidic research.

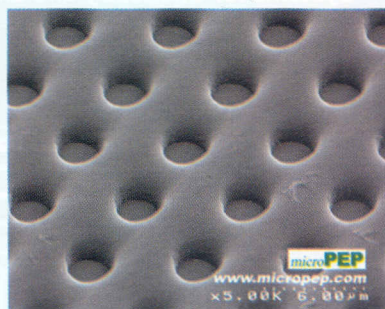


2656

### Disposable microfluidic substrates: Transitioning from the research laboratory into the clinic

Jason S. Kuo and Daniel T. Chiu\*

We survey recent development in disposable microfluidic substrates in the context of eventual regulatory approval for *in vitro* diagnostic use.



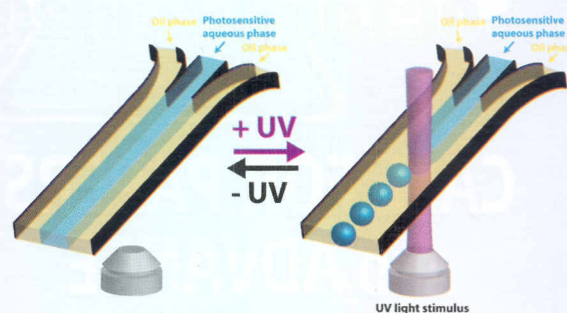
## COMMUNICATIONS

2666

### Photoreversible fragmentation of a liquid interface for micro-droplet generation by light actuation

Antoine Diguët, Hao Li, Nicolas Queyriaux, Yong Chen and Damien Baigl\*

The addition of a photosensitive surfactant to the aqueous phase of a flow focusing device allows us to reversibly control using light the transition between a continuous two-phase laminar flow and a droplet generating regime in a highly dynamical and spatially resolved fashion.

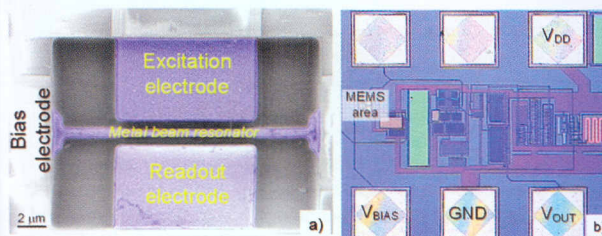


2670

### Metal microelectromechanical oscillator exhibiting ultra-high water vapor resolution

J. Verd,\* M. Sansa, A. Uranga, F. Perez-Murano, J. Segura and N. Barniol

Water vapor sensing characterization of a metal resonator fabricated with an industrial 0.35  $\mu\text{m}$  CMOS technology is reported.



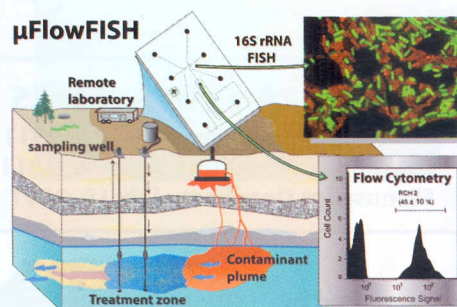
## PAPERS

2673

### Microfluidic fluorescence *in situ* hybridization and flow cytometry ( $\mu\text{FlowFISH}$ )

Peng Liu, Robert J. Meagher, Yooli K. Light, Suzan Yilmaz, Romy Chakraborty, Adam P. Arkin, Terry C. Hazen and Anup K. Singh\*

The  $\mu\text{FlowFISH}$  device enables automated, culture-independent analysis of environmental and clinical microbial samples by 16S rRNA FISH and flow cytometry seamlessly integrated in a microfluidic chip.



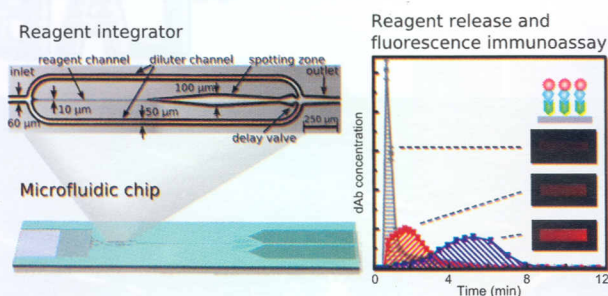


2680

### Controlled release of reagents in capillary-driven microfluidics using reagent integrators

Martina Hitzbleck, Luc Gervais and Emmanuel Delamarche\*

We present a novel microfluidic functional element for the controlled release of dried reagents into microfluidics for biological assays.

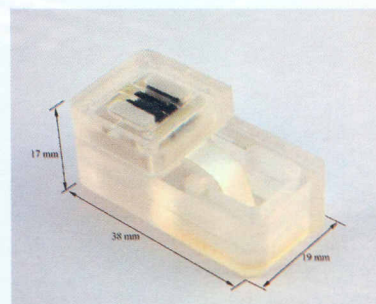


2686

### A self-heating cartridge for molecular diagnostics

Changchun Liu, Michael G. Mauk, Robert Hart, Xianbo Qiu and Haim H. Bau\*

A water-activated, self-heating, self-regulated, non-instrumented cartridge for molecular diagnostics.

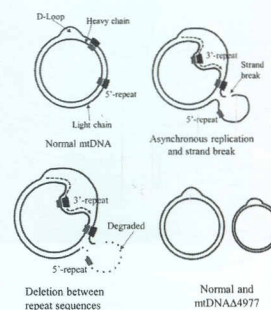


2693

### A microfluidic system for fast detection of mitochondrial DNA deletion

Chen-Min Chang, Li-Fang Chiu, Pei-Wen Wang, Dar-Bin Shieh\* and Gwo-Bin Lee\*

This study reports an integrated microfluidic system capable of automatic extraction and analysis of mitochondrial DNA (mtDNA).

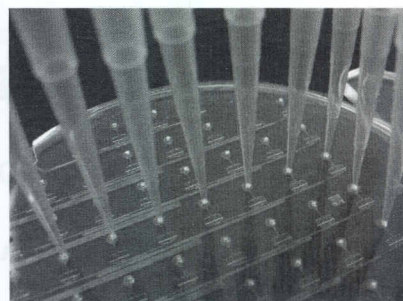


2701

### Integrated microfluidic array plate (iMAP) for cellular and molecular analysis

Ivan K. Dimov, Gregor Kijanka, Youngeun Park, Jens Ducreé, Taewook Kang and Luke P. Lee\*

Integrated microfluidic array plate (iMAP), for cellular and molecular analysis with gene expression, protein immunoassay, and cytotoxicity information in parallel.

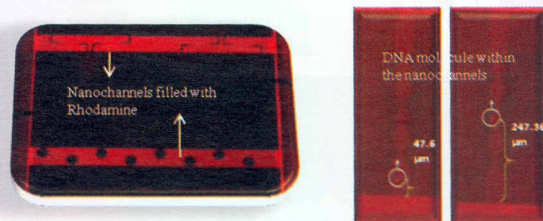


2711

### DNA tracking within a nanochannel: device fabrication and experiments

V. R. S. S. Mokkalapati,\* V. Di Virgilio, C. Shen, J. Mollinger, J. Bastemeijer and A. Bossche

This paper describes the detailed fabrication of a nanofluidic device and its testing. A single DNA molecule has been trapped and tracked through the length of the nanochannel and further analysed.

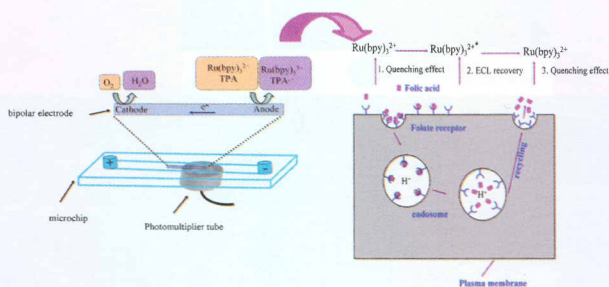


2720

### Electrochemiluminescence analysis of folate receptors on cell membrane with on-chip bipolar electrode

Mei-Sheng Wu, Bi-Yi Xu, Hai-Wei Shi, Jing-Juan Xu\* and Hong-Yuan Chen

A microfluidic chip ECL system based on ITO bipolar electrodes for sensitive detection of folate receptors on cell membranes and the transport pathway of folic acid is reported.



2725

### Integrated immunoassay using tuneable surface acoustic waves and lensfree detection

Yannyk Bourquin, Julien Reboud, Rab Wilson, Yi Zhang and Jonathan M. Cooper\*

We have developed an integrated biosensor for tuberculosis using technologies commonly found in mobile phones such as surface acoustic wave transducers, a CMOS camera and a LED.

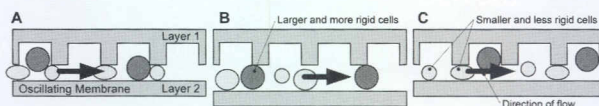


2731

### Chromatographic behaviour of single cells in a microchannel with dynamic geometry

Thomas Gerhardt, Sangpil Woo and Hongshen Ma\*

A microchannel with dynamic geometry that imparts different flow rates to different cells based on their physical properties is presented. The dynamic channel is formed between a textured surface and a flexible membrane. As cells flow through the channel, the height of the channel oscillates causing periodic entrapment of the larger cells, thereby attenuating their velocity.



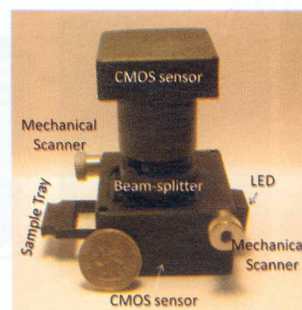


2738

### Combined reflection and transmission microscope for telemedicine applications in field settings

Gabriel Biener, Alon Greenbaum, Serhan O. Isikman, Kelvin Lee, Derek Tseng and Aydogan Ozcan\*

We demonstrate a field-portable upright and inverted microscope that can digitally image specimens in both reflection and transmission modes.

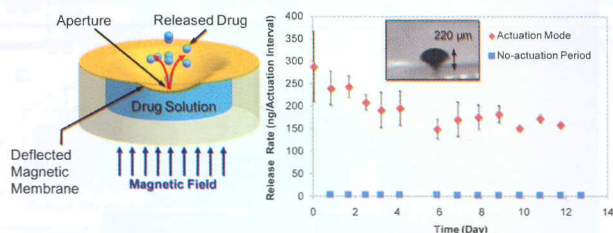


2744

### On-demand controlled release of docetaxel from a battery-less MEMS drug delivery device

Fatemeh Nazly Pirmoradi, John K. Jackson, Helen M. Burt and Mu Chiao\*

We report the on-demand and controlled release of an antiproliferative drug, docetaxel, from a magnetically controlled MEMS device. Reproducible and constant release rates have been achieved for 35 days. Drug maintains its biological activity after packaged in the MEMS device for over two months.

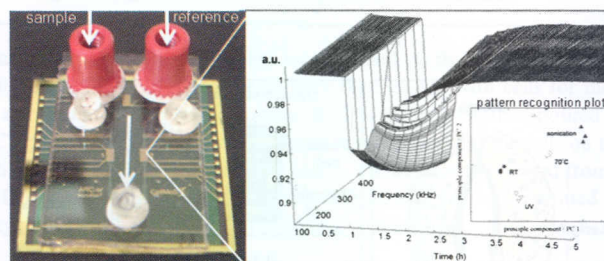


2753

### Rapid liposome quality assessment using a lab-on-a-chip

Gerald Birnbaumer, Seta Küpcü, Christian Jungreuthmayer, Lukas Richter, Karola Vorauer-Uhl, Andreas Wagner, Claudia Valenta, Uwe Sleytr and Peter Ertl\*

Identification of liposome formulation stability using multivariate data analysis of time-resolved dielectric spectra.

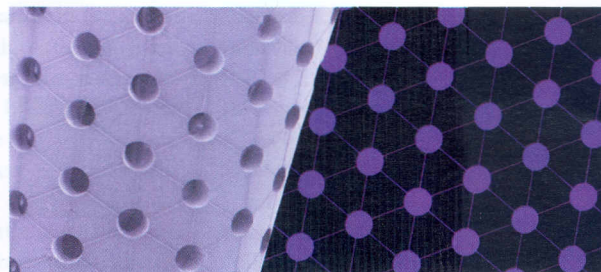


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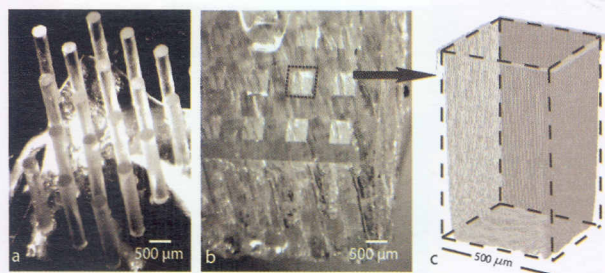
### High fidelity neuronal networks formed by plasma masking with a bilayer membrane: analysis of neurodegenerative and neuroprotective processes

Heike Hardelauf, Julia Sinsaiske, Amir Ali Taghipour-Anvari, Peter Jacob, Evelyn Drabiniok, Ulrich Marggraf, Jean-Philippe Frimat, Jan G. Hengstler, Andreas Neyer, Christoph van Thriel and Jonathan West\*

Precision protein patterns were prepared by plasma masking with a bilayer membrane and used for the reproducible formation of spatially standardized neuronal networks.



2772



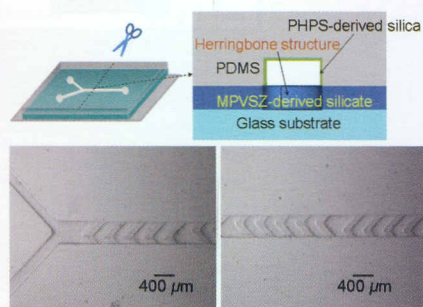
### Soft-lithography fabrication of microfluidic features using thiol-ene formulations

John F. Ashley, Neil B. Cramer, Robert H. Davis and Christopher N. Bowman

A novel thiol-ene based photopolymerizable resin formulation was shown to exhibit highly desirable characteristics, such as low cure time and the ability to overcome oxygen inhibition, for the photolithographic fabrication of microfluidic devices.

### TECHNICAL NOTES

2779

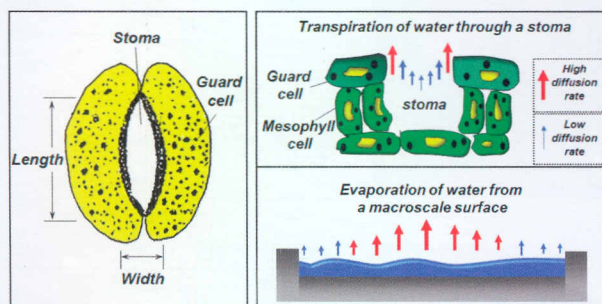


### Facile fabrication of a rigid and chemically resistant micromixer system from photocurable inorganic polymer by static liquid photolithography (SLP)

Qingling Fang, Dong-Pyo Kim,\* Xiaodong Li, Tae-Ho Yoon and Yihe Li

A photocurable inorganic polymer as a silicate precursor was used to fabricate a passive micromixer system by static liquid photolithography (SLP).

2785

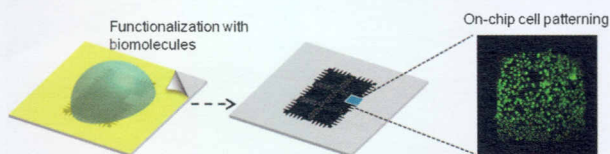


### A bio-inspired micropump based on stomatal transpiration in plants

Jing-min Li, Chong Liu,\* Zheng Xu, Kai-ping Zhang, Xue Ke, Chun-yu Li and Li-ding Wang

We present a bio-inspired micropump based on stomatal transpiration to obtain high and controllable flow rate without external power supplies.

2790



### Biofunctionalization of electrowetting-on-dielectric digital microfluidic chips for miniaturized cell-based applications

Daan Witters, Nicolas Vergauwe, Steven Vermeir, Frederik Ceysens, Sandra Liekens, Robert Puers and Jeroen Lammertyn\*

This work describes a dry lift-off method based on a Parylene-C mask for the biofunctionalization of digital microfluidic chips without affecting chip performance.