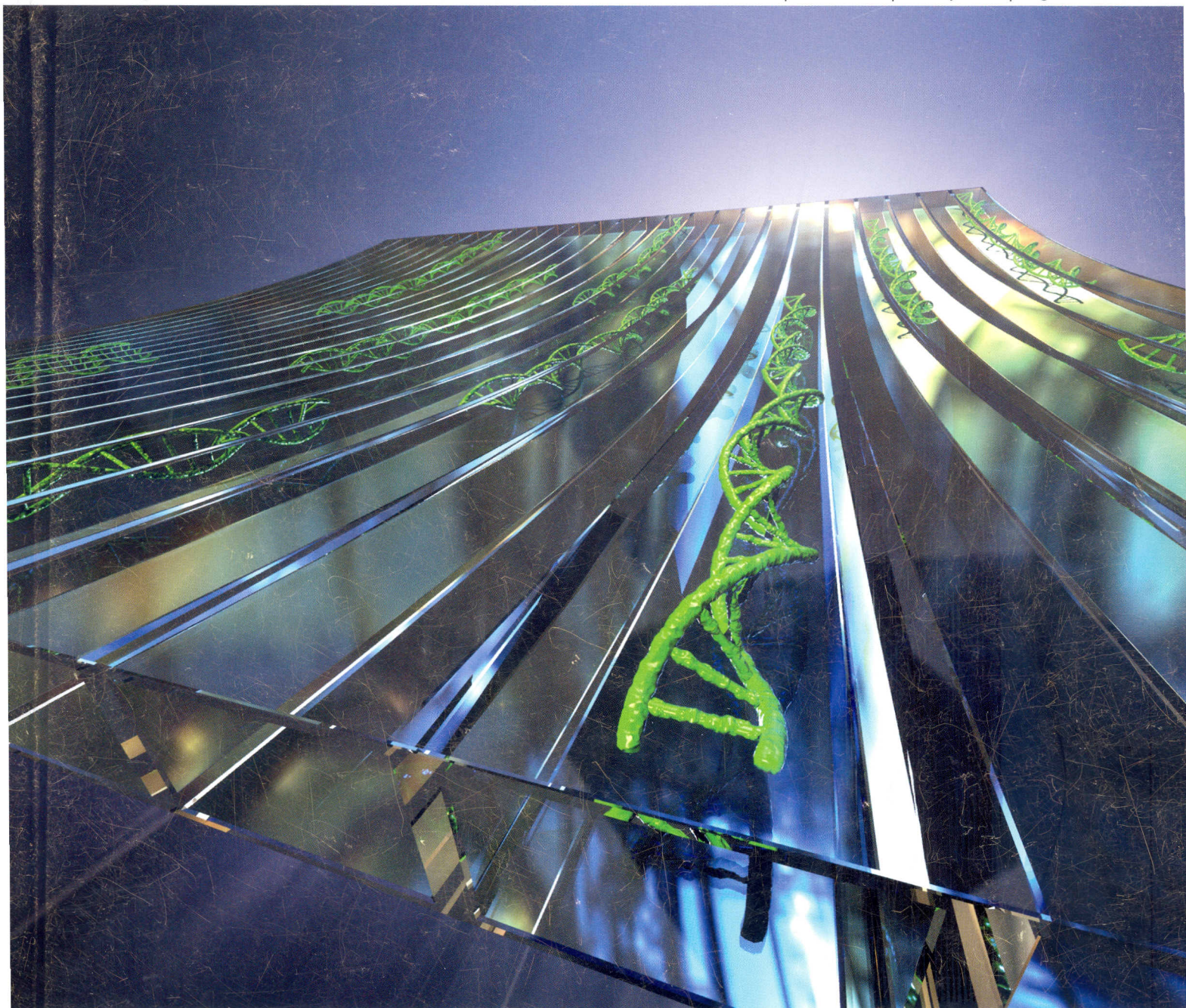


Lab on a Chip

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

www.rsc.org/loc

Volume 11 | Number 10 | 21 May 2011 | Pages 1701–1840



ISSN 1473-0197

RSC Publishing

PAPER

Jo *et al.*

Nanochannel confinement: DNA stretch approaching full contour length



1473-0197 (2011) 11:10;1-6

Lab on a Chip

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

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

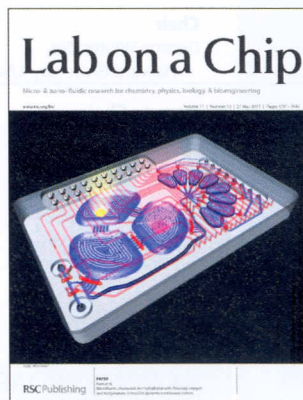
IN THIS ISSUE

ISSN 1473-0197 CODEN LCAHAM 11(10) 1701–1840 (2011)



Cover

See Jo *et al.*, pp. 1721–1729.
Image reproduced by permission
of Kyubong Jo from *Lab Chip*,
2011, **11**, 1721.



Inside cover

See Ram *et al.*, pp. 1730–1739.
Image reproduced by permission
of Kevin S. Lee from *Lab Chip*,
2011, **11**, 1730.

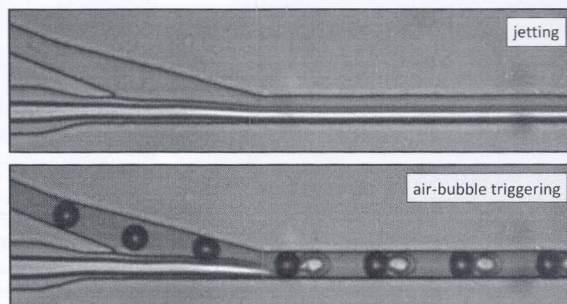
COMMUNICATIONS

1713

Air-bubble-triggered drop formation in microfluidics

Adam R. Abate* and David A. Weitz

Monodisperse drops formed under jetting flow conditions using periodically injected air bubbles to induce regular jet breakup.

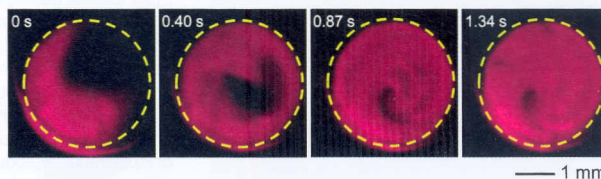


1717

Air stream-mediated vortex agitation of microlitre entities on a fluidic chip

Matthias Geissler,* Benoît Voisin and Teodor Veres

Agitation is achieved through a circulating flux of compressed air which transmits momentum and kinetic energy to a small-scale fluid reservoir.

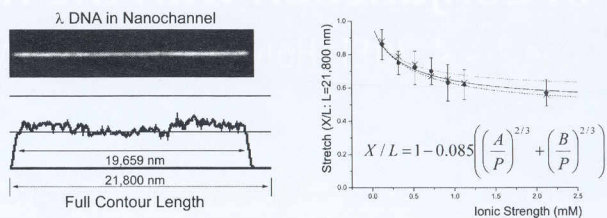


1721

Nanochannel confinement: DNA stretch approaching full contour length

Yoori Kim, Ki Seok Kim, Kristy L. Kounovsky, Rakwoo Chang, Gun Young Jung, Juan J. dePablo, Kyubong Jo* and David C. Schwartz*

This paper reports fully stretched DNA molecules confined in nanochannels. To validate Odijk's equation, we measure DNA elongation by varying ionic strength and channel dimensions with a Monte Carlo simulation. Collectively, we present a more complete understanding of nanochannel confined DNA stretching.

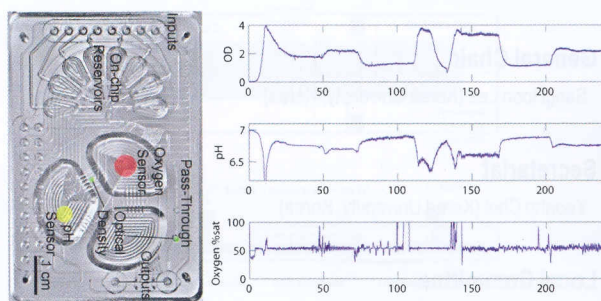


1730

Microfluidic chemostat and turbidostat with flow rate, oxygen, and temperature control for dynamic continuous culture

Kevin S. Lee, Paolo Boccazzi, Anthony J. Sinskey and Rajeev J. Ram*

We present a continuous cell culture device combining active microfluidics with large volume (1 mL) growth chambers. Integrated flow control, online sensors, and rapid offline sampling enable chemical analysis of multiple steady state and dynamic environmental conditions.

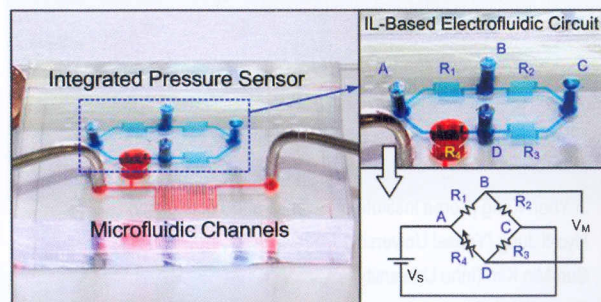


1740

Integrated ionic liquid-based electrofluidic circuits for pressure sensing within polydimethylsiloxane microfluidic systems

Chueh-Yu Wu, Wei-Hao Liao and Yi-Chung Tung*

This paper reports an ionic liquid-based electrofluidic pressure sensor that can be seamlessly integrated into PDMS microfluidic systems.

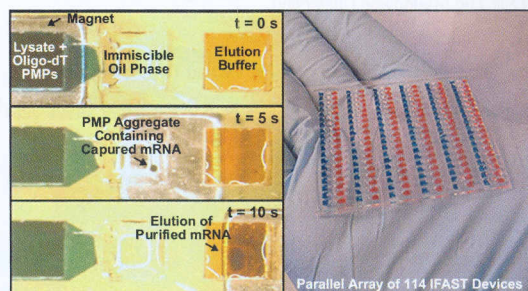


1747

One-step purification of nucleic acid for gene expression analysis via Immiscible Filtration Assisted by Surface Tension (IFAST)

Scott M. Berry, Elaine T. Alarid and David J. Beebe*

We utilize "pinned" aqueous/organic interfaces to streamline nucleic acid purification, such that NA from multiple samples can be isolated in parallel in less than 5 minutes without sacrificing performance.

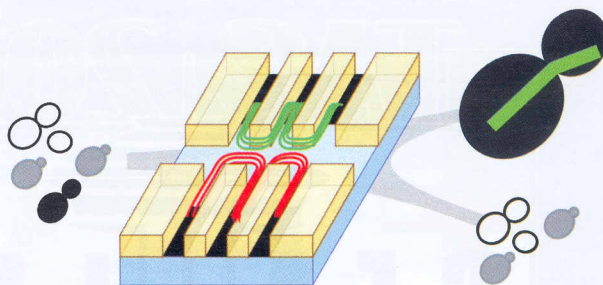


1754

Tracking and synchronization of the yeast cell cycle using dielectrophoretic opacity

Ana Valero,* Thomas Braschler,* Alex Rauch,
Nicolas Demierre, Yves Barral and Philippe Renaud

Yeast cell cycle synchronization using dielectrophoresis.

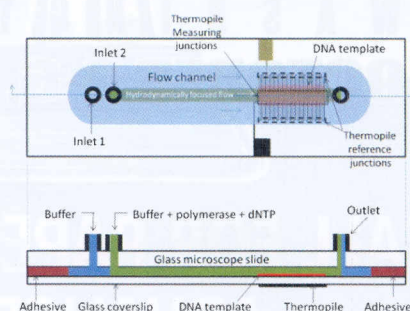


1761

Thermoelectric method for sequencing DNA

Gergana G. Nestorova and Eric J. Guilbeau*

This study describes a novel, thermoelectric method for DNA sequencing in a microfluidic device. The method measures the heat released when DNA polymerase inserts a dNTP into a DNA template.

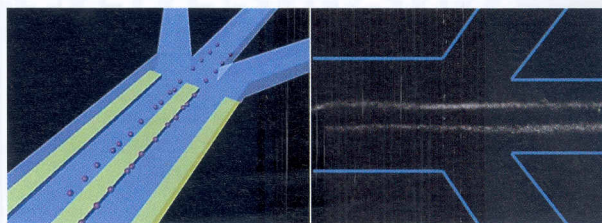


1770

Hybrid electrokinetic manipulation in high-conductivity media

Jian Gao, Mandy L. Y. Sin, Tingting Liu, Vincent Gau,
Joseph C. Liao and Pak Kin Wong*

Hybrid electrokinetics enables effective manipulation of bacterial pathogens in physiological fluids.

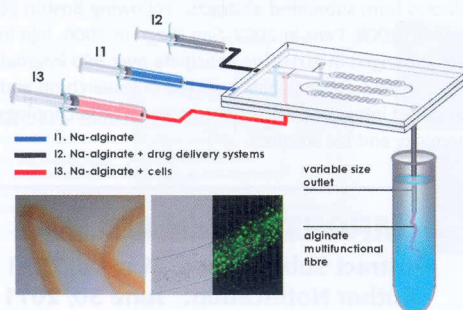


1776

Optimised production of multifunctional microfibres by microfluidic chip technology for tissue engineering applications

Stefania Mazzitelli, Lorenzo Capretto, Dario Carugo,
Xunli Zhang, Roberta Piva and Claudio Nastruzzi*

The production of an "on demand" cell containing multifunctional microfibres using chips with dispersing chambers is presented. The fibres provide cell structural support and immunisolation for tissue engineering applications.

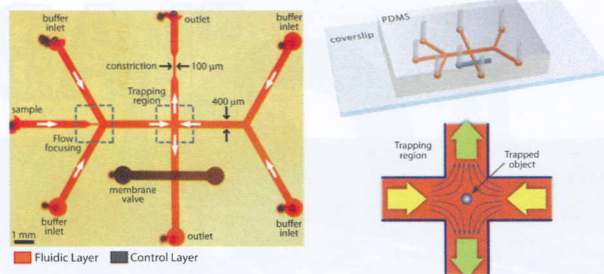


1786

A microfluidic-based hydrodynamic trap: design and implementation

Melikhhan Tanyeri, Mikhil Ranka, Natawan Sittipolkul and Charles M. Schroeder*

A microfluidic-based hydrodynamic trap enables fine-scale manipulation and confinement of micro- and nanoscale particles in free-solution.

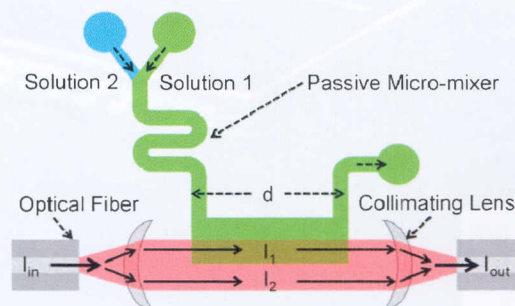


1795

A single-layer, planar, optofluidic Mach–Zehnder interferometer for label-free detection

Michael Ian Lapsley, I.-Kao Chiang, Yue Bing Zheng, Xiaoyun Ding, Xiaole Mao and Tony Jun Huang*

An optofluidic interferometer for label-free detection of liquid samples was calibrated with calcium chloride and detected bovine serum albumin.

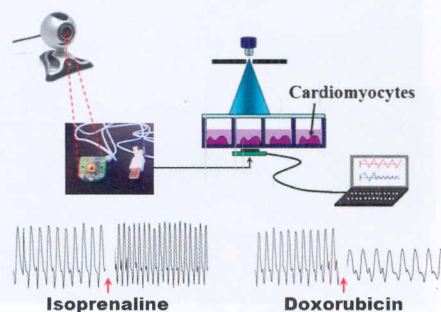


1801

A cell-based biosensor for real-time detection of cardiotoxicity using lensfree imaging

Sang Bok Kim, Hojae Bae, Jae Min Cha, Sang Jun Moon, Mehmet R. Dokmeci, Donald M. Crokek and Ali Khademhosseini*

A biosensor that uses a webcam-based CMOS imaging module was developed that can analyze real-time beating of cardiac cells in response to various chemicals.

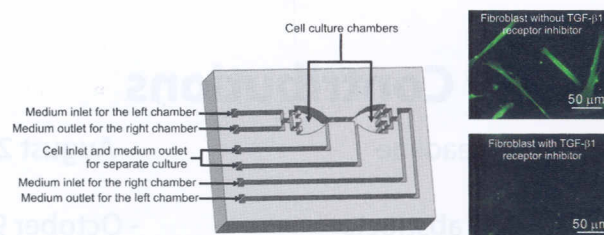


1808

Analysis of the paracrine loop between cancer cells and fibroblasts using a microfluidic chip

Tsi-Hsuan Hsu, Jian-Long Xiao, Yu-Wei Tsao, Yi-Lun Kao, Shih-Hao Huang, Wei-Yu Liao and Chau-Hwang Lee*

Left: a microfluidic culture chip used for analyzing the paracrine loop between cancer cells and fibroblasts. Right: fluorescence images of α -smooth muscle actin (α -SMA) in fibroblasts. The conditioned medium of cancer cells increases the expression of α -SMA (top). With the pre-treatment of transforming growth factor- β 1 (TGF- β 1) receptor inhibitor, the expression of α -SMA is low (bottom).



1815

Zebrafish embryo development in a microfluidic flow-through system

Eric M. Wielhouwer, Shaukat Ali, Abdulrahman Al-Afandi, Marko T. Blom, Marinus B. Olde Riekerink, Christian Poelma, Jerry Westerweel, Johannes Oonk, Elwin X. Vrouwe, Wilfred Buesink, Harald G. J. vanMil, Jonathan Chicken, Ronny van't Oever and Michael K. Richardson*

We show for the first time that an animal embryo can develop in a true microfluidic environment.



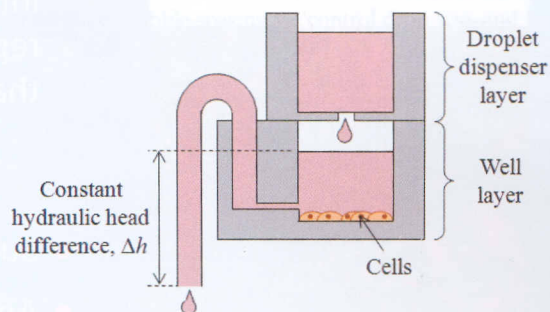
TECHNICAL NOTES

1825

A pumpless cell culture chip with the constant medium perfusion-rate maintained by balanced droplet dispensing

Taeyoon Kim and Young-Ho Cho*

This paper presents a pumpless cell culture chip, where a constant-rate medium perfusion is achieved by balanced droplet dispensing.



1831

Fabrication of high-aspect-ratio polymer microstructures and hierarchical textures using carbon nanotube composite master molds

Davor Copic, Sei Jin Park, Sameh Tawfick, Michael F. L. De Volder and A. John Hart*

CNT-polymer nanocomposite microstructures are used as master molds for large-scale fabrication of polymer microstructures having anisotropic nanoscale textures and high aspect ratios.

