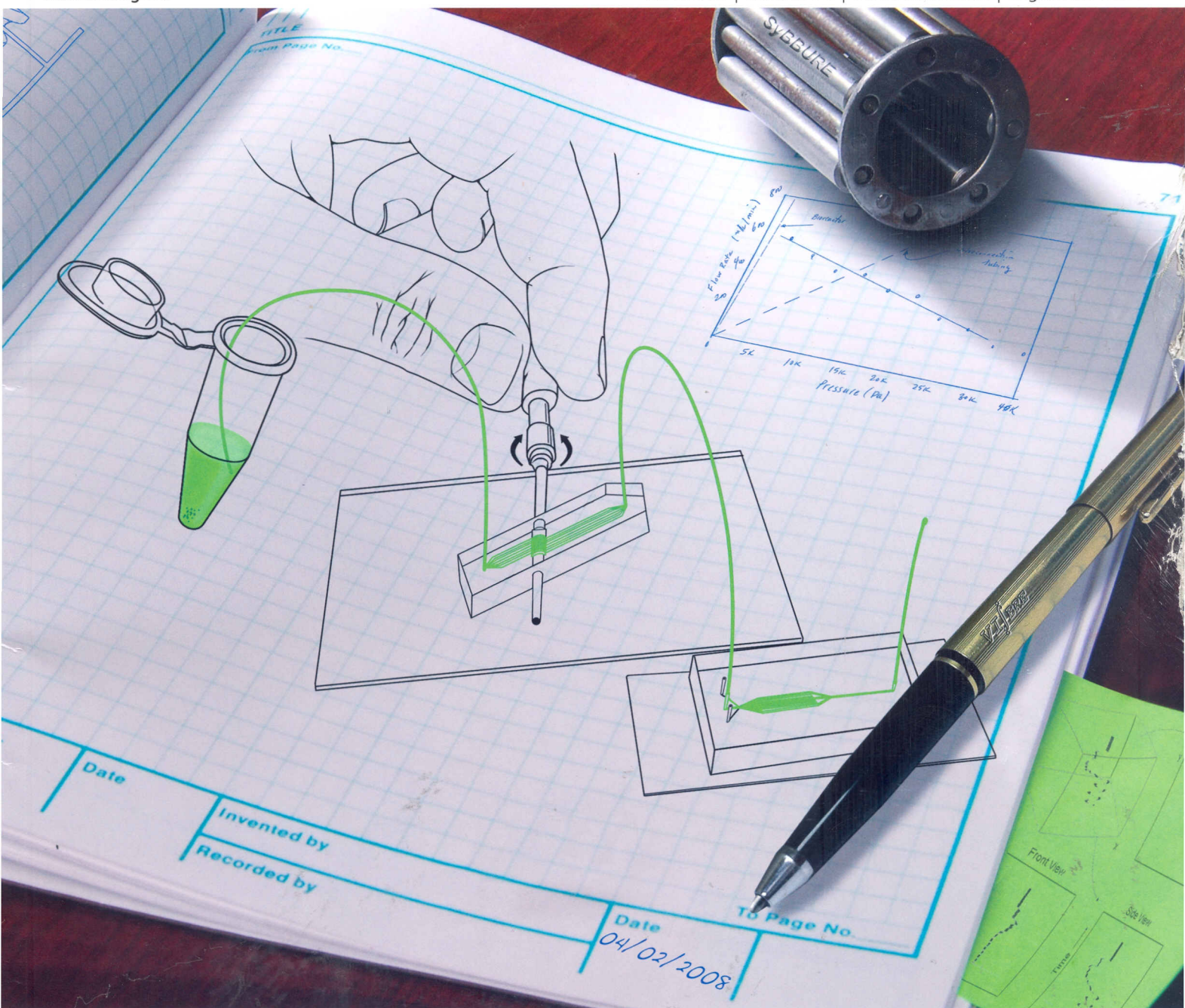


Lab on a Chip

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

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ISSN 1473-0197

RSC Publishing

PAPER

Searle *et al.*

A metering rotary nanopump for microfluidic systems

Celebrating
10
Years of publishing



1473-0197 (2010) 10:23;1-4

Lab on a Chip

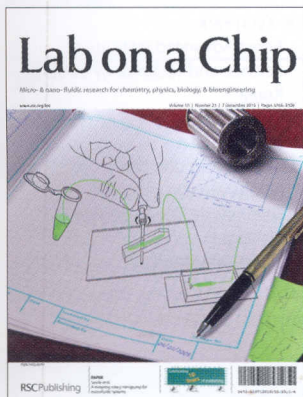
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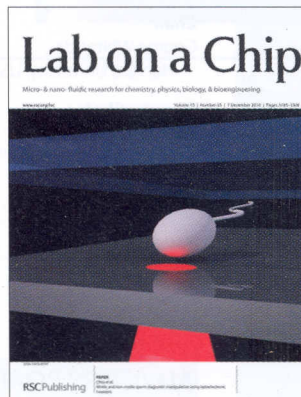
IN THIS ISSUE

ISSN 1473-0197 CODEN LCAHAM 10(23) 3185–3308 (2010)



Cover

See Darby *et al.*, pp. 3218–3226. Vanderbilt undergraduates invented and characterized a metering rotary nanopump - a microscopic cousin of the familiar roller-bearing bench top peristaltic pumps. Artwork by Dominic Doyle. Image reproduced by permission of Vanderbilt University from *Lab Chip*, 2010, **10**, 3218.



Inside cover

See Ohta *et al.*, pp. 3213–3217. Optoelectronic tweezers use light (the red light, from bottom) to induce forces which distinguish between viable and non-viable spermatozoa in a microfluidic device. Image reproduced by permission of Aaron T. Ohta from *Lab Chip*, 2010, **10**, 3213.

HIGHLIGHT

3195

Research Highlights

Petra S. Dittrich*

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



FOCUS

3197

Start me up...

Holger Becker*

Holger Becker discusses the characteristics of typical organizations who deal with the commercial aspects of microfluidics—part of a series of Focus articles on the commercialization of microfluidics.

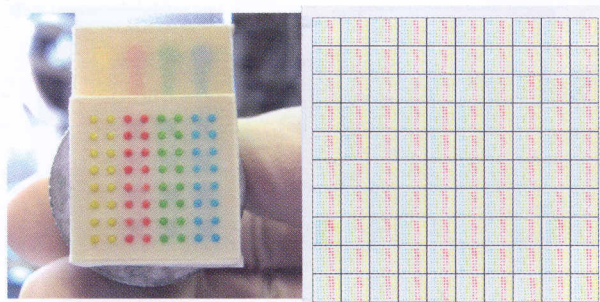


3201

Millimeter-scale contact printing of aqueous solutions using a stamp made out of paper and tape

Chao-Min Cheng, Aaron D. Mazzeo, Jinlong Gong, Andres W. Martinez, Scott T. Phillips, Nina Jain and George M. Whitesides*

Paper-based stamp is made from inexpensive materials, and it is easily assembled by hand; the technology is thus accessible to a wide range of laboratories, including those in developing economies.

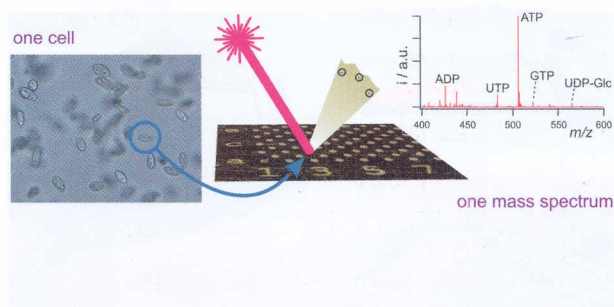


3206

High-density micro-arrays for mass spectrometry

Pawel L. Urban, Konstantins Jefimovs, Andrea Amantonico, Stephan R. Fagerer, Thomas Schmid, Stefanie Mädler, Josep Puigmarti-Luis, Nils Goedecke and Renato Zenobi*

Functional high-density micro-arrays for mass spectrometry enable rapid picolitre-volume aliquoting and ultrasensitive analysis of microscale samples, for example, single cells.

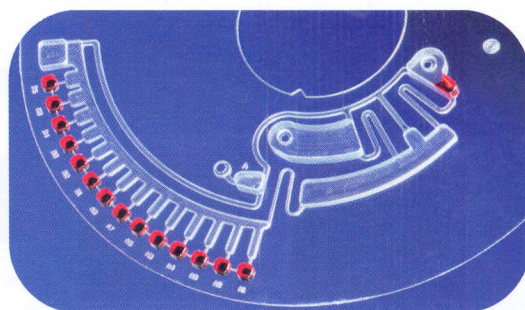


3210

Centrifugal microfluidic system for primary amplification and secondary real-time PCR

Maximilian Focke, Fabian Stumpf, Günter Roth, Roland Zengerle* and Felix von Stetten

An integrated centrifugal microfluidic system was developed enabling pre-amplification of specific DNA sequences prior to automated dilution, aliquoting and real-time PCR in a modified commercial thermocycler.



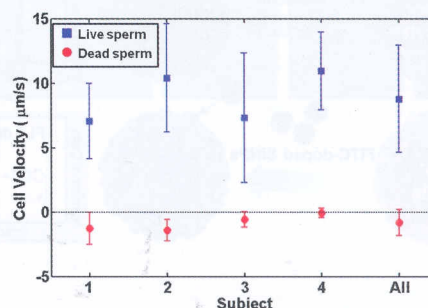
PAPERS

3213

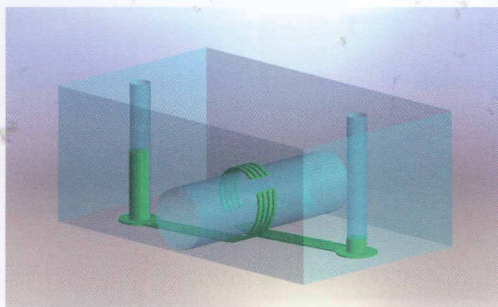
Motile and non-motile sperm diagnostic manipulation using optoelectronic tweezers

Aaron T. Ohta,* Maurice Garcia, Justin K. Valley, Lia Banie, Hsan-Yin Hsu, Arash Jamshidi, Steven L. Neale, Tom Lue and Ming C. Wu

Optoelectronic tweezers-induced velocities of live non-motile sperm and dead sperm. Positive values indicate attraction to the manipulation patterns, while negative values indicate repulsion by the manipulation patterns. The error bars indicate the standard deviation of the measurements. "All" refers to sperm velocities averaged across all 4 subjects.



3218

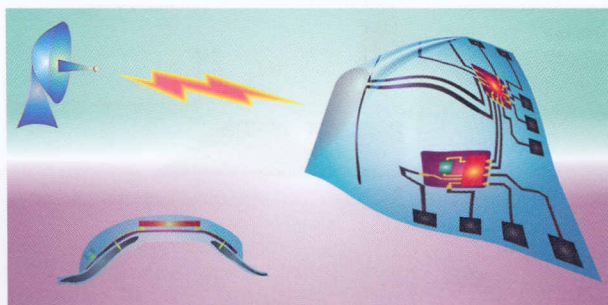


A metering rotary nanopump for microfluidic systems

Scott G. Darby, Matthew R. Moore, Troy A. Friedlander, David K. Schaffer, Ron S. Reiserer, John P. Wikswo and Kevin T. Seale*

The metering rotary nanopump consisting of helical microfabricated fluidic channels around a central camshaft and having a 3.3 nL stroke volume.

3227

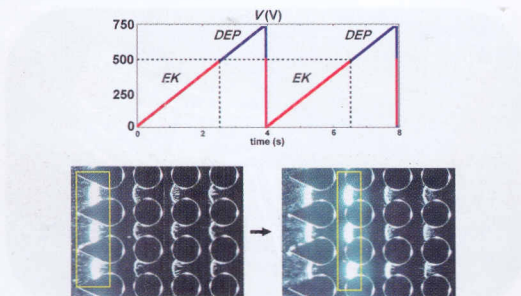


Microfluidic stretchable RF electronics

Shi Cheng and Zhigang Wu*

We present the first stretchable integrated radio frequency (RF) electronic device, using the concept of incorporating flexible printed circuits (FPCs) to elastic microfluidic electronics.

3235

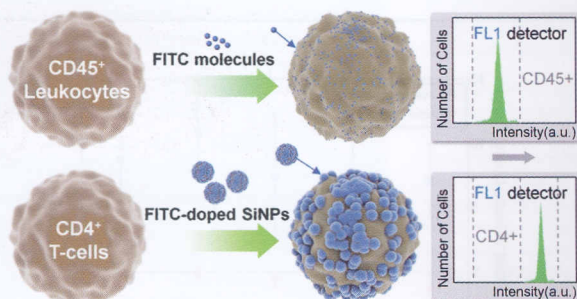


Controlled microparticle manipulation employing low frequency alternating electric fields in an array of insulators

Javier L. Baylon-Cardiel, Nadia M. Jesús-Pérez, Ana V. Chávez-Santoscoy and Blanca H. Lapizco-Encinas*

Dielectrophoretic manipulation of bands of particles employing a sawtooth AC voltage with low frequencies allow entire bands of particles to “jump” from one column to the next within an array of cylindrical insulating structures.

3243



Simultaneous counting of two subsets of leukocytes using fluorescent silica nanoparticles in a sheathless microchip flow cytometer

Hoyoung Yun, Hyunwoo Bang, Junggi Min, Chanil Chung, Jun Keun Chang and Dong-Chul Han*

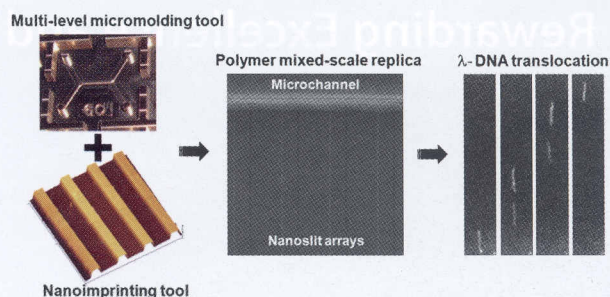
A new labeling method using functional silica nanoparticles enables enumeration of multiple cell types with only one detector in a disposable sheathless microchip flow cytometer.

3255

Simple replication methods for producing nanoslits in thermoplastics and the transport dynamics of double-stranded DNA through these slits

Rattikan Chantiwas, Mateusz L. Hupert, Swathi R. Pullagurla, Subramanian Balamurugan, Jesús Tamarit-López, Sungook Park, Proyag Datta, Jost Goetttert, Yoon-Kyoung Cho and Steven A. Soper*

Thermoplastic nanoslits were replicated from a simple molding tool and consisted of mixed-scale structures with successful DNA translocation through the slits demonstrated.

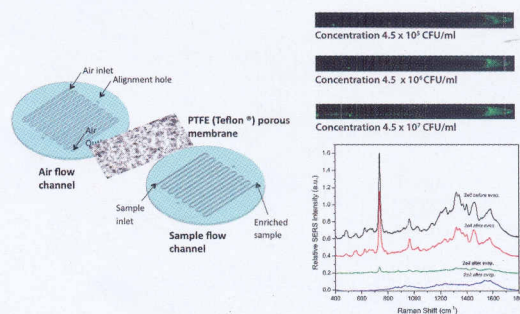


3265

Rapid point-of-care concentration of bacteria in a disposable microfluidic device using meniscus dragging effect

Jane Yuqian Zhang, Jaephil Do, W. Ranjith Premasiri, Lawrence D. Ziegler and Catherine M. Klapperich*

We report a low cost, disposable polymer microfluidic sample preparation device to perform rapid concentration of bacteria from liquid samples using enhanced evaporation targeted at downstream detection using surface enhanced Raman spectroscopy (SERS).

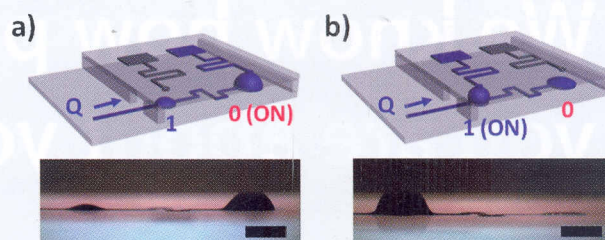


3271

Three-dimensional surface microfluidics enabled by spatiotemporal control of elastic fluidic interface

Lingfei Hong and Tingrui Pan*

Distinct elastic interface of surface microfluidics enables novel three-dimensional (deformable) and time-dependent (capacitive) operations of the surface flow.

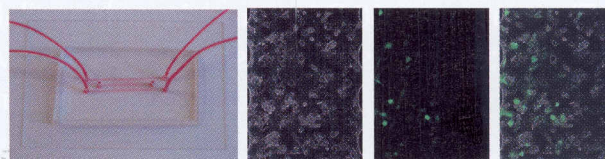


3277

Microfluidic device generating stable concentration gradients for long term cell culture: application to Wnt3a regulation of β -catenin signaling

Elisa Cimetta, Christopher Cannizzaro, Richard James, Travis Biechele, Randall T. Moon, Nicola Elvassore* and Gordana Vunjak-Novakovic*

In integrated experimental and modeling studies, we developed a microfluidic cell culture device that can precisely generate stable concentration gradients of molecular species.

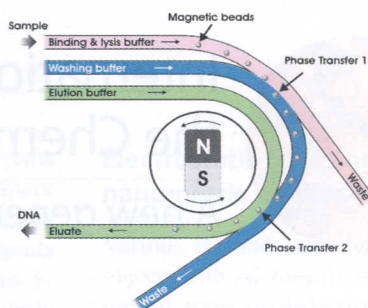


3284

Continuous microfluidic DNA extraction using phase-transfer magnetophoresis

Marc Karle,* Junichi Miwa, Gregor Czilwik, Volker Auwärter, Günter Roth, Roland Zengerle and Felix von Stetten

A novel microfluidic-chip based platform using “phase-transfer magnetophoresis” enables continuous biomolecule processing. As an example we demonstrate continuous DNA extraction from cell lysate.



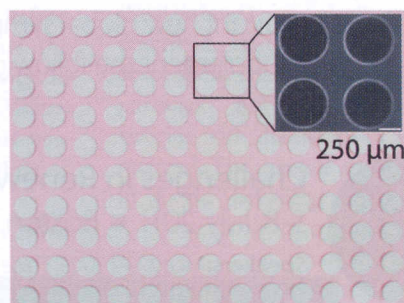
TECHNICAL NOTES

3291

Oxygen sensitive microwells

Elly Sinkala and David T. Eddington*

Oxygen sensitive microwells incorporate *platinum(II) octaethylporphyrin ketone* (PtOEPK) into polystyrene microwells to simultaneously culture and monitor the cells' oxygen state.

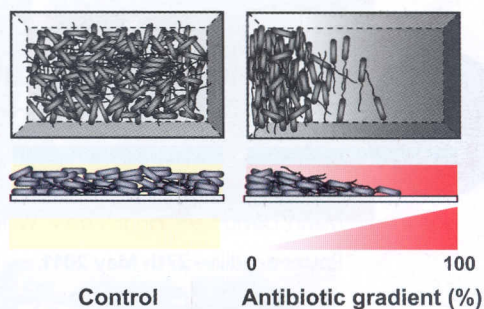


3296

In situ monitoring of antibiotic susceptibility of bacterial biofilms in a microfluidic device

Keun Pil Kim, Yun-Gon Kim, Chang-Hyung Choi, Hye-Eun Kim, Sang-Ho Lee, Woo-Suk Chang* and Chang-Soo Lee*

This study presents a microfluidic approach for the *in situ* analysis of antibiotic susceptibility of bacterial biofilms using the generation of a continuous concentration gradient of antibiotics.



3300

Use of directly molded poly(methyl methacrylate) channels for microfluidic applications

Sung Hoon Lee, Do Hyun Kang, Hong Nam Kim and Kahp Y. Suh*

A solvent-assisted micromolding method is used to create a homogeneous, circular polymer microchannel without bonding. The molded microchannel is tested for blocking absorption and diffusion of small molecules and constructing artificial endothelial cell-cultured capillaries.

