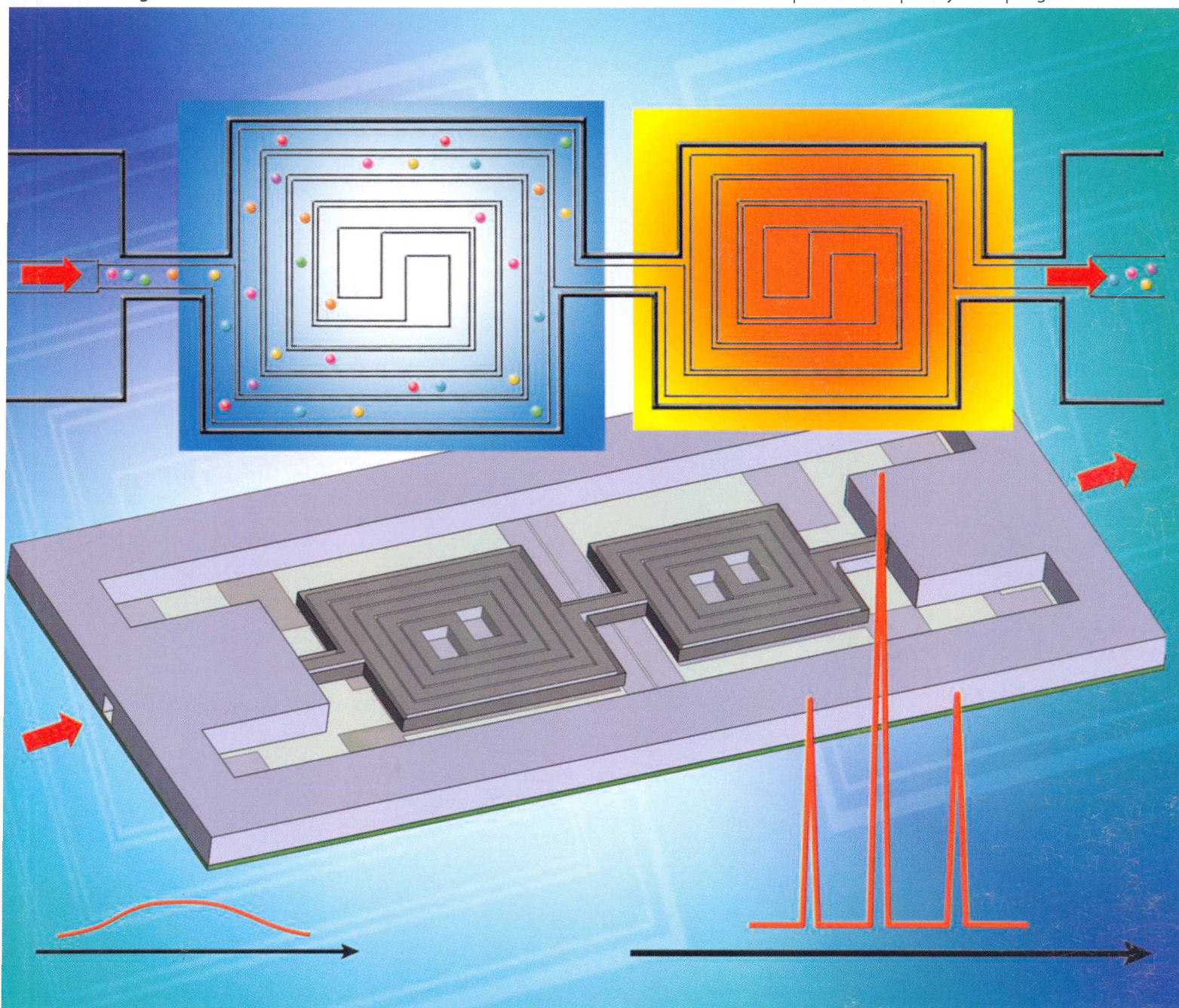


Lab on a Chip

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

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Kurabayashi
2D micro gas chromatography

Ho
Continuous sorting of embryoid
bodies



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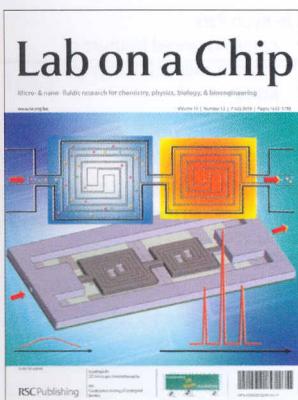
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Cover

See Kurabayashi *et al.*, pp. 1647–1654

Enhancement of the analytical sensitivity and chromatographic resolution of n-alkane gas compound mixtures using a two-stage on-chip thermal modulator for comprehensive two-dimensional micro gas chromatography.

Image reproduced by permission of Sung-Jin Kim, Shaelah M. Reidy, Bruce P. Block, Kensall D. Wise, Edward T. Zellers and Katsuo Kurabayashi from *Lab Chip*, 2010, **10**, 1647.



Inside cover

See Chiou *et al.*, pp. 1655–1661. Lab on a mobile display: an extremely low light intensity is sufficient to actuate droplets on single-sided continuous optoelectrowetting (SCOEW) devices.

Image reproduced by permission of Sung-Yong Park, Michael A. Teitell and Eric P. Y. Chiou from *Lab Chip*, 2010, **10**, 1655.

HIGHLIGHT

1645

Research Highlights

Petra S. Dittrich*

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



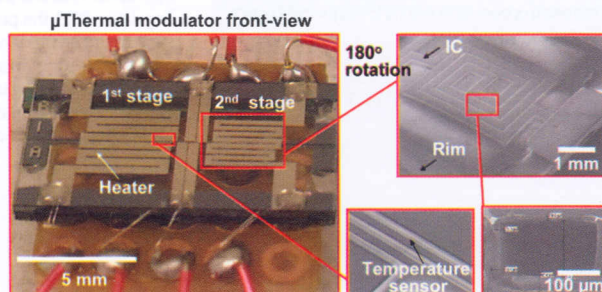
PAPERS

1647

Microfabricated thermal modulator for comprehensive two-dimensional micro gas chromatography: design, thermal modeling, and preliminary testing

Sung-Jin Kim, Shaelah M. Reidy, Bruce P. Block, Kensall D. Wise, Edward T. Zellers and Katsuo Kurabayashi*

We show the development of a microfabricated thermal modulator (μ TM), which plays a critical role in a comprehensive two-dimensional gas chromatography system.

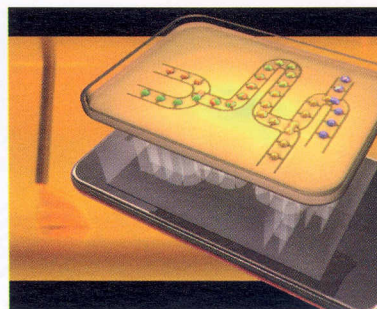


1655

Single-sided continuous optoelectrowetting (SCOEW) for droplet manipulation with light patterns

Sung-Yong Park, Michael A. Teitell and Eric P. Y. Chiou*

We report on a single-sided continuous optoelectrowetting (SCOEW) mechanism that enables light-patterned electrowetting modulation for continuous droplet manipulation on an open, featureless, and photoconductive surface.

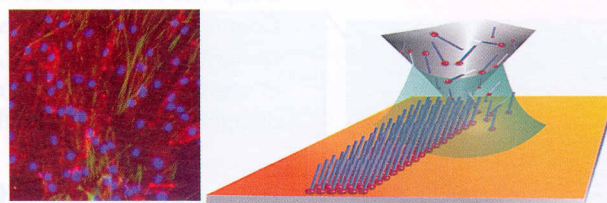


1662

Introducing dip pen nanolithography as a tool for controlling stem cell behaviour: unlocking the potential of the next generation of smart materials in regenerative medicine

Judith M. Curran,* Robert Stokes, Eleanore Irvine, Duncan Graham, N. A. Amro, R. G. Sanedrin, H. Jamil and John A. Hunt

Here we report the successful use of dip pen nanolithography as a tool for producing surfaces that can be used to control stem cell behaviour and produce homogenous populations of cells.

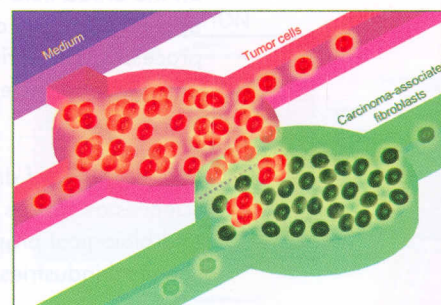


1671

Carcinoma-associated fibroblasts promoted tumor spheroid invasion on a microfluidic 3D co-culture device

Tingjiao Liu, Bingcheng Lin* and Jianhua Qin*

We present a microfluidic-based 3D co-culture device to reconstruct an *in vitro* tumor microenvironment for investigating the effect of CAFs on cancer cell invasion in 3D matrix.

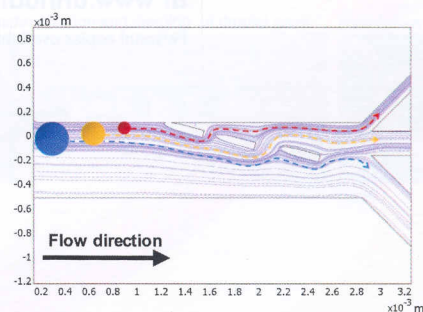


1678

Continuous sorting of heterogeneous-sized embryoid bodies

Peter B. Lillehoj, Hideaki Tsutsui, Bahram Valamehr, Hong Wu and Chih-Ming Ho*

We present a compact device for sorting embryoid bodies (EBs), ranging from 1–300 μm , based upon the modification of a fluid flow within a microchannel with high separation efficiencies.

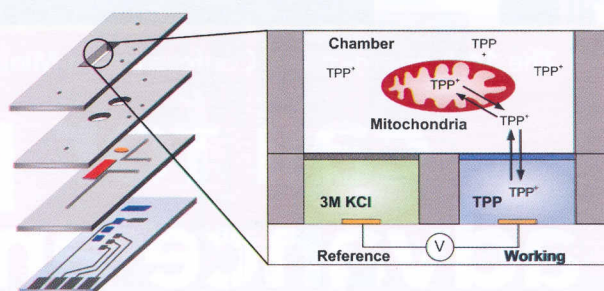


1683

Assessment of mitochondrial membrane potential using an on-chip microelectrode in a microfluidic device

Tae-Sun Lim,* Antonio Dávila, Douglas C. Wallace and Peter Burke

An on-chip microelectrode sensor fabricated with ion-selective membranes allows non-invasive, electrochemical, *in situ* monitor of the mitochondrial membrane potential in a controlled microfluidic environment.

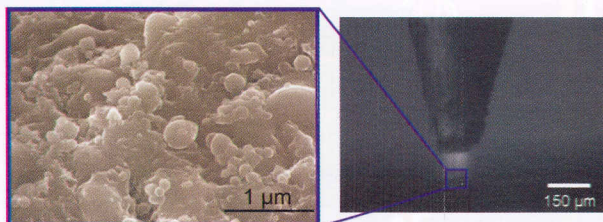


1689

Fabrication of nanocluster silicon surface with electric discharge and the application in desorption/ionization on silicon-mass spectrometry

Niina M. Suni, Markus Haapala, Elina Färm, Emma Härkönen, Mikko Ritala, Lauri Sainiemi, Sami Franssila, Tapio Kotiaho* and Risto Kostianen*

Atmospheric pressure microdischarge to create nanocluster silicon surface.

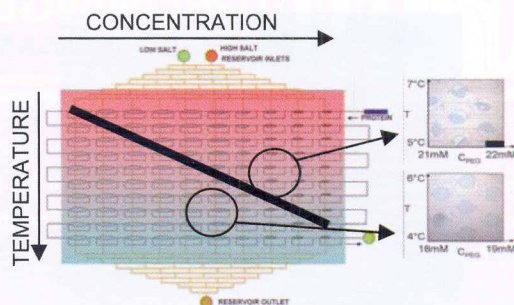


1696

Mapping and manipulating temperature–concentration phase diagrams using microfluidics

Šeila Selimović, Frédéric Gobeaux and Seth Fraden*

The PhaseChip can measure phase diagrams of aqueous solutions as a function of concentration (C) and temperature (T). The chip stores 800 drops of 20 nl volume at 400 different values of C , T .

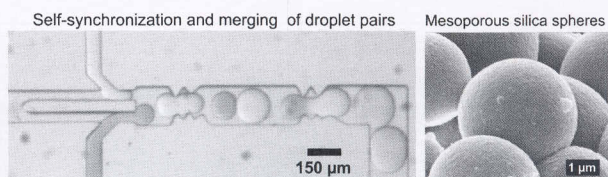


1700

Optimized droplet-based microfluidics scheme for sol–gel reactions

Venkatachalam Chokkalingam, Boris Weidenhof, Michael Krämer, Wilhelm F. Maier, Stephan Herminghaus and Ralf Seemann*

Silica particles with superior surface area are produced by an optimized sol–gel synthesis route where the chemicals are dispensed into droplet pairs, merged, mixed and pre-processed in the microfluidic device.

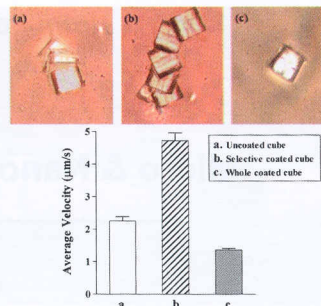


1706

Motility enhancement of bacteria actuated microstructures using selective bacteria adhesion

Sung Jun Park, Hyeoni Bae, Joonhwuy Kim, Byungjik Lim, Jongoh Park* and Sukho Park*

The bacteria patterned to a specific site using 5% BSA significantly increase the motility of the bacteria actuated microstructure.

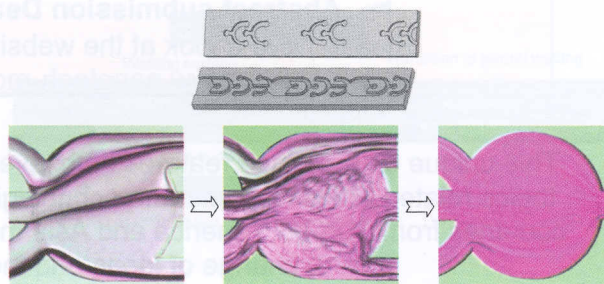


1712

A microfluidic mixer with self-excited 'turbulent' fluid motion for wide viscosity ratio applications

H. M. Xia, Z. P. Wang,* Y. X. Koh and K. T. May

While the flow in a microfluidic device is typically laminar, which greatly impedes the mixing rate, the current micromixer design produces viscous flow instabilities to achieve global 'turbulent' mixing for liquids with large viscosity contrasts.

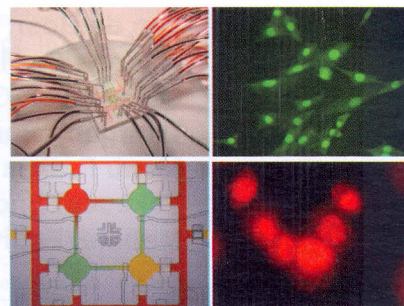


1717

An integrated microfluidic system for studying cell-microenvironmental interactions versatily and dynamically

Wenming Liu, Li Li, Xuming Wang, Li Ren, Xueqin Wang, Jianchun Wang, Qin Tu, Xiaowen Huang and Jinyi Wang*

We present an integrated microfluidic system for the study of cell-microenvironmental interactions, which can provide precise and efficient micromechanical manipulation for positioning operation and microenvironmental transition.



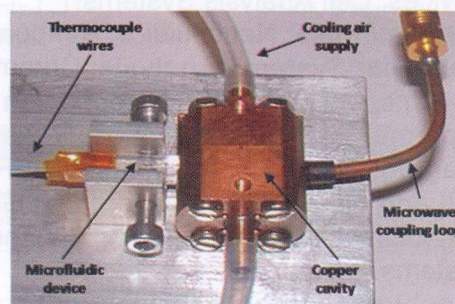
TECHNICAL NOTES

1725

Rapid PCR amplification using a microfluidic device with integrated microwave heating and air impingement cooling

Kirsty J. Shaw, Peter T. Docker, John V. Yelland, Charlotte E. Dyer, John Greenman, Gillian M. Greenway and Stephen J. Haswell*

An 8 GHz microwave based heating system with air impingement cooling offering rapid PCR thermal cycling with heating and cooling rates of up to $65\text{ }^{\circ}\text{C s}^{-1}$ and minimal over-shooting or under-shooting ($\pm 0.1\text{ }^{\circ}\text{C}$).

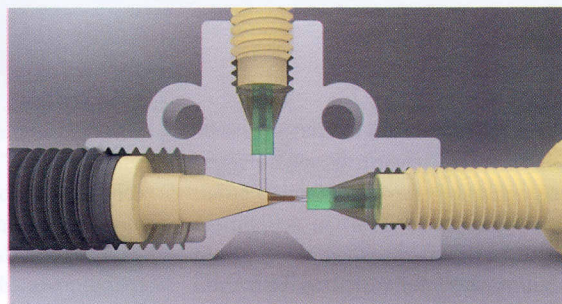


1729

"Off-the-shelf" 3-D microfluidic nozzle

Alex Terray and Sean J. Hart*

We present the construction and operation of a microfluidic nozzle created using several standard fluidic parts available commercially.

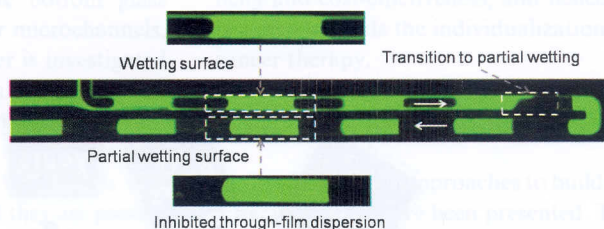


1732

Partial wetting gas-liquid segmented flow microreactor

S. Ali Kazemi Oskoei and David Sinton*

A partial wetting microfluidic reactor strategy is demonstrated that effectively eliminates dispersion between liquid plugs.

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