Lab on a Chip

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

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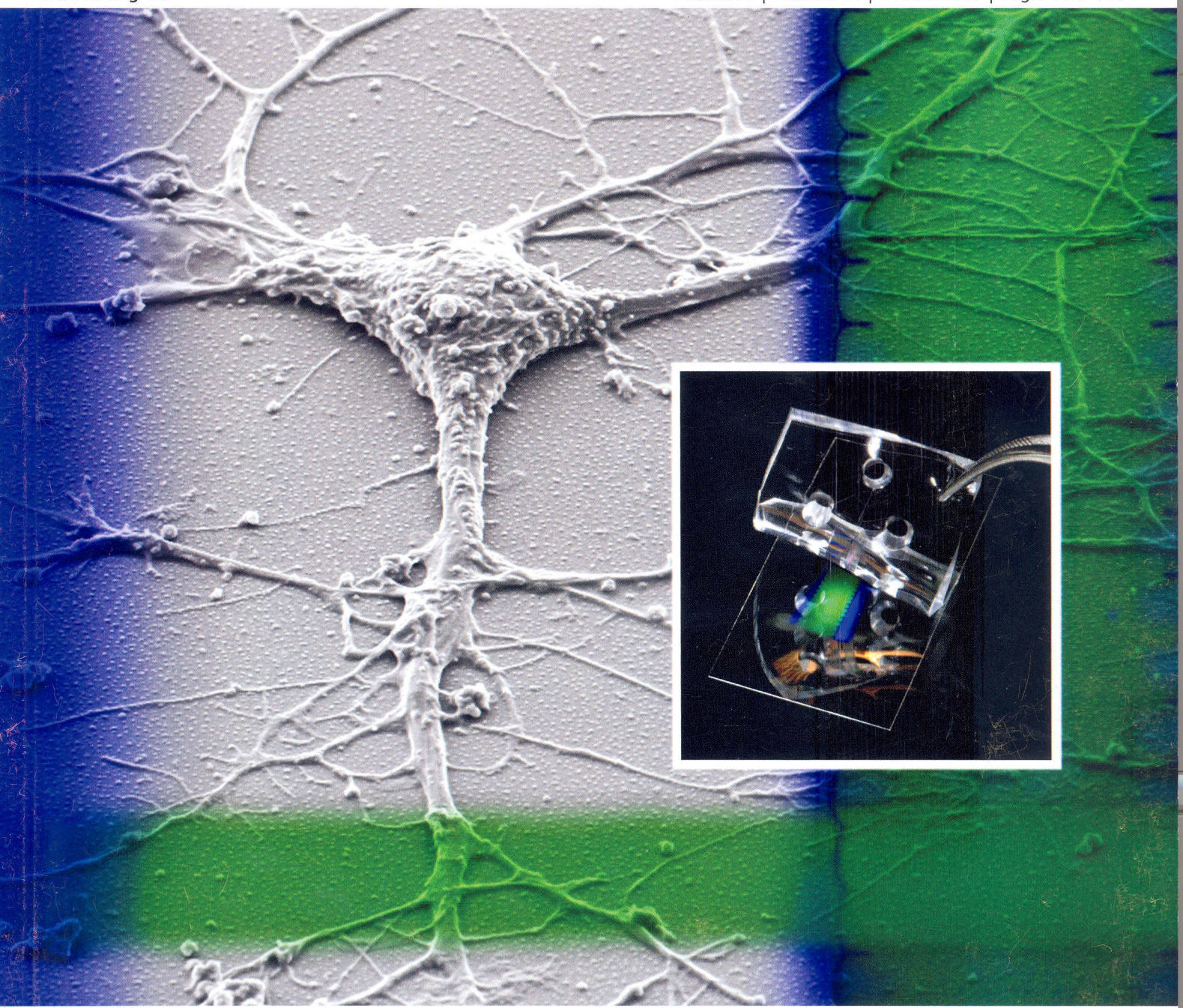

ISSN 1473-0197

RSC Publishing

Gillette
Guiding neuron development

Muller and Sohn
Single-molecule sequencing

Celebrating 10 Years of publishing

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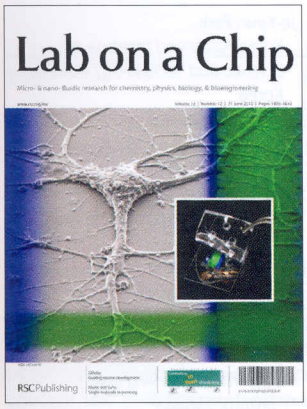
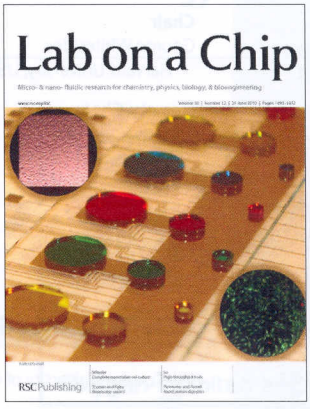
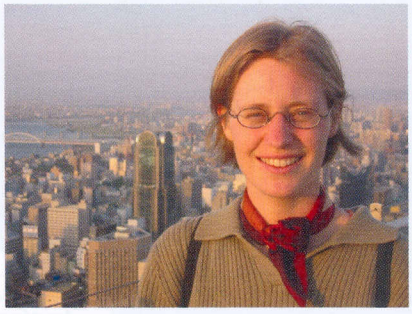


Cover
Neuronal development can be engineered by surface-bound gradients of biochemical cues, signals that can be deposited with the use of microfluidic devices. Image created by Larry Millet, Janet Sinn-Hanlon and Darren Stevenson.
Image reproduced by permission of Larry J. Millet, Matthew E. Stewart, Ralph G. Nuzzo and Martha U. Gillette from *Lab Chip*, 2010, **10**, 1525.

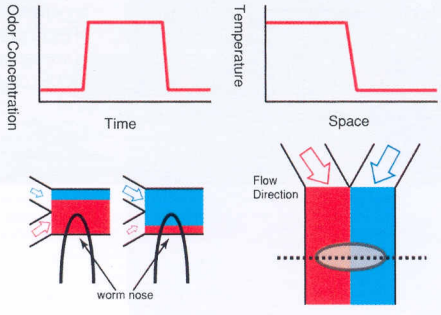


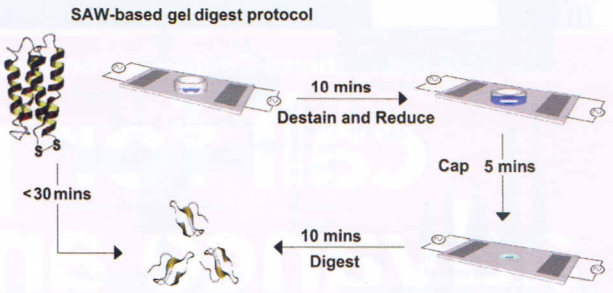
Inside cover
See Wheeler *et al.*, pp. 1536–1542. A digital microfluidic platform for complete mammalian cell culture in 150-nL droplets.
Image reproduced by permission of Irena Barbulovic-Nad, Sam H. Au and Aaron R. Wheeler from *Lab Chip*, 2010, **10**, 1536.

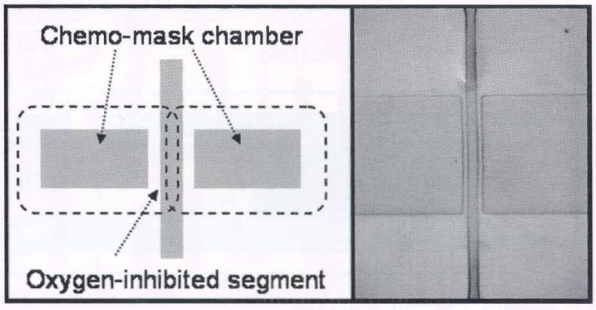
HIGHLIGHT

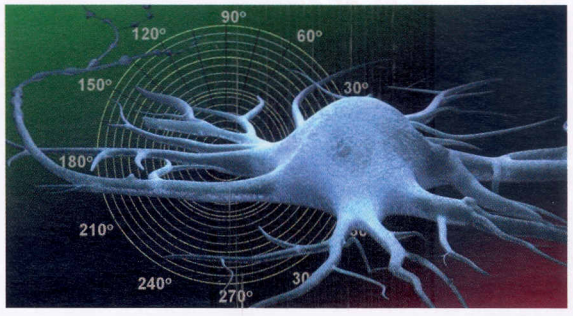


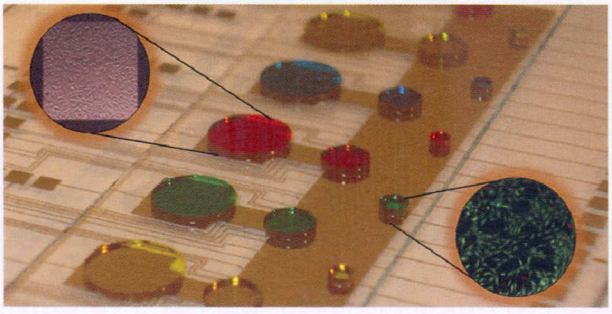
CRITICAL REVIEW









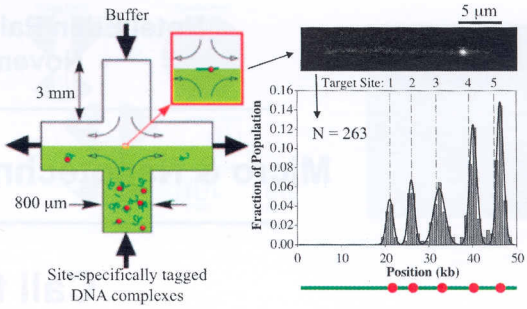


1543

Single-molecule sequence detection *via* microfluidic planar extensional flow at a stagnation point

Rebecca Dylla-Spears, Jacqueline E. Townsend, Linda Jen-Jacobson, Lydia L. Sohn and Susan J. Muller*

Single DNA molecules are trapped and extended at the stagnation point of a planar extensional flow, where target site positions, indicated by fluorescent markers, are determined by fluorescence microscopy.

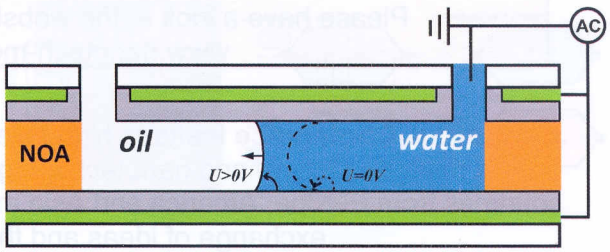


1550

A hybrid microfluidic chip with electrowetting functionality using ultraviolet (UV)-curable polymer

Hao Gu,* Michel H. G. Duits and Frieder Mugele

We present a novel method to fabricate microchannels with integrated electrowetting (EW) functionality based on the "microfluidic stickers" technology in combination with robust insulating layers made of Teflon AF. Using these devices we demonstrate EW-controlled filling of microfluidic channels as well as the generation of microdrops.

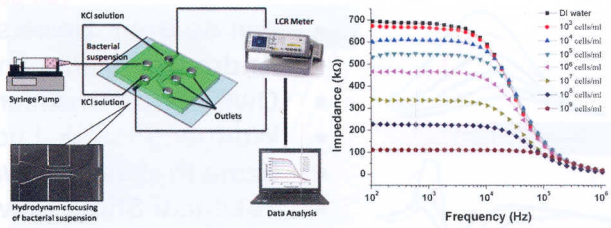


1557

Detection of bacterial cells by impedance spectra *via* fluidic electrodes in a microfluidic device

Tao Zhu, Zhenhua Pei, Jianyong Huang, Chunyang Xiong,* Shenggen Shi and Jing Fang

We present a novel method for detecting bacterial cells in deionized (DI) water suspension by using fluidic electrodes with a hydrodynamic focusing technique.

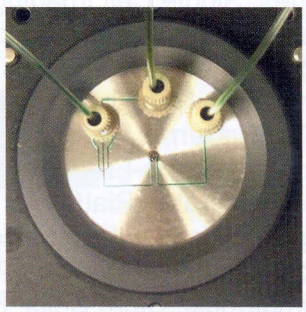


1561

Attenuated total reflection Fourier transform infrared spectroscopy for on-chip monitoring of solute concentrations

Jesse Greener, Bardia Abbasi and Eugenia Kumacheva*

A robust and cost-efficient *in situ* ATR-FTIR method is proposed for rapid acquisition of high-resolution spectra of solutes flowing through microfluidic channels.

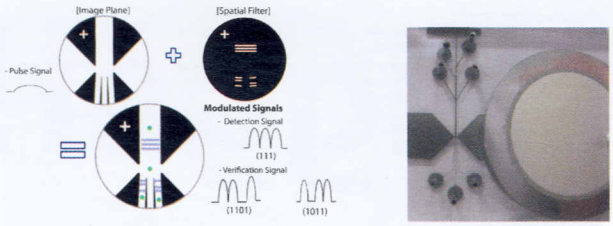


1567

Human mammalian cell sorting using a highly integrated micro-fabricated fluorescence-activated cell sorter (μFACS)

Sung Hwan Cho,* Chun H. Chen, Frank S. Tsai, Jessica M. Godin and Yu-Hwa Lo

The novel high fluorescence detection strategy called "space-time coding" technique and the on chip PZT actuator realized a lab-on-a-chip sorter with high purity and high throughput.

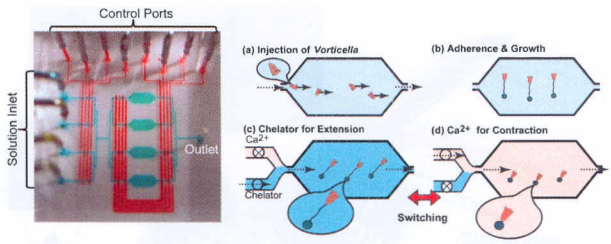


1574

Chemical control of *Vorticella* bioactuator using microfluidics

Moeto Nagai,* Sangjin Ryu, Todd Thorsen, Paul Matsudaira and Hiroyuki Fujita

We demonstrate a microfluidic platform to control the stalk contraction and extension of *Vorticella convallaria* by changing concentration of Ca^{2+} with pneumatically-actuated elastomeric microvalves.

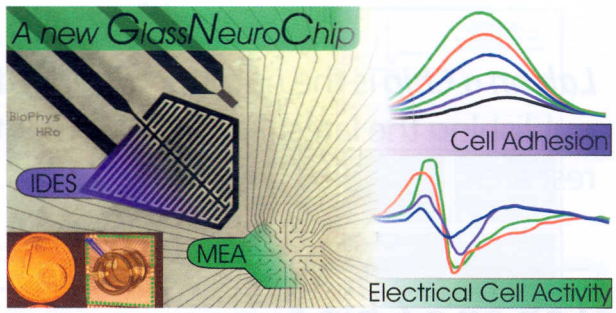


1579

Modular glass chip system measuring the electric activity and adhesion of neuronal cells—application and drug testing with sodium valproic acid

Philipp Julian Koester, Sebastian Moritz Buehler, Marco Stubbe, Carsten Tautorat, Mathias Niendorf, Werner Baumann and Jan Gimsa*

Koester *et al.* present a glass-chip system combining a microelectrode array (MEA) for detecting the electrical activity of neurons or cardiomyocytes with a sensor (IDES) for cell number and adhesion.

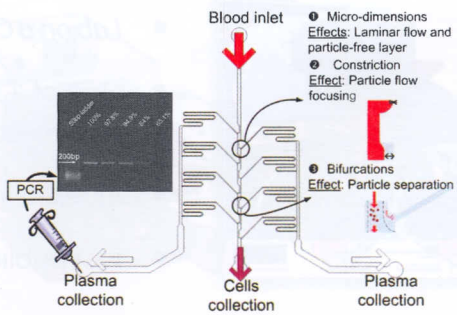


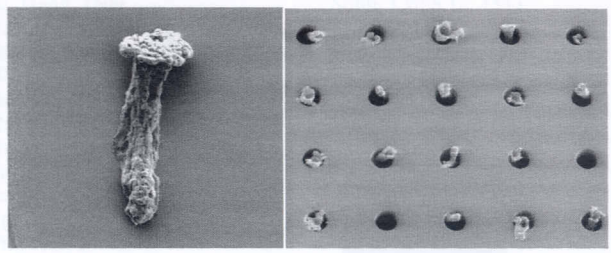
1587

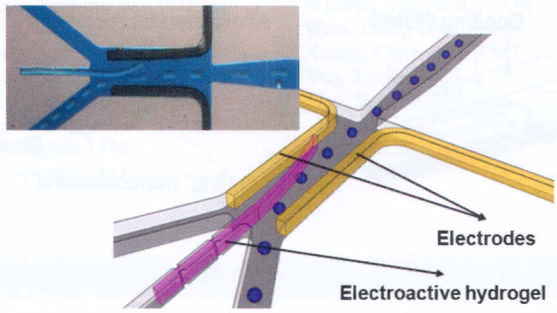
Validation of a blood plasma separation system by biomarker detection

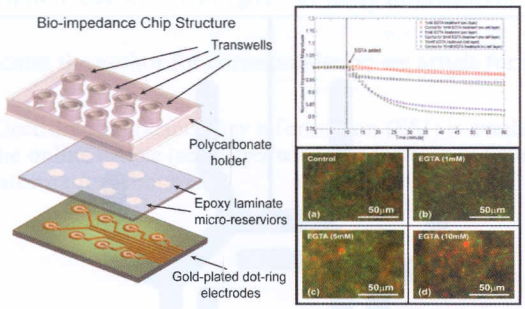
Maïwenn Kersaudy-Kerhoas,* Deirdre M. Kavanagh, Resham S. Dhariwal, Colin J. Campbell and Marc P. Y. Desmulliez

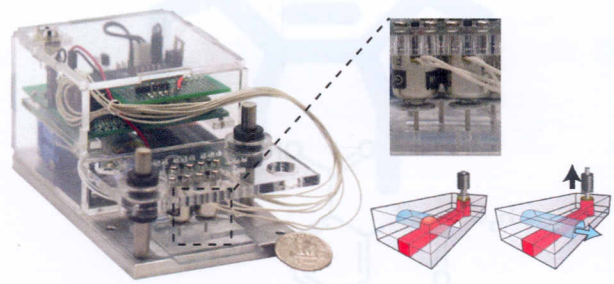
The blood plasma separation system features constrictions and bifurcations in series and relies solely on hydrodynamic forces. This device has been validated by the detection of a house-keeping gene sequence in the extracted plasma.











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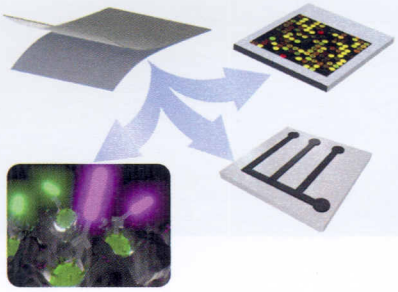
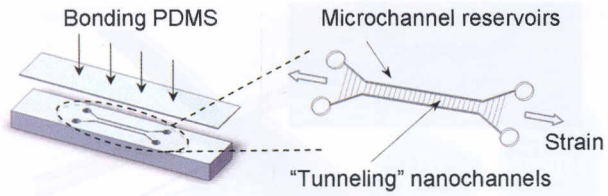


Better shrinkage than Shrinky-Dinks

Diep Nguyen, Douglas Taylor, Kun Qian, Nizilla Norouzi, Jerald Rasmussen, Steve Botzet, Matt Lehmann, Kurt Halverson and Michelle Khine*

We demonstrate the ability to rapidly and easily create unique microstructures, increase microarray feature density, and induce self-assembled integrated metallic nanostructures with polyolefin shrink wrap films that shrink by 95%.

1627



Instantaneous fabrication of arrays of normally closed, adjustable, and reversible nanochannels by tunnel cracking

K. L. Mills, Dongeun Huh, Shuichi Takayama* and M. D. Thouless*

Tunnel cracking of oxidized, bonded PDMS to produce size-adjustable nanochannels in a direct and simple fashion.