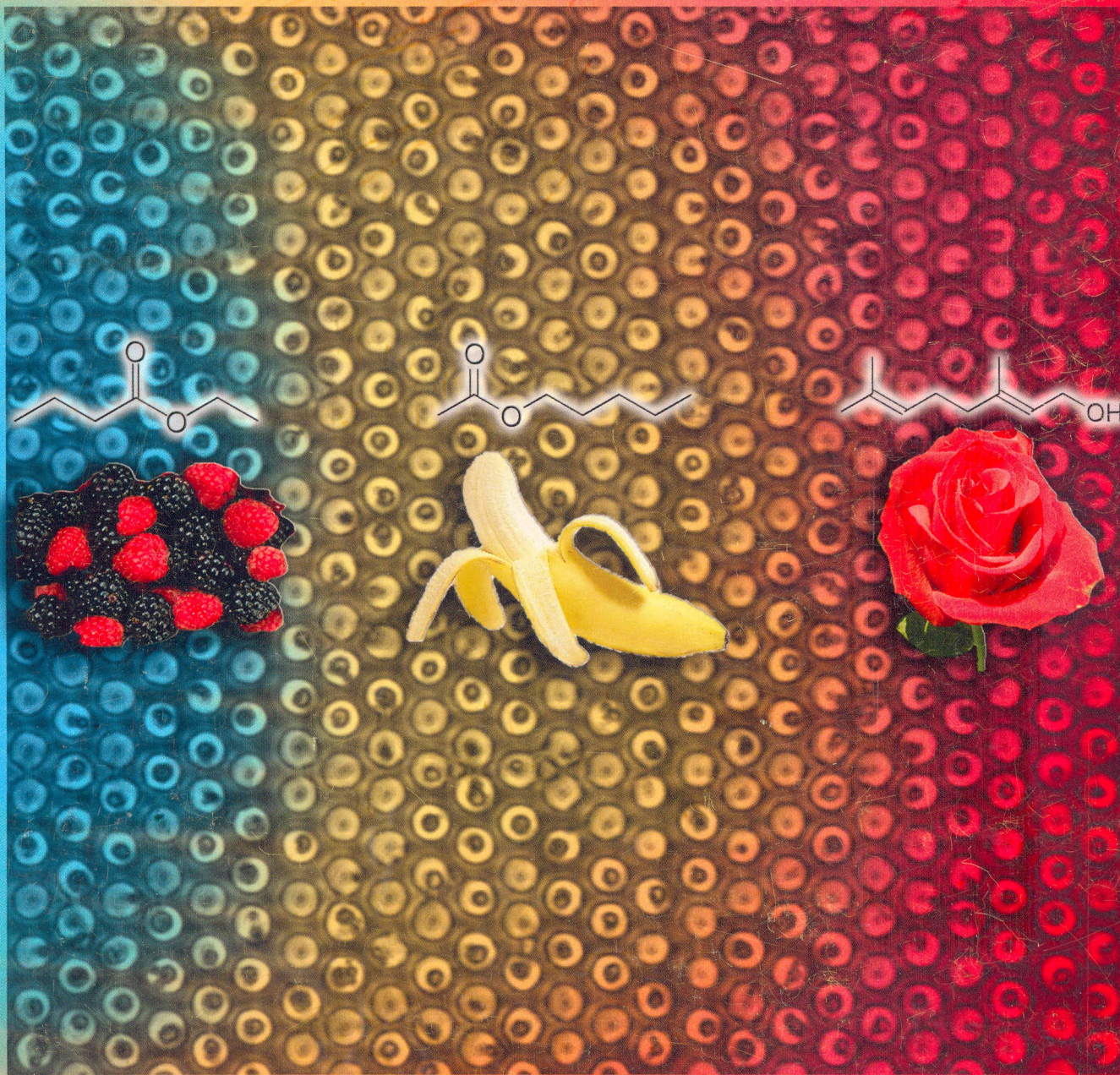


Lab on a Chip

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

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Folch
Olfactory neuron responses

Bashir and King
Microcantilever heaters



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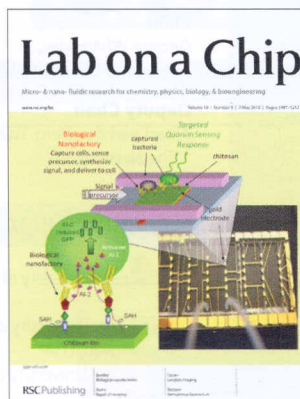
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Cover

See Folch *et al.*, pp. 1120–1127.
A microfluidic-based method for studying the response of thousands of dissociated olfactory sensory neurons to a sequence of odorants, allowing for probing all the olfactory receptor space simultaneously.

Image reproduced by permission of Xavier A. Figueroa, Gregory A. Cooksey, Scott V. Votaw, Lisa F. Horowitz and Albert Folch from *Lab Chip*, 2010, **10**, 1120.



Inside cover

See Bentley *et al.*, pp. 1128–1134.
Biological nanofactories are assembled *via* synthetic biology and biofabrication to capture and stimulate a quorum sensing response in spatially defined locales.

Image reproduced by permission of Rohan Fernandes, Xiaolong Luo, Chen-Yu Tsao, Gregory F. Payne, Reza Ghodssi, Gary W. Rubloff and William E. Bentley from *Lab Chip*, 2010, **10**, 1128.

HIGHLIGHT

1107

Research Highlights

Petra S. Dittrich*

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



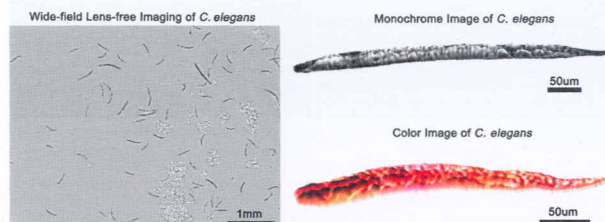
COMMUNICATIONS

1109

Color and monochrome lensless on-chip imaging of *Caenorhabditis elegans* over a wide field-of-view

Serhan O. Isikman, Ikbâl Sencan, Onur Mudanyali, Waheb Bishara, Cetin Oztoprak and Aydogan Ozcan*

We demonstrate color and monochrome on-chip imaging of *Caenorhabditis elegans* samples over a wide field-of-view using a lensfree imaging platform that is especially suitable for high-throughput screening applications.



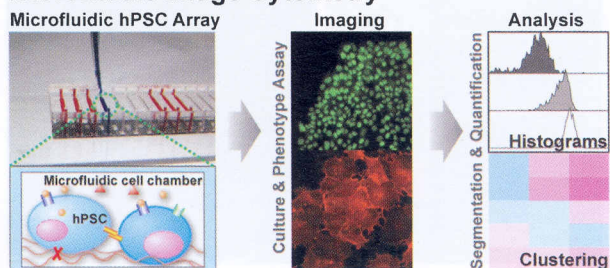
1113

Microfluidic image cytometry for quantitative single-cell profiling of human pluripotent stem cells in chemically defined conditions

K.-i. Kamei,* M. Ohashi, E. Gschwend, Q. Ho, J. Suh, J. Tang, Z. T. For Yu, A. T. Clark, A. D. Pyle, M. A. Teitell, K.-B. Lee, O. N. Witte and H.-R. Tseng*

Microfluidic image cytometry allows culturing of human pluripotent stem cells (hPSCs) in chemically defined conditions and quantifying multiple phenotypic markers of hPSCs at a single-cell level.

Microfluidic Image Cytometry



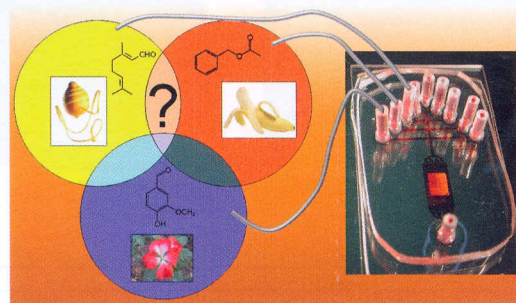
PAPERS

1120

Large-scale investigation of the olfactory receptor space using a microfluidic microwell array

Xavier A. Figueroa, Gregory A. Cooksey, Scott V. Votaw, Lisa F. Horowitz and Albert Folch*

The manuscript describes a microfluidic-based method for studying the response of thousands of dissociated olfactory sensory neurons (OSNs) to a sequence of odorants.

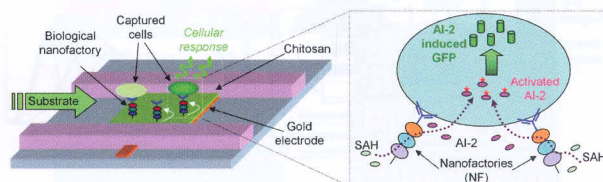


1128

Biological nanofactories facilitate spatially selective capture and manipulation of quorum sensing bacteria in a bioMEMS device

Rohan Fernandes, Xiaolong Luo, Chen-Yu Tsao, Gregory F. Payne, Reza Ghodssi, Gary W. Rubloff and William E. Bentley*

We exploit biological nanofactories within a bioMEMS device to capture and manipulate the behavior of quorum sensing (QS) bacteria as a step toward modifying bacterial signaling.

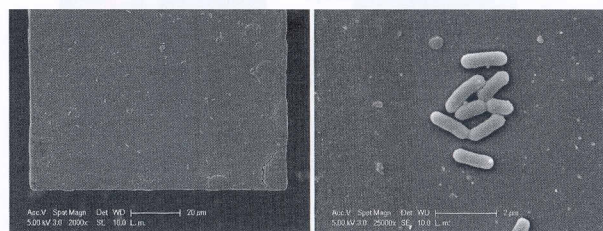


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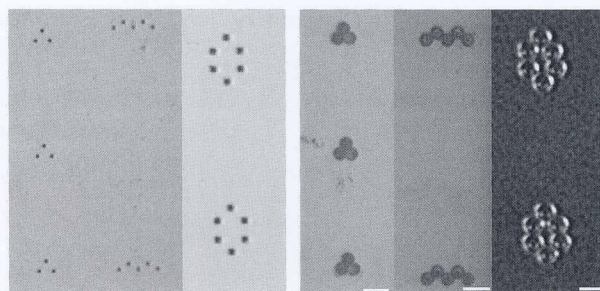
Rapid thermal lysis of cells using silicon–diamond microcantilever heaters

Natalya Privorotskaya, Yi-Shao Liu, Jungchul Lee, Hongjun Zeng, John A. Carlisle, Adarsh Radadia, Larry Millet, Rashid Bashir and William P. King*

This work demonstrates heat-mediated cell lysis of either mammalian or bacterial cells using a silicon–diamond microcantilever heater, which is potentially an efficient platform for releasing DNA/RNA for downstream detection and biological processes.



1142

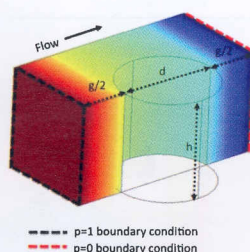
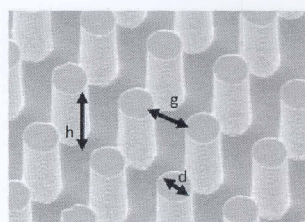


Selective arraying of complex particle patterns

Ramsey I. Zeitoun, Dustin S. Chang, Sean M. Langelier, Joanna Mirecki-Millunchick, Michael J. Solomon and Mark A. Burns*

We have developed a methodology for precise and rapid two-dimensional arraying of particles and cells. This was accomplished using a surface patterned hole array coupled to a microfluidic device to convectively position individual objects into exact positions.

1148

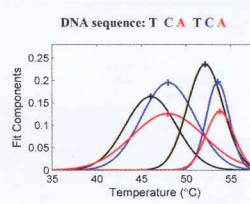
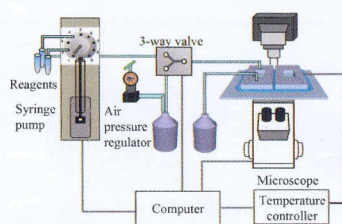


A unified scaling model for flow through a lattice of microfabricated posts

Nimisha Srivastava,* Changsong Din, Andrew Judson, Noel C. MacDonald and Carl D. Meinhart

A scaling model is presented for flow within an array of posts and validated with experiments. The results indicate that the flow scales as $\sim h^{1.17} g^{1.33} / d^{0.5}$ where h is height, d diameter and g is spacing between posts.

1153

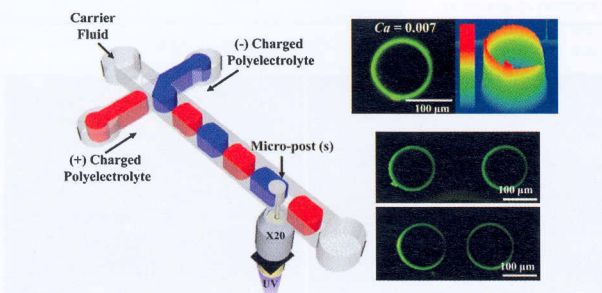


DNA sequencing by denaturation: experimental proof of concept with an integrated fluidic device

Ying-Ja Chen, Eric E. Roller and Xiaohua Huang*

We report the experimental proof of concept of a novel DNA sequencing technology called sequencing by denaturation (SBD) using an instrument with integrated fluidics, temperature control, and fluorescence imaging. The denaturation profiles of several synthetic oligonucleotides were measured with this system and our data demonstrated the ability to sequence short DNA by SBD.

1160



Multilayer deposition on patterned posts using alternating polyelectrolyte droplets in a microfluidic device

Misook Lee, Wook Park, Changkwon Chung, Jaehoon Lim, Sunghoon Kwon, Kyung Hyun Ahn, Seung Jong Lee and Kookheon Char*

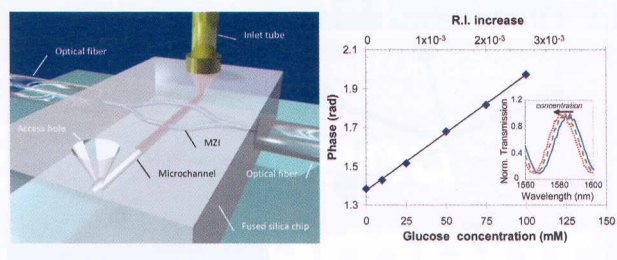
We demonstrate that polyelectrolyte (PE) multilayer thin films deposited on lithographically defined patterned posts can be achieved in a facile manner using alternating polyelectrolyte droplets generated in a microfluidic channel.

1167

Three-dimensional Mach-Zehnder interferometer in a microfluidic chip for spatially-resolved label-free detection

Andrea Crespi, Yu Gu, Bongkot Ngamsom, Hugo J. W. M. Hoekstra, Chaitanya Dongre, Markus Pollnau, Roberta Ramponi, Hans H. van den Vlekert, Paul Watts, Giulio Cerullo and Roberto Osellame*

We demonstrate a monolithic optofluidic device in fused silica providing label-free and spatially-resolved sensing in a microfluidic channel. Label-free sensing of glucose and mono-peptide solutions is performed with spatial resolution of 11 μm and limit of detection down to 10^{-4} RIU.

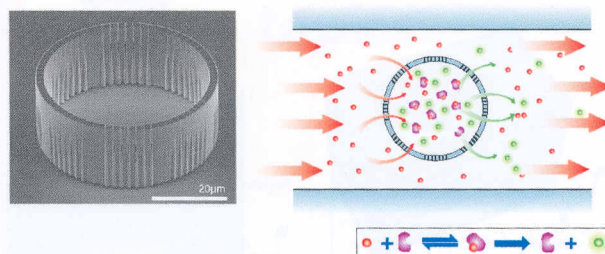


1174

Development and fabrication of nanoporous silicon-based bioreactors within a microfluidic chip

Scott T. Retterer,* Piro Siuti, Chang-Kyoung Choi, Darrell K. Thomas and Mitchel J. Doktycz

Multi-scale lithography and cryogenic deep reactive ion etching techniques were used to create ensembles of nanoporous, picolitre volume, reaction vessels within a microfluidic system.

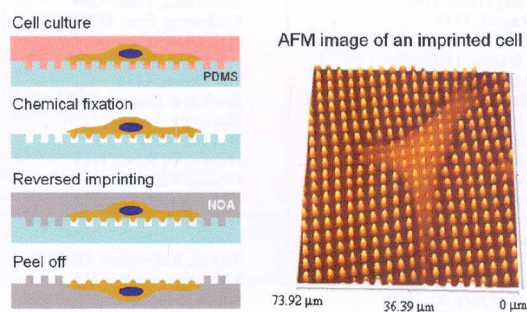


1182

Reversed cell imprinting, AFM imaging and adhesion analyses of cells on patterned surfaces

Xiongtu Zhou, Jian Shi, Fan Zhang, Jie Hu, Xin Li, Li Wang, Xueming Ma and Yong Chen*

We develop a reversed cell imprinting technique for the observation of underside surface morphology of cells cultured on high density micro hole arrays.

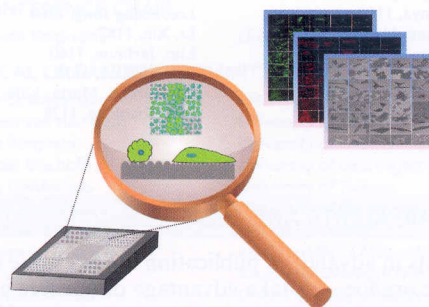


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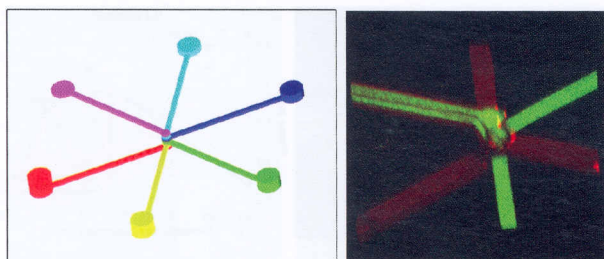
A nanodevice for rapid modulation of proliferation, apoptosis, invasive ability, and cytoskeletal reorganization in cultured cells

Yao-Ching Hung, Hsu-An Pan, Shih-Ming Tai and G. Steve Huang*

Nanostructure encodes information that directs cell behavior: proliferation or apoptosis. We have fabricated an integral nanodevice to obtain parameters that define the life or death of cells.



1199

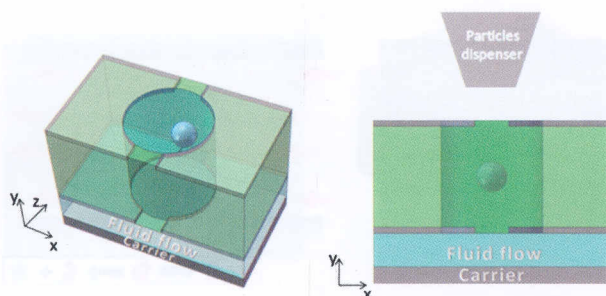


A simple method for fabricating multi-layer PDMS structures for 3D microfluidic chips

Mengying Zhang, Jinbo Wu, Limu Wang, Kang Xiao and Weijia Wen*

A PDMS slab surface-treated by PFOCTS can act as a reusable transferring layer to achieve a simple method of fabricating PDMS multi-layer microfluidic chips.

1204



Horizontal nDEP cages within open microwell arrays for precise positioning of cells and particles

Marta Lombardini,* Massimo Bocchi,* Laura Rambelli, Luca Giulianelli and Roberto Guerrieri

We present the structure of an open microwell, *i.e.* a microwell open at both the top and bottom ends, which enables single-cells to be handled, processed and recovered after the experiment.

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