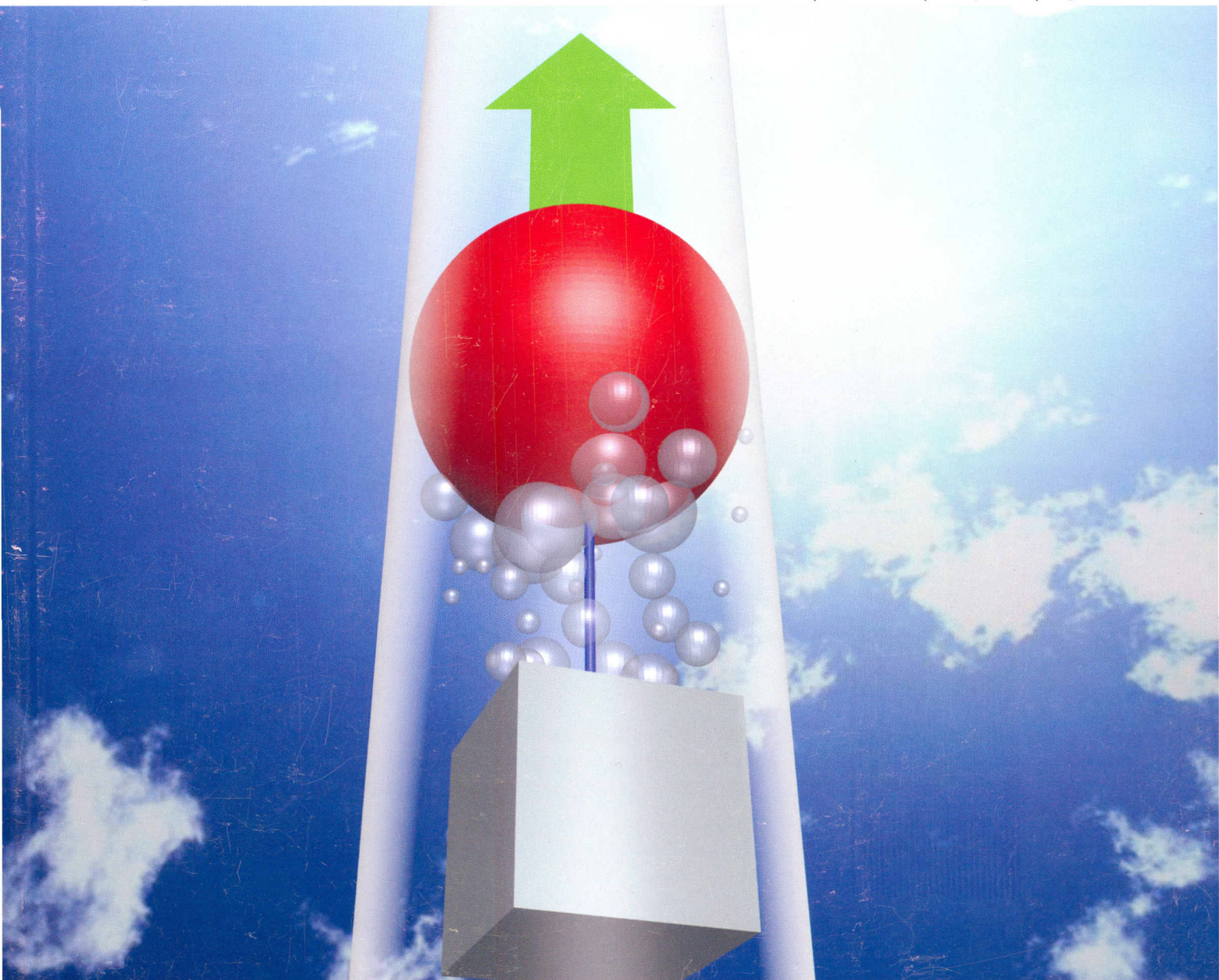


Lab on a Chip

Miniaturisation for chemistry, physics, biology, materials science and bioengineering

www.rsc.org/loc

Volume 12 | Number 11 | 8 May 2012 | Pages 1905–2076



Themed issue: NANO-technologies and -materials for miniaturisation

ISSN 1473-0197

RSC Publishing

PAPER

Gabriel Loget and Alexander Kuhn
Bipolar electrochemistry for cargo-lifting in fluid channels



1473-0197 (2012) 12:11;1-1

Lab on a Chip

Miniaturisation for chemistry, 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 12(11) 1905–2076 (2012)



Cover
See Gabriel Loget and Alexander Kuhn, pp. 1967–1971. Image reproduced by permission of Alexander Kuhn from *Lab Chip*, 2012, 12, 1967.



Inside cover
See Arben Merkoçi *et al.*, pp. 1932–1943. Image reproduced by permission of Arben Merkoçi from *Lab Chip*, 2012, 12, 1932.

THEMED ISSUE ARTICLES

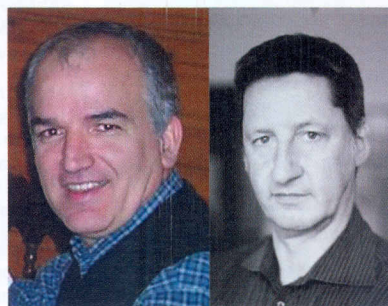
EDITORIAL

1915

Analytical miniaturization and nanotechnologies

Arben Merkoçi and Jörg P. Kutter

This *Lab on a Chip* themed issue is in collaboration with the III International Workshop on Analytical Miniaturization and NANotechnologies, Barcelona, 2012.



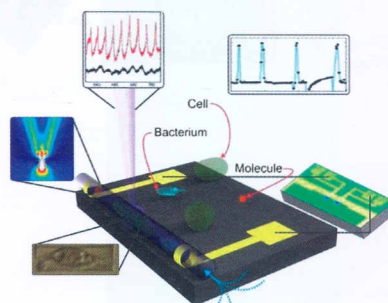
TUTORIAL REVIEW

1917

Lab-in-a-tube: ultracompact components for on-chip capture and detection of individual micro-/nanoorganisms

Elliot J. Smith,* Wang Xi, Denys Makarov, Ingolf Mönch, Stefan Harazim, Vladimir A. Bolaños Quiñones, Christine K. Schmidt, Yongfeng Mei, Samuel Sanchez and Oliver G. Schmidt*

A review over present and future on-chip rolled-up devices, which can be used to develop lab-in-a-tube total analysis systems.



1932

Nanomaterials and lab-on-a-chip technologies

Mariana Medina-Sánchez, Sandrine Miserere and Arben Merkoçi*

Nanomaterials and lab-on-a-chip technologies are a promising synergy for a wide range of applications. Two points of view are described: microfluidics for nanomaterial production and characterization, and nanomaterials to enhance microfluidic processes.

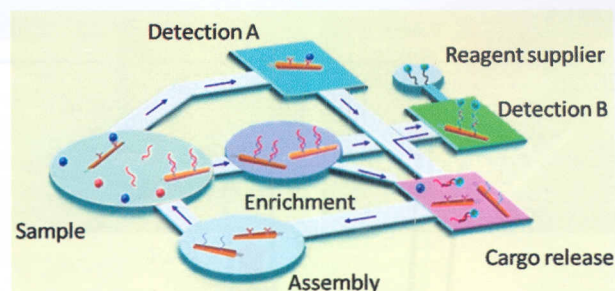


1944

Cargo-towing synthetic nanomachines: Towards active transport in microchip devices

Joseph Wang*

Chemically-powered synthetic nano/microscale motors for directed transport of different cargoes in lab-on-a-chip systems are described.

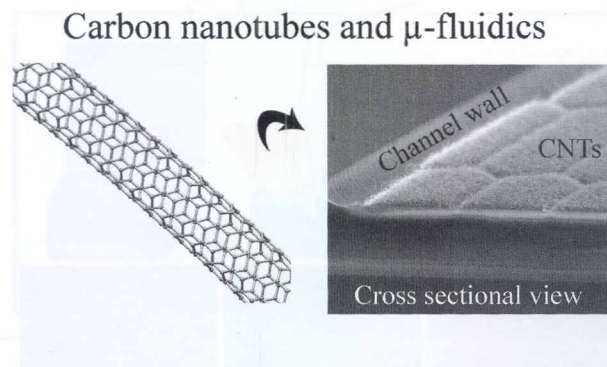


1951

Carbon nanotube based stationary phases for microchip chromatography

Klaus B. Mogensen* and Jörg P. Kutter

The unique properties of carbon nanotubes and related carbon based nanomaterials for microchip chromatography are critically reviewed.



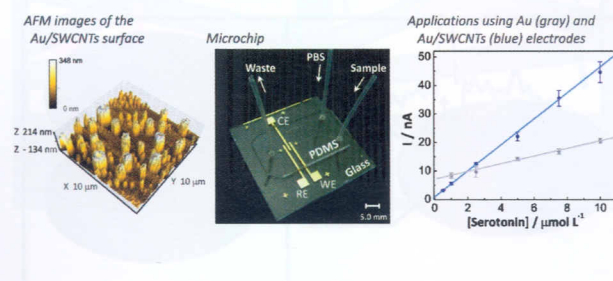
COMMUNICATIONS

1959

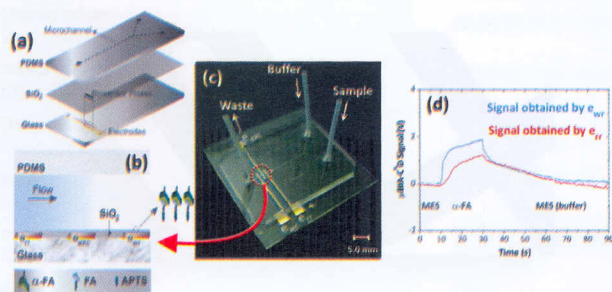
Glass/PDMS hybrid microfluidic device integrating vertically aligned SWCNTs to ultrasensitive electrochemical determinations

Fernando Cruz Moraes, Renato Sousa Lima, Thiago Pinotti Segato, Ivana Cesarino, Jhanisus Leonel Melendez Cetino, Sergio Antonio Spinola Machado, Frank Gomez and Emanuel Carrilho*

Microfluidic device with vertically aligned SWCNTs that requires a simple microfabrication/functionalization protocol and allows direct and ultrasensitive determinations of serotonin.



1963



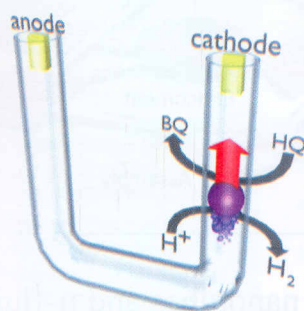
Contactless conductivity biosensor in microchip containing folic acid as bioreceptor

Renato S. Lima, Maria H. O. Piazzetta, Angelo L. Gobbi, Ubirajara P. Rodrigues-Filho, Pedro A. P. Nascente, Wendell K. T. Coltro and Emanuel Carrilho*

Microfluidic system (a–c) for real time monitoring of biomolecular interactions (d) using capacitively coupled contactless conductivity transduction and FA as a bioreceptor.

PAPERS

1967

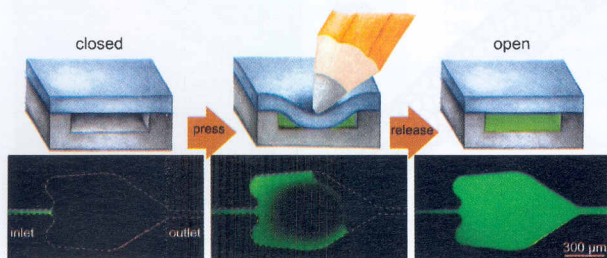


Bipolar electrochemistry for cargo-lifting in fluid channels

Gabriel Loget and Alexander Kuhn*

Levitation of beads in capillaries can be achieved based on a bubble-propulsion mechanism, induced by bipolar-electrochemistry, and allowing cargo lifting in fluid channels.

1972

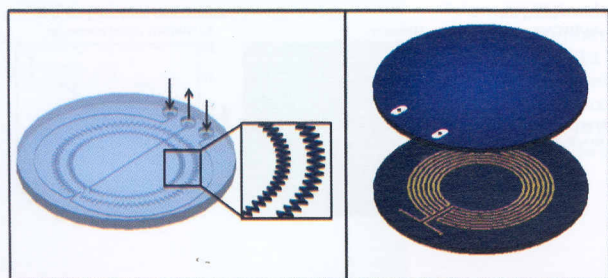


Capillary soft valves for microfluidics

Martina Hitzbleck, Laetitia Avrain, Valerie Smekens, Robert D. Lovchik, Pascal Mertens and Emmanuel Delamarque*

We present capillary soft valves for stopping liquids in capillary-driven microfluidics. These valves are simple to implement and can be actuated by pressing them with, for example, the tip of a pen.

1979



Microreactor with integrated temperature control for the synthesis of CdSe nanocrystals

Sara Gómez-de Pedro, Cynthia S. Martínez-Cisneros, Mar Puyol and Julián Alonso-Chamarro*

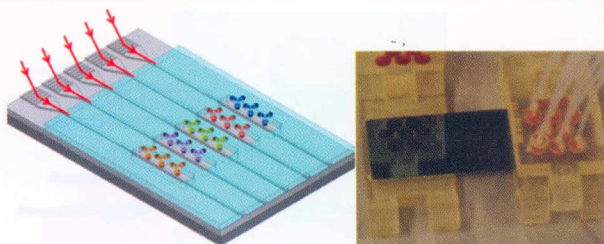
Here we present a ceramic based microfluidic system to perform controlled high temperature synthetic reactions of nanocrystals.

1987

Nanophotonic lab-on-a-chip platforms including novel bimodal interferometers, microfluidics and grating couplers

Daphné Duval, Ana Belén González-Guerrero, Stefania Dante, Johann Osmond, Rosa Monge, Luis J. Fernández, Kirill E. Zinoviev, Carlos Domínguez and Laura M. Lechuga*

We show the implementation of a label-free biosensing LOC platform based on photonic interferometric sensors integrated with a novel all-optical wavelength modulation system, sub-micronic grating couplers and a SU-8 microfluidics network.

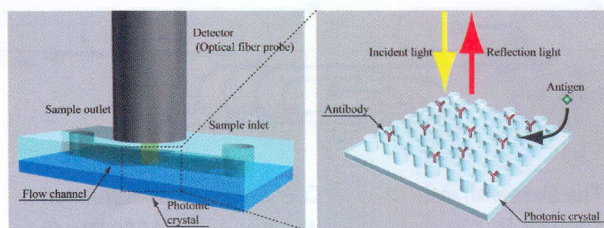


1995

Printed two-dimensional photonic crystals for single-step label-free biosensing of insulin under wet conditions

Tatsuro Endo,* Masaya Sato, Hiroshi Kajita, Norimichi Okuda, Satoru Tanaka and Hideaki Hisamoto

Two-dimensional photonic crystals (2D-PCs) fabricated on a cyclo-olefin polymer (COP) film using a printable photonics technology based on nano-imprint lithography (NIL) were used for label-free biosensing of insulin under wet conditions.

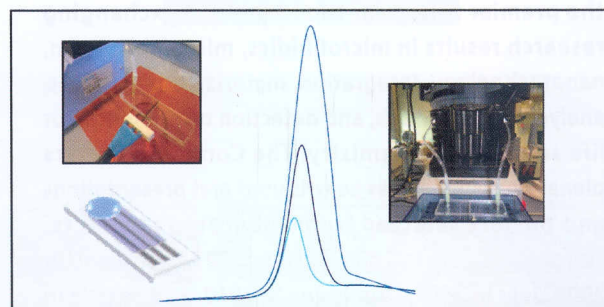


2000

On-chip electrochemical detection of CdS quantum dots using normal and multiple recycling flow through modes

Mariana Medina-Sánchez, Sandrine Miserere, Sergio Marín, Gemma Aragay and Arben Merkoçi*

A flexible hybrid polydimethylsiloxane–polycarbonate microfluidic chip with integrated screen printed electrodes was fabricated and applied for electrochemical quantum dots detection.

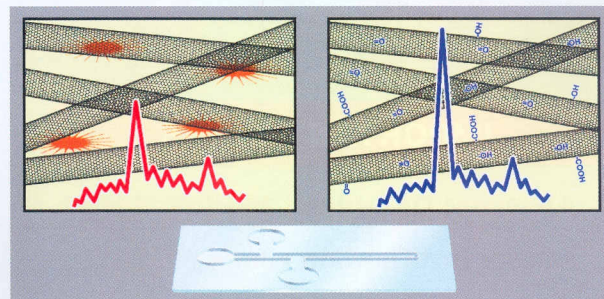


2006

High NIR-purity index single-walled carbon nanotubes for electrochemical sensing in microfluidic chips

Diana Vilela, Alejandro Ansón-Casaos, María Teresa Martínez, María Cristina González and Alberto Escarpa*

High NIR-purity index oxidized SWCNTs for electrochemical sensing in microfluidic chips.



2015

Research highlights

Šeila Selimović, Cole A. DeForest, Mehmet R. Dokmeci and Ali Khademhosseini*

Hydrodynamic tweezers – Combinatorial concentration gradients for drug screening – Culturing endothelial cells on micropillars.



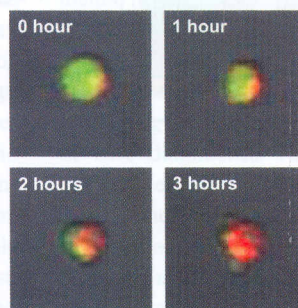
FOCUS

2018

Acoustofluidics 12: Biocompatibility and cell viability in microfluidic acoustic resonators

Martin Wiklund*

In this focus article we discuss the factors defining the biocompatibility of a micro-device for ultrasonic cell manipulation, and different methods to measure cell viability.



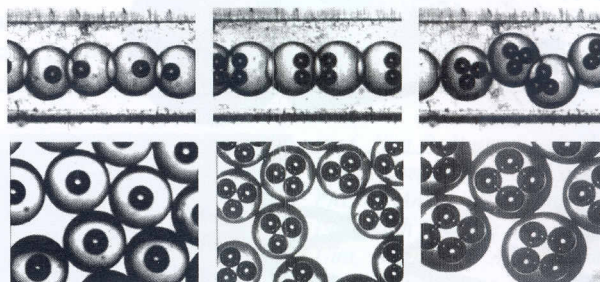
PAPERS

2029

Controllable gas/liquid/liquid double emulsions in a dual-coaxial microfluidic device

Jian-Hong Xu,* Ran Chen, Yun-Dong Wang and Guang-Sheng Luo*

We first successfully prepared monodispersed G/O/W and G/W/O double emulsions with controlled structures in the same dual-coaxial microfluidic device. This simple approach gives a new idea for preparing hollow and porous microspheres with microbubbles as the direct core/pores templates.

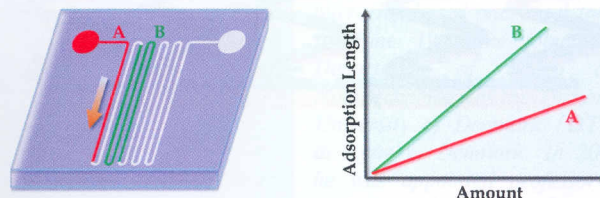


2037

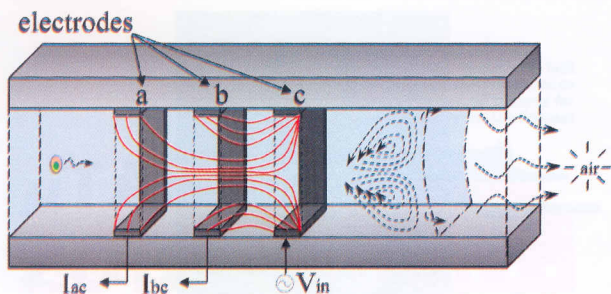
Label-free quantitation of peptide release from neurons in a microfluidic device with mass spectrometry imaging

Ming Zhong, Chang Young Lee, Callie A. Croushore and Jonathan V. Sweedler*

We demonstrate a unique method for quantifying released peptides from neurons based on adsorption length within microfluidic devices.



2046

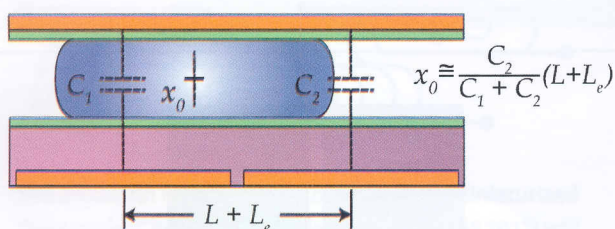


Impedance measurement technique for high-sensitivity cell detection in microstructures with non-uniform conductivity distribution

Andrea Faenza,* Massimo Bocchi, Nicola Pecorari, Eleonora Franchi and Roberto Guerrieri

An innovative impedance measurement technique based on asymmetrical polarization and a division circuit improves cell detection in non-cell-sized microdevices characterized by non-homogeneous physical conditions.

2053

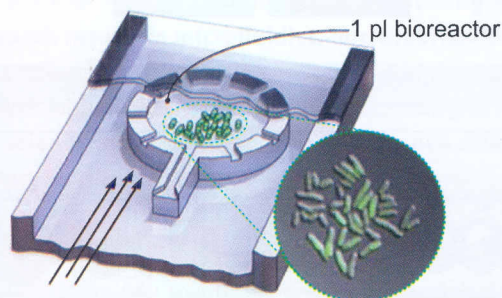


Capacitance-based droplet position estimator for digital microfluidic devices

Miguel Angel Murran and Homayoun Najjarian*

A calibration-free capacitance-based droplet position sensing technique with unparalleled resolution for digital microfluidic systems.

2060

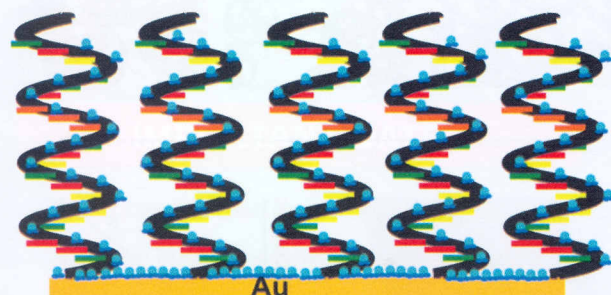


A disposable picolitre bioreactor for cultivation and investigation of industrially relevant bacteria on the single cell level

Alexander Grünberger, Nicole Paczia, Christopher Probst, Georg Schendzielorz, Lothar Eggeling, Stephan Noack, Wolfgang Wiechert and Dietrich Kohlheyer*

An innovative microfluidic pL sized bioreactor device is described allowing continuous cultivation and analysis of industrially relevant microorganisms at single cell resolution.

2069



Monitoring the hydration of DNA self-assembled monolayers using an extensional nanomechanical resonator

Alberto Cagliani,* Priscila Kosaka, Javier Tamayo and Zachary James Davis

Ultrasensitive micromechanical resonator to monitor the hydration properties of ssDNA monolayers. A novel label-free tool for nucleic acid sensors.