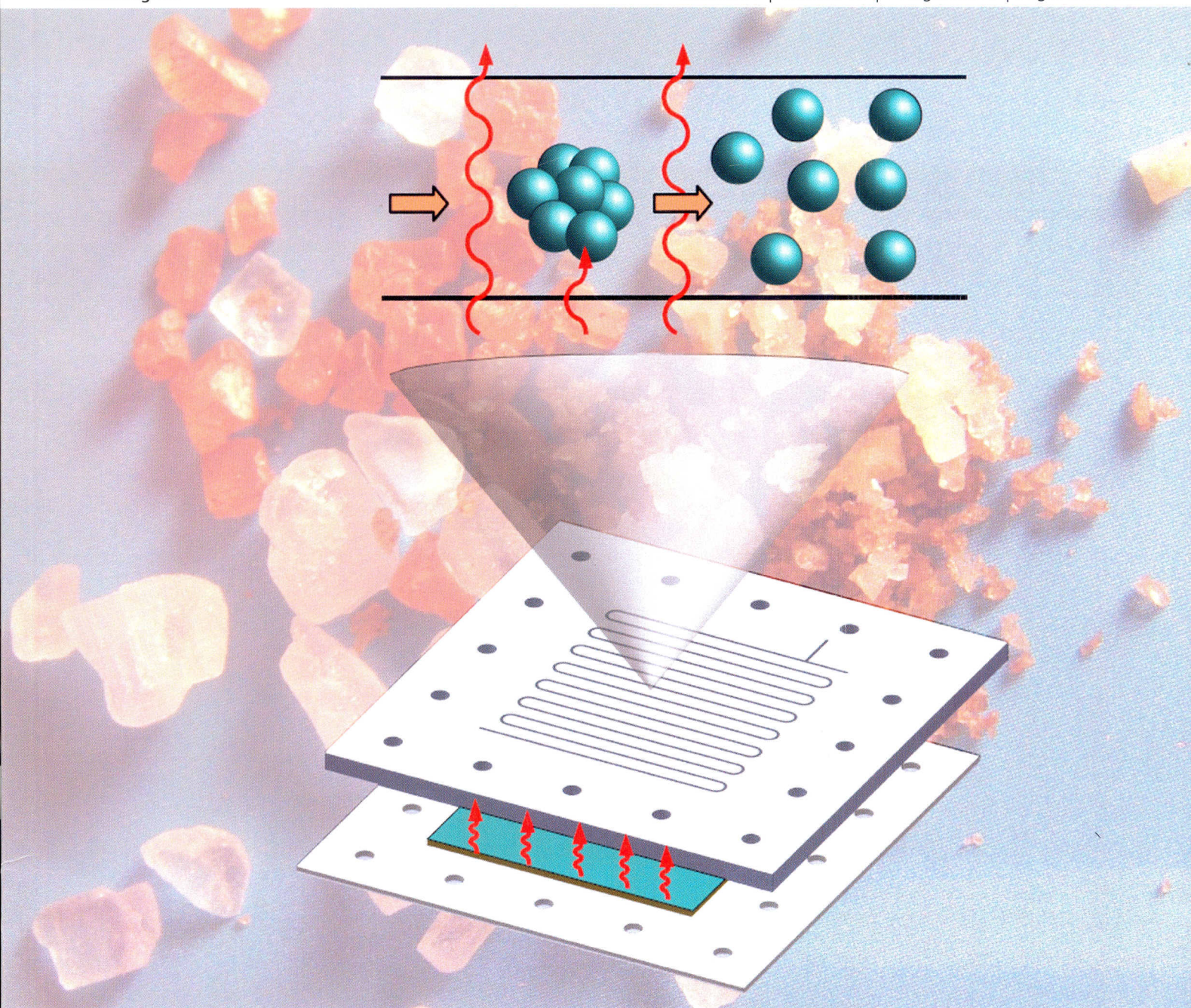


Lab on a Chip

Miniaturisation for chemistry, physics, biology and bioengineering

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PAPER

Klavs F. Jensen *et al.*

A Teflon microreactor with integrated piezoelectric actuator to handle solid forming reactions



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Lab on a Chip

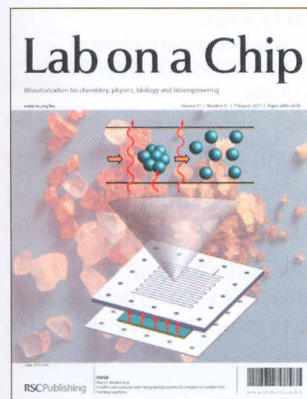
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See Klavs F. Jensen *et al.*, pp. 2488–2492.
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Inside cover

See Dhananjaya Dendukuri *et al.*, pp. 2493–2499.
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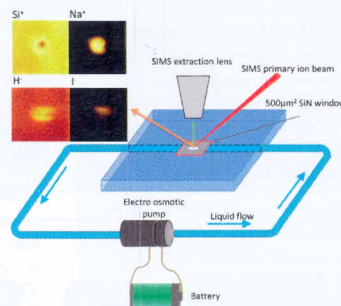
COMMUNICATIONS

2481

Probing liquid surfaces under vacuum using SEM and ToF-SIMS

Li Yang, Xiao-Ying Yu,* Zihua Zhu, Martin J. Iedema and James P. Cowin*

We report the first self-contained microfluidic interface for high-vapor pressure liquid surfaces to vacuum-based analytical instruments like SEM and ToF-SIMS.

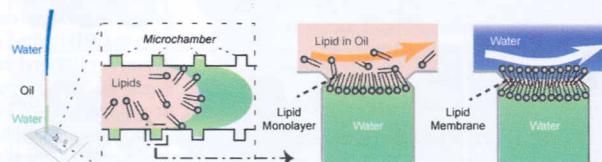


2485

Microfluidic lipid membrane formation on microchamber arrays

Sadao Ota, Hiroaki Suzuki and Shoji Takeuchi*

We present a simple method to form free-standing lipid membranes on arrayed microchambers (>100). The formed membranes are perpendicular to an imaging plane with control of solute concentration on each side of the membranes. This platform let us quantitatively detect membrane transport of non-charged fluorescent molecules, induced by membrane proteins.

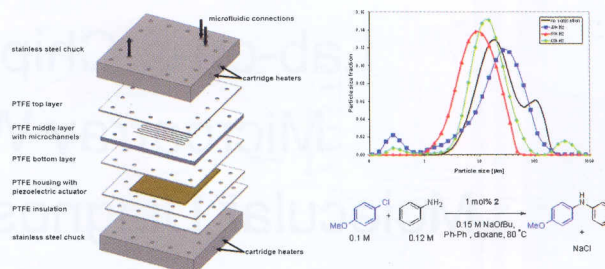


2488

A Teflon microreactor with integrated piezoelectric actuator to handle solid forming reactions

Simon Kuhn, Timothy Noël, Lei Gu, Patrick L. Heider and Klavs F. Jensen*

A sonicated Teflon microreactor to prevent clogging in solid forming reactions.



2493

'Fab-Chips': a versatile, fabric-based platform for low-cost, rapid and multiplexed diagnostics

Paridhi Bhandari,* Tanya Narahari* and Dhananjaya Dendukuri

Weaving of functionalized silk yarn is presented as an integrated, scalable platform for the manufacture of Fab-Chips (fabric chips) for low-cost, rapid and multiplexed diagnostic tests.

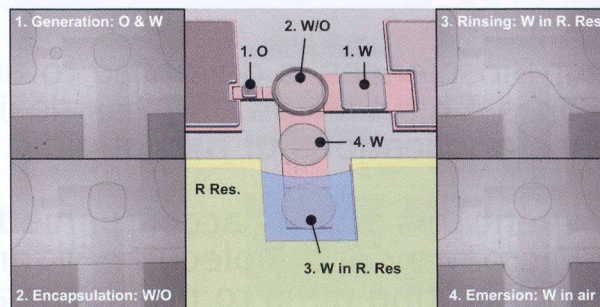


2500

Encapsulated droplets with metered and removable oil shells by electrowetting and dielectrophoresis

Shih-Kang Fan,* Yao-Wen Hsu and Chiun-Hsun Chen

Encapsulated droplets with metered and removable oil shells are demonstrated through the steps of (1) generation, (2) encapsulation, (3) rinsing, and (4) emersion.

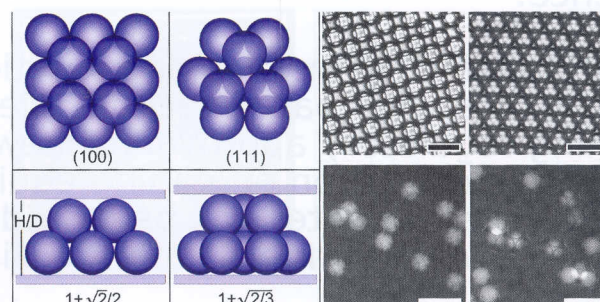


2509

Tunable 3D droplet self-assembly for ultra-high-density digital micro-reactor arrays

Andrew C. Hatch, Jeffrey S. Fisher, Stephen L. Pentoney, David L. Yang and Abraham P. Lee*

We present a tunable three-dimensional (3D) self-assembled droplet packing method to achieve high-density micro-reactor arrays for greater imaging efficiency and higher-throughput chemical and biological assays.

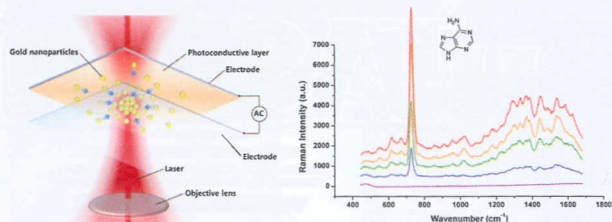


2518

In situ dynamic measurements of the enhanced SERS signal using an optoelectrofluidic SERS platform

Hyundoo Hwang, Dongsik Han, Young-Jae Oh, Yoon-Kyoung Cho, Ki-Hun Jeong and Je-Kyun Park*

In situ measurements of the enhanced SERS signal are demonstrated by using dynamic SERS active sites resulted from optically induced electrokinetic mechanisms.

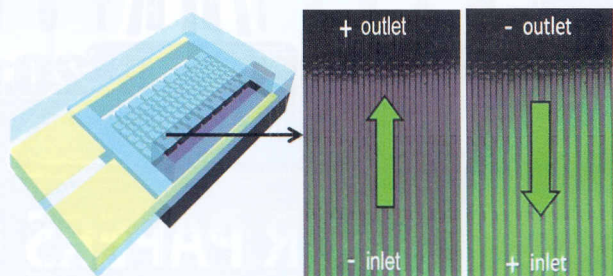


2526

A low-voltage electrokinetic nanochannel drug delivery system

Daniel Fine, Alessandro Grattoni, Erika Zabre, Fazle Hussein, Mauro Ferrari and Xuewu Liu*

We present an actively controlled nanofluidic membrane produced using high precision silicon fabrication techniques that exploits electrophoresis to control the magnitude, duration, and timing of drug release at low voltage.

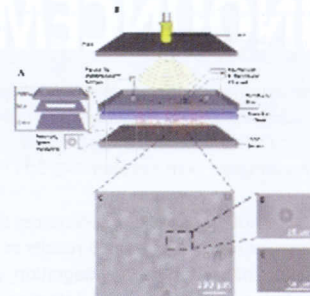


2535

Lensless imaging for simultaneous microfluidic sperm monitoring and sorting

Xiaohui Zhang, Imran Khimji, Umut Atakan Gurkan, Hooman Safaee, Paolo Nicolas Catalano, Hasan Onur Keles, Emre Kayaalp and Utkan Demirci*

We presented an integrated microfluidic based lensless CCD imaging system to realize wide field of view and automatic recording of sperm sorted *in situ*.

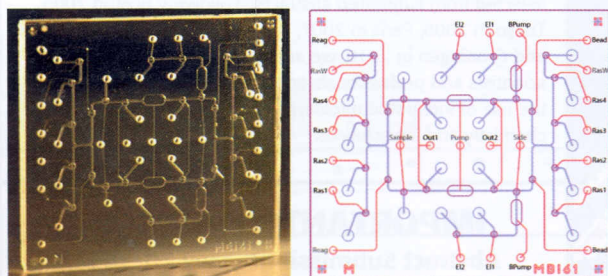


2541

A flexible microfluidic processor for molecular biology: application to microarray sample preparation

Yuan Li, Wendell Jones, Farzaneh Rasti, Iuliu Blaga, Greg Bogdan, David Eberhart, Boris Kobrin, Dongho Lee, Bill Nielsen, Ezra van Gelder, Stevan Jovanovich and Seth Stern*

Amplification of mRNA in a microfluidic device employing on-chip, programmable MOVE™ pumps and valves is demonstrated.

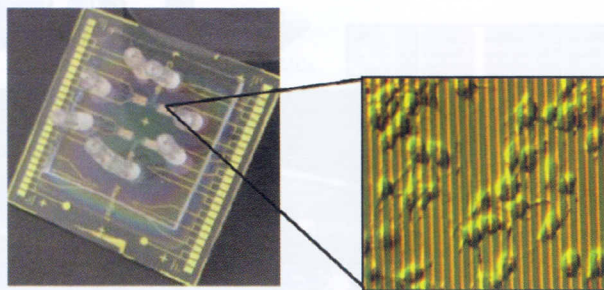


2551

Monitoring cellular stress responses to nanoparticles using a lab-on-a-chip

Lukas Richter, Verena Charwat, Christian Jungreuthmayer, Florian Bellutti, Hubert Brueckl and Peter Ertl*

Monitoring collagen production of normal human dermal fibroblast cells using contactless dielectric microsensors.

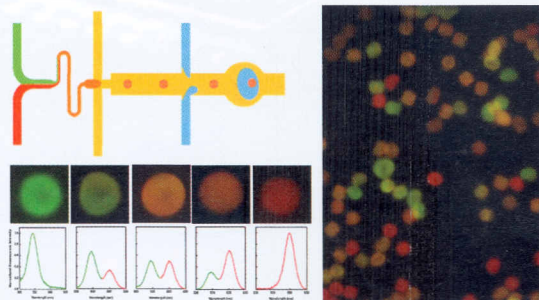


2561

On-demand preparation of quantum dot-encoded microparticles using a droplet microfluidic system

Xing-Hu Ji, Wei Cheng, Feng Guo, Wei Liu, Shi-Shang Guo, Zhi-Ke He* and Xing-Zhong Zhao*

We present a simple and robust approach for on-demand preparation of quantum dot-encoded alginate hydrogel microparticles based on a droplet microfluidic system.

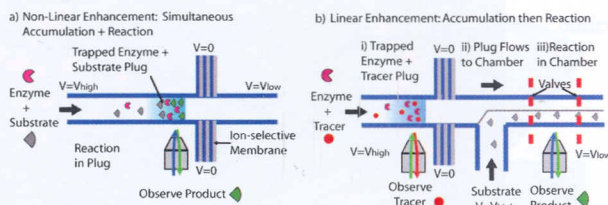


2569

Non-linear and linear enhancement of enzymatic reaction kinetics using a biomolecule concentrator

Aniruddh Sarkar and Jongyoon Han*

Concentration-enhanced enzyme activity assays in nanofluidic biomolecule concentrator chips are investigated by mathematical model and experiments. A new linear enhancement mode with accumulation followed by reaction is proposed and demonstrated using a device with an integrated reaction chamber.

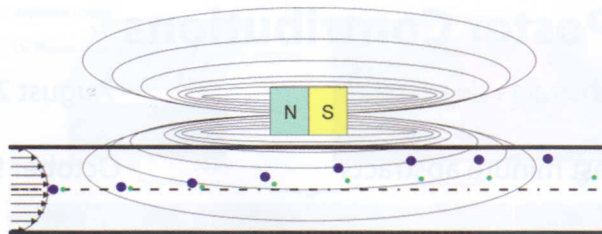


2577

Microfluidic immunomagnetic multi-target sorting – a model for controlling deflection of paramagnetic beads

Scott S. H. Tsai, Ian M. Griffiths and Howard A. Stone*

The development and testing of a design parameter for microfluidic systems that sort magnetic beads based on size and susceptibility.

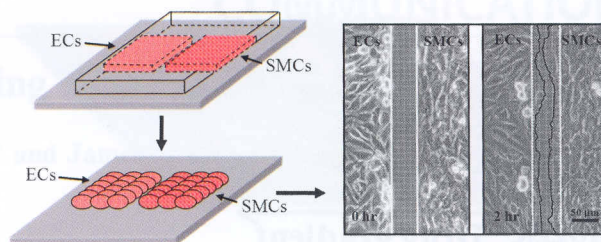


2583

Using a co-culture microsystem for cell migration under fluid shear stress

Chia-Hsien Yeh, Shen-Hsing Tsai, Li-Wen Wu* and Yu-Cheng Lin*

Two types of cells were co-cultivated in a defined gap for cell migration under a shear stress flow.

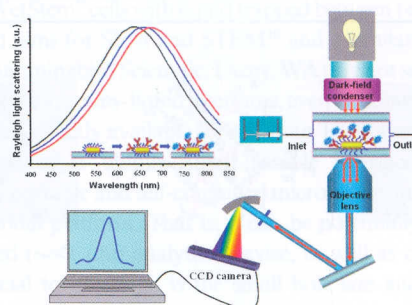


2591

A new method for non-labeling attomolar detection of diseases based on an individual gold nanorod immunosensor

Phuoc Long Truong, Cuong Cao, Sungho Park, Moonil Kim and Sang Jun Sim*

By indirectly displacing CTAB, tightly packed on the Au nanorod surface, with OEG₆ before LSPR sensing, an individual Au nanorod immunosensor was successfully utilized for non-labeling detection of PSA antigen based on Rayleigh light scattering responding to changes in RI induced by adsorbates.

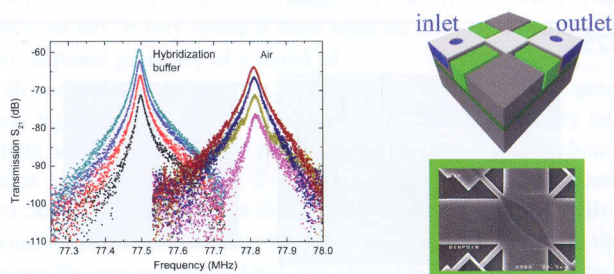


2598

An embedded microchannel in a MEMS plate resonator for ultrasensitive mass sensing in liquid

V. Agache,* G. Blanco-Gomez,* F. Baleras and P. Caillat

An innovative square plate resonator mass sensor integrating a fluidic conduit which can perform high sensitivity detection in ambient conditions is demonstrated.

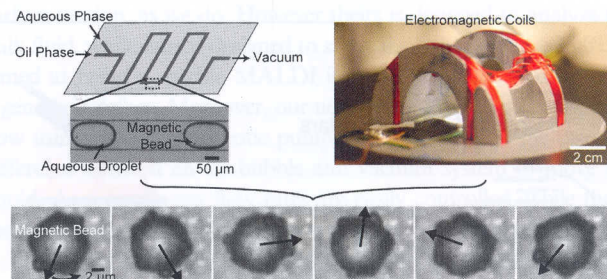


2604

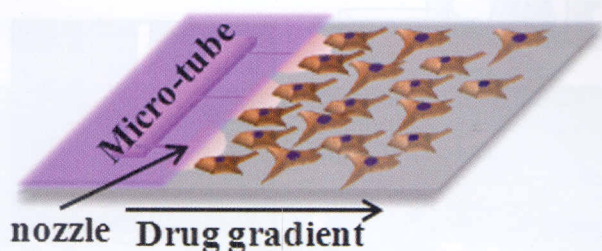
Asynchronous magnetic bead rotation (AMBR) biosensor in microfluidic droplets for rapid bacterial growth and susceptibility measurements

Irene Sinn, Paivo Kinnunen, Theodore Albertson, Brandon H. McNaughton, Duane W. Newton, Mark A. Burns and Raoul Kopelman*

A magnetic bead compartmentalized in a microfluidic droplet rotates when placed within electromagnetic coils. With this platform, bacterial cell growth can be monitored by measuring changes in the bead's rotational rate.



2612



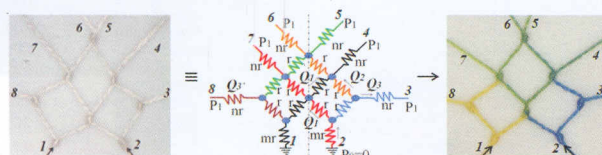
Integrated and diffusion-based micro-injectors for open access cell assays

Xin Li, Li Liu, Li Wang, Ken-ichiro Kamei, Qinghua Yuan, Fan Zhang, Jian Shi, Akihiro Kusumi, Min Xie, Zhenjie Zhao and Yong Chen*

Tube-like micro-channels could be plated with large open access areas for perspective biological applications.

TECHNICAL NOTES

2618

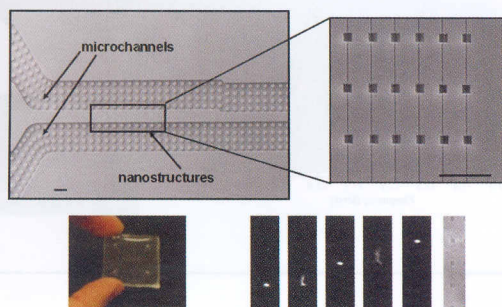


Microfluidics made of yarns and knots: from fundamental properties to simple networks and operations

Roozbeh Safavieh, Gina Z. Zhou and David Juncker*

We introduce microfluidic circuits made of yarns and knots and characterize their properties. We found that knots with different topologies produce different mixing ratios and that by selecting a suitable knot, fluidic circuits can be designed and modeled analogously to electrical circuits, which is illustrated by the serial dilutor shown in the image.

2625

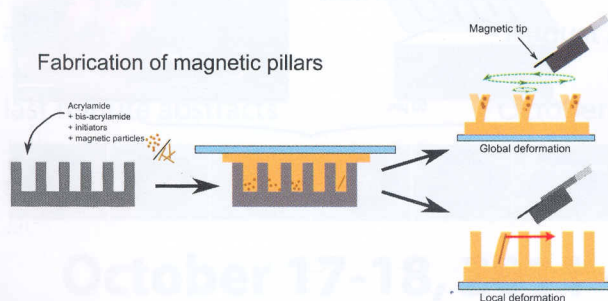


DNA manipulation with elastomeric nanostructures fabricated by soft-moulding of a FIB-patterned stamp

Elena Angeli,* Chiara Manneschi, Luca Repetto, Giuseppe Firpo and Ugo Valbusa

Novel elastomeric devices for DNA manipulation, through nanoconfinement effects, were demonstrated by replicating a FIB patterned silicon stamp.

2630



Magnetic micropillars as a tool to govern substrate deformations

Jimmy le Digabel, Nicolas Biais, Jérôme Fresnais, Jean-François Berret, Pascal Hersen and Benoit Ladoux*

By combining microfabrication and the dispersion of magnetic aggregates into polymeric matrices, we present a strategy to create magnetically actuated micropillar structures that allow to control substrate deformations.