

Lab on a Chip

Devices and applications at the micro- and nanoscale
rsc.li/loc

The Royal Society of Chemistry is the world's leading chemistry community. Through our high impact journals and publications we connect the world with the chemical sciences and invest the profits back into the chemistry community.

IN THIS ISSUE

ISSN 1473-0197 CODEN LCAHAM 23(7) 1717-1958 (2023)



Cover
See Chan Kwon and Aram J. Chung, pp. 1758–1767. Image reproduced by permission of Aram J. Chung from *Lab Chip*, 2023, 23, 1758.



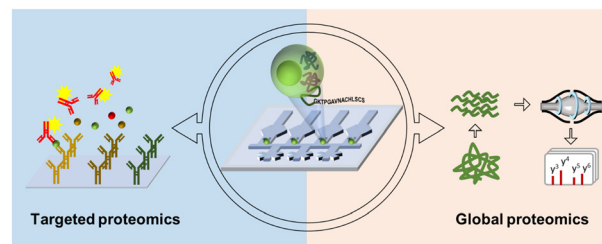
Inside cover
See Pouyan E. Boukany et al., pp. 1768–1778. Image reproduced by permission of Pouyan E. Boukany from *Lab Chip*, 2023, 23, 1768.

CRITICAL REVIEW

1726

Recent advances in microfluidics for single-cell functional proteomics

Sofani Tafesse Gebreyesus, Gul Muneer, Chih-Cheng Huang, Asad Ali Siyal, Mihir Anand, Yu-Ju Chen and Hsiung-Lin Tu*

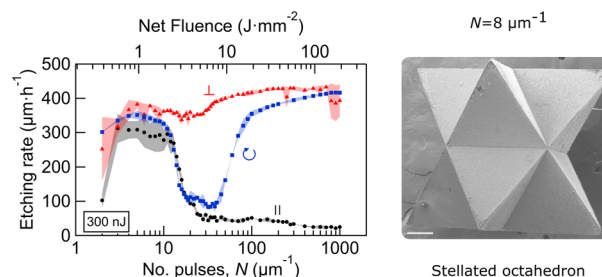


COMMUNICATION

1752

Polarisation-independent ultrafast laser selective etching processing in fused silica

Mario Ochoa,* Pablo Roldán-Varona, José Francisco Algorri, José Miguel López-Higuera and Luis Rodríguez-Cobo



Editorial Staff

Executive Editor

Philippa Ross

Deputy Editor

Alice Smallwood

Editorial Production Manager

Jason Woolford

Development Editor

David Lake

Publishing Editors

Gabriel Clarke, Derya Kara-Fisher, Cara Sutton, Ziva Whitelock

Editorial Assistant

Leo Curtis

Publishing Assistant

Andrea Whiteside

Publisher

Jeanne Andres

For queries about submitted papers please contact Jason Woolford, Editorial Production Manager, in the first instance. E-mail: loc@rsc.org

For pre-submission queries please contact Philippa Ross, Executive Editor. E-mail: loc-rsc@rsc.org

Lab on a Chip (electronic: ISSN 1473-0189) is published 24 times a year by the Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge, UK CB4 0WF.

All orders, with cheques made payable to the Royal Society of Chemistry, should be sent to the Royal Society of Chemistry Order Department, Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge, CB4 0WF, UK

Tel +44 (0)1223 432398; E-mail orders@rsc.org

2023 Annual (electronic) subscription price: £1617; US\$2902.

Customers in Canada will be subject to a surcharge to cover GST. Customers in the EU subscribing to the electronic version only will be charged VAT.

If you take an institutional subscription to any Royal Society of Chemistry journal you are entitled to free, site-wide web access to that journal. You can arrange access via Internet Protocol (IP) address at www.rsc.org/ip

Customers should make payments by cheque in sterling payable on a UK clearing bank or in US dollars payable on a US clearing bank.

Whilst this material has been produced with all due care, the Royal Society of Chemistry cannot be held responsible or liable for its accuracy and completeness, nor for any consequences arising from any errors or the use of the information contained in this publication. The publication of advertisements does not constitute any endorsement by the Royal Society of Chemistry or Authors of any products advertised. The views and opinions advanced by contributors do not necessarily reflect those of the Royal Society of Chemistry which shall not be liable for any resulting loss or damage arising as a result of reliance upon this material. The Royal Society of Chemistry is a charity, registered in England and Wales, Number 207890, and a company incorporated in England by Royal Charter (Registered No. RC000524), registered office: Burlington House, Piccadilly, London W1J 0BA, UK, Telephone: +44 (0) 207 4378 6556.

Advertisement sales:

Tel +44 (0) 1223 432246; Fax +44 (0) 1223 426017;

E-mail advertising@rsc.org

For marketing opportunities relating to this journal, contact marketing@rsc.org

Lab on a Chip

Devices and applications at the micro- and nanoscale

rsc.li/loc

Lab on a Chip provides a unique forum for the publication of significant and original work related to miniaturisation, at the micro- and nano-scale, of interest to a multidisciplinary readership. The journal seeks to publish work at the interface between physical technological advancements and high impact applications that are of direct interest to a broad audience.

Editorial board

Editor-in-Chief

Aaron Wheeler, University of Toronto, Canada

Associate Editors

Jean-Christophe Baret, University of

Bordeaux

Yoon-Kyoung Cho, UNIST, South Korea

Amy Herr, University of California, Berkeley,

USA

Séverine Le Gac, University of Twente,

The Netherlands

Hang Lu, Georgia Institute of Technology, USA

Xingyu Jiang, Southern University of Science

and Technology, Shenzhen, China

Manabu Tokeshi, Hokkaido University, Japan

Hongkai Wu, Hong Kong University of Science

and Technology, China

Advisory Board

Esther Amstad, Swiss Federal Institute of

Technology in Lausanne (EPFL), Switzerland

Yoshinobu Baba, Nagoya University, Japan

Holger Becker, microfluidic ChipShop GmbH,

Germany

Anja Boisen, Technical University of Denmark,

Denmark

Oscar Ces, Imperial College London, UK

Dino Di Carlo, University of California, Los

Angeles, USA

Stephanie Descroix, Institut Curie, France

Petra Dittrich, ETH Zurich, Switzerland

Xudong Fan, University of Michigan, USA

Qun Fang, Zhejiang University, China

Albert Folch, University of Washington, USA

Piotr Garstecki, Institute of Physical Chemistry

of the Polish Academy of Sciences, Poland

Martin A. M. Gijs, EPFL, Switzerland

Mark Gilligan, Dolomite, UK

Keisuke Goda, University of Tokyo, Japan

Mei He, University of Kansas, USA

Tony Jun Huang, Duke University, USA

Yanyi Huang, Peking University, China

Daniel Irimia, Massachusetts General

Hospital, USA

David Issadore, University of Pennsylvania,

USA

Noo Li Jeon, Seoul National University, South

Korea

Michelle Khine, University of California,

Irvine, USA

Sunghoon Kwon, Seoul National University,

South Korea

Wlibur Lam, Georgia Institute of Technology

and Emory University, USA

Abraham Lee, University of California, Irvine,

USA

Gwo-Bin Lee, National Tsing Hua University,

Taiwan

Weihua Li, University of Wollongong, Australia

Xiujun Li, University of Texas at El Paso, USA

Chwee Teck Lim, National University of

Singapore, Singapore

Ai Qun Liu, Nanyang Technological University,

Singapore

Adrian Neild, Monash University, Australia

Nam-Trung Nguyen, Griffith University,

Australia

Nicole Pamme, Stockholm University, Sweden

Ian Papautsky, University of Illinois at Chicago,

USA

Jianhua Qin, Dalian Institute of Chemical

Physics, China

Sámuel Sánchez, Institute of Bioengineering of

Catalonia, Spain

Anderson Shum, University of Hong Kong,

China

David Sinton, University of Toronto, Canada

Shoji Takeuchi, University of Tokyo, Japan

Sindy Tang, Stanford University, USA

Yi-Chin Toh, Queensland University of

Technology, Australia

Albert van den Berg, University of Twente,

The Netherlands

Joel Voldman, Massachusetts Institute of

Technology, USA

Jeff Tza-Huei Wang, Johns Hopkins University,

USA

David Weitz, Harvard University, USA

George Whitesides, Harvard University, USA

Chaoyong James Yang, Xiamen University,

China

Po Ki Yuen, Corning Incorporated, New

York, USA

Roland Zengerle, Hahn-Schickard, Germany

Weian Zhao, University of California, Irvine,

USA

Information for Authors

Full details on how to submit material for publication in *Lab on a Chip* are given in the Instructions for Authors (available from <http://www.rsc.org/authors>). Submissions should be made via the journal's homepage: rsc.li/loc

Authors may reproduce/republish portions of their published contribution without seeking permission from the Royal Society of Chemistry, provided that any such republication is accompanied by an acknowledgement in the form: (Original Citation)–Reproduced by permission of the Royal Society of Chemistry.

This journal is © The Royal Society of Chemistry 2023.

Apart from fair dealing for the purposes of research or private study for non-commercial purposes, or criticism or review, as permitted under the Copyright, Designs and Patents Act 1988 and the Copyright and Related Rights Regulation 2003, this publication may only be reproduced, stored or transmitted, in any form or by any means, with the prior permission in writing of the Publishers or in the case of reprographic reproduction in accordance with the terms of licences issued by the Copyright Licensing Agency in the UK. US copyright law is applicable to users in the USA.

© The paper used in this publication meets the requirements of ANSI/NISO Z39.48-1992 (Permanence of Paper).

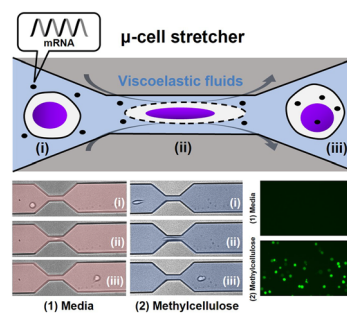
Registered charity number: 207890



1758

Highly efficient mRNA delivery with nonlinear microfluidic cell stretching for cellular engineering

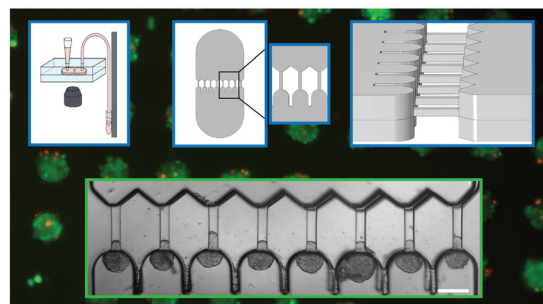
Chan Kwon and Aram J. Chung*



1768

High-throughput mechanophenotyping of multicellular spheroids using a microfluidic micropipette aspiration chip

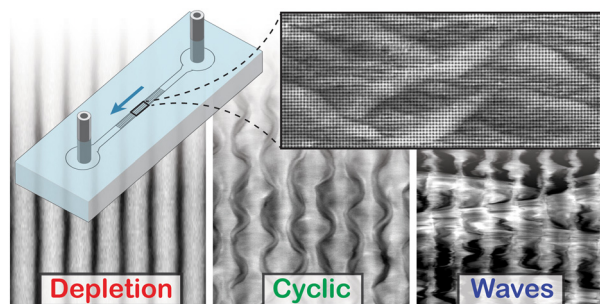
Ruben C. Boot, Alessio Roscani, Lennard van Buren, Samadarshi Maity, Gijse H. Koenderink and Pouyan E. Boukany*



1779

Short and long-range cyclic patterns in flows of DNA solutions in microfluidic obstacle arrays

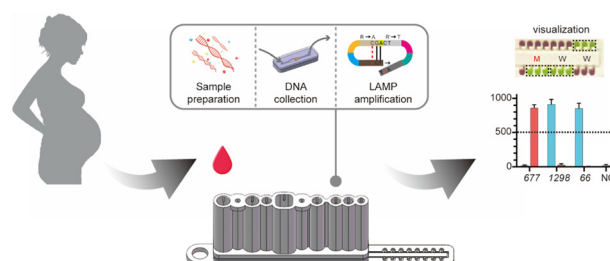
Oskar E. Ström, Jason P. Beech and Jonas O. Tegenfeldt*



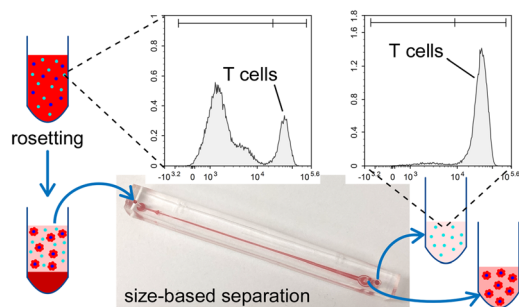
1794

A fully integrated nucleic acid analysis system for multiplex detection of genetic polymorphisms related to folic acid metabolism

Baobao Lin, Zhi Geng, Yanjing Chen, Wu Zeng, Bao Li, Yan Zhang* and Peng Liu*



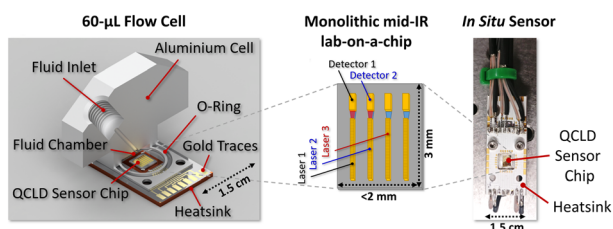
1804



Red blood cell rosetting enables size-based separation of specific lymphocyte subsets from blood in a microfluidic device

Kumar Abhishek, Anto Sam Crosslee Louis Sam Titus, Mai T. P. Dinh, Anton Mukhamedshin, Chandra Mohan, Sean C. Gifford and Sergey S. Shevkopyas*

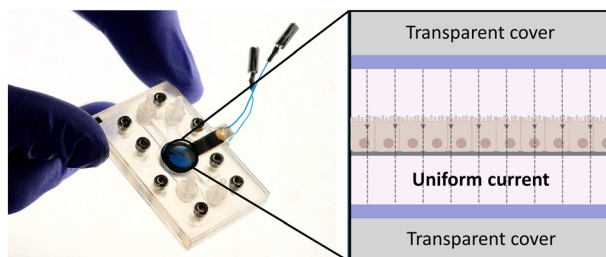
1816



Beyond Karl Fischer titration: a monolithic quantum cascade sensor for monitoring residual water concentration in solvents

Florian Pilat,* Benedikt Schwarz, Bettina Baumgartner, Daniela Ristanić, Hermann Detz, Aaron M. Andrews, Bernhard Lendl, Gottfried Strasser and Borislav Hinkov*

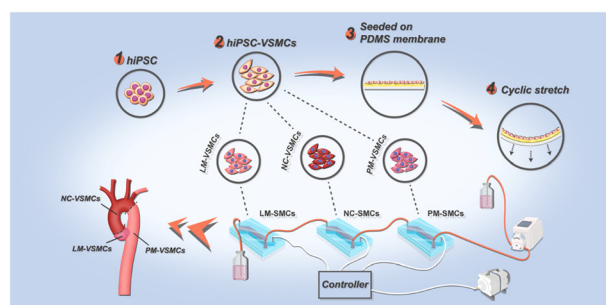
1825



Organ-on-a-chip with integrated semitransparent organic electrodes for barrier function monitoring

Denise Marrero, Anton Guimera, Laure Maes, Rosa Villa, Mar Alvarez* and Xavi Illa*

1835



A hiPSC-derived lineage-specific vascular smooth muscle cell-on-a-chip identifies aortic heterogeneity across segments

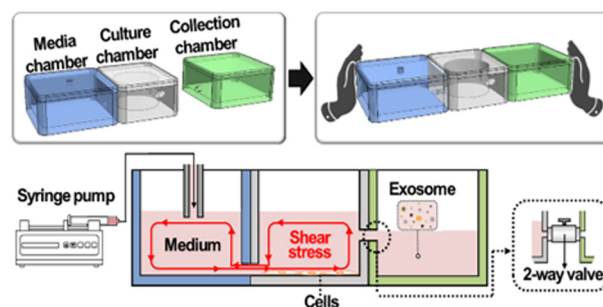
Gang Liu, Jun Li, Yang Ming, Bitao Xiang, Xiaonan Zhou, Yabin Chen, Nan Chen, Mieradilijiang Abudupataer, Shichao Zhu, Xiaoning Sun, Yongxin Sun, Hao Lai, Sisi Feng,* Chunsheng Wang* and Kai Zhu*



1852

Modularized dynamic cell culture platform for efficient production of extracellular vesicles and sequential analysis

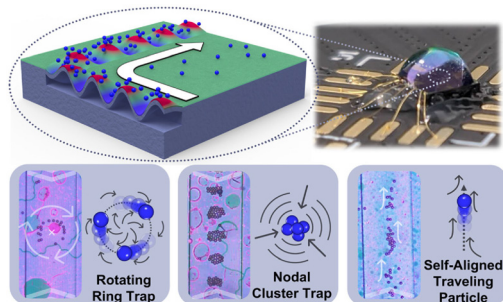
Seo Yeon Kim, Seong Min Ha, Dong-Uk Kim, Junhyun Park, Sunyoung Park, Kyung-A Hyun* and Hyo-Il Jung*



1865

Microfabricated acoustofluidic membrane acoustic waveguide actuator for highly localized in-droplet dynamic particle manipulation

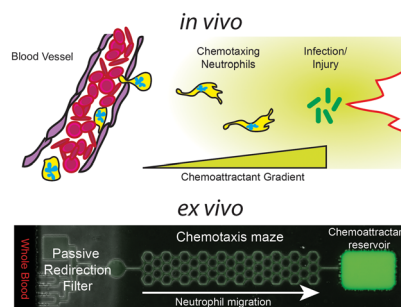
Philippe Vachon,* Srinivas Merugu, Jaibir Sharma, Amit Lal, Eldwin J. Ng, Yul Koh, Joshua E.-Y. Lee and Chengkuo Lee



1879

Passive redirection filters minimize red blood cell contamination during neutrophil chemotaxis assays using whole blood

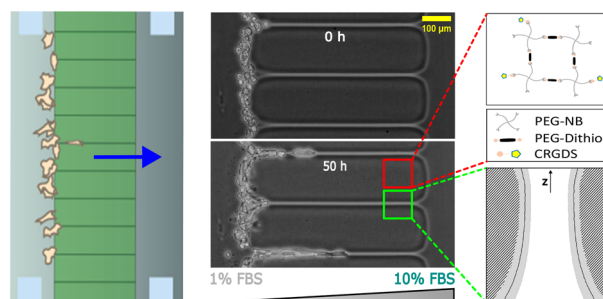
Felix Ellett* and Daniel Irimia*



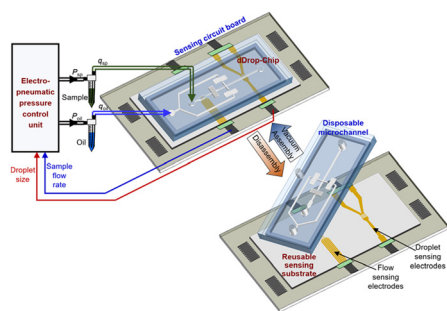
1886

Photolithographic microfabrication of hydrogel clefts for cell invasion studies

Stefan Stöberl, Miriam Balles, Thomas Kellerer and Joachim O. Rädler*



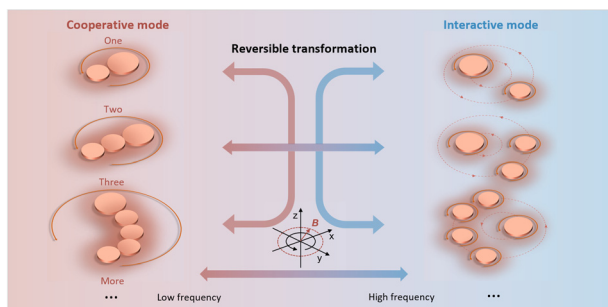
1896



dDrop-Chip: disposable film-chip microfluidic device for real-time droplet feedback control

Jaewook Ryu, Junhyeong Kim and Ki-Ho Han*

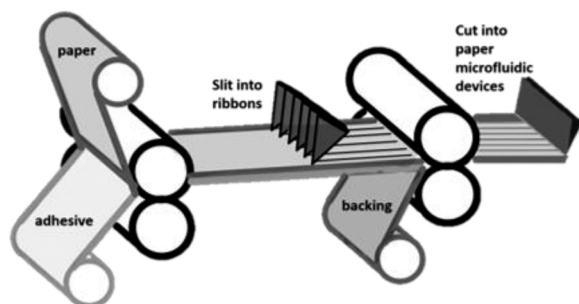
1905



Dynamically reversible cooperation and interaction of multiple rotating micromotors

Shilu Zhu, Yifan Cheng, Jialong Chen, Guangli Liu, Tingting Luo and Runhuai Yang*

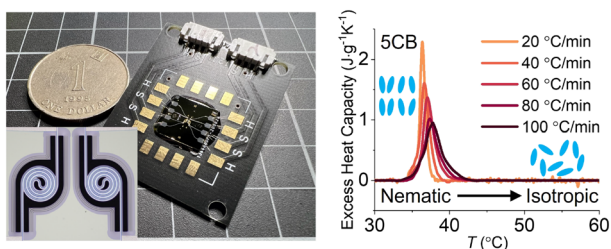
1918



The air-gap PAD: a roll-to-roll-compatible fabrication method for paper microfluidics

Rachel M. Roller, Angela Rea and Marya Lieberman*

1926



Sub-nL thin-film differential scanning calorimetry chip for rapid thermal analysis of liquid samples

Sheng Ni, Hanliang Zhu, Pavel Neuzil and Levent Yobas*

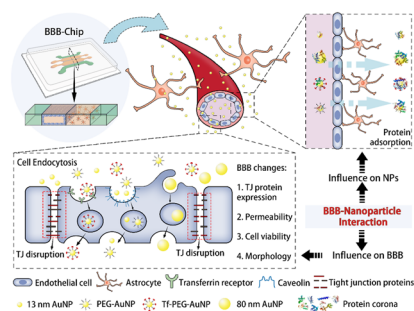


PAPERS

1935

Understanding drug nanocarrier and blood–brain barrier interaction based on a microfluidic microphysiological model

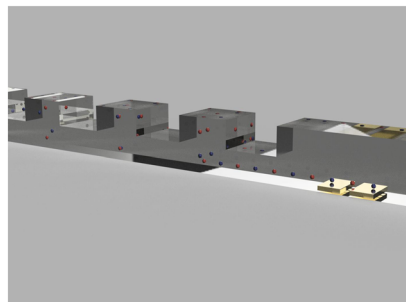
Yuanyuan Fan, Chang Xu, Ning Deng, Ze Gao, Zhongyao Jiang, Xiaoxiao Li, Yingshun Zhou, Haimeng Pei, Lu Li* and Bo Tang*



1945

High-throughput multi-gate microfluidic resistive pulse sensing for biological nanoparticle detection

June Soo Kim, Soon Yeol Kwon, Jae Yong Lee, Seung Deok Kim, Da Ye Kim, Hyunjun Kim, Noah Jang, Jijie Wang, Maeum Han* and Seong Ho Kong*



CORRECTIONS

1954

Correction: Organ-on-a-chip with integrated semitransparent organic electrodes for barrier function monitoring

Denise Marrero, Anton Guimera, Laure Maes, Rosa Villa, Mar Alvarez* and Xavi Illa*

1955

Correction: Virtual microwells for digital microfluidic reagent dispensing and cell culture

Irwin A. Eydellant, Uvaraj Uddayasankar, Bingyu 'Betty' Li, Meng Wen Liao and Aaron R. Wheeler*

