

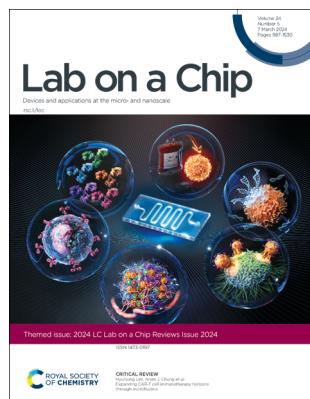
Lab on a Chip

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.

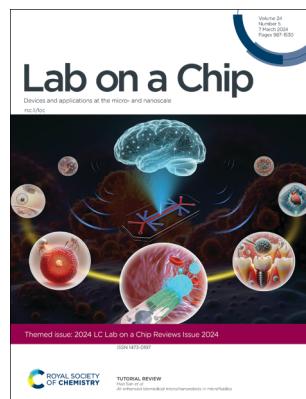
IN THIS ISSUE

ISSN 1473-0197 CODEN LCAHAM 24(5) 987–1530 (2024)



Cover

See Hyunjung Lim,
Aram J. Chung *et al.*,
pp. 1229–1261.
Image reproduced by
permission of Aram Chung
from *Lab Chip*, 2024, 24, 1229.



Inside cover

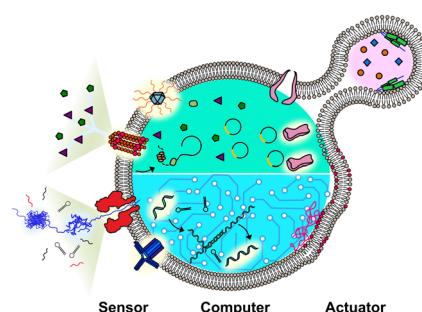
See Hao Sun *et al.*,
pp. 1419–1440.
Image reproduced by
permission of Hao Sun
from *Lab Chip*, 2024, 24, 1419.

PERSPECTIVES

996

Lipid vesicle-based molecular robots

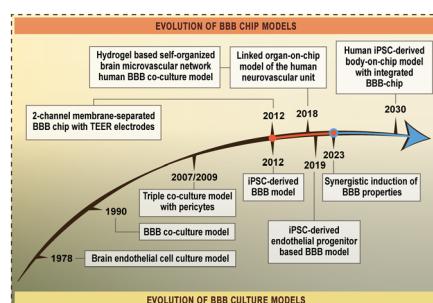
Zugui Peng, Shoji Iwabuchi, Kayano Izumi, Sotaro Takiguchi, Misa Yamaji, Shoko Fujita, Harune Suzuki, Fumika Kambara, Genki Fukasawa, Aileen Cooney, Lorenzo Di Michele,* Yuval Elani,* Tomoaki Matsuura* and Ryuji Kawano*



1030

Lab-on-a-chip models of the blood–brain barrier: evolution, problems, perspectives

Mária A. Deli,* Gergő Porkoláb, András Kincses, Mária Mészáros, Anikó Szecskó, Anna E. Kocsis, Judit P. Vigh, Sándor Valkai, Szilvia Veszelka, Fruzsina R. Walter and András Dér





RSC Advances

At the heart of open access for the global chemistry community

Editor-in-chief

Russell J Cox

Leibniz Universität Hannover, Germany

We stand for:



Breadth We publish work in all areas of chemistry and reach a global readership



Quality Research to advance the chemical sciences undergoes rigorous peer review for a trusted, society-run journal



Affordability Low APCs, discounts and waivers make publishing open access achievable and sustainable



Community Led by active researchers, we publish quality work from scientists at every career stage, and all countries

Submit your work now

rsc.li/rsc-advances

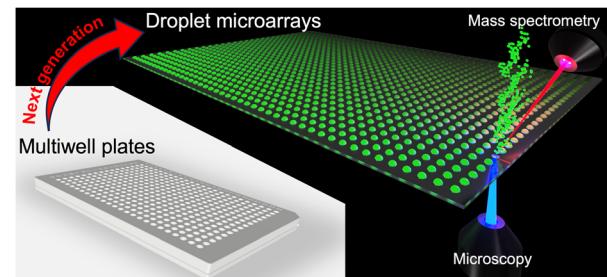
@RSC_Adv

PERSPECTIVES

1064

Open microfluidics: droplet microarrays as next generation multiwell plates for high throughput screening

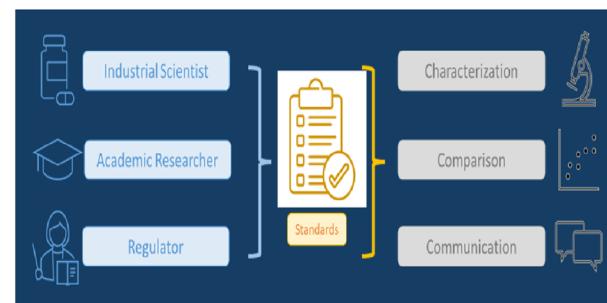
Robert Strutt, Bijing Xiong, Vanessa Fabienne Abegg and Petra S. Dittrich*



1076

From animal testing to *in vitro* systems: advancing standardization in microphysiological systems

Darwin R. Reyes,* Mandy B. Esch, Lorna Ewart, Rohollah Nasiri, Anna Herland, Kyung Sung, Monica Piergiovanni, Carolina Lucchesi, James T. Shoemaker, Jelena Vukasinovic, Hiroki Nakae, James Hickman, Kapil Pant, Anne Taylor, Niki Heinz and Nureddin Ashammakhi*

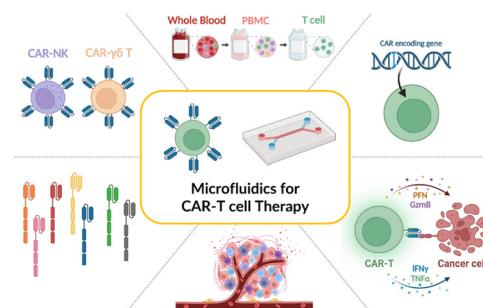


CRITICAL REVIEWS

1088

Expanding CAR-T cell immunotherapy horizons through microfluidics

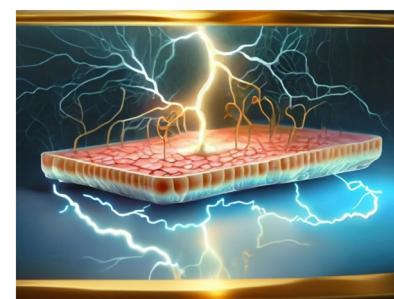
Hyelee Kim, Suyeon Kim, Hyunjung Lim* and Aram J. Chung*



1121

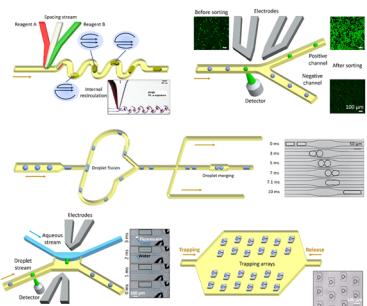
Innovative electrode and chip designs for transendothelial electrical resistance measurements in organs-on-chips

Muriel A. Holzreuter* and Loes I. Segerink



CRITICAL REVIEWS

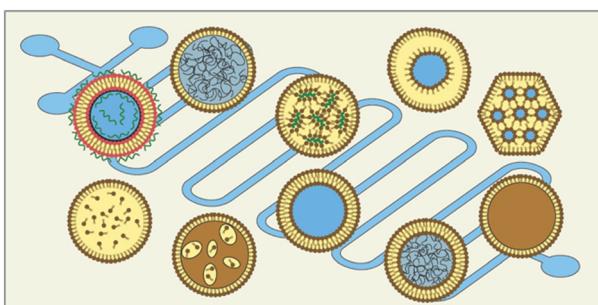
1135



Development and future of droplet microfluidics

Lang Nan, Huidan Zhang, David A. Weitz
and Ho Cheung Shum*

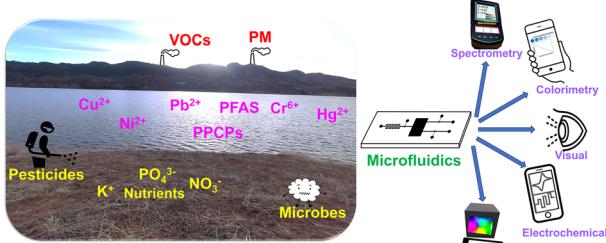
1154



Microfluidic synthesis of lipid-based nanoparticles for drug delivery: recent advances and opportunities

Sima Mehrabi and Don L. DeVoe*

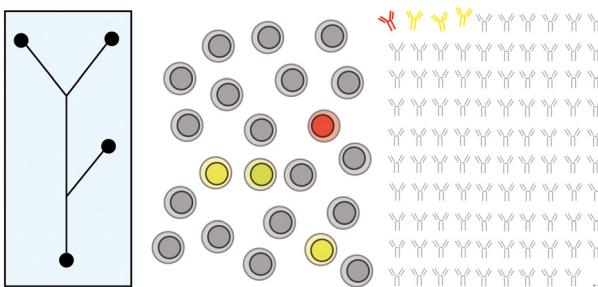
1175



Microfluidics in environmental analysis: advancements, challenges, and future prospects for rapid and efficient monitoring

Prakash Aryal, Claire Hefner, Brandaise Martinez
and Charles S. Henry*

1207



Antibodies, repertoires and microdevices in antibody discovery and characterization

Luca Johannes Schlotheuber, Ines Lüchtefeld
and Klaus Eyer*

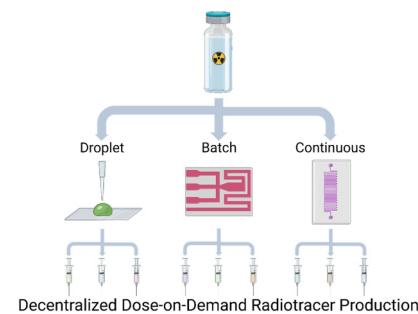


CRITICAL REVIEWS

1226

Microfluidic synthesis of radiotracers: recent developments and commercialization prospects

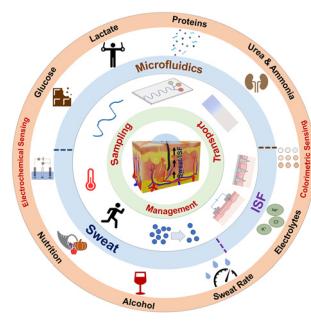
Mark Mc Veigh and Leon M. Bellan*



1244

Harvesting and manipulating sweat and interstitial fluid in microfluidic devices

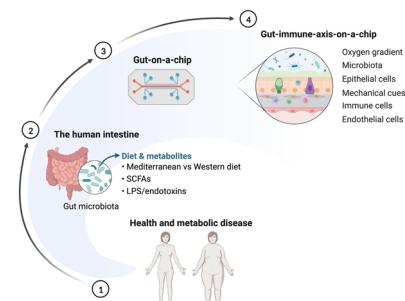
Tamoghna Saha,* Sneha Mukherjee, Michael D. Dickey* and Orlin D. Velev*



1266

Lab-on-chip technologies for exploring the gut-immune axis in metabolic disease

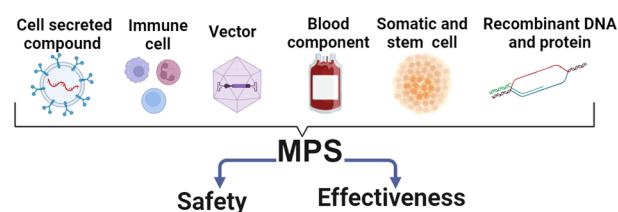
Alexandra E. Wheeler, Verena Stoeger and Róisín M. Owens*



1293

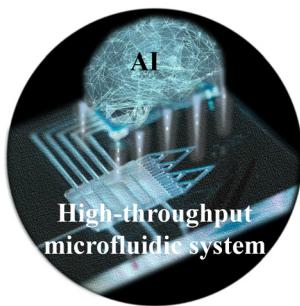
Progress in developing microphysiological systems for biological product assessment

Mona Mansouri, Johnny Lam and Kyung E. Sung*



CRITICAL REVIEWS

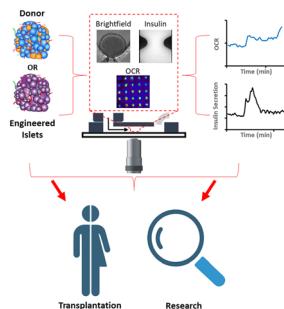
1307



High-throughput microfluidic systems accelerated by artificial intelligence for biomedical applications

Jianhua Zhou, Jianpei Dong, Hongwei Hou, Lu Huang* and Jinghong Li*

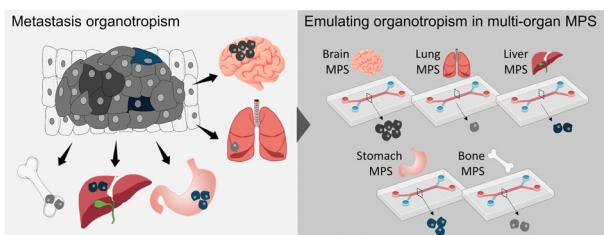
1327



Twenty years of islet-on-a-chip: microfluidic tools for dissecting islet metabolism and function

Romario Regeenes and Jonathan V. Rocheleau*

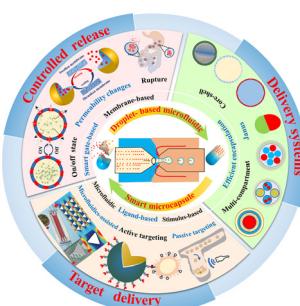
1351



Recent advances in micro-physiological systems for investigating tumor metastasis and organotropism

Heejeong Yoon, Jonathan Sabaté del Río, Seung Woo Cho and Tae-Eun Park*

1367



Revolutionizing targeting precision: microfluidics-enabled smart microcapsules for tailored delivery and controlled release

Lingling Ren, Shuang Liu, Junjie Zhong* and Liyuan Zhang*

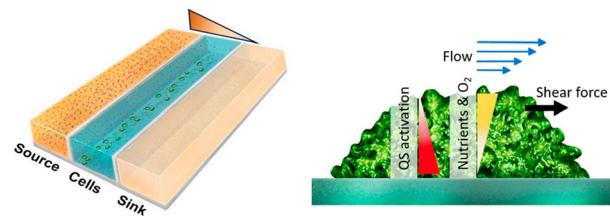


CRITICAL REVIEWS

1394

Microfluidic approaches in microbial ecology

Giovanni Stefano Ugolini,* Miao Xiao Wang, Eleonora Secchi, Roberto Pioli, Martin Ackermann and Roman Stocker*

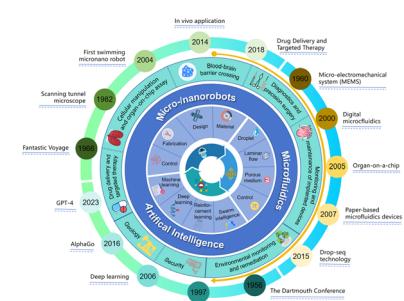


TUTORIAL REVIEWS

1419

AI-enhanced biomedical micro/nanorobots in microfluidics

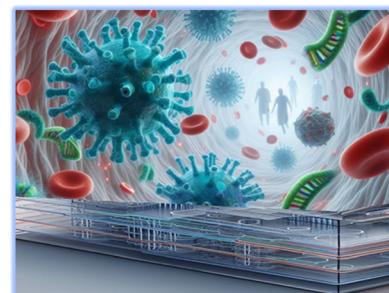
Hui Dong, Jiawen Lin, Yihui Tao, Yuan Jia, Lining Sun, Wen Jung Li and Hao Sun*



1441

Microfluidic systems for infectious disease diagnostics

Thomas Lehnert* and Martin A. M. Gijs



1494

Heart-on-a-chip systems: disease modeling and drug screening applications

Derrick Butler and Darwin R. Reyes*

