

# Lab on a Chip

Devices and applications at the micro- and nanoscale  
[rsc.li/loc](http://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 25(5) 731-1374 (2025)



**Cover**  
See Wei Li *et al.*,  
pp. 856–883.  
Image reproduced by  
permission of Wei Li from  
*Lab Chip*, 2025, 25, 856.



**Inside cover**  
See W. Russ Algar *et al.*,  
pp. 884–955.  
Image reproduced by  
permission of Yihao Wang  
and Russ Algar from *Lab Chip*,  
2025, 25, 884.

## PERSPECTIVES

741

### Point-of-need diagnostics in a post-Covid world: an opportunity for paper-based microfluidics to serve during syndemics

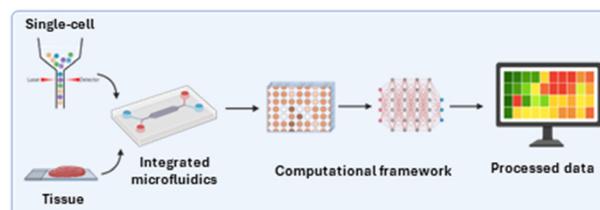
Maria-Nefeli Tsaloglou,\* Dionysios C. Christodouleas, Jonathan Milette, Kendall Milkey, Isabelle C. Romine, Judy Im, Shefali Lathwal, Duraipandian Thava Selvam, Hadley D. Sikes and George M. Whitesides\*



752

### Microfluidics for morphomics and spatial omics applications

Nishanth Venugopal Menon, Jeeyeon Lee, Tao Tang and Chwee Teck Lim\*



# EES Catalysis

GOLD  
OPEN  
ACCESS

## Exceptional research on energy and environmental catalysis

### Open to everyone. Impactful for all

[rsc.li/EESCatalysis](https://rsc.li/EESCatalysis)

Fundamental questions  
Elemental answers

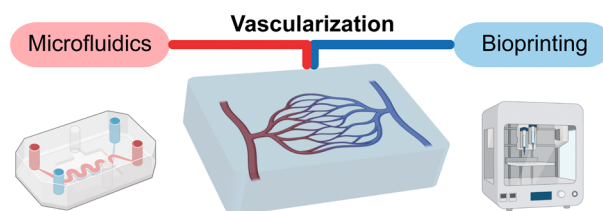
Registered charity number: 207890



764

## Integrating microfluidic and bioprinting technologies: advanced strategies for tissue vascularization

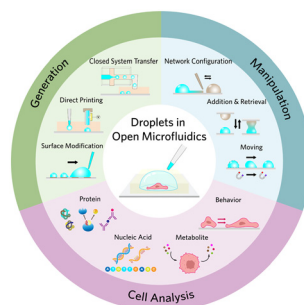
Xuan Mei, Ziyi Yang, Xiran Wang, Alan Shi, Joel Blanchard, Fanny Elahi, Heemin Kang,\* Gorka Orive\* and Yu Shrike Zhang\*



787

## Droplets in open microfluidics: generation, manipulation, and application in cell analysis

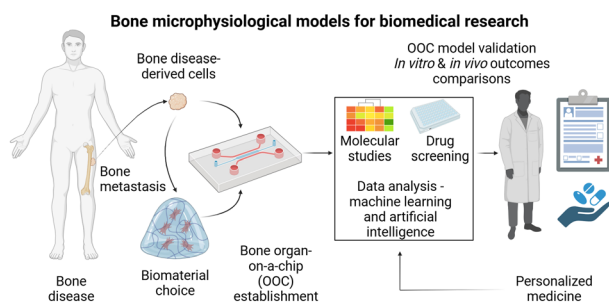
Jiaxu Lin, Ying Hou, Qiang Zhang and Jin-Ming Lin\*



806

## Bone microphysiological models for biomedical research

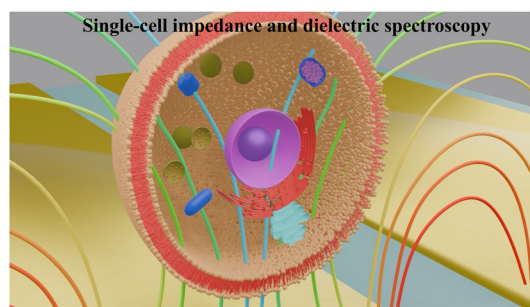
Francisco Verdugo-Avello,\* Jacek K. Wychowaniec, Carlos A. Villacis-Aguirre, Matteo D'Este and Jorge R. Toledo



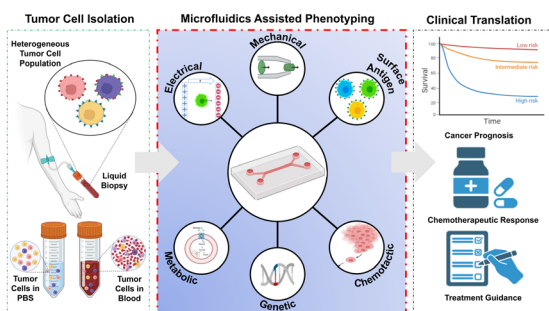
837

## Tutorial on impedance and dielectric spectroscopy for single-cell characterisation on microfluidic platforms: theory, practice, and recent advances

Fatemeh Dadkhah Tehrani, Michael D. O'Toole\* and David J. Collins



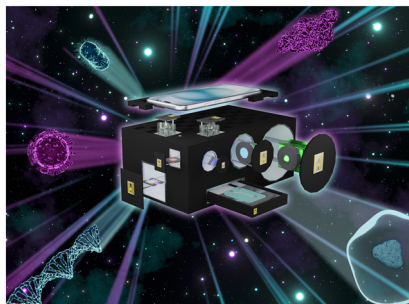
856



### Advances in microfluidic platforms for tumor cell phenotyping: from bench to bedside

Rutwik Joshi, Hesaneh Ahmadi, Karl Gardner, Robert K. Bright, Wenwen Wang and Wei Li\*

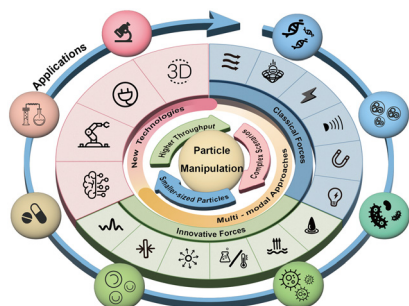
884



### Smartphones as a platform for molecular analysis: concepts, methods, devices and future potential

Daina V. Baker, Jasmine Bernal-Escalante, Christine Traaseth, Yihao Wang, Michael V. Tran, Seth Keenan and W. Russ Algar\*

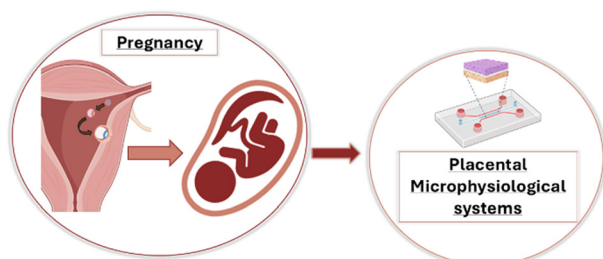
956



### Particle manipulation under X-force fields

Chundong Xue, Yifan Yin, Xiaoyu Xu, Kai Tian, Jinghong Su and Guoqing Hu\*

979



### Placental microphysiological systems: new advances on promising platforms that mimic the microenvironment of the human placenta

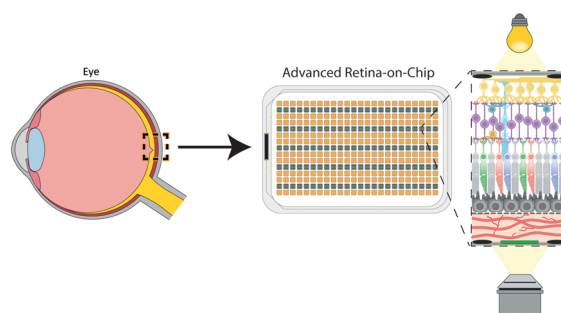
Inês M. Gonçalves, Muhammad Afzal, Nithil Kennedy, Ana Moita, Rui Lima, Serge Ostrovidov, Takeshi Hori, Yuji Nashimoto and Hirokazu Kaji\*



996

## Retina-on-chip: engineering functional *in vitro* models of the human retina using organ-on-chip technology

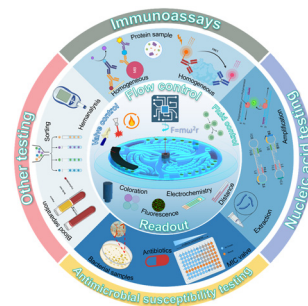
Tarek Gensheimer, Devin Veerman, Edwin M. van Oosten, Loes Segerink, Alejandro Garanto and Andries D. van der Meer\*



1015

## Recent advances in centrifugal microfluidics for point-of-care testing

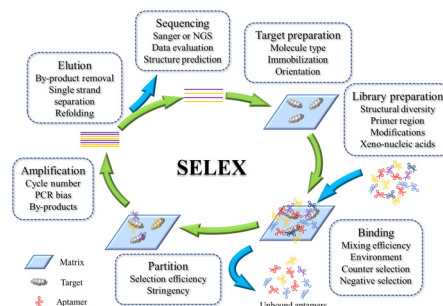
Huijuan Yuan, Zeyu Miao, Chao Wan, Jingjing Wang, Jinzhi Liu, Yiwei Li, Yujin Xiao,\* Peng Chen\* and Bi-Feng Liu\*



1047

## Aptamer selection *via* versatile microfluidic platforms and their diverse applications

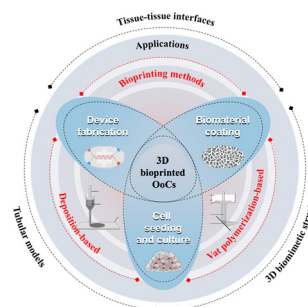
Yi-Da Chung, Yi-Cheng Tsai, Chi-Hung Wang and Gwo-Bin Lee\*



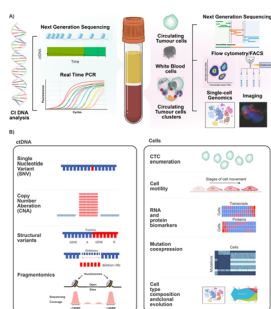
1081

## Developing 3D bioprinting for organs-on-chips

Zuhao Wu, Rui Liu, Ning Shao and Yuanjin Zhao\*



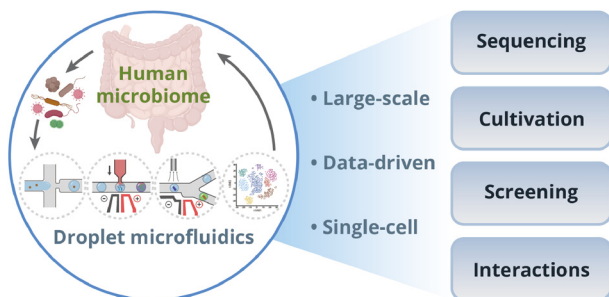
1097



### Challenges in blood fractionation for cancer liquid biopsy: how can microfluidics assist?

Robert Salomon,\* Sajad Razavi Bazaz, Kirk Mutafooulos, David Gallego-Ortega, Majid Warkiani, David Weitz and Dayong Jin

1128



### Droplet microfluidics: unveiling the hidden complexity of the human microbiome

Yibin Xu, Zhiyi Wang, Caiming Li, Shuiquan Tian and Wenbin Du\*

1149

### Microsensors for Cell Cultures

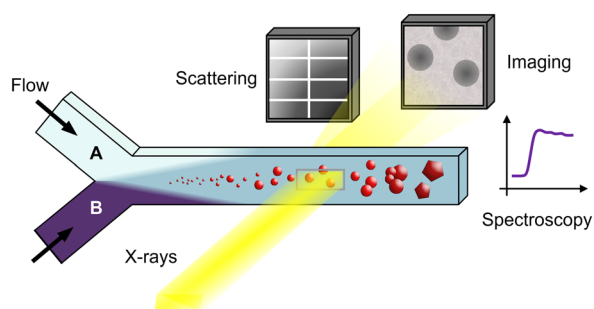


and Organs-on-Chip

### Microsensor systems for cell metabolism – from 2D culture to organ-on-chip (2019–2024)

Johannes Dornhof, Jochen Kieninger, Stefan J. Rupitsch and Andreas Weltin\*

1169



### Micro- and milli-fluidic sample environments for *in situ* X-ray analysis in the chemical and materials sciences

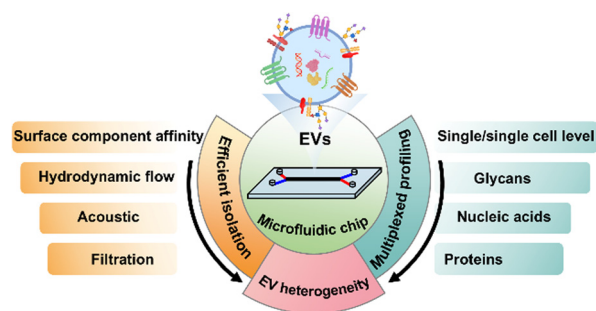
Mark A. Levenstein,\* Corinne Chevillard, Florent Malloggi, Fabienne Testard and Olivier Taché



1228

## Demystifying EV heterogeneity: emerging microfluidic technologies for isolation and multiplexed profiling of extracellular vesicles

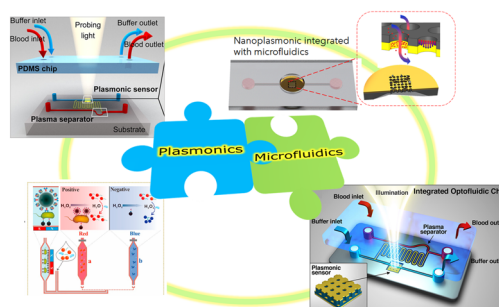
Guihua Zhang, Xiaodan Huang, Sinong Liu, Yiling Xu, Nan Wang, Chaoyong Yang and Zhi Zhu\*



1256

## Synergizing microfluidics and plasmonics: advances, applications, and future directions

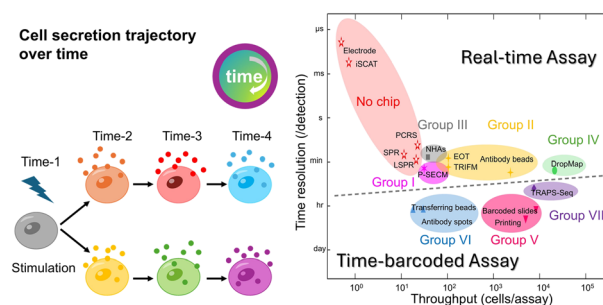
C. Escobedo\* and A. G. Brolo\*



1282

## Time-resolved single-cell secretion analysis via microfluidics

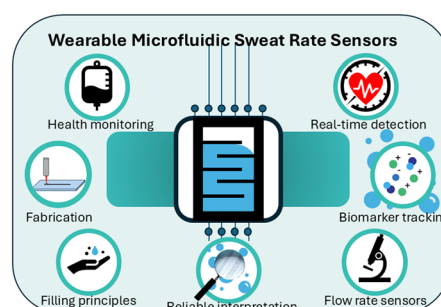
Ying Xu, Mei Tsz Jewel Chan, Ming Yang, Heixu Meng and Chia-Hung Chen\*



1296

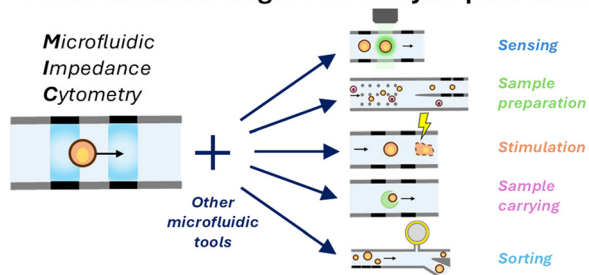
## Worth your sweat: wearable microfluidic flow rate sensors for meaningful sweat analytics

R. F. R. Ursem, A. Steijlen,\* M. Parrilla,\* J. Bastemeijer, A. Bossche and K. De Wael\*



1316

### Multifunctional single-cell analysis platforms

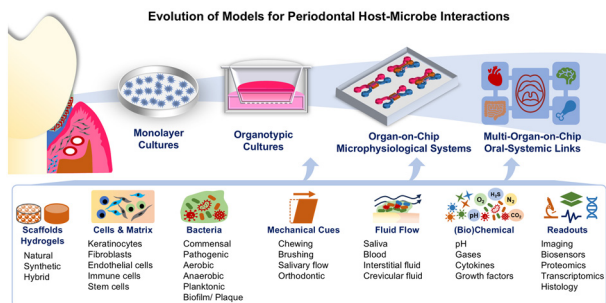


### Integrating impedance cytometry with other microfluidic tools towards multifunctional single-cell analysis platforms

Marta Righetto, Cristian Brandi, Riccardo Reale and Federica Caselli\*

1342

### Evolution of Models for Periodontal Host-Microbe Interactions



### Advances in modeling periodontal host-microbe interactions: insights from organotypic and organ-on-chip systems

Hardik Makkar and Gopu Sriram\*

