## 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 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

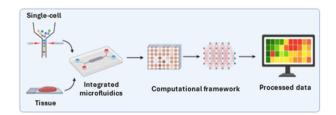
## Point-of-need diagnostics in a post-Covid world: an opportunity for paper-based microfluidics to serve during syndemics

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\*



## Microfluidics for morpholomics and spatial omics applications

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





# **EES Catalysis**



Exceptional research on energy and environmental catalysis

Open to everyone. Impactful for all

rsc.li/EESCatalysis

Fundamental questions Elemental answers

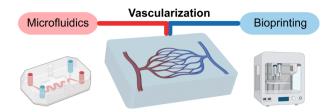
Registered charity number: 207890

#### **TUTORIAL REVIEWS**

#### 764

Integrating microfluidic and bioprinting technologies: advanced strategies for tissue vascularization

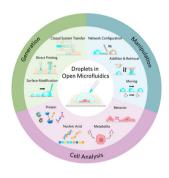
Xuan Mei, Ziyi Yang, Xiran Wang, Alan Shi, Joel Blanchard, Fanny Elahi, Heemin Kang,\* Gorka Orive\* and Yu Shrike Zhang\*



#### 787

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

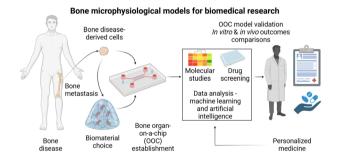
Jiaxu Lin, Ying Hou, Qiang Zhang and Jin-Ming Lin\*



#### 806

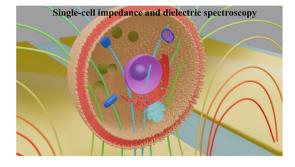
## Bone microphysiological models for biomedical

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

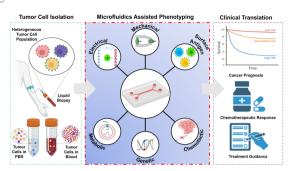


Tutorial on impedance and dielectric spectroscopy for single-cell characterisation on microfluidic platforms: theory, practice, and recent advances

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\*



#### Particle manipulation under X-force fields

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

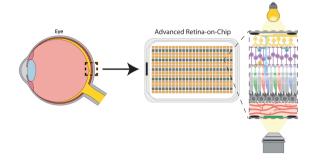
979 Pregnancy Placental Microphysiological systems

### 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\*

### 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

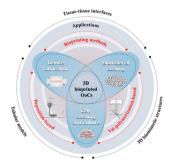
#### Aptamer selection via versatile microfluidic platforms and their diverse applications

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

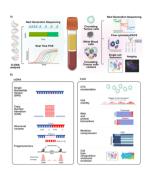


#### Developing 3D bioprinting for organs-on-chips

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

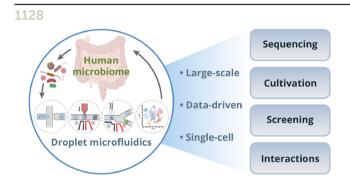


1097



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

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



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

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

1149

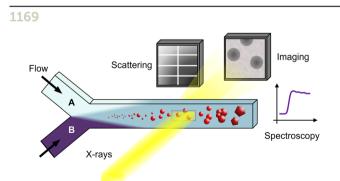
### Microsensors for Cell Cultures



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\*



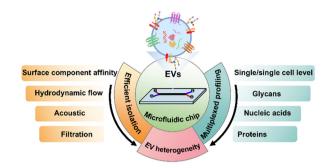
Micro- and milli-fluidic sample environments for in situ X-ray analysis in the chemical and materials sciences

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

#### 1228

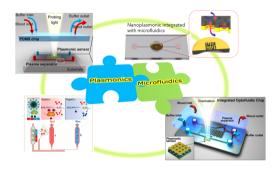
Demystifying EV heterogeneity: emerging microfluidic technologies for isolation and multiplexed profiling of extracellular vesicles

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



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

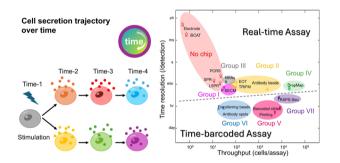
C. Escobedo\* and A. G. Brolo\*



#### 1282

Time-resolved single-cell secretion analysis via microfluidics

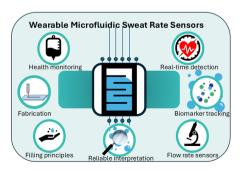
Ying Xu, Mei Tsz Jewel Chan, Ming Yang, Heixu Meng and Chia-Hung Chen\*



#### 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

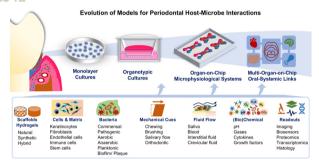
#### Multifunctional single-cell analysis platforms **M**icrofluidic *Impedance* Sample **C**ytometry preparation Stimulation Sample Other carrying

Sorting

microfluidic tools

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

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



Advances in modeling periodontal host-microbe interactions: insights from organotypic and organon-chip systems

Hardik Makkar and Gopu Sriram\*