

# Lab on a Chip

Devices and applications at the micro- and nanoscale  
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## IN THIS ISSUE

ISSN 1473-0197 CODEN LCAHAM 26(9) 2625-2938 (2026)



**Cover**  
See Xiaoyun Ding *et al.*, pp. 2673–2683.  
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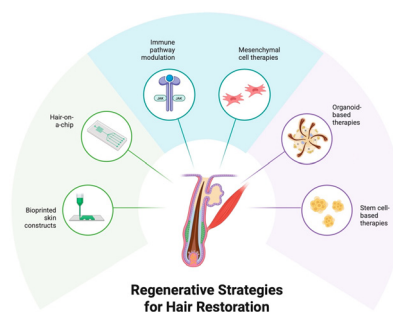
**Inside cover**  
See Jialan Cao, Alexander Groß *et al.*, pp. 2684–2696.  
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## PERSPECTIVE

2634

### Human hair regeneration using organoids and hair-on-chip technologies

Imaan A. Ahmed and Abbas Shafiee\*

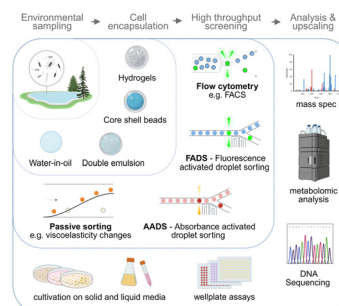


## TUTORIAL REVIEW

2646

### Ultra-high throughput droplet microfluidics for cultivation and functional screening of environmental microbial strains and consortia

Luca Potenza, Jozef Krzak, Maciej S. Andrzejewski, Adam Pyzik and Tomasz S. Kaminski\*





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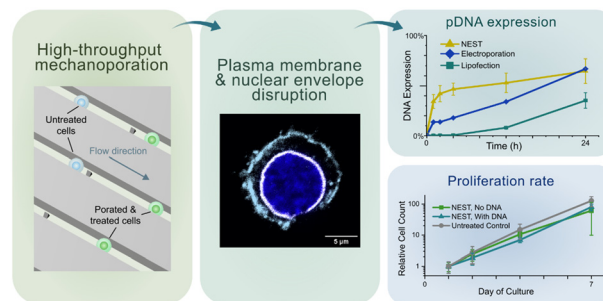
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2673

## Vector-free DNA transfection by nuclear envelope mechanoporation

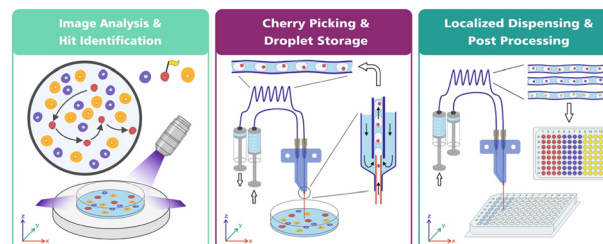
Leyla Akh, Apresio K. Fajrial, Sunwoo Sohn, Benjamin Seelbinder, Xin Xu, Wei Tan, Jill E. Slansky, Corey P. Neu and Xiaoyun Ding\*



2684

## Smarter cell sorting: droplet microfluidics meets pick-and-place sorting

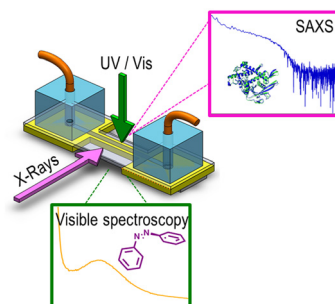
Olivia Gerhard, Steffen Schneider, Michaela Dehne, Janina Bahnemann, Klaus Palme, Ralf Welsch, Oleksandr Dovzhenko, Qiuju Yu, Michael Köhler, Jialan Cao\* and Alexander Groß\*



2697

## Multi-wavelength transparent microfluidic device for UV-visible illumination and X-ray scattering studies of photoactive systems

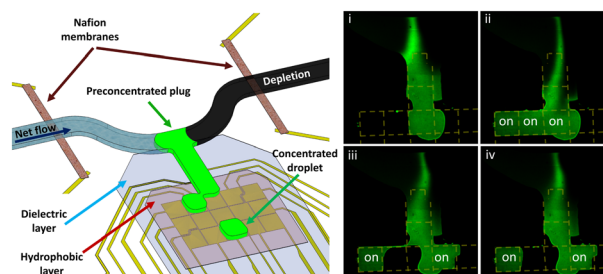
Benedetta Marmiroli,\* Sumea Klokic,\* Barbara Sartori, Marie Reißbüchel, Alessio Turchet and Heinz Amenitsch



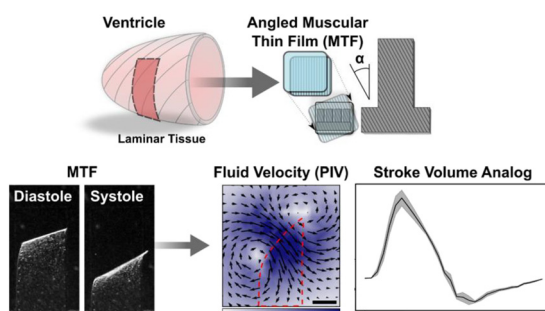
2709

## Integration of continuous microfluidic electrokinetic bioparticle preconcentration with programmable extraction into a discrete microfluidic platform

Amir Hillman, Sinwook Park and Gilad Yossifon\*



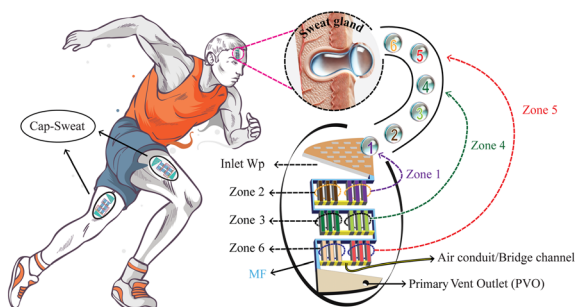
2720



### Stroke volume analog on a chip – *in vitro* hydrodynamic model of cardiac pumping efficiency

John F. Zimmerman, Luke A. MacQueen, Douglas Henze, Daniel J. Drennan, Sean L. Kim, Herdeline Ann M. Ardoña, Suji Choi, Qianru Jin and Kevin Kit Parker\*

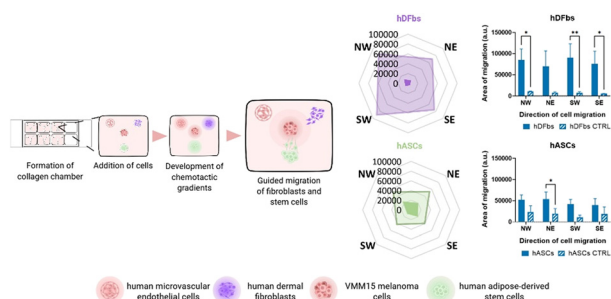
2734



### Cap-Sweat: a capillary microfluidic platform for digitized sweat sampling and time-resolved biomarker analysis

Pezhman Jalali and Amir Sanati Nezhad\*

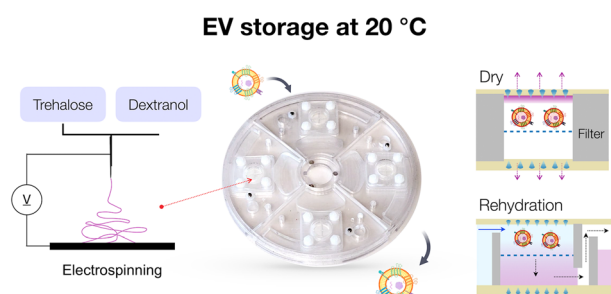
2747



### A 3D model to evaluate cell chemotaxis within a heterogenic tumor microenvironment

Daniel B. Rodrigues, Daniela Cruz-Moreira, Luca Gasperini, Mariana Jarnalo, Ricardo Horta, Rui L. Reis and Rogério P. Pirraco\*

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### Rapid desiccation and on-disc rehydration of extracellular vesicles for non-cryogenic preservation

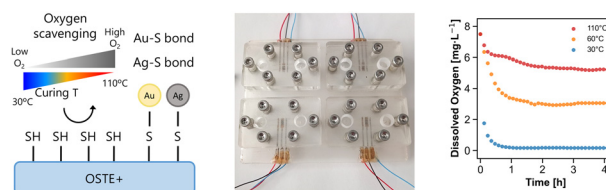
Hyun-Kyung Woo, Sangjin Seo, Advitiya Mahajan, Seoyoung Lee, Seoyoon Bae, Jeremy M. Quintana, Changhyun Kim, Alptekin Aksan\* and Hakho Lee\*



2775

## Low-temperature inkjet-printed electrochemical sensors on OSTE+ microfluidics for oxygen monitoring and scavenging

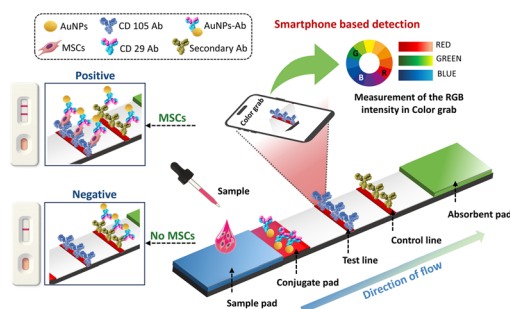
Denise Marrero, Ferran Pujol-Vila, Eva Tuset, Gemma Gabriel, Rosa Villa, Mar Alvarez\* and Xavi Illa\*



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## A dual-antibody gold nanoparticle-based lateral flow assay for rapid and selective detection of mesenchymal stem cell stemness

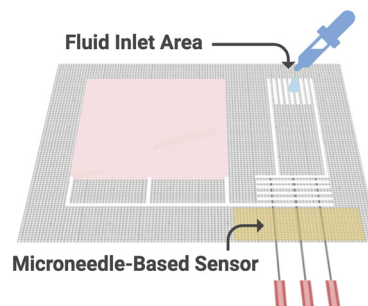
Drishya Prakashan, C. A. Amarnath, Shilpa N. Sawant, G. Taru Sharma and Sonu Gandhi\*



2804

## Lyocell-modal thread microfluidic platform integrated with a microneedle sensor for lactate detection in saliva

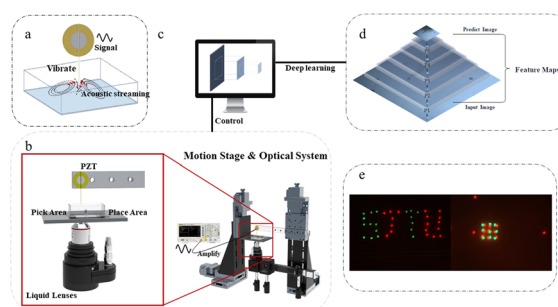
Ling Ding, Huizi Zhang, Yao Li and Jun Kameoka\*



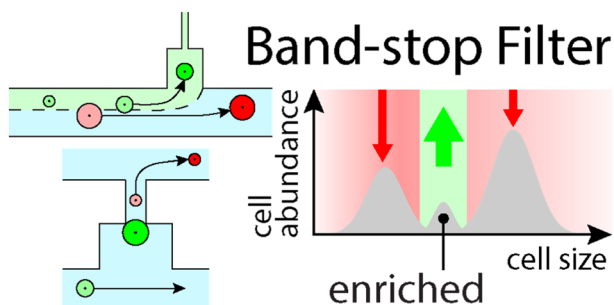
2820

## Robotic acoustofluidic single-cell picking and placement platform

Wanqi Li, Qiu Yin,\* Jiahui Wu, Chenfan Zhang, Xiaochen Li, Chenyang Zhou, Xianting Ding\* and Xiang Chen\*



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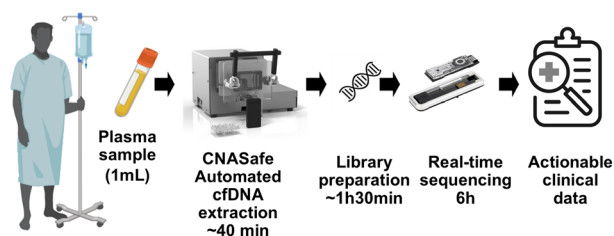


### Band-stop microfluidics for high-purity, label-free enrichment of viable cancer cells from whole blood

Lewis Krzeczkowski, Georgios Nteliopoulos, Simak Ali, Paul Davey, R. Charles Coombes and Ali Salehi-Reyhani\*

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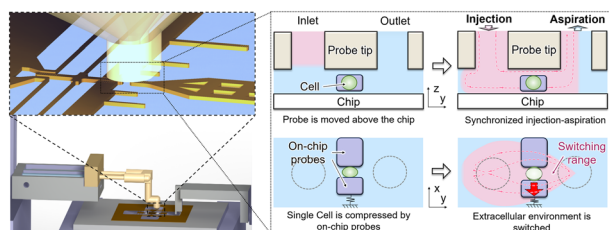
Patients presenting at hospital with signs of sepsis or febrility



### An automated and portable platform for rapid cell-free DNA isolation and its application in microbial DNA metagenomic sequencing from human blood samples

Linda Marriott, Ana Martinez-Lopez, Antonio Liga, Kazuhiro Horiba, Amanda Warr, Jacob N. Phulusa, Radhe Shantha Kumar, Laura Carey, Yoshinori Ito, Benjamin J. Parcell, Nicholas R. Leslie, Nicholas A. Feasey, Shevin T. Jacob, Jamie Rylance and Mäiwenn Kersaudy-Kerhoas\*

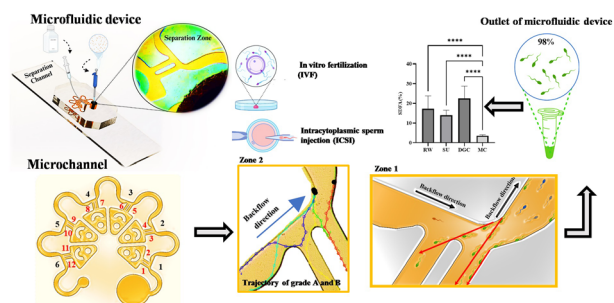
2861



### High-speed liquid switching and on-chip force sensing reveal the transient mechanical response of MscL in *Synechocystis* sp. PCC 6803

Xu Du, Masaru Tsujii, Nobuyuki Uozumi and Fumihito Arai\*

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### Bioinspired quality-based sperm sorting in a spiral microfilter-enhanced microfluidic device: enhancing DNA integrity via rheotaxis and boundary dynamics

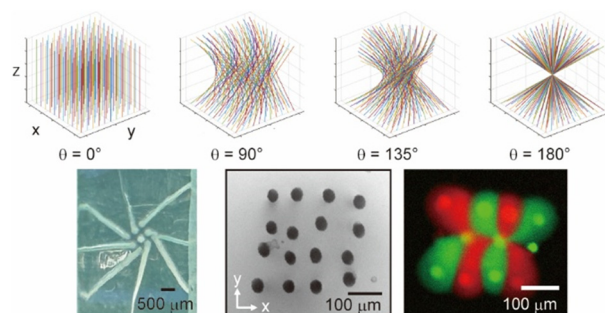
Donya Shahhoseini and Naser Naserifar\*



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## Facile fabrication of high-density two-dimensional micronozzle arrays using twisted thin-wire molds

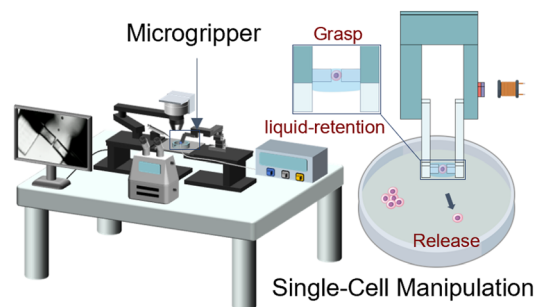
Koki Takahashi and Kyohei Terao\*



2900

## A 3D-printed electromagnetically actuated microgripper system for precision single-cell manipulation

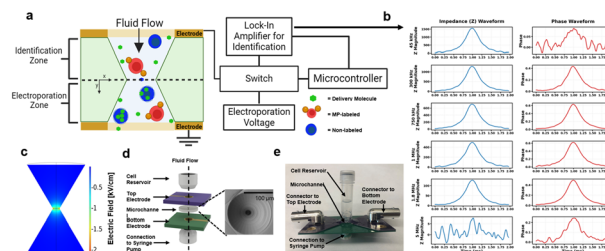
Xi Chen, Qingying Ren, Wenshuo Zhao, Minhao Wang, Yining Guo, Jing Huang, Xuhui Zhao, Xinyu Lu, Yuan Liu\* and Haifeng Xu\*



2909

## Microparticle-enabled single cell multiparameter electronic immunophenotyping for selective electroporation

Madeline Hoyle, Josiah Rudge, Yuvraj Rallipalli and Aniruddh Sarkar\*



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## An automated modular microfluidic platform for end-to-end mRNA synthesis and purification

Vikas Sharma, Amirreza Mottafeqh, Jeong-Un Joo and Dong-Pyo Kim\*

