# 2026 IEEE 39th International Conference on Micro Electro Mechanical Systems (MEMS 2026)

## Salzburg, Austria
## 25-29 January 2026

## Pages 1-525

**IEEE Catalog Number:** CFP26MEM-POD
**ISBN:** 979-8-3315-7252-5

**Copyright © 2026 by the Institute of Electrical and Electronics Engineers, Inc.**
**All Rights Reserved**

*Copyright and Reprint Permissions*: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

| | |
|---|---|
| IEEE Catalog Number: | CFP26MEM-POD |
| ISBN (Print-On-Demand): | 979-8-3315-7252-5 |
| ISBN (Online): | 979-8-3315-7251-8 |
| ISSN: | 1084-6999 |

**Additional Copies of This Publication Are Available From:**

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com



# TABLE OF CONTENTS

3D-Printing Water-Soluble Channels Filled with Liquid Metal for Recyclable and Cuttable Wireless Power Sheet ..... 1
*Takashi Sato, Ryo Takahashi, Kento Yamagishi, Takao Someya, Michinao Hashimoto, Eiji Iwase, Yoshihiro Kawahara, Junya Kurumida, Wataru Iwasaki*

Multimodal Microelectrode-Microcantilever Array for Electromechanical Analysis of Cardiomyocyte Tissue in Drug Testing ..... 5
*Haolan Sun, Longlong Li, Eung-Sam Kim, Bong-Kee Lee, Dong-Weon Lee*

Photoacoustic Cuffless Blood Pressure Monitoring: Alignment-Insensitive Diameter Sensing with a Single High-Sensitivity Sc0.3Al0.7N PMUT ..... 9
*Yexing Fang, Lei Zhao, Mengyue Zhang, Zhiwei You, Xinyue Zhang, Xirui Zhao, Changhui Li, Bowen Sheng, Jinchi Han, Yipeng Lu*

Microheater Integrated Smart Biochemical Sensing Patch for Monitoring Wounds and Accelerating Healing ..... 13
*Md Selim Reza, Zahidul Islam, Gagan Bahadur Pradhan, Jiwon Go, Jae Yeong Park*

A Low-G Threshold Mems Inertial Event Sensor with Friction-Enabled Mechanical Latching ..... 17
*Lyuyan Wang, Xiaoqin Liu, Kaiyuan Jiang, Jiahao Zhao*

Fast and Sensitive Room-Temperature Hydrogen Detection by Two-Dimensional Palladium Metallene-Loaded Thermopile Sensors ..... 21
*Ming Li, Changkun Zhu, Zechun Li, Jun Yan, Pengcheng Xu, Xinxin Li*

Sensor System for Gas Source Localization Integrating a Compact 3D Wind Vector Sensor and Gas Sensor ..... 25
*Ryusei Ando, Hidetoshi Takahashi*

SI-H Eliminated Conductive PDMS Micro Patterns for Ultra Sensitive Temperature Sensor ..... 29
*Yeon-Jeong Hwang, Yeeun Na, Jongcheol Park, Min-Ho Seo*

8×8 Large-Aperture Micromirror Array with High Fill Factor and 3-DOF Quasi-Static Driving ..... 33
*Yichen Liu, Wenli Xue, Yongquan Su, Xingwang Zhu, Yi Yang, Jun Luo, Dalong Chen, Yang Wang, Lihao Wang, Zhenyu Wu*

Glass Reflow Integrated Hybrid Neural Probe with a Multishank Architecture for Optical and Electrical Stimulation ..... 37
*Jin-Yeong Park, Chaesung Kim, Maesoon Im, Seung-Ki Lee, Jae-Hyoung Park*

Open-Source, Three-Dimensional Polymer Microelectrode Array for Multi-Region Hippocampal Recording ..... 41
*Yingyi Gao, Jingjing Liang, Yan Gong, Alberto Esteban-Linares, Zihan Jin, Zhouxiao Lu, Huijing Xu, Dong Song, Ellis Meng*

Buried Silicon Anti-Counterfeiting Tags with Wavelengthspecific Encoding and Roughness-Derived Pufs ..... 45
*Taeyeong Kim, Kibum Jung, Jungchul Lee*

Piezoelectric Microspeaker on Corrugated Parylene Diaphragm ..... 49
*Yicheng Zhang, Anik Sengupta, Kianoush Sadeghian Esfahani, Akash Roy, Eun S. Kim*

Monolithically Fabricated Mems-Driven Beam Steerable Antenna System for KA-Band Networks ..... 53
*Rayan Bajwa, Farid Khamoueitouli, Mostafa Vafaei, Ibrahim Tekin, Javad Yavandhasani, Murat Kaya Yapici*

Quantitative Design and Experimental Realization of High-Performance Piezo-Transmittance Strain Sensors ..... 57
*Myung-Kun Chung, Su-Min Jeon, Jae-Soon Yang, Jae-Young Yoo, Min-Uk Kim, Beom-Jun Kim, Min-Seung Jo, Tae-Yeon Lee, Se-Yoon Jung, Jun-Bo Yoon*

Intrinsic Dual-Frequency Ultrasound Transduction Enabled by a CMOS-MEMS Vertical Dual-Gap CMUT Design ..... 61
*Wei-Hsiang Hsu, Hung-Yu Chen, Sheng-Shian Li*

Mass Transfer Printing Fabrication of Individually Addressable Large-Scale Graphene NEMS Resonator Arrays ..... 65
*Zuheng Liu, Lingyu Zhu, Zhenggang Cai, Pengcheng Zhang, Liwei Liu, Rui Yang*

Large-Scale Tactile Sensor Array Fabrication Via Sequential Grayscale DLP Printing with High Spatial Resolution and Low Crosstalk ..... 69
*Muhammad Faizul Zaki, Pin-Chuan Chen*

Machine Learning-Assisted Large Area Screen-Printing Process Design for Uniform Carbon Nanotube Patterning ..... 73
*Daeyeon Koh, Hanbin Cho, Hyungyu Im, Geunmin Son, Wonkeun Park, Seunghwa Ryu, Jongbaeg Kim*

Neuron-Inspired Computational E-Skin with Device Intrinsic In-Sensor Computing and Self-Powered Comprehensive Tactile Perception ..... 77
*Xinge Guo, Jingfeng Xu, Luwei Wang, Chengkuo Lee*

Living Liquid Metal Composites for Biotic-Abiotic Interfacing in Wearable Electronics ..... 81
*Maryam Rezaie, Yang Gao, Seokheun Choi*

Mechanically Regulated Ionic P-N Junctions Enable Passive and Stable Tactile Sensing with Intelligent Perception ..... 85
*Ting Wen, Wei Huang, Zhiyang Wang, Cao Xia, Yuanlin Xia, Yubo Huang, Kang Song, Zhuqing Wang*

A Pumpless Microneedle Bioinspired by Ligia Exotica -Microstructures Layout and Device Characterization- ..... 89
*Bolong Du, Masato Suzuki, Tomokazu Takahashi, Seiji Aoyagi*

Biologically Inspired Miniatured Hemispherical Imaging System ..... 93
*Young-Gil Cha, Dongyoung Choi, Jae-Myeong Kwon, Hyun-Kyung Kim, Jiwoong Na, Yejoon Kwon, Yong-Jin Jo, Hyewon Bang, Min H. Kim, Ki-Hun Jeong*

Anti-Phase Enhanced PMUT Supercell with Optimized Acoustic Coupling Engineering for High-Q and High-SPL Ultrasonic Applications ..... 97
*Jinghan Gan, Xinyu Feng, Lei Zhao, Jiao Xia, Bowen Sheng, Yipeng Lu*

Sensitivity Enhancement of Piezoelectric Micromachined Ultrasonic Transducers (PMUT) with Irregular Shapes for Bandwidth Extension ..... 101
*Zhou Da, Tingzhong Xu, Jeremy Streque, Alessandro S. Savoia*

Advanced Surface Sensing Based on Ultrasonic Guided-Wave and Pulse-Echo Using Wide-Bandwidth and High Acoustic Pressure PMUT Arrays ..... 105
*Junhao Wang, Kai Yang, Chenyuan Zhang, Yufeng Gao, Jiao Xia, Xinyue Zhang, Bowen Sheng, Wei Wang, Yipeng Lu*

Ⅼ-Shaped PMUT with High Electromechanical Coupling and Low Crosstalk ..... 109
*Lei Zhao, Chong Yang, Zhiwei You, Wensong Xiao, Bowen Sheng, Xixin Cao, Yipeng Lu*

Multimodal Normal and Shear Force Tactile Sensing Via PMUTS ..... 113
*Megan Teng, Nikita G. Lukhanin, Akshay Shivkumar, Fan Xia, Declan M. Fitzgerald, Chun-Ming Chen, Peisheng He, Yande Peng, Liwei Lin*

Monolithic CMOS-MEMS Thermal Conductivity Detector with On-Chip Integrated Microchannel for Rapid and Flow-Insensitive Gas Identification ..... 117
*Yubin Ma, Linze Hong, Xiangyu Song, Haoxin Hu, Wei Xu*

Acetylene Gas Detection Using MEMS Thermopiles ..... 121
*Jingjing Yang, Hao Jia, Haoran Zhang, Pengcheng Xu, Xinxin Li*

Batch-Processed Gas Sensor with Carbon Nanotube Preconcentrator for PPB-Level Toluene Detection ..... 125
*Kyungdong Son, Sangjun Sim, Hee-Jin Ko, Kyubin Bae, Sungjong Lee, Jongbaeg Kim*

Acoustic Resonance-Based Gas Sensor Response to Temperature and Gas Mixtures ..... 129
*Hande Yaylali, Erdinc Tatar*

Event-Triggered in Situ Boolean Logic Calculation of Aldehyde VOCs for Distinguishing Plant Stresses ..... 133
*Farhan Sadik Sium, Steven Tran, Amirali Nikeghbal, Seungbeom Noh, Carlos Mastrangelo, Hanseup Kim*

Non-Invasive Evaluation of Radial Artery Stiffness Via Piezoelectric Micromechanical Ultrasonic Transducer and Pressure Sensor Fusion ..... 137
*Yunhao Wang, Ke Sun, Fang Wang, Yunhan Wang, Hao Yu, Yechen Miao, Jiawei Li, Mingye Du, Xiaoyuan Xia, Yi Sun, Tao Wu, Xinxin Li*

Differential 3-Ring Electrode PMUTS with High Acoustic Pressure for Glaucoma Optic Neuroprotection ..... 141
*Kai Yang, Zeyuan Wang, Junhao Wang, Chong Yang, Yufeng Gao, Jiao Xia, Fengrui Yang, Bowen Sheng, Huijuan Wu, Yipeng Lu*

3D Imaging Via Four PMUT Receivers by Compressed Sensing ..... 145
*Nikita G. Lukhanin, Divij Muthu, Chaoying Gu, Megan Teng, Kamyar Behrouzi, Chun-Ming Chen, Laura Waller, Liwei Lin*

900 MHz Low Phase Noise LINBO3/SIO2/Sapphire SAW Delay Line Oscillator with a Close-In FOM of 210 dB at 10-KHz Offset ..... 149
*Ya-Ching Yu, Zhi-Qiang Lee, Sung-Yuan Huang, Yu-Sian Lin, Ming-Huang Li*

Fusion of Multi-Resonance Modes in Differential Micromechanical Resonant Accelerometer for Enhanced Performance ..... 153
*Kunfeng Wang, Bingchen Zhu, Xiaorui Bie, Zheng Wang, Wuhao Yang, Zhitian Li, Zhaoyang Zhai, Xingdong Liang, Xudong Zou*

Frequency-Stable AIScN-ON-SiC MEMS Lamb Wave Resonator Operating in Very High Temperature Environment Up to 1000°C ..... 157
*Connor A. Watkins, Wen Sui, Philip X.-L. Feng*

Reaching High Velocities in Micromachined Resonant Structures Via Electrostatic Metamaterial Actuation ..... 161
*Milad Daneshnazar, Sepehr Sheikhlari, Armin Moayedizadeh, Siavash Pourkamali*

Mechanical Soliton Frequency Combs Generated by Pulsed Vibro-Impacts ..... 165
*Ting-Yi Chen, Nilabh Basu, Wei-Chang Li*

A Silk-Enabled Bioadhesive Neurovascular Interface for Electrophysiological Monitoring and Modulation ..... 169
*Xiner Wang, Zexi Su, Weijian Fan, Jinyun Tan, Tiger H. Tao, Zhitao Zhou*

Dermalink: An All-Polymer Electrode Array for Wearable Electrophysiology ..... 173
*Zhitong Zhang, Qian Wan, Lexuan Yang, Bingchen Zhao, Xiaofeng Luo, Jingquan Liu, Zhihong Li, Yu-Qing Zheng*

Mems-Based Lift-Off of 2D Gold Nanosheets for Ultra-High-Density Neuromorphic Soft Electronics ..... 177
*Seongsik Jeong, Donghyeon Seo, Gibeom Song, Sangyoon Lee, Hae-Jin Kim*

Selective and Gentle Modulation of Multi-Period Sinusoidal Texture on Curved Surface of Diamond-Like Carbon Via Cold Atmospheric Plasma Jet ..... 181
*Zhiyuan Du, Qingda Xu, Ye Xi, Wu Liu, Huimin Wen, Xu Yang, Quan Peng, Kunyu Zheng, Ning Wei, Longchun Wang, Chunpeng Jiang, Xiuyan Li, Qingkun Liu, Xiaolin Wang, Bin Yang, Zude Lin, Jingquan Liu*

Fabrication of a Nanopore Device with an Integrated Gold Nanoparticle Dimer for SERS-Based DNA Analysis ..... 185
*Shintaro Yotsuzuka, Akio Uesugi, Hiroaki Honma, Koji Sugano, Yoshitada Isono*

Self-Aligned Sidewall Heaters Applied in a Microfluidic Thermal Flow Sensor ..... 189
*Maarten J.S. Bonnema, Nekija Dzemaili, Henk-Willem Veltkamp, Jarno Groenesteijn, Remco J. Wiegerink, Joost C. Lotters*

A Piezoelectric MEMS True Random Number Generator Driven by Amplitude-Modulated Internal Resonance ..... 193
*Ting-Yi Chen, Nilabh Basu, Cheng-Yang Chang, Sheng-Hsiang Tseng, Wei-Chang Li*

Micromechanical Signal Transmission Line Enabled by Chained Asymmetrical Bistable Elements ..... 197
*Shun Yasunaga, Yoshio Mita*

Frequency Modulated Piezoelectric MEMS Magnetometer Based on Mechanically-Coupled Cantilevers ..... 201
*Yi-Hsun Lee, Wei-Bin Fan, Chun-Yu Chou, Sheng-Shian Li, Ming-Huang Li*

Microelectrode Arrays for Dropletronic Circuits ..... 205
*Baptiste Tankwa, Jiaxin Zhu, Atila Shirin, Alain Aziz, Yide Jiao, Antoine Remy, Yujia Zhang*

Beyond 2D: 2.3D Platforms and Functional Assays as Intermediate Physiological Systems: SCADA and CellStudio ..... 208
*Lourdes Basabe Desmonts*

A Dual-Gradient Lab-On-A-Disc Platform for Scalable High-Throughput Nanomaterial Synthesis ..... 212
*Hiep Van Nguyen, Vu Minh Phan, Tae Seok Seo*

An Integrated Digital Microfluidic Platform with Functional Micropillar Arrays and Miniature Mass Spectrometry for Exosome Isolation and Molecular Fingerprinting ..... 216
*Menglei Zhao, Liyuan Guo, Gong Li, Haobing Liu, Rongxin Fu, Kangfu Chen, Hang Li, Shuailong Zhang*

Lateral-Mode GHz Baw Resonators: A New Mems Platform for Sub-Wavelength Acoustofluidic Manufacturing ..... 220
*Wei Wei, Zhaoxun Wang, Menglun Zhang, Xuexin Duan*

Biomimetic Performance Evaluation of Funnel Geometries in Nanofluidic Artificial Synaptic Memristors ..... 224
*Yu Liu, Peiyue Li, Junjie Liu, Yufeng Jin, Pan Zhang, Wei Wang*

Low-VpiL Acousto-Optic Modulators in Silicon Loaded Scandium Aluminum Nitride on Sapphire ..... 227
*Jack Guida, Siddhartha Ghosh*

An Integrated Photonic Magneto-Optomechanical Modulator for Protection of Switching Power Converters ..... 231
*Francis J. Lynch, Jackson B. Vyletel, Anish Mondal, Aobo Yang, Mertcan Erdil, Firooz Aflatouni, Lei Gu, Mark G. Allen*

Magnetically Tunable Mems Acoustic Isolator Over 60 DB Isolation Via Piezoelectric-Lorentz Coupling ..... 236
*Daozheng Luo, Yuxi Wang, Xuankai Xu, Jiawei Li, Lihui Jin, Tao Wu*

In-Situ TEM Chip with Dual-Temperature Zones for Real-Time CVD Process Observation ..... 240
*Shaotong Hu, Muyu Yan, Ming Li, Ying Chen, Xiaoying Shen, Ruomeng Guo, Na Li, Xinxin Li, Pengcheng Xu*

High-Efficient SEM Cross-Sectional Image Analysis in Deep Reactive Ion Etching Processes Based on Lightweight Physical-Driven Neural Network Model ..... 244
*Fang Wang, Jun Wan, Yuqing Mao, Hao Yu, Yechen Miao, Yue He, Ke Sun, Yi Sun, Heng Yang, Xinxin Li*

A Wafer-Level Test Approach for Stopper Sidewall Friction Force Characterization Using a MEMS Accelerometer Based Test Structure ..... 248
*Lukas Ackermann, Erkan Bektas, Matthew Lewis, Gevorg Aleksanyan, Marvin Freier, Dominic Palm, Jens Anders*

High-Temperature Long-Lifetime MEMS Thermopile with Tan Diffusion Barrier for Chip-Based DSC ..... 252
*Zechun Li, Zhihao Zhang, Shaokui Tan, Jun Yan, Ming Li, Pengcheng Xu, Xinxin Li*

Comprehensive Characterization of Niobate Phase Transitions Via Simultaneous on-Chip Differential Scanning Calorimetry (DSC) and in Situ Raman Spectroscopy ..... 256
*Shaokui Tan, Zechun Li, Pengcheng Xu, Xinxin Li*

Liquid Metal-Enabled High-Robustness MEMS Flexible Neural Interface for Chronic Cortical Recording ..... 260
*Songtao Lai, Chuning Peng, Tiger H. Tao, Zhitao Zhou*

Magnetically Assisted Minimally Invasive MEMS Flexible Cortical Electrode Array with High Expansion Ratio ..... 264
*Hailang He, Yihan Diao, Tiger H. Tao, Zhitao Zhou*

3D Cone-Shape Carbon Electrode Array for High-Fidelity Ecog Acquisition ..... 267
*Xuanqi Wang, Xiaoli You, Yong Yang, Shouyan Li, Yu Zhang, Quetao Yu, Chenfei Cao, Feng Yue, Honglong Chang, Bowen Ji*

Flexible MEMS Neural Interface for Long-Term Minimally Invasive Deep-Brain Recording Within CSF Environments ..... 271
*Jizhi Liang, Xiaoyu Li, Xiner Wang, Tiger H. Tao, Zhitao Zhou*

Freeform Chevron Actuator Beams Optimized for Varied Work-Consumption Trade-Offs Via Genetic Algorithms..... 275
*Ryugo Shimamura, Shun Yasunaga, Chen Wang, Akio Higo, Ryosho Nakane, Michael Kraft, Yoshio Mita*

2D Micromirror with M-Shaped Piezoelectric Actuator for Mixed-Signal Enhanced Raster and Lissajous Scans..... 279
*Wei-Kai Sung, Chen-Wei Chang, Jerwei Hsieh, Mingching Wu, Weileun Fang*

Flip-Chip Bonded HTS MEMS Contact Switch with SOI Cantilever..... 283
*Liwei Jiang, Zirui Liu, Boyu Lu, Zheyao Wang*

Improved Dynamic Performance of Dielectric Elastomer Actuators Using Bidirectional Driving..... 287
*Ayato Minaminosono, Eiji Iwase*

Discovery 5.0: Human-Centric, Sustainable and Resilient Research for a Micro-Photonics Age..... 291
*Mark R. Hutchinson*

Microvortex-Induced Liquid Replacement Reveals Cellular Dynamic Behavior ..... 295
*Makoto Saito, Yoko Yamanishi, Shinya Sakuma*

Electrostatic-Enriched Rapid and Ultrasensitive Detection of Allergic Conjunctivitis Biomarker Ige in a Top-Gated Silicon Nanowires Fet Biosensor..... 299
*Yazhao Li, Hang Chen, Yi Wang, Tie Li*

Tube-Shaped Inline Oxygen Sensor Integrated with in Vitro Intestinal Model for Anaerobic Bacteria Co-Culture..... 303
*Ichito Hanyu, Shota Uramoto, Hiroaki Onoe*

Backscatter Ultrasonic Communication Microsystem with a High Bit Rate Using Piezoelectric MEMS Transducers..... 307
*Chenyuan Zhang, Kai Yang, Conghao Gao, Junhao Wang, Xinyue Zhang, Bowen Sheng, Jinchi Han, Jiamin Li, Yipeng Lu*

Broadband, High-Sensitivity Ultrasonic Receiver Enabled by a Compact PMUT with Low-Noise Integrated Circuit for Miniature Photoacoustic Sensing.....311
*Yexing Fang, Juncheng Tu, Hongye Sheng, Xili Wang, Xinhang Xu, Bowen Sheng, Linxiao Shen, Yipeng Lu*

A Mid-Infrared Micro-Spectrometer Via MEMS Analog Micromirror Array and Metasurface Filter Matrix..... 315
*Xinyu Ding, Jihui Ni, Yue Tang, Huikai Xie*

A Poct System Based on Solution-Gated Graphene Transistors for Highly-Sensitive and Rapid Detection of Exosomal Mirna..... 319
*Yunhua Yang, Yan Li, Panhui Yang, Haojie Chen, Fang Bao, Hui Cong, Qinghui Jin, Shilun Feng, Wanlei Gao*

A Hydrogel Microwell for Stable Liquid Films for Prolonged Lifetime of Cell-Based Odor Biosensors ..... 323
*Jin Xing, Jumpei Muramatsu, Koji Sato, Hiroaki Onoe*

A Hybrid Metasurface Microfluidic Sensor Empowered by Quasi-Bound States in the Continuum for High-Sensitivity Biosensing ..... 327
*Shuai Wang, Lijun Ma, Dingbang Liu, Yunhao Cao, Yusa Chen, Hongshun Sun, Mingyao Gao, Wengang Wu*

An Achiral Secondary Grating Metasurface for Quasi-Bicenhanced Chiral Response and Sensing..... 331
*Lijun Ma, Shuai Wang, Jiaqi Guo, Chao Shen, Yunhao Cao, Wengang Wu*

An Enhanced Terahertz Metasurface Biosensor Based on Reduced Substrate Effect and QBIC Resonance..... 335
*Yunhao Cao, Bingrui Wang, Hongshun Sun, Lijun Ma, Shuai Wang, Long Rong, Wengang Wu*

An Ion-Milling Fabricated Nanoring Array as High-Sensitivity Fluorescence ..... 339
*Mengcheng Wang, Li Jiang, Ruoxin Mei, Hongbing Shi, Yi Xu, Zhijuan Su, Zhuoqing Yang, Guifu Ding, Faheng Zang*

DNA Tetrahedra-Functionalized Dual-Channel Fiber-Optic SPR Sensor for Simultaneous Detection of AFP and CRP in Early Diagnosis of Hepatocellular Carcinoma..... 343
*Jiaming Ma, Kexin Xu, Dachao Li, Ridong Wang*

Plasmonic Photothermal Pump-Integrated System for Continuous Cell Lysis and RPA-CRISPR/Cas Assay ..... 347
*Eun-Sil Yu, Jaehun Jeon, Jae-Myeong Kwon, Hyejeong Jeong, Hyejin Chang, Ki-Hun Jeong*

Optoelectronic Manipulation Platform for Parallel and Sequential Droplet Processing ..... 350
*Zonghao Li, Shuhao Zhang, Zongliang Guo, Kangfu Chen, Huikai Xie, Rongxin Fu, Shuailong Zhang*

Stimulating Cellular Appetite: Electro-Mechanical Poration Boosts Lipid Nanoparticle-Mediated Gene Delivery in Blood Cells..... 354
*Niko Kimura, Yoko Yamanishi, Yoshitaka Shirasaki, Satoshi Yotsumoto, Shigeo S. Sugano, Shinya Sakuma*

A Battery-Based Electronic Skin with Microchannels for Self-Powered Static and Dynamic Tactile Perception..... 358
*Yangyang Song, Wanling Wang, Haoyu Nan, Yubo Huang, Cao Xia, Yuanlin Xia, Zhuqing Wang*

A Stretchable Hydrophobic Triboelectric Nanogenerator for Wearable Self-Powered Biomotion Monitoring and Sign Language Interpretation..... 362
*Omar Faruk, Md Shofiul Alam, Ahmad Abdus Samad, Trilochan Bhatta, Jae Yeong Park*

A Wearable Fingertip Flexible Thermoelectric Sensor Based on Composite Carbon Nanotube Materials..... 366
*Lijie Peng, Wei Huang, Cao Xia, Zhujie Zhao, Qi Yang, Yuanlin Xia, Zhuqing Wang*

Breathable Honeycomb-Inspired Flexible Heater and Sensor Array for Uniform Skin Heating and Enhanced ISF Extraction..... 370
*Hao Zheng, Xueqin Wang, Xingguo Zhang, Wangwang Zhu, Wenjun Li, Dachao Li, Zhihua Pu*

Doping-Engineering of Semiconducting Nanocomposites for Highly Integrated Soft Circuits..... 374
*Gibeom Song, Seongsik Jeong, Donghyeon Seo, Sangyoon Lee, Hae-Jin Kim*

Miniaturized Epidermal Wrist Patch for Simultaneous Early Heat-Stress Detection and Continuous Blood Pressure Tracking ..... 378
*Gagan Bahadur Pradhan, Sudeep Sharma, Jae Yeong Park*

High-Sensitive PDMS-Encapsulated P(VDF-TrFE) Pressure Sensor for Physiological Monitoring ..... 382
*Siyao Jiang, Haizhao Feng, Xiaohong Wang*

Non-Invasive and Continuous Monitoring of Lactate in Interstitial Fluid for Real-Time Metabolic Assessment ..... 386
*Mutian Wang, Wangwang Zhu, Jiaqi Hou, Wenjun Li, Chenxi Jin, Hao Zheng, Dachao Li, Xingguo Zhang, Zhihua Pu*

Papertronics: Enhanced Density Via Laser-Induced Hydrophilic Patterning ..... 390
*Zahra Rafiee, Ruohan Zhang, Seokheun Choi*

Reproducible Direct-Ink-Writing of 2D Gold Nanosheet Inks for Scalable and Stretchable Circuit Integration ..... 394
*Donghyeon Seo, Seongsik Jeong, Gibeom Song, Hae-Jin Kim*

Residual-Stress Self-Assembled 3D Flexible Strain Sensor for Temperature-Insensitive Respiratory Monitoring ..... 398
*Jiaxiang Wang, Fengming Ye, Zhiyuan Hu, Chenyang Zhou, Mengqiu Li, Jie Ni, Faheng Zang, Xiaojun Guo, Hua Liu, Bin Sun, Yunna Sun, Zhuoqing Yang*

Research on an Ionic-Electronic Dual-Mode Flexible Strain Sensor with Integrated High Sensitivity and Broad Sensing Range ..... 402
*Wenjie Chen, Jiaqi Zhou, Junhao Wang, Yucheng Yan, Cao Xia, Yuanlin Xia, Zhuqing Wang*

Selective-Deposition Electrospun PVDF-TRFE Film for Highly Sensitive Multi-Functional Electronic Skin ..... 406
*Chu Qin, Min Wang*

Single-Device Flexible Tactile Interface Enabling Multimodal Sensing and Feedback ..... 410
*Mingyu Kang, Hanju Oh, Soonjae Pyo*

Thin-Check-Valve-Integrated Indirect Suction Cup Array for Handling Soft Object ..... 414
*Ken Sugama, Shingo Terashima, Eiji Iwase*

A Pressure and Temperature Bimodal Sensor Integrated on an Optical Fiber Surface by in Situ Cylindrical Projection Lithography for Potential Interventional Laser Therapy ..... 418
*Fengming Ye, Jiaxiang Wang, Zhiyuan Hu, Mengqiu Li, Jianwei Hou, Huan Chen, Kaiming Su, Zhuoqing Yang*

A Novel Metasurface Design for Generating Needle-Shaped Ultrasonic Beams ..... 422
*Jintao Ni, Ye Jiang, Xu Guo, Jiehe Wang, Bo Ma*

A Quadrupedal Biohybrid Robot Walking on Light-Driven Muscles ..... 426
*Shotaro Saito, Byeongwook Jo, Tomohiro Morita, Shota Noda, Minghao Nie, Shoji Takeuchi*

Biodegradable Micro UV Photodetectors Directly Fabricated on Electrospun PLLA Substrates ..... 428
*Zekai Meng, Zhiqing Xu, Qinhua Guo, Lizhou Yang, Man Chan, Yunda Wang*

Conductivity-Engineered Silk Hydrogel-Enabled Adaptive Flexible Neural Microprobe Array ..... 432
*Yan Wang, Yuxin Liu, Tiger H. Tao, Xiner Wang, Zhitao Zhou*

Design and Wafer-Level Fabrication of Wireless Passive LC Pressure Sensors Via Micro-Casting Technique for Biomedical Applications ..... 435
*Pichao Pan, Li Wang, Jiebin Gu, Zhaohui Qiu, Xinxin Li*

Fabrication of Su-8-Based High-Aspect-Ratio Optrode Array Integrated with Reflowed Glass Lenses Using an Out-Of-Plane Configuration ..... 439
*Kyeong-Taek Nam, Chaesung Kim, Yong-Kweon Kim, Seung-Ki Lee, Maesoon Im, Jae-Hyoung Park*

From Dlp Printing to Dle Integration: Streamlined Fabrication of Cell Monitoring Platforms ..... 443
*Phong V. Lam, Huei-Wen Chen, Pai-Shan Chen, Pin-Chuan Chen*

Iridium Oxide-Modified Silicon-Based Neural Interfaces for Deep Brain LFP Recording ..... 447
*Aiping Wang, Yuan Zhang, Gege Zhan, Zhongxue Gan, Lihua Zhang, Xiaoyang Kang*

Manufacturing Ceramic-Substrate Microneedle Neural Electrode (c-μNeurode) with Projection-Micro-Stereolithography (PμSL) Technology ..... 451
*Zhe Huang, Ruikai Liu, Xinyi Ma, Yuxing Pang, Yunuo Li, Dongxu Ma, Zixiao Yu, Jingquan Liu, Junshi Li, Zhihong Li*

Desensitisation Potential of Microdevice Synthesised Nanobioglass: An Ex Vivo Study ..... 455
*Lakshmi Krishnan, Abinaya Rajendran, Kavitha Illath, Moeto Nagai, Suresh Rao, Tuhin Subhra Santra*

Implantable Silk Optrodes for Simultaneous Optogenetic Stimulation and Recording of Seizures ..... 459
*Zhengyu Liang, Guopei Zhou, Zhong Gao, Lirui Yang, Yanyan Zhu, Zheng Zhang, Man Li, Huiran Yang, Xiaoling Wei*

Micropatterned Rgo Device for High-Throughput and Biocompatible Photoporation-Mediated Intracellular Delivery ..... 463
*Donia Dominic, Nandhini Balasubramaniam, Srabani Kar, Moeto Nagai, Tuhin Subhra Santra*

256-Channel Flexible Electrode Array Fabricated in Situ on TSV for System-Level Packaging and High-Density Neural Recording ..... 467
*Dongyang Wen, Jingjing An, Kejun Tu, Ning Wei, Zixing Li, Kaijie Yang, Yang Xiao, Longchun Wang, Chunpeng Jiang, Zhihong Li, Jingquan Liu*

A PEDOT:PSS-Coated Bioimpedance Ingestible Device for Stable Sensing During GI Transit ..... 471
*Mateo W. Lim, Justin M. Stine, Julie M. Karasik, Reza Ghodssi*

A Multifunctional Neural Probe with Drug Delivery Capability by 3D Printed Microfluidic Channel ..... 475
*Yuxing Pang, Chang Guo, Yuying Shao, Zhe Huang, Dongxu Ma, Jingquan Liu, Zhuo Huang, Zhihong Li*

A Silicon Diaphragm Sensor for Smart Stents: Combining Polymer-Like Flexibility with Crystalline Stability for Chronic in-Vivo Monitoring ..... 479
*Lei Wang, Dong-Su Kim, Jinliang Wei, Dong-Weon Lee*

A Thermocompression Bonded Magnetically Graded Magnetoelectric Antenna for Efficient Data Transfer in Implantable Electronics ..... 483
*Dibyajyoti Mukherjee, Vinit Kumar Yadav, Umayr M.B. Surti, Dhiman Mallick*

Clinically-Applicable High-BPS Motor Imagery Decoding Enabled by High-Density μECoG Brain-Computer Interfaces ..... 487
*Erda Zhou, Zuyong Fang, Haowen Zhao, Tiger H. Tao, Zhitao Zhou*

Controlled Delamination and Anti-Withdrawal Design for Reliable In-Vivo Implantation of Ultra-Wide Flexible Neural Probs ..... 490
*Kaijie Yang, Longchun Wang, Kejun Tu, Dongyang Wen, Quan Peng, Zixing Li, Haoyuan Chen, Chunpeng Jiang, Zhihong Li, Jingquan Liu*

Decoding Pain-Specific Oscillations in Deep Brain Structures with a Flexible Multi-Channel Bioelectronic Interface for Precision Neuromodulation ..... 494
*Yanyan Zhu, Lirui Yang, Guopei Zhou, Zhengyu Liang, Man Li, Huiran Yang, Xiaoling Wei*

Design and Fabrication of Bioresorbable Microelectrode Probes for Transient Neural Biointerfaces ..... 498
*Mohamed K. M. Abdelbaki, Dina N. Arvanitis, Clement Cointe, Christian Bergaud, Ali Maziz*

Fractal-Laplace MEMS Electrode for Integrated Cardiac Low-Voltage Precision Pulsed Field Ablation and Monitoring ..... 502
*Quan Peng, Mengfei Xu, Ziliang Song, Mu Qin, Ning Wei, Kaijie Yang, Zhiyuan Du, Kunyu Zheng, Zixing Li, Haoyuan Chen, Bin Yang, Jingquan Liu*

Hollow Microneedle Electrode Array (HMEA): A Tool for Drug Delivery and Low-Voltage Electroporation in Vivo ..... 506
*Xiaoyong Tang, Pengfei Wu, Dongxu Ma, Zixiao Yu, Yuxing Pang, Yuxuan Chen, Yingjie Ren, Zhongyan Wang, Xiaoyi Shi, Zigang Ge, Yuanyu Huang, Jingquan Liu, Zhitong Zhang, Zhihong Li*

Implantable Nanoscale Neural Probe for Single-Neuron Intracellular Electrophysiological Analysis in Vivo ..... 510
*Zhiyuan Du, Qingda Xu, Xu Yang, Ye Xi, Ning Wei, Quan Peng, Kunyu Zheng, Longchun Wang, Chunpeng Jiang, Xiuyan Li, Qingkun Liu, Xiaolin Wang, Bin Yang, Zhihong Li, Jingquan Liu*

MEMS-Based High-Resolution Neural Interfaces for Chinese Phonemes Decoding ..... 514
*Changjiang Liu, Jiaqi Yang, Tiger H. Tao, Zhitao Zhou*

Microneedle-Mediated Adaptive Phototherapy (MAP) Wound Patch with Microlens ..... 518
*Nadezhda Korostyleva, Raneen Qasim, Mahsa Rastegar Pour, Donghoon Yoon, Jungkwun Kim, Albert Kim*

Ultra-Thin Silicon-Based Pressure and Temperature Sensors Integrated on a Flexible Neural Probe Array ..... 522
*Ci Song, Yue He, Xinxin Li*

Ultrasoft Pit-Free Electrodes for High-SNR Neural Recordings ..... 526
*Ruiyu Bai, Xuanqi Wang, Xiaoli You, Yong Yang, Yu Zhang, Quetao Yu, Chenfei Cao, Feng Yue, Minghao Wang, Yunlei Zhou, Honglong Chang, Bowen Ji*

Ultrasonically Powered Implantable Tumor Treating Field (I-TTF) System ..... 530
*Sophia Selvarajan, Raneen Qasim, Natalia Ochoa, Silvia A Valdes Rives, Yijun Yang, Zeng-Jie Yang, Albert Kim*

Wireless Biphasic Silicon Solar Cell Retinal Prosthesis with a Push–Pull Mechanism for Enhanced Focal Stimulation and Charge Balance ..... 534
*Chaesung Kim, Yunseo Son, Jin-Yeong Park, Minju Kim, Hyeonhee Roh, Seung-Ki Lee, Byung Chul Lee, Hyung-Min Lee, Min Gu Kang, Sang Hee Lee, Jae-Hyoung Park, Yong-Jin Kim, Maesoon Im*

A Dual QCM Integrated with a Heater and Temperature Sensor for the Detection of VOCs from Human Skin ..... 538
*Muhammad Awais Maqbool, Hamza Shakeel*

A Pain Intensity Assessment Method Based on High-Density Flexible Tactile Sensor Array ..... 542
*Yi Sun, Ke Sun, Fang Wang, Yue He, Yunhao Wang, Yuqing Mao, Hao Yu, Yechen Miao, Xiaoyuan Xia, Yemin Dong, Heng Yang, Xinxin Li*

Bioinspired Barbed Microneedle for Anchored and Enhanced Transdermal Delivery Via Iontophoresis ..... 546
*Shu Huang, Yuheng Xie, Wanling Wang, Wenjie Chen, Yuanlin Xia, Cao Xia, Zhuqing Wang*

Coaxial ION Source with On-Chip Matching Network for Rapid Mass Spectrometry Detection of Natural Products ..... 550
*Jui-Chi Tsai, Che-Hsin Lin*

Hybrid Thin Film Transistor-Micro Electrode/Micro Pillar Array Platform for Multimodal Electrophysiological and Contractility Analysis of Cardiomyocytes ..... 554
*Cecilia Beccari, Gilgueng Hwang, Satoshi Amaya, Fumihito Arai, Yoshio Mita, Roberto Raiteri, Agnes Tixier-Mita*

Fabrication of a Calorimetric Biosensor with Suspended Freestanding Channel for Small Volume Enzymatic Reaction Detection ..... 558
*Xiasheng Wang, Hanwen Cong, Minghao Zhao, Yuanlin Xia, Cao Xia, Zhuqing Wang*

Quantitative Point-Of-Care Cadmium Detection Using a MEMS Spectrometer-Based LFA Reader ..... 562
*Yu-Chen Hsu, Weileun Fang, Chitsung Hong, Cheng-Hao Ko, Jyun-Wei Wen, Guan-Yi Lin*

An Optical Sensor for Measuring Sub-Newtonian Planar Ground Reaction Forces in Insects: A Low-Tech Alternative to Silicon Mems ..... 566
*Vincent Mansard, Elliot Perrez, Dorian Gautier, Julien Roul, Christian Bergaud, Pierre Moretto, Vincent Fourcassie*

Guided Unidirectional Cell Migration Over Sloped Steps ..... 570
*Chang Liu, Yijun Cheng, Stella W. Pang*

Hybrid Fabrication of a Multi-Actuator Ingestible Capsule for Localized GI Drug Delivery ..... 574
*Joshua A. Levy, Nomin-Erdene Oyunbaatar, Jude A. C. Stephen, Rehan M. Rao, Justin M. Stine, Luke A. Beardslee, Reza Ghodssi*

Pipette-Free Operation of Biomedical Microdevice for Field-Deployable Molecular Diagnostics ..... 578
*Nae Yoon Lee, Kieu The Loan Trinh, So Yeon Park*

3D Neurospheroids with Axon Bundle Connection Guided by Narrow Path in Hydrogel Microfiber ..... 580
*Momoka Terajima, Shota Sato, Midori Kato-Negishi, Hiroaki Onoe*

Multi-Dimensionally Biomimetic and Engineered Human Alveolus-On-A-Chip Model ..... 584
*Zening Li, Rongtao Zhang, Jianlong Zhao, Jian Yang, Lin Zhou, Hongju Mao*

Three-Layered Hydrogel Microfiber Encapsulating Fiber-Shaped Hipsc-Derived Cardiac Tissue for Maturation Triggered by Electrical Stimulation ..... 588
*Shohei Sasaki, Jumpei Muramatsu, Akari Masuda, Shugo Tohyama, Hiroaki Onoe*

A Data-Driven Approach for Accurate Prediction of Thickness Uniformity in Tin Oxide Nanoparticles Coating ..... 592
*Minwoo Park, Wonkeun Park, Eunsoo Ha, Seunghwa Ryu, Jongbaeg Kim*

Data-Driven Analysis of Resonance Behavior in Metal-Coated Silicon Micro-Cantilevers ..... 596
*Sina Zare Pakzad, Saurabh Thorat, Andre Loch Gesing, Dominik Huber, Patrick Egger, Georg Pfusterschmid, Ulrich Schmid, Michael Schneider*

AI-Driven Label-Free Exfoliated Tumor Cells Identification Using Hyperspectral Single-Cell Optofluidics ..... 600
*Hanqi Hu, Zongliang Guo, Siyu Hu, Mengjie Li, Tao Zhao, Hang Li, Kangfu Chen, Shuailong Zhang, Haixia Li, Rongxin Fu*

Intelligent Resonator Design Framework Integrating Vector Fitting, Spurious Score Learning with DNN, and Pareto Optimization for Spurious-Free High-Q Performances ..... 604
*Xingyu Liu, Junyan Zheng, Fangsheng Qian, Zijun Ren, Kai Yang, Songbin Gong, Jun Zhang, Yansong Yang*

Intelligent Wearable Laser-Induced Graphene-Based Sensor for High-Fidelity Pressure and Temperature Detection Via LSTM-Driven Signal Decoupling ..... 608
*Faizan T. Beigh, Soha M. Bhat, Dhiman Mallick*

Respiratory Monitoring and State Classification Via CNN–Transformer Deep Learning on a MEMS Multi-Sensor Chip ..... 612
*Yu. Zhang, Linze Hong, Xiaofang Pan, Wei Xu*

Achieving 2.0-Ppb Frequency Stability with a Curved-Beam Piezoelectric MEMS Resonator Via Multiple TCf Regulation Method ..... 616
*Yancheng Lian, Yueyang Li, Fangzhou Chen, Jinbo Yang, Jinuo Zhou, Chen Wang, Michael Kraft, Xueyong Wei, Jianlin Chen, Ka-meng Lei, Man Kay Law, Rui Martins, Pui-In Mak, Yuan Wang*

Correlative Characterization of the Fabrication Process of Single-Particle MOF Glasses Via Integrated Chip-Based DSC and In-Situ FTIR ..... 620
*Zechun Li, Zhihao Zhang, Shaokui Tan, Jun Yan, Ming Li, Pengcheng Xu, Xinxin Li*

MEMS LiDAR-Enabled Multi-Modal System for 3D Radiation Field Mapping ..... 624
*Yisen Hu, Yuanlin Xia, Xiang Guo, Zhimin Hu, Zhuqing Wang*

Silicon-Glass Hybrid Micro Gas Chromatography Columns with High-Aspect-Ratio ..... 628
*Minjie Zhu, Guoqin Zhang, Wanchun Li, Fanhong Chen, Shuai Liu, Kehan Zhu, Zhuqing Wang, Xiaohui Du*

Integrated Resonant Cantilever for Characterizing Molybdenum Oxide Thermal Decomposition ..... 632
*Hao Jia, Jun Li, Pengcheng Xu, Xinxin Li*

CMOS-MEMS PUF Exploiting Mode Localization in a Multi-DOF Tuned-Mass-Damper Resonator ..... 636
*Chiao-Jen Hsueh, Chun-Pu Tsai, Ting-Yi Chen, Wei-Chang Li*

A High-Speed and Stable Flexible Electromagnetic Actuator with Enhanced Vibration Performance for Advanced Tactile Human-Machine Interfaces ..... 640
*Biyan Wang, Menglin Chen, Senlin Jiang, Wenbiao Zhou, Huikai Xie, Xiaoyi Wang*

Tactile Sensor for Texture Recognition Based on a Piezoelectric Microdome Array ..... 644
*Litao Wang, Zihan Zhuang, Yuwen Weng, Kaiteng Tan, Jinchi Han*

Harnessing Vibro-Impact Dynamics for High-Performance MEMS-Based Reservoir Computing ..... 648
*Nilabh Basu, Ting-Yi Chen, Chun-Pu Tsai, Wei-Chang Li*

Compact On-Chip Metalens Enabled Photonic Integrated Circuits for Ultrafast Fourier Transform-Based Convolutional Neural Network Acceleration ..... 652
*Zhihao Ren, Yangyang Zhuge, Yuxin Liu, Daoye Zheng, Fujun Sun, Yan Yang, Chengkuo Lee*

Electrostatic MEMS Mirror-Based 1D Rotational Scanning for High-Precision 2D Eye Tracking ..... 656
*Tianxiang Liang, Haoyu Nan, Haoyu Tan, Zenghui Hao, Cao Xia, Yuanlin Xia, Zhuqing Wang*

A Real-Time Point Cloud Compensation System for High-Frequency Piezoelectric MEMS Lidar Based on FPGA ..... 660
*Zenghui Hao, Boyan Huang, Wei Huang, Xiang Guo, Tianxiang Liang, Ji Chen, Cao Xia, Yuanlin Xia, Zhuqing Wang*

A High Output Multi-Frequency Ultrasonic Transmitter Based on Nonlinear Harmonic Enhancement ..... 664
*Xinyu Feng, Yufeng Gao, Longju Yi, Xili Wang, Jinghan Gan, Bowen Sheng, Yipeng Lu*

Mixed Higher Order Nonlinear Dynamics of a Bridge Supported Cantilever MEMS Device ..... 668
*Samuel L. Kirkbride, Ashwin A. Seshia*

Switchable Combination and Internal Resonance in a CMOS-MEMS Resonator with via-Engineered Mass Asymmetry ..... 672
*Nilabh Basu, Ting-Yi Chen, Wei-Chang Li*

Efficient Glass-Based Micro-Oven for Atomic Sources ..... 676
*Jannik Koch, Alexander Kassner, Folke Dencker, Marc C. Wurz*

Optimization of Beam Characteristics for Quantum Magnetometers Based on 3D Mems Alkali Vapor Cells ..... 680
*Wenqi Li, Jintang Shang*

In-Situ On-Chip Technique for Mapping Vibration Sensitivity in MEMS Tuning-Fork Resonators ..... 684
*Chenggang Zhang, Chenzhe Du, Yi Tang, Qiancheng Zhao, Jian Cui*

Packaging-Induced Mode Distortions in Wideband Aircoupled PMUT Arrays ..... 688
*Javad Abbaszadeh, Rodrigo Tumolin Rocha, Alexander Shatalov*

Suppression of Thermal Effects in a Palm-Sized Mems Gravimeter with Sub-Nano-G Sensitivity ..... 692
*Runhan Xie, Wenjie Wu, Fangzheng Li, Le Gao, Bingyang Cai, Zhiqing Zhang, Zhong Zhang, Liangcheng Tu*

CMOS-Integrated Tactile Sensing Hub for Force, Proximity, and Heat-Flux Detection ..... 696
*Yung-Chun Yang, Fuchi Shih, Yuanyuan Huang, Yi Chiu, Weileun Fang*

Coil-On-Hall Enabliing Dual-Mode Magnetic and Pressure Sensors for CMOS-MEMS Environmental Hub ..... 700
*Tsai-Wen Chang, Fuchi Shih, Ming-Hsuan Huang, Yuanyuan Huang, Mei-Feng Lai, Weileun Fang*

Vertical Integration of Gas and Flow Sensors for Miniaturized Monolithic CMOS-Mems Gas Monitoring System ..... 704
*Xuanqing Hua, Fengyang Li, Zhiheng Yu, Peng Liu, Dacheng Zhang*

CMOS-Compatible Top-Emitting Oled Microarray for Wavelength-Selective Retinal Stimulation ..... 708
*Jiwoo Oh, Fuze Jiang, Jingjing Zang, Stephan C.F. Neuhauss, Hua Wang, Chih-Jen Shih*

Slidable Lateral Flow 2D Chromatography Cassette with Through-Hole Electrospray Ionization and Desorption for High Performance MS Analysis ..... 712
*Tsung Lin Chang, Che-Hsin Lin*

Bulge Test for Direct Mechanical Characterization of ALN and Scaln Thin Films ..... 716
*Emre Ozyilmaz, Enise F. Altin, Mehdi Y. Arzefouni, Eda Ozyilmaz, Cristian Cassella, Matteo Rinaldi, David Horsley, Benyamin Davaji*

High-Q SOG MEMS Resonator with 5PPB Allan Deviation..... 720
*Alejandro Godinez Perez Medina, Jerome Juillard, Etienne Hertz, Abdelmounaim Harouri, Alain Bosseboeuf, Alexis Brenes*

Real-Time Optical Quantification of Surface Diffusion in Semiconductor Nanostructures..... 724
*Taeyeong Kim, Bong Jae Lee, Jungchul Lee*

Surface Potential Trimming in Microdomains of Self-Assembled Electrets Using Ultraviolet Light..... 727
*Mitsuto Kojima, Minori Morihata, Suzaku Kimura, Ryu Kumagai, Ayato Jingu, Yuya Tanaka, Daisuke Yamane*

Tailore Ruthenium Oxide Films for Mems Cryogenice Thermometry with Record Sensitivity Below 10K..... 730
*Yonghao Xie, Minmin You, Zude Lin, Yongpeng Ran, Xiao Ma, Yanjie Li, Bin Yang, Jingquan Liu*

A Low-Temperature-Gradient Thermal Actuation Platform for In-Situ Tensile Test of Nanoscale Films..... 734
*Jiakang Li, Jiawei Zhou, Fengyang Li, Xufeng Wang, Dacheng Zhang*

Piezoresistive Pressure Sensors Fabricated Based on in-Situ Doping Technology Exhibits Outstanding Performance at High Temperatures..... 738
*Yuanying Zhang, Binghe Ma, Xiaojing Wang, Jinjun Deng, Xingxu Zhang, Jian Luo, Fengyun Liu, Yunzhe Liu, Tao Zhang*

Dynamic Tuning of Temperature Coefficient of Frequency and Turnover Point Via Electro-Mechanical Coupling in 2D MoS2 Nems Resonator..... 742
*Zeyu Zhuang, Junhe Tong, Runpu Zhou, Bingren Feng, Luda Wang*

Evaluation of Temporary Bonding Techniques for Pfas-Free Polymer Integration in Mems Devices..... 746
*Mohammadsadegh Namnabat, Anton Lagosh, Washim Reza Ali, Annalisa De Pastina, Rodrigo Tumolin Rocha, Humberto Campanella, Luis Guillermo Villanueva, Adrien Piot*

Linking Crystal Phase to Frequency Scaling Based on Nanomechanical Resonators..... 750
*Shuang Cai, Yalan Wang, Bo Xu, Hao Jia, Zenghui Wang*

High Performance Mxenes-Based Conimnp-TI3AlC2 Permanent Magnetic Film for Flexible Mems Devices..... 754
*Ruoyan Shi, Binkai Zhang, Quan Yuan*

High-Efficiency Gate-Tunable Frequency Control in Doubly-Clamped MoS2 NEMS Resonators..... 758
*Pengcheng Zhang, Ines Kraiem, Miroslav Haluska, Christofer Hierold*

High-Performance Polymer Aerogel for Fire-Retardant and Self-Powered Devices ..... 762
*Feng-Chi Pai, Jui-Hsi Tsai, Guan-Ze Song, Nai-Jen Chang, Ching-Te Kuo*

Precision Programming Biomimetic Actuator Based on Photolithography Dopamine Coating..... 766
*Yangzhi Yu, Chun Huang, Cao Xia, Yuanlin Xia, Zhuqing Wang*

Sandwich-Structured Flexible Metal-Based Thermal Interface Material with Metal-Level Thermal Conductivity and Silicone-Level Elasticity Enabling Zero Contact Thermal Resistance..... 770
*Hetong Fang, Guifu Ding, Yongjin Wu*

The Frequency Tuning Behavior Induced by Electrostatic-Optothermal Coupling in 2D Nanomechanical Resonators ..... 774
*Yalan Wang, Shuang Cai, Bo Xu, Hao Jia, Zenghui Wang*

Transmit-Receive Performance Enhancement of $SC_{0.3}AL_{0.7}N$ PMUTS Through Ferroelectric Activation ..... 778
*Jihang Liu, Subhranu Samanta, Daniel Ssu-Han Chen, Yan Hong, Shyam Trivedi, Duan Jian Goh, David Choong Sze Wai, Silvia Adorno, Alberto Leotti, Hwee Hwee Ong, Young Jik Hur, Yul Koh, Yao Zhu*

Tunable and Reconfigurable Frequency Comb in Atomically Thin Nanomechanical Resonator Via Low-Frequency Pumping ..... 782
*Bo Xu, Shuang Cai, Yalan Wang, Jiaqi Wu, Hao Jia, Zenghui Wang*

A Mems Loudspeaker Based on a Polymer Membrane with Partial Stiffening, Actuated by a Thin Pzt Film ..... 786
*Romain Liechti, Christel Dieppedale, Timothee Rotrou, Gwenael Le Rhun*

Fabrication of Aperture-Tunable Silicon Nanostencil Membrane Via Localized Laser Annealing ..... 790
*Doohong Min, Taeyeong Kim, Jungchul Lee*

Diamond ICP-DRIE Etching with Pecvd SiO Thick Masks and Its Application on Microchannel Cooling ..... 793
*Rui Tang, Jianyu Du, Jinwen Zhang, Wei Wang*

Fabrication of High-Aspect-Ratio Macro-Mesopore Arrays Via Electrochemical Etching with Tunable Mode Transition ..... 797
*Doohong Min, Taeyeong Kim, Kibum Jung, Jungchul Lee*

Dry Mask Transfer Lithography: A Solution-Less Approach for Patterning Colloidal Nanomaterials ..... 800
*Na Yoon Kim, Kyeong Jun Park, Junhyung Kim, Seok Kim, Hohyun Keum, Hoe Joon Kim*

Fabrication of Low Frequency Split Micro Hemispherical Resonator Based on Positive Pressure Multiple-Step Blowing ..... 804
*Bizhen Gao, Haoyang Li, Jiawei Huang, Jintang Shang*

Fluorine-Free Anti-Stiction Coating Using Polydimethylsiloxane ..... 808
*Peter F. Satterthwaite, Hohyeon Kim, Eduard O. Bobylev, Jeremiah A. Johnson, Farnaz Niroui*

Investigation of Zinc Oxide Nanostructures Grown on Thermally Isolated Micro-Architectures Via Laser-Assisted Hydrothermal Process ..... 812
*Yonghoon Lee, Sangrim Lee, Jonghyeon Woo, Jongsung Park, Jisoo Kim, Yunsung Kang*

Maskless Ultraviolet Grayscale Lithography for Fabry-Pérot Cavity Color Printing with Post-Exposure Bleaching ..... 816
*Dongxu Ma, Yuxing Pang, Zhe Huang, Xiaoyong Tang, Jingquan Liu, Zhihong Li*

Multiple Detachment of Porous 4H-SIC Thin Foils Using Electrochemical Etching ..... 820
*Georg Pfusterschmied, Christopher Zellner, Tingqiang Yang, Ulrich Schmid*

Photoresist-Free Patterning of 2D Materials Via Non-Liquid Anodic Oxidation with Borosilicate Glass Mold ..... 824
*Kaiwen Sha, Detao Yuan, Ke Sun, Liangliang Wang, Hao Jia, Pengcheng Xu, Heng Yang, Xinxin Li*

Piezoelectricity Enhancement Investigation of PVDF Micro-Springs Fabricated by Melt Electrowriting ..... 827
*Haizhao Feng, Biranche Tandon, Sonke Menke, Chenxiang Zhang, Xiaohong Wang, Jurgen Brugger, Arnaud Bertsch*

True MEMS-Scale Hair-Like Flow Sensors Fabricated Via Hybrid Projection Micro-Stereolithography and Aerosol Jet Printing ..... 831
*Engincan Tekin, Ming Cao, Ajay Giri Prakash Kottapalli*

Design and Implement of Notched Tether for Large-Volume Micro-Transfer-Printing Technique ..... 835
*Yuanyuan. Huang, Chih-Hao Lin, Shiuo-Yi Kuo, Weileun Fang*

Development of a Cmp-Free Parylene-C/Cu Hybrid Bonding Structure with Low-Temperature Processing ..... 839
*Yuanyuan Huang, Su-Ching Hsiao, Wei-Lan Chiu, Liang-Cyuan Chang, Hsiang-Hung Chang, Weileun Fang*

Fabrication and Packaging of Electrowetting LENS/PRISM Elements ..... 843
*Eduardo J. Miscles, Mahima Rana, Samuel Becker, Alexander Hedrick, Parker McDonnell, Kaushik Jayaram, Juliet T. Gopinath, Victor M. Bright*

Flex to Flex Bonding Method for High-Density Ultra-Thin Electrode Arrays ..... 847
*Gege Zhan, Aiping Wang, Yuan Zhang, Lihua Zhang, Zhongxue Gan, Xiaoyang Kang*

2-DOF Electromagnetic MEMS Mirror for Dental Laser Ablation ..... 851
*Huu-Cuong Nguyen, Thanh An Truong, Alaa Habeb, Omar Zuaiter, Trong-Du Nguyen, Peter Woodfield, Van Thanh Dau, Dzung Viet Dao*

A Nano-Gap MEMS Switch Simultaneously Achieving Ultra-Fast Switching and Ultra-Low Resistance ..... 855
*Tae-Soo Kim, Yong-Bok Lee, So-Young Lee, Yu-Hyun Shim, Sung-Ho Kim, Jun-Bo Yoon*

A Robust Lateral Shift Free (LSF) Electrothermal Micromirror with Multi-Segment Flexible Connections ..... 859
*Hengzhang Yang, Qiangqiang Liu, Yingtao Ding, Anrun Ren, Shuailong Zhang, Xiaoyi Wang, Huikai Xie*

Agile Millimeter-Scale Microrobot Driven by Single Piezoelectric Actuator ..... 863
*Meng Cui, Liyun Zhen, Lihan Yu, Xingyu Bai, Xuhao Chen, Yonghao Xie, Jingquan Liu, Bin Yang*

An ALN-Based Piezoelectric Micromirror with Four-Degree-Of-Freedom Motion ..... 867
*Hao Chen, Xudong Ma, Yaoyu Deng, Xinyu Ding, Ke Cao, Hui Shang, Wenlong Jiao, Huikai Xie*

Bi-Axial Piezoelectric MEMS Micromirror with a Hybrid Spring and Supporting Frame for Large-Angle Scanning ..... 871
*Po-Chun Lin, Chun-Hung Chiang, Jerwei Hsieh, Mingching Wu, Mei-Feng Lai, Weileun Fang*

Biomimetic-Inspired Silicon-Honeycomb/PDMS Hybrid Damper for Piezoelectric MEMS Microspeakers ..... 875
*Xuchen Wang, Yukio Suzuki, Chung-Min Li, Shuji Tanaka*

CMOS-Integrated Biaxial MEMS Scanning Mirror with Closed-Loop Control for Stable Long-Term Precision ..... 879
*Shang-Yang Chen, Chung-Ying Chou, Sheng-Hsiang Tseng, Michael S.-C. Lu*

Design of a Piezoelectric Uniaxial MEMS Micromirror with Integrated Angular Feedback ..... 883
*Kai Du, Hongbo Guo, Xiang Guo, Yiseng Hu, Yuanlin Xia, Cao Xia, Zhuqing Wang*

Dual-Axis Acoustically Driven Mems Mirror with a Parallel Double-Layered Helmholtz Resonator Array ..... 887
*Masahiro Fukuta, Hidetoshi Takahashi*

Flexible Piezoelectric Ultrasonic Transducers with High Sensitivity and Ultra-Large Bandwidth ..... 891
*Zhengshuai Wang, Kaiteng Tan, Yuwen Weng, Simeng Wu, Junzhe Yu, Jinchi Han*

High-Frequency Piezoelectric Mems Mirror Design and Adaptive Variable-Density Scanning Method ..... 895
*Yuhan Zhang, Xiang Guo, Xianzhe Zhang, Cao Xia, Yuanlin Xia, Zhuqing Wang*

In-Plane Resonant Coupling Actuation Inspired by Out-Of-Plane Resonant MEMS Mirror Actuation ..... 899
*Yuki Okamoto, Soya Sato, Yusuke Takei*

Piezoelectric Mems Micromirror with Arched Actuator and W-Shaped Spring for Raster and Lissajous Scanning ..... 903
*Chang-I Lin, Yi-Cheng Kuo, Jerwei Hsieh, Mingching Wu, Weileun Fang*

Multi-Degree-Of-Freedom Electrothermal Microgripper Based on Al-Polyimide Bimorph Structures ..... 907
*Hengzhang Yang, Qiangqiang Liu, Zonghao Li, Anrun Ren, Shuailong Zhang, Xiaoyi Wang, Huikai Xie*

Quasi-Periodic MEMS Micromirror Scanning for Enhanced Image Classification ..... 911
*Shuaishuai Zhang, Changhao Wang, Jianlin Chen, Hao Jia, Tao Wu, Yuan Wang, Nan Wang*

Towards a Fully Passive Radio Receiver with an Integrated Capacitive MEMS Speaker ..... 915
*Raul Ruiz, Gabriel Abadal*

A Wearable Ultrasonic Energy Harvesting System for Airborne Transmission Using ScAlN-Based PMUT with Large Reception Angle and High Efficiency ..... 919
*Cong Hou, Guoying Xu, Wei-Mong Tsang, Long Zhang, Liang Lou*

Actively-Controlled Electrostatic MEMS Transducer for Kinetic Energy Harvesting Approaching the Physical Limits of Power Conversion ..... 923
*Moein Rahmani, Armine Karami, Ayoub Dahani, Frederic Marty, Dimitri Galayko, Philippe Basset*

A Micro Pneumatic Gas Chromatographic Injector Based on MEMS Technology ..... 928
*Shaojie Ma, Wenbo Li, Yuchen Zhu, Zhirui Li, Bin Zhao, Fei Feng*

Bandwidth Enhancement of Piezoelectric MEMS Microspeaker Using Reverse-Trapezoid Cantilever with Combined Piston and Bending Motion ..... 932
*Chia-Lung Lin, Tsung-Wen Tsai, Ping-Hua Liu, Chia-Hao Lin, Zih-Song Hu, Sung-Cheng Lo, Yu-Chen Chen, Mei-Feng Lai, Weileun Fang*

Bandwidth Enhancement of Piezoelectric MEMS Speaker Via Frequency Separation of Resonance and Zero Modes Using Curved Actuator and Joint Spring ..... 936
*Ping-Hua Liu, Po-Shen Chen, Chia-Lung Lin, Chia-Hao Lin, Zih-Song Hu, Sung-Cheng Lo, Yu-Chen Chen, Weileun Fang*

Reversible and Flexible Electrolytic Actuator with 3D Porous Carbon Nanotube Electrodes for Electrodes for Enhanced Displacement ..... 940
*Kyuhyun Hwang, Kyungdong Son, Seunghwan Koh, Sangjun Sim, Kyubin Bae, Jongbaeg Kim*

Bilayers of PVD-Deposited PZT: Fabrication and Characterization ..... 944
*Andrea Picco, Riccardo Gianola, Carla M. Lazzari, Sonia Costantini*

Design and Development of Liquid Crystal Elastomerepoxy Resin Microactuator Enabling Dual-Mode Deformation Switching ..... 948
*Yinfeng Xia, Yuanlin Xia, Cao Xia, Zhuqing Wang*

High Velocity Diamond Disk Resonator ..... 952
*William Dong, Hung-Yu Chen, Kevin H. Zheng, Xintian Liu, Clark T-C. Nguyen*

Moisture-Harvesting Silicone Rubber Composite with Repeatable Large Actuation Via Liquid-Gas Phase Transition ..... 956
*Kiko Tanaka, Yoshihiro Taguchi, Masaaki Hashimoto*

Effect of Surface Properties on the Vibrational Behavior of Electron Beam Driven Microactuators ..... 959
*Suengyoon Lee, Joowon Lim, Byeongju Hong, Won Chul Lee*

Tri-Eapiezo Crawler: A Mems-Based Tripedal Microrobot Featuring PVDF Actuators and EA Pads for Agile Navigation ..... 962
*Yingzhi Wang, Weianliang Wang, Xinyu Ding, Xiaoyi Wang, Hong Ding, Jin Xie*

Combination of Stereolithography Elastomeric 3D Printing and Dual Surface Modification for High-Performance Flexible Supercapacitors ..... 966
*Minghao Xu, Siyao Jiang, Tao Lin, Xiaohong Wang*

Piezoelectric-Decoupled Pyroelectric Sensor for Robotic Tactile Sensing and Materials Classification ..... 970
*Yoobin Choi, Hang Gyeom Kim, Hoe Joon Kim*

Self-Powered MEMS Accelerometer Using Highly Integrated Comb Electrodes Coated with Electrets for Frequency-Independent High-Sensitivity Detection ..... 974
*Hiroaki Honma, Rikuto Kamiya, Hiroshi Toshiyoshi, Akio Uesugi, Koji Sugano, Yoshitada Isono*

V2CTx@Ecoflex Composite Triboelectric Layer with Enhanced Charge Retention Using MoS2 for Self-Powered Motion and Joint Monitoring Sensor Applications ..... 978
*MoonSeong Jo, Trilochan Bhatta, Shital Sharma, Aklesh Teli, Jae Yeong Park*

A MEMS Sensor for Simultaneous Measurement of Thermal Conductivity and Diffusivity in Gases ..... 982
*Philipp Raimann, Frank Hedrich, Sophie Billat, Alfons Dehe*

A Low Power CMOS-MEMS Monolithic Integrated Dual-Mode Thermal Sensor with Thermal Conductivity Compensation for Accurate Binary Gas Measurement ..... 986
*Shizhen Xu, Shuixiang Yin, Daishan Yue, Le Lu, Yue Tang, Huikai Xie, Feng Gao, Xiaoyi Wang*

A Monolithically Integrated 3D Wind Sensor with Low Crosstalk Based on a Three-Level Cascade Mechanism ..... 990
*Penghong Shi, Gaopeng Xue, Erzhen Pan, Wenfu Xu, Guochang Liu, Shuo Gao, Yonggang Jiang, Bing Li*

A Rolled Wireless Passive Inline Cross-Correlation Flow Sensor ..... 994
*Ruitong Chen, Alex Baldwin, Jingjing Liang, Ellis Meng*

Machine Learning Assisted Multiparameter Sensing Via a Single Thermal Piezoresistive Membrane Resonator in Air ..... 998
*Chen Wang, Jing Mi, Appo van der Wiel, Ben Maes, Michiel Gidts, Yuan Wang, Michael Kraft*

MEMS-IC Co-Design and Experimental Demonstration of a Surface Micromachined CMOS-MEMS Pirani Vacuum Gauge ..... 1002
*Jiahong Huang, Xiangyu Song, Linze Hong, Haoxin Hu, Wei Xu*

A Highly Sensitive Piezoresistive Pressure Sensor Based on Oxygen-Doped Zirconium Nitride Thin Film ..... 1006
*Yunhe Luo, Huimin Wen, Yongpeng Ran, Xiao Ma, Zhiyong Hu, Bin Yang, Minmin You, Jingquan Liu*

Monolithically Integrated High-Resolution and Large-Range MEMS Triaxial Force Sensor with Sub-Millimeter Proximity Sensing ..... 1010
*Xincheng Zhu, Cong Lin, Xueliang Wang, Yang Zhong, Jiahao Miao, Zhanxuan Zhou, Xiaomei Yu*

A Parallel-Beam MEMS Six-Axis Force/Torque Sensor with High Sensitivity, Low Crosstalk, and Packaging for Large-Range Applications ..... 1014
*Xincheng Zhu, Xueliang Wang, Yang Zhong, Jiahao Miao, Cong Lin, Zhanxuan Zhou, Xiaomei Yu*

CMOS-MEMS Tactile Sensor with Adjustable-Sensitivity Force Sensing and Proximity Detection ..... 1018
*Fuchi Shih, Mei-Feng Lai, Weileun Fang*

Monolithic Integration of GaN-Based Flexible Microcantilever for Opto-Electromechanical Force Sensing ..... 1022
*Pohsing Chiu, Yuwei Chen, Chengshiun Liou, Chingfu Tsou*

Squeeze Film Enhanced Frequency Modulation in a Multimodal Resonator for High-Sensitivity Pressure Sensing ..... 1026
*Tanya Chauhan, Seyyed Mojtaba Hassani Gangaraj, Mingyo Park, Azadeh Ansari*

The Interdimensional Error for Quartz Crystal Resonator Force Sensor for Multiaxis Use ..... 1030
*Hirotaka Sugiura, Satoshi Amaya, Fumihito Arai*

Torque Sensing Device with Off-Center Anchored Resonant Sensing Suspension Beams ..... 1032
*Maxim Drizovsky, Alexandra A. Zobova, Erez Benjamin, Slava Krylov*

Triaxial Microforce Plate Array for Measuring Reaction Force Distribution of Ants Walking on Ground and Wall ..... 1036
*Toshihiro Shiratori, Hidetoshi Takahashi*

A MEMS Skewed Oscillating Mirror with Built-In Piezoresistive Sensor for Photoacoustic Gas Detection ..... 1040
*Yun Liu, Penghong Shi, Yufan Chen, Yuqin Lu, Minjie Zhu, Bing Li, Gaopeng Xue*

A Swelling-Activated Micro-Dispensed Piezoresistive Sensor Array for High-Fidelity Electronic Nose ..... 1044
*Zhiyang Wang, Weiran Meng, Chun Huang, Yuanlin Xia, Cao Xia, Yubo Huang, Kang Song, Takahito Ono, Zhuqing Wang*

AI-Enhanced E-Nose Based on Film Bulk Acoustic Resonators for Identification of Volatile Organic Compounds ..... 1048
*Luwei Wang, Mengyao Xiao, Weixin Liu, Dongxiao Li, Yingpeng Wang, Ying Zhang, Yao Zhu, Chengkuo Lee*

A PH-Nanosensor for Reliable Intracellular In-Situ Diagnosis of Single Neurons in Abnormal States ..... 1052
*Zhiyuan Du, Qingda Xu, Xu Yang, Ye Xi, Kunyu Zheng, Quan Peng, Ning Wei, Chunpeng Jiang, Longchun Wang, Xiuyan Li, Qingkun Liu, Xiaolin Wang, Bin Yang, Zhihong Li, Jingquan Liu*

An Ultra-Low-Power Mems-Based Quad-Beam Dual-Bridge Catalytic Combustion Gas Sensor for Hydrogen Detection..... 1056
*Di He, Dongcheng Xie, Dongwen Wang, Qiuju Wu, Dongliang Chen, Lei Xu*

High-Performance CMOS-MEMS No2 Gas Sensors with Inkjet Printed ZnO on Pillar Electrodes ..... 1060
*Alexandr Laposa, Chiung-Jen Sun, Vojtech Povolny, Ming-Hsuan Huang, Ondrej Kaman, Pavel Hazdra, Yuan-Yuan Huang, Sheng-Hsiang Tseng, Mei-Feng Lai, Weileun Fang*

Predictive Identification of Gas Species Using Dual Thermal Conductivity Sensors at Different Temperatures ..... 1064
*Tao Jiang, Ying Chen, Jiachou Wang, Xinxin Li, Pengcheng Xu*

Quantifying Active Oxygen Species with Integrated Microcantilevers to Improve Sensitivity and Linearity of Gas Sensors ..... 1068
*Ruomeng Guo, Qiaoyuan Yang, Ming Li, Ying Chen, Shaotong Hu, Tao Lu, Pengcheng Xu, Xinxin Li*

Single Sensor-Based E-Nose Via Nanoheater Temperature Modulation for Ultralow Power Gas Identification ..... 1072
*Jong-Hyun Kwak, Yeop Jin, Jihyeon Yoo, Wootaek Cho, Yonggi Kim, Jae Joon Kim, Heungjoo Shin*

4.7PPM Scale Factor Nonlinearity and 0.007°/H Bias Instability Honeycomb Disk Resonator Gyroscope Realized by Calibration of Mode Deflection..... 1075
*Liangqian Chen, Qingsong Li, Tongqiao Miao, Peng Wang, Shuiyang Liang, Xuhui Zhang, Xuezhong Wu, Dingbang Xiao*

A Dual-Mode X-Cut LiNbO3 Saw Sensor for Humidity Sensing with Inherent Temperature Decoupling ..... 1079
*Min Gyu Seo, Il Ryu Jang, Kyeong Jun Park, See Jin Ryoo, Hoe Joon Kim*

A High-Q ALN Wide Annular Gyroscope with Sub 10 Deg Per Hour Bias Instability ..... 1083
*Zhenxiang Qi, Kunfeng Wang, Zhaoyang Zhai, Xiaorui Bie, Wuhao Yang, Yao Wang, Xudong Zou*

Compensation for Temperature and Pressure Variations in MEMS Resonant Accelerometers Using a Multi-Mode Method ..... 1087
*Bingchen Zhu, Xiaorui Bie, Kunfeng Wang, Zhaoyang Zhai, Zheng Wang, Liangbo Ma, Xudong Zou*

Effects of Spurious Modal Coupling on the Stability of Amplitude-Modulated Mode-Split Gyroscopes ..... 1091
*Carolina Viola, Marco De Pace, Gabriele Gattere, Luca Falorni, Pietro Peliti, Valentina Zega, Claudia Comi, Giacomo Langfelder*

Improvements to Reduce the Creep Effects of MEMS Differential Resonant Accelerometer Module..... 1095
*Kei Masunishi, Etsuji Ogawa, Naoki Hiramatsu, Kengo Uchida, Fumitaka Ishibashi, Daiki Ono, Fumito Miyazaki, Hideaki Murase, Jumpei Ogawa, Yamato Tamarimizu, Yasushi Tomizawa*

Integration of Spintronic Readout for High-Bandwidth Displacement Transduction in MEMS Devices ..... 1099
*Filipa C. Mota, Artem Talantsev, Luana Benetti, Ines S. Garcia, Rosana A. Dias, Ricardo Ferreira', Filipe S. Alves*

MEMS Gravimeter Achieving Record-Low Self-Noise of 0.1 Microgal/√Hz Through Plasma-Thermal Hybrid Stiffness Tuning ..... 1103
*Le Gao, Wenjie Wu, Fangzheng Li, Bingyang Cai, Runhan Xie, Zhong Zhang, Liangcheng Tu*

Multi-Time-Scale Frequency Drift in a CMOS-MEMS Oscillator Modeled by Poole-Frenkel Dielectric Sidewall Charging ..... 1107
*Chih-Chin Liu, Gary K. Fedder*

No-Drift Mode-Matched Ring Gyroscope with On-Chip Stress and Temperature Calibration ..... 1111
*Ahmet Arif Aslan, Erdinc Tatar*

Non-Hermitian Dynamics in a Frequency-Matched, Dissipation-Imbalanced MEMS Gyroscope ..... 1115
*Sen Zhang, Xin Zhou*

Nonlinear Couplings in MEMS Gyroscopes: Duffing in Drive Impacts Sense Mode ..... 1119
*Mehran Hosseini-Pishrobat, Erdinc Tatar*

Self-Compensated Low-Drift Mems IEPE Accelerometer Via Thermal Stress Tailoring for High-Temperature Applications ..... 1123
*Cheng Zhang, Jiachang Zhang, Anna Li, Hao Huang, Yongquan Su, Dalong Chen, Yichen Liu, Lihao Wang, Feng Tian, Yang Wang, Zhenyu Wu*

Self-Sustained Resonant Accelerometer Based on Thermal-Actuation and Piezoresistive-Detection Mechanis ..... 1127
*Yuxuan Cheng, Geer Teng, Zhenxing Liu, Chenhao Yang, Haojie Li, Langyue Nie, Chengxin Li, Honglong Chang, Hemin Zhang*

An Acoustic Touch-Motion Button with Haptic Function Via an in-Situ Fabricated Elastomeric Lens Atop PMUTs ..... 1131
*Declan M. Fitzgerald, Yudong Xie, Sean Isomatsu, Nikita Lukhanin, Zihan Wang, Liwei Lin*

Experimentally Calibrated Modeling of NEMS Pull-In Voltage Reduction Via Negative Capacitance ..... 1135
*Collin P. Finnan, Tsu-Jae King Liu*

Manufacturing Silicon-Nanowire Based Piezoresistive Force Sensors with Top-Down Stepwise Controllable Etching Process ..... 1139
*Geer Teng, Junbo Guo, Ziming Yang, Xin Li, Xiaoying Li, Yongcun Hao, Weizheng Yuan, Honglong Chang, Hemin Zhang*

UV-Induced Ozone Enables Direct Patterning of Twodimensional Materials for Batch Fabrication of Heterojunction Gas Sensors ..... 1143
*Na Li, Ming Li, Wanli Lin, Changkun Zhu, Shaotong Hu, Ying Chen, Pengcheng Xu, Xinxin Li*

Characterization of Leakage Currents and Conduction Models in Al0.7SC.03N Piezoelectric Stacks ..... 1147
*Amalia Balsamo, Andrea Picco, Carla M. Lazzari, Elaheh Allahyari, Rossana Scaldaferri, Sonia Costantini, Dmytro Solonenko, Nastaran Behravan, Sanjay Nayak*

Cube-Root Enhanced Sensing with Nonlinear PT-Symmetric Micromechanical Resonators ..... 1151
*Yujue Xie, Lifeng Wang, Qing-an Huang*

MEMS Ultrasonic Transducer-Based Nondestructive Testing of Concrete Compressive Strength .....1155
*Jiandong Shen, Lei Ren, Wangyang Zhang, Jiaqian Yang, Hanjie Dou, Yuchen Mao, Jixuan Zhang, Tianhao Yan, Xiaojing Mu*

Non-Scanning Vibrometer for Picometer-Amplitude 100-Mhz Mems by Spatiotemporal Demodulation .....1159
*Junfeng Zhou, Zhaoliang Peng, Xiaoyong Fang, Xingyu Wei, Lei Shao, Wenming Zhang*

Rapid System Identification of Linear MEMS Resonators Using Brief Single Harmonic Excitation .....1163
*Michael Feldman, Danny A Kassie, David Elata*

Ultra Low Leak Rate Measurement for MEMS Resonant Devices Based on Constant Vibration Control.....1167
*Chun Xu, Chenzhe Du, Qiancheng Zhao, Jian Cui*

Atomic Force Microscopy with Ultra-High Frequency Optomechanical Probes .....1171
*Suyambulingam Subramanian, Ilan Shlesinger, Pierre Moritz, Clement Le Fur, Nicolas Mauran, Cherif Belacel, Laurent Mazenq, Munique Mendes, Laurent Mollard, Guillaume Jourdan, Ivan Favero, Ignacio Casuso, Bernard Legrand*

Real-Time Monitoring of Analyte Mass Dynamics with Nems-Based Mass Spectrometry.....1173
*Sebastien Regord, Louis Dartiguelongue, Thomas Fortin, Mehrzad Roudini, Andreas Winkler, Christophe Masselon, Marc Sansa*

Single-Particle Nanomechanical Mass Spectrometry in Nanoliter Liquid Suspensions.....1177
*Juan Molina, Javier E. Escobar, Priscila M. Kosaka, Oscar Malvar, Jose J. Ruz, Javier Tamayo, Alvaro San Paulo, Montserrat Calleja*

Ultra-Sensitive Nanosensor for Rapid Detection of Pfas in Simulated Drinking Water.....1181
*Nikita G. Lukhanin, Keming Bai, Kang Wang, Mia Wang, Declan M. Fitzgerald, Grigory Tikhomirov, Liwei Lin*

Breaking the Sensitivity Bandwidth Trade-Off with a Multi-Pzt-Cantilever-Based Mems Acoustic Emission Sensor for Structural Health Monitoring of Infrastructure .....1185
*Yongfang Li, Tongyang Liu, Yuki Ueda, Takashi Usui, Kazuo Watabe*

A Biomimetic Flexible Piezoelectric Acoustic Sensor with Comb Wing Structures for Intelligent Sound Recognition .....1189
*Biao Jin, Tianyu Sheng, Zhiqiang Ma, Xin Ke, Weitai Zhou, Hong Ye, Yansong Gai, Yonggang Jiang*

A Full-Band Piezoelectric MEMS Microphone with a Single Diaphragm.....1193
*Zhuoyue Zheng, Junchen Liu, Jinuo Zhou, Fengzhe Xu, Chen Wang, Huahuang Luo, Qingqing Ke, Michael Kraft, Rui P. Martins, Pui-in Mak, Yuan Wang*

A High-Performance PMUT Array Based on Bilayer Lithium Niobate .....1197
*Xiaoxi Zhao, Michiel Pertijs, Tomas Manzaneque*

A Low-Frequency-Adapted Thermal Acoustic Vector Sensor for Underwater Sensing..... 1201
*Xu Ma, Lihao Ma, Xiaoyu Qi, Yan Zhao, Chengchen Gao, Zhenchuan Yang*

A Novel Single-Side Bulk-Micromachined Ring PMUT Array on (111)-Silicon with High Acoustic Pressure Generation..... 1205
*Xiaopeng Chen, Xinrong He, Sijai Ling, Hanyang Tong, Yujing Xiao, Jin Zhang, Zhengyin Yu, Qinghui Jin*

An Innovative Structure Design for an Electromagnetic MEMS Speaker with Optimized SPL and THD Performance ..... 1209
*Wen-Yu Fang, Yu-Min Fu, Chia-Cheng Kuo, Tse-Chih Tang, Sheng-Shian Li*

Audio Digit Classification at the Edge Via PMUT Geometric Nonlinearity ..... 1213
*Jiapeng Xu, Tingzhong Xu, Rodrigo Tumolin Rocha, Chunlei Xu, Zhou Da, Humberto Campanella, Gabriele Schrag*

Bistable Bimorph PMUT with Large Switching Displacement and Acoustic Output ..... 1217
*Shyam Trivedi, Prakasha Chigahalli Ramegowda, Sagnik Ghosh, Duan Jian Goh, David Choong Sze Wai, Daniel Ssu-Han Chen, You Qian, Yong Shun Teo, Subhranu Samanta, Yul Koh, Fabrizio Cerini, Alberto Leotti, Carla Lazzari, Naadaa Ghulaam Zakiyyan*

Bistable Snap-Through Nonlinear Mode PMUT with Remarkable Bandwidth and Mid-Air Transmission ..... 1221
*Yufeng Gao, Xinyu Feng, Xili Wang, Chong Yang, Bowen Sheng, Yipeng Lu*

Close-Distance Object Tracking with Air-Coupled PMUT Arrays: Reducing Blind Zone and Improving Axial Resolution ..... 1225
*Marco Passoni, Domenico Giusti, Marco Ferrera*

Demonstration of Microspeaker Driven by Amplitude Modulated Acoustic Radiation Force from PMUT Array ..... 1229
*Juan Pablo Romero-Campos, Andrea Vergara, Shuji Tanaka*

Enhanced Transmission and Low-Voltage Performance of Sealed-Silicon-Cavities PMUTs ..... 1233
*Xiaoya Duan, Jiashuai Xu, Yufeng Gao, Xinyue Zhang, Zijun Ren, Kai Yang, Chengjie Zuo, Yipeng Lu, Yansong Yang*

Dual-Frequency PZT PMUTs Via Enhanced 2nd-Order Nonlinearity for Advanced Ultrasound Imaging ..... 1237
*Yiwei Wang, Xuankai Xu, Ruihong Xiong, Jiawei Li, Daozheng Luo, Tao Wu*

Enhancement of Signal-To-Noise Ratio in Piezoelectric Microphone Using Highly Scandium-Doped Aluminum Nitride ..... 1241
*Yuya Sakurai, Tomoya Joke, Tetsuya Enomoto, Hideo Yamada, Tetsuya Kato, Takahide Usui, Kentaro Shiraishi, Ichiro Kashiwagi, Hiroyuki Wado*

Fire-Retardant-Functionalized MXene-Mulberry Paper for Lightweight Foldable Thermoacoustic Speakers ..... 1245
*Sumin Yoon, Sungmin Choi, Sangrim Lee, Jaebeen Ahn, Jaesam Sim, Taewook Kim, Changyong Yim, Yunsung Kang, Eunhwan Jo*

High-Sensitivity and Broadband Ultrasonic Sensing Using a Mode-Fusion Groove-Structure PMUT Array Integrated with Analog Addition Readout ASIC ..... 1249
*Jiao Xia, Hongye Sheng, Kai Yang, Yufeng Gao, Junhao Wang, Jinghan Gan, Bowen Sheng, Linxiao Shen, Yipeng Lu*

Lumped Modeling of Far-Field Sound Propagation for Airborne Acoustic Transducers Using Acoustic Transmission Lines ..... 1253
*Christian Gorner Tenorio, Thao Linh Ngo, Sebastian Anzinger, Christian Bretthauer, Heinrich Heiss, Gabriele Schrag*

Mems Piezoelectric Hydrophone with Flat Sensitivity Based on Bionic Cochlear Structure ..... 1257
*Zhiyong Hu, Lixuan Li, Fangtao Kuang, Hanshuo Liu, Zhiyue Yang, Yunhe Luo, Bin Yang, Jingquan Liu*

Multi-Beam Ultrasonic Transmission from a Single Channel PMUT Array with Cosine-Apodized Amplitude Modulation Via Various Top Electrode Areas ..... 1261
*Xili Wang, Jinghan Gan, Yufeng Gao, Kai Yang, Lei Zhao, Bowen Sheng, Yipeng Lu*

On Chip Noise Cancellation for Piezoelectric Micromachined Ultrasound Transducers ..... 1265
*Milind Pandit, Robert Ukropec, Pieter Gijsenbergh*

Piezoelectric Microphone with Self-Adaptive Harmonic Distortion Reduction Based on Pressure Compensation Structures ..... 1269
*Zhiwei You, Liwei Deng, Sien Wang, Tongbin Zhao, Bowen Sheng, Yipeng Lu*

PMUT Parametric Array with Localized Harmonic Generation for High-Resolution Obstacle Detection ..... 1273
*Zhou Da, Rodrigo T. Rocha, Jiapeng Xu, Jeremy Streque, Chunlei Xu, Alessandro S. Savoia, Tingzhong Xu*

Single-Pmut Sensor for Proximity-Tactile Sensing: Tof Distance and Contact Detection Via Cavity Resonance ..... 1277
*Kota Arai, Kensuke Nakamura, Taiju Emi, Taiyo Matsuoka, Masato Suzuki, Tomokazu Takahashi, Hidekazu Yamane, Shuichi Murakami, Yasuhiro Yoshikawa, Seiji Aoyagi*

Biodegradable Isotropic Metamaterial Sensor for in-Situ Subsurface Monitoring of Agricultural Soil ..... 1281
*Tetsuya Yarimizo, Yu Tanaami, Yasutaka Murakami, Hiroaki Onoe, Tetsuo Kan*

CMOS-MEMS Magnetic Sensor with Mode-Selectable Reverse Movement for Enhanced Sensitivity ..... 1284
*Yen-Chen Lin, Shih-Jui Chen, Ching-Yu Tai*

Compact Current-Spun 3D Magnetic Field Sensing Modes for an Inverted Pyramid Hall-Effect Sensor ..... 1288
*Jacopo Ruggeri, Udo Ausserlechner, Helmut Kock, Karen M. Dowling*

A Robust MEMS Mirror with Enhanced Reflectance and Surface Figure for High-Power Laser Applications ..... 1292
*Yi Yang, Hongfeng Zhao, Jiachen Han, Wenli Xue, Yichen Liu, Pengcheng Zhang, Lihao Wang, Tao Wu, Zhenyu Wu*

Dual-Axis Piezoelectric Scanner with Pivot-Spring Linked Wing-Shaped Actuators Featuring Driving Electrodes Arrangement for Angle Enhancement ..... 1296
*Hung-Yu Lin, Mingching Wu, Mei-Feng Lai, Weileun Fang*

Electrostatic Comb-Actuated Resonant MEMS Micromirror with Integrated Electromagnetic Induction Sensing ..... 1300
*Yohan Jung, Seunghun Lee, Eunhwan Jo, Jongbaeg Kim*

Piezoelectric MEMS Fast Steering Mirrors with Integrated Piezoresistive Sensors for Pointing, Acquisition, and Tracking System ..... 1304
*Wenli Xue, Yichen Liu, Yongquan Su, Yi Yang, Hongfeng Zhao, Pengcheng Zhang, Yang Wang, Lihao Wang, Zhenyu Wu*

Piezoelectric Micromirror Using Integrated Resonant Sensors with Temperature Compensation Function ..... 1308
*Takashi Sasaki, Adrien Piot, Sara R.P. Guerreiro, Anton Lagosh, Rodrigo T. Rocha, Clement Fleury, Dominik Holzmann, Ales Travnik*

Precise Image Projection Using MEMS Spiral Scanning Through Frequency Components Optimization Control ..... 1312
*Yuta Watanabe, Mizuki Shinkawa, Shuichi Suzuki, Masayuki Fujishima, Tsuyoshi Hashiguchi, Akitoshi Mochida, Shinichi Kojima, Yuko Nakase, Kazuhito Akiyama, Shu Tanaka, Masaaki Sato*

Ultra-Thin Vapor Cell with Metasurfaces for Atomic Clocks on Chip ..... 1316
*Yuto Kataoka, Zulhaimi Faris Hazmi, Motoaki Hara, Kentaro Iwami*

Low-Noise MN-CO-NI-O Suspended Bridge Uncooled Infrared Microbolometer Based on Vertical Electrode ..... 1320
*Yan Zhao, Zirui Yang, Xu Ma, Chengchen Gao, Zhenchuan Yang*

Thermal Drift Compensation in Uncooled NEM IR Pixels Via Multimode Operation ..... 1324
*Enise Feyza Altin, Aurelio Venditti, Pietro Simeoni, Matteo Rinaldi, Benyamin Davaji*

Residual Stress Anisotropy in Thin-Film Lithium Niobate for Stress-Managed Mems ..... 1328
*Byeongjin Kim, Ian Anderson, Tzu-Hsuan Hsu, Ziqian Yao, Mihir Chaudhari, Sinwoo Cho, Ruochen Lu*

A CMOS-MEMS Tunable Clock Generator Based on Vibro-Impact Beating Dynamics ..... 1332
*Yi-Xiang Chen, Ting-Yi Chen, Chun-Pu Tsai, Wei-Chang Li*

A Universal Platform for Drift Cancellation of MEMS Resonators Based on Hybrid Digital-Physical Synchronization ..... 1336
*Bernardo P. Madeira, Ruopeng Chen, Yuan Wang, Yufeng Dong, Georges Gielen, Michael Kraft, Chen Wang*

An Asymmetric Mechanically Coupled MEMS Resonator with 20 Ppm TCF Via Effective Mass Tuning ..... 1339
*Zhaoliang Peng, Le Xu, Hongcheng Qiu, Lei Shao, Jinghui Xu, Linhai Huang*

Bullseye Resonators for Ultra-High-Frequency Timing Applications ..... 1343
*Hemant K. Verma, Thomas Furcatte, Lydia Bourti, Munique Kazar Mendes, Marc Gely, Sebastien Hentz, Franck Badets, Marc Sansa*

Non-Ovenized MEMS Clock with+- PPB Dynamic Temperature Stability and Sub-PPB Long-Term Stability ..... 1347
*Jintark Kim, Alkim Bozkurt, Rakibul Islam, Karim Elmeligy, Jie Yan, Gabrielle Vukasin, Hyun-Keun Kwon, Thomas W. Kenny, Pavan K. Hanumolu, Gaurav Bahl*

Electrode Optimization for Ring-Shaped AIN Piezoelectric MEMS Resonators ..... 1351
*Quan Yuan, Yuxin Ruan, Jiaming Wang*

Passive Self-Temperature Compensating Diamond Ring Resonator ..... 1355
*Hung-Yu Chen, Kevin H. Zheng, Xintian Liu, William Dong, Clark T.-C. Nguyen*

Radial Mode Lithium Niobate Rosen Transformer ..... 1359
*Ziqian Yao, Heather Chang, Eric Stolt, Clarissa Daniel, Tzu-Hsuan Hsu, Juan Rivas-Davila, Ruochen Lu*

A Piezoelectric Micromirror with Large Scanning Angle Based on Single-Crystal PZT ..... 1363
*Ke Cao, Qingcheng Zheng, Hao Chen, Hui Shang, Chenyu Bai, Yulang Chen, Xudong Ma, Huikai Xie*

Asymmetric Mach-Zehnder Interleaver Employing Electrostatic MEMS Phase Shifters for Ultra-Low-Power Reconfigurable Photonic Integrated Circuits ..... 1366
*Leila Vatandoust, Jae Hyeon Kim, Taeyeon Kim, Dong Uk Kim, Young Jae Park, Dong Ju Choi, Md Munirul Tusher, Shashank Gupta, Jong-Bum You, Hyung-Myung Moon, Moritz Merklein, Sangyoon Han, Niels Quack*

Nano-Opto-Electro-Mechanical Gratings for Ultrafast Wavelength-Selective Switching and Spectral Shaping ..... 1370
*Weixin Liu, Siyu Xu, Chengkuo Lee*

Self-Powered, Bend-Robust Flexible UV Photodetector: CDS-BTO Ferroelectric Hybrid with Enhanced Responsivity ..... 1374
*Rohit Raj Padhi, Guo-Hua Feng*

2.9 Ghz Electro-Acoustic Phase Modulator Based on Alscn Thin Film ..... 1378
*Lihui Jin, Xiaoyin Wan, Jiawei Li, Daozheng Luo, Tao Wu*

3.7 GHz Acoustic Wave Amplitude Modulation Via On-Chip Thermo-Acoustic Phase Control ..... 1382
*Xuankai Xu, Jiawei Li, Ruihong Xiong, Yiwei Wang, Daozheng Luo, Tao Wu*

A Fast-Settling CMOS-MEMS Resoswitch Using a Structurally Damped Output Electrode ..... 1386
*Jhih-Wei Lin, Chun-Pu Tsai, Nilabh Basu, Wei-Chang Li*

Accurate Model of RF Frequency Tuning in 2D NEMS Using a Fringing-Sensitive Capacitance ..... 1390
*Timothy Platten, Cosmin Roman, Christofer Hierold, Pengcheng Zhang*

Anchor Energy Dissipation Suppression in a Lamé-Mode Resonator Enabling a 2.36X1013F X Q Product ..... 1394
*Hao Yu, Yechen Miao, Yuqing Mao, Fang Wang, Ke Sun, Yi Sun, Heng Yang, Xinxin Li*

Development of Single-Chip Nanoacoustic Filter Banks for Ku-Band Applications ..... 1398
*Luca Spagnuolo, Luca Colombo, Kapil Saha, Pietro Simeoni, Matteo Rinaldi*

Electrically Tunable Suspended Acoustic Mach-Zehnder Interferometer Based on Alscn Thin Films ..... 1402
*Jiawei Li, Xuankai Xu, Lihui Jin, Yuxi Wang, Yiwei Wang, Tao Wu*

High-Q A3-Mode Lamb Wave Resonators on 128° Y-Cut LiNbO3 Thin Film with Bragg Reflector at 18 GHz ..... 1406
*Yiming Wang, Fuhong Lin, Zhongbin Dai, Kai Yang, Jiming Fang, Jie Chen, Han Qiu, Meijuan Li, Chengjie Zuo*

Layered Acoustic Wave Devices with Enhanced Power Handling Based on Lithium Tantalate on Silicon ..... 1410
*Shuhan Chen, Fangsheng Qian, Zijun Ren, Kai Yang, Wei Wei, Junyan Zheng, Jiashuai Xu, Xingyu Liu, Xiaoya Duan, Yansong Yang*

Maximizing Q at mmWave Frequencies: Material and Mirror Engineering in Overmoded Bulk Acoustic Resonator ..... 1414
*Juhun Baek, Stephan Barth, Fabian Gottfried, Olaf Zywitzki, Hagen Bartzsch, John Duncan, Gianluca Piazza*

Tunable Multi-State Impedance in Ferroelectric Based 17 GHZ Bulk Acoustic Wave Resonators ..... 1418
*Juhun Baek, Luis D. Hurtado, Daniel J. Noronha, Gianluca Piazza*

Wireless Operando Monitoring of Batteries Via Implantable LC Sensor ..... 1421
*Xinyi He, Xiaodong Huang*

Frequency-Tunable Terahertz Metalens on a Flexible Film ..... 1425
*N. Inomata, T. Xu, T. Okatani, Y. Kanamori*

Low-Interference ACMB Integrated with VOX Bolometer on SI-ONO Membrane Substrate for 290 GHz MEMS THz Imaging ..... 1428
*JinHyoung Kim, Hakseon Lee, Kwonhong Lee, Sungmin Hong, Kyoung Il Lee, Daesung Lee*

Machine Learning Enabled MEMS Reconfigurable Intelligent Surface for Terahertz Beam Steering and Wireless Communication ..... 1432
*Yinpeng Wang, Qiqi Dai, Cheng Xu, Dongxiao Li, Zhihao Ren, Luwei Wang, Nanhan Liu, Chong Pei Ho, Prakash Pitchappa, Chengkuo Lee*

2D Cell-Squeezing Mechanoporation with a Mask R-CNN Model for Delivery Analysis ..... 1436
*Allwin Grace, Pulasta Chakrabarty, Akanksha Jha, Yuva Sree Chinnakalai, Moeto Nagai, Tuhin Subhra Santra*

A Microfluidic In-Vitro Platform for Studying Cancer-Neuron Interactions and Anti-Cancer Drug-Induced Neurotoxicity ..... 1440
*Preyanka P, Iyer Gomathy Narayanan, Pulasta Chakrabarty, Moeto Nagai, Amal Kanti Bera, Tuhin Subhra Santra*

A Microfluidic Picoinjection Platform for DNA Fragment Assembly ..... 1444
*Xuedong Lan, Zequan Zhao, Dayin Wang, Yifan Liu, Yuan Luo, Jianlong Zhao*

An Antibiofouling Parallel-Plate Coplanar EWOD System Enabled by Slips Integration ..... 1448
*Yi-Teng Ciou, Wei-Teng Lu, Yu-Hsin Lin, Che-Chin Chen, Meng-Shiue Lee*

Chemically Pressurized Ocular Drug Delivery Patch for Gravity-Independent Therapeutics in Microgravity ..... 1452
*Jaehun Jeon, Ki-Hun Jeong*

Decrescendo Spiral Microfluidic Channel: Secondary Flow Enhancement for Efficient Microparticle Separation ..... 1456
*Hoyoung Kim, SungHoon Bae, Ye Seung Lee, Yugyung Jung, Sung Yang*

Dimensional Analysis and Design of Dual-Scale Hexagonal Microfluidic Array Chips for High-Efficiency Capture of CTCS and CTC Clusters ..... 1460
*Sile Fang, Hadi Tavakkoli, Shuo MA, Zongqin KE, Yi-Kuen Lee*

Dual-Channel Suspended Microfluidic Biosensor with In-Channel Alkyne–Azide Click Chemistry for Enzyme Immobilization ..... 1464
*Wanmeng Wang, Yiming Sun, Hongbo Guo, Cao Xia, Yubo Huang, Yuanlin Xia, Zhuqing Wang*

Dual-Size Particle (1 μm and 4 μm) Separation and Concentration in a High Throughput Double-Layer Microfluidic Channel ..... 1468
*Seung Lee, Ye Sung Lee, Yugyung Jung, Sung Yang*

Microfluidic 3D Cell-Culture Liver Chip with Integrated Chemical Gradients for Predictive Cholestatic Hepatotoxicity Screening ..... 1472
*Jianan Hui, Xinzhuo Gao, Tian Tian, Hebin Sun, Hui Ma, Lin Zhou, Chen Chen, Zhenhua Wu, Feiyun Cui, Qin Zhou, Jiyu Li, Hongju Mao*

Electrochemical Detection of Lysozyme in Microfluidics Using Engineered Monobodies ..... 1476
*Derek Goderis, Sunanda Dey, Samuel Lobert, Daniel R. Woldring, David P. Hickey, Andrew J. Mason*

Microfluidic Artificial Lung with Improved Oxygenation and Hemocompatibility Via Membrane Microstreaming for Active Mixing ..... 1480
*Anthony L. Mercader, Sang-Ho Ye, William R. Wagner, Sung Kwon Cho*

Microlfuidic Device for Bovine Sperm Sex Sorting ..... 1484
*Vidhi Das, Abinaya R, Lakshmi Krishnan, Srabani Kar, Tuhin Subhra Santra*

Pneumatic Valve-Integrated Magnetic Levitation-Based Microfluidic System for in-Situ Medium Exchange ..... 1488
*Sadik Koc, Busra Erimez, Hilal Doger, H. Cumhur Tekin*

Wind-Assisted Microfluidic Immunoassay Platform ..... 1492
*Meng-Shiue Lee, Yu-Kai Lin, Ya-Jou Lan, Wensyang Hsu*

Ultra-Low Profile µRobot-Driven Guidewire for Steerable Neurointerventional Procedure ..... 1496
*MohammadReza Momeni Koupaei, Youngjae Chun, Sung Kwon Cho*

A Self-Regulating Microfluidic Valve Based on Deformable Porous Media ..... 1500
*You Cheng, Gyan E. Zesiro, Xiaosong Ma, Boris Stoeber*

Hydrodynamic Control Via Programmable Magnetic Cilia for Enhanced Microfluidic Mixing in Photodegradation ..... 1504
*Dineshkumar Loganathan, Tung Ou Yan, Chia-Yuan Chen*

Nanoliter Droplet Merging Through Dc Electrocoalescence ..... 1508
*Debdyuti Mandal, Hongxiang Gao, Akash Roy, Eun Sok Kim*

Pervaporation Enabled Precipitation of Ion for the Nanofluidic Ionic Gating ..... 1512
*Sungjoon Ji, Taesung Kim*

Polarity-Reversible Droplet Transport at Liquid-Liquid Interfaces ..... 1515
*Mobina Hatami Miri, Hyejin Moon*

An Automated Rotating Immuno-Wall Platform of Competitive Elisa for Ultra-Small Molecules ..... 1519
*Xiang Zhou, Toshihiro Kasama, Yuki Igarashi, Masaya Shuto, Takahiro Matsuda, Madoka Takai, Ryo Miyake*

An Ultrasensitive Electrochemiluminescent Microfluidic Sensor for Dual Detection of Waterborne Foodborne Pathogens ..... 1523
*Pengfei Xin, Haojun Yuan, Beibei Lu, Wanlei Gao, Panhui Yang, Yan Xu, Haojie Chen, Qinghui Jin*

CMOS-Embedded Microfluidics for Channel-Addressable Parallel Readout of Spad Fluorescence Lifetime Sensors ..... 1527
*Max S. Ladabaum, Alexander Di, Julian M. Bao, Grigory Tikhomirov, Jun-Chau Chien*

Wrinkle Assisted Nanofluidic Memristors for Tunable Ionic Memory and Neuromorphic Learning ..... 1531
*Minsu Kwon, Dongwoo Seo, Taesung Kim*

High-Sensitivity Suspended Nanochannel Resonators with Fluidic Interposer for Weighing 30 nm Gold Nanoparticles ..... 1535
*Oceane Barrucand, Francois Boizot, Stephane Bonnet, Charles Boutonnet, Lionel Herve, Alexandre Martino, Katell Aldrin, Murielle Jurdit, Scott Manalis, Pascal Mailley, Vincent Agache*

Machine Learning-Enabled Magnetic Microfluidic Platform for Multiple Cardiovascular Biomarker Detection Over an Ultra-Wide Concentration Range ..... 1539
*Bo Bao, Yuqian Zhao, Ridong Wang, Dachao Li*

Measuring Shear and Normal Forces in a Microchannel Induced by Fruid Inertia Using Embedded Pattern and Sampling Moiré Method..... 1543
*Yukitake Nakahara, Takuto Kishimoto, Jumpei Muramatsu, Hiroaki Onoe, Hidetoshi Takahashi*

Mechano-Index Activated Sorting by Utilizing Acoustic Signal in a Multi-Layered Microfluidic Chip Made by High-Rigid Polymer..... 1547
*Nariaki Kiyama, Makoto Saito, Yoko Yamanishi, Shinya Sakuma*

Nanopost Array Integrated Digital Microfluidics for Exosome Enrichment and Molecular Ionization..... 1551
*Liyuan Guo, Menglei Zhao, Boyu Li, Bin Fu, Rongxin Fu, Kangfu Chen, Hang Li, Shuailong Zhang*

Monolithic Integration of Time-Domain CMOS Circuits with Capillary Microfluidics for Cardiovascular Biomarker Detection ..... 1555
*Sasi Kiran Boilla, Ihua Lee, Tsung-Heng Tsa, Gwo-Bin Lee*

Optimization of Plasmonic-Assisted Osmotic Energy Conversion Using Physics-Informed Genetic Algorithm Toward Real-World Applications..... 1559
*Gyubin Park, Syed Muhammad Anas Ibrahim, Jeewon Shin, Jungyul Park*

Subtractive Nanofluidics in 65-Nm CMOS Copper BEOL Achieve 100-Nm Width..... 1562
*Alexander Di, Michael Pedowitz, Jun-Chau Chien*

Programmable Spatiotemporal Microcluster Manipulation Using Integrated Magnetosonic Microfluidic Platform..... 1565
*Vinit Kumar Yadav, Pankaj Pathak, Sujoy Paul, Samaresh Das, Dhiman Mallick*

3D Nanoprinting Microfluidic Diodes Via Ex Situ Direct Laser Writing ..... 1569
*Paige M.R. Campbell, Molly A. Carton, Prithwish Dasgupta, Daria Didenko, Travis Dutton, Christine Fienkeng, Aamir Ghadially, Dennis Gomez, Alex Pereira, Ben Walsh, Bailey Felix, Ryan D Sochol*

A Method for Preparing Low-Noise Solid-State Nanopole Via Controlled Dielectric Breakdown..... 1573
*Changhui Xu, Jun Yang, Jingjie Sha*

A Thin-Wall Bonding Process for Reliable Microfluidic Device Fabrication ..... 1577
*Wei-Teng Lu, Yung-Pei Hsu, Meng-Shiue Lee*

Development of a Grayscale Lithography Process with a Pixelated Grayscale Mask for the Fabrication of Gradient Inlet Structures for Nanochannels Enabling DNA Analysis..... 1581
*Nicole Hintz, Martina Hubner, Christopher Johnson, Michael J. Vellekoop*

High-Speed and Large-Displacement Hydrogel Valve Enabled by a Partially Fixed Fabrication Process..... 1585
*Hiroki Wada, Akito Watanabe, Yoshiyuki Yokoyama, Takeshi Hayakawa*

Tribo-Charge Driven Wettability Control for Electric-Free Droplet Manipulation..... 1589
*Yeonwoo Lee, Lawrence Park, George Youssef, Yeonhwa Kwak, Sung-Yong Park*

Beyond 2D Flow Approximations in Modelling MEMS in Viscous Fluids by Use of the 3D Unsteady Stokeslet ..... 1593
*Andre Gesing, Martin Ostermann, Daniel Platz, Ulrich Schmid*

Markovian Model of K+ Permeation in Mthk Channels: Steady-State Electrical Features and Hysteresis ..... 1597
*Zhan Zhang, Yunfei Chen*

A Tunable Integrated Gas Flow Regulator-Heater Module for Miniaturized Propulsion Systems..... 1601
*Xiaohan Wang, Chaofeng Cheng, Yik Kin Cheung, Shuo Mao, Qian Xu, Limeng Zhao, Rui Jiao, Yan Shen, Hongyu Yu*

Gate-Controlled Nanofluidic Device Enables Reconfigurable Bilingual Synaptic Behavior..... 1605
*Peiyue Li, Pan Zhang, Junjie Liu, Yu Liu, Jingyi Li, Lang Chen, Xiaofeng Shan, Yufeng Jin, Wei Wang*

**Author Index**