IEEE

MEMS 2025

19–23 JANUARY 2025 • KAOHSIUNG, TAIWAN

THE 38TH IEEE INTERNATIONAL CONFERENCE ON MICRO ELECTRO MECHANICAL SYSTEMS

FINAL PROGRAM

General Co-Chairs:
Hyunjoo "Jenny" Lee
KAIST, Korea

Sheng-Shian Li
NTHU, Taiwan

Sponsored by

IEEE

MEMS
IEEE MEMS TECHNICAL COMMUNITY

CONFERENCE AT A GLANCE

SUNDAY, 19 JANUARY	
12:00-19:00	**Conference Registration and Check-In**
13:00-17:10	**Industry Session** (Room 304a)
17:10-19:00	**Welcome Reception** (Room 305)

MONDAY, 20 JANUARY		
08:00-08:25	**Welcome Address** (Room 301)	
08:25-08:45	• IEEE Fellows Recognition in the Field of MEMS/NEMS • IEEE EDS Robert Bosch Micro and Nano Electro Mechanical Systems Award	
08:45-09:30	**Plenary Presentation I** (Room 301) Tien Wu – *Advanced Semiconductor Engineering, Inc (ASE), TAIWAN*	
09:30-10:30	**Session I - Medical MEMS** (Room 301)	
10:30-11:00	**Break and Exhibit Inspection** (Hall S2)	
11:00-12:00	**Session II - Electromagnetic MEMS** (Room 301)	
12:00-12:05	**MEMS Community Announcement** (Room 301)	
12:05-13:05	**Lunch and Exhibit Inspection** (Hall S2)	
12:05-13:05	**Student Mixer** (Central Boulevard – West Lobby Side)	
13:05-14:05	**Session IIIa - Inertial MEMS** (Room 304a)	**Session IIIb - Biomedical Sensing** (Room 304b)
14:05-14:10	**Transition**	
14:10-15:10	**Session IVa - 3D MEMS** (Room 304a)	**Session IVb - In Vitro Assays** (Room 304b)
15:10-17:00	**Poster Session I** (Hall S2)	
15:10-15:40	**Break and Exhibit Inspection** (Hall S2)	
17:00	**Adjourn for the Day**	

TUESDAY, 21 JANUARY	
08:15-09:00	**Plenary Presentation II** (Room 301) Kurt Petersen – *Silicon Valley Band of Angels, USA*
09:00-10:00	**Session V - Acoustic MEMS** (Room 301)
10:00-10:30	**Break and Exhibit Inspection** (Hall S2)
10:30-11:45	**Session VI - 3D Manufacturing** (Room 301)
11:45-12:00	**MEMS 2026 Announcement** (Room 301)
12:00-13:00	**Lunch and Exhibit Inspection** (Hall S2)
13:00-15:00	**Poster Session II** (Hall S2)
14:20-14:50	**Break and Exhibit Inspection** (Hall S2)

CONFERENCE AT A GLANCE

TUESDAY (continued)		
14:20-14:50	**Student Led Conference Session I** (Hall S2)	
15:00-16:00	**Session VIIa - MEMS for Computing** (Room 304a)	**Session VIIb - Soft MEMS** (Room 304b)
16:00-16:05	**Transition**	
16:05-16:50	**Session VIIIa - Metrology Using MEMS** (Room 304a)	**Session VIIIb - Physical Sensing** (Room 304b)
16:50	**Adjourn for the day**	
18:30-21:00	**Conference Banquet** (Marriott Hotel)	

WEDNESDAY, 22 JANUARY		
08:15-09:00	**Plenary Presentation III** (Room 301) Han Chung – *i3system, KOREA*	
09:00-10:00	**Session IX - Resonators** (Room 301)	
10:00-10:30	**Break and Exhibit Inspection** (Hall S2)	
10:30-11:45	**Session X - Mechanical Cell Manipulation** (Room 301)	
11:45-13:00	**Lunch and Exhibit Inspection** (Hall S2)	
11:45-13:00	**Women in Engineering Networking Luncheon** (Central Boulevard – West Lobby Side)	
13:00-14:00	**Session XIa - Neural Interface I** (Room 304a)	**Session XIb - Biomedical Ultrasound** (Room 304b)
14:00-14:10	**Transition**	
14:10-15:10	**Session XIIa - Neural Interface II** (Room 304a)	**Session XIIb - Nano Material** (Room 304b)
15:10-17:10	**Poster Session III** (Hall S2)	
16:40-17:10	**Break and Exhibit Inspection** (Hall S2)	
16:40-17:10	**Student Led Conference Session II** (Hall S2)	
17:10	**Adjourn for the day**	
18:00-20:30	**Reunion and Networking Night** (Sunset Beach)	

THURSDAY, 23 JANUARY	
08:15-09:00	**Plenary Presentation IV** (Room 304a) Sabeth Verpoorte – *University of Groningen, NETHERLANDS*
09:00-10:00	**Session XIII - Innovative Sensor** (Room 304a)
10:00-10:30	**Break and Exhibit Inspection** (Hall S2)
10:30-11:30	**Session XIV - Environmental Sensing** (Room 304a)
11:30-12:00	**Awards Ceremony and Final Remarks** (Room 304a)
12:00	**Conference Adjourns**
13:00-16:50	**ASE Kaohsiung Technical Tour**

TECHNICAL PROGRAM

PLENARY SPEAKERS

MONDAY, 20 JANUARY — 08:45 (Room 301)

Plenary Presentation I

Tien Wu – *Advanced Semiconductor Engineering, Inc (ASE), TAIWAN*

NAVIGATING THE NEW NORMAL

TUESDAY, 21 JANUARY — 08:15 (Room 301)

Plenary Presentation II

Kurt Petersen – *Silicon Valley Band of Angels, USA*

MY 50 YEARS IN MEMS

WEDNESDAY, 22 JANUARY — 08:15 (Room 301)

Plenary Presentation III

Han Chung – *i3system, KOREA*

HIGH-RESOLUTION UNCOOLED INFRARED SENSORS: INNOVATIONS IN 3D MEMS TECHNOLOGY FOR MILITARY USE

THURSDAY, 23 JANUARY — 08:15 (Room 304a)

Plenary Presentation IV

Sabeth Verpoorte – *University of Groningen, NETHERLANDS*

WILL ORGAN-ON-A-CHIP SURVIVE THE TEST OF TIME?

INVITED SPEAKERS

MONDAY, 20 JANUARY — 13:05

Session IIIb – Biomedical Sensing

Room 304b

MICROMACHINED SILICA RESONATORS FOR BIOSENSING APPLICATIONS

Srinivas Tadigadapa

Northeastern University, USA

MONDAY, 20 JANUARY — 14:10

Session IVa – 3D MEMS

Room 304a

3D PRINTED MEMS

Frank Niklaus

KTH Royal Institute of Technology, SWEDEN

TUESDAY, 21 JANUARY — 15:00

Session VIIIa – Metrology Using MEMS

Room 304b

EMERGING TECHNOLOGY FOR THE BIOHYBRID ROBOTICS

Shoji Takeuchi

University of Tokyo, JAPAN

WEDNESDAY, 22 JANUARY — 14:10

Session XIIb – Nano Material

Room 304b

CARBON NANOTUBES AS CONTACT MATERIAL FOR MEMS: ENHANCING SENSITIVITY, DURABILITY, AND FLEXIBILITY

Jongbaeg Kim

Yonsei University, KOREA

INVITED STUDENT SPEAKERS

TUESDAY, 21 JANUARY

Hall S2, First Floor

Session I

14:20 – 14:35

ENABLING ON-CHIP 3D MAGNETIC FIELD DETECTION WITH HALL EFFECT SENSORS

Jacopo Ruggeri

Delft University of Technology, NETHERLANDS

Session I

14:35 – 14:50

CARBON NANOTUBE RESONATOR RESEARCH

Morten Vollmann

ETH Zürich, SWITZERLAND

WEDNESDAY, 22 JANUARY

Hall S2, First Floor

Session II

16:40 – 16:55

TOWARDS TACTILE SENSING HUB VIA CMOS-MEMS PLATFORM: EFFECT OF CONTACT INTERFACE MATERIAL AND COIL TURNS ON THE PERFORMANCE OF INDUCTIVE TACTILE SENSORS

Fuchi Shih

National Tsing Hua University, TAIWAN

Session II

16:55 – 17:10

FROM MOTION TO MEDICINE: TRIBOELECTRIC NANOGENERATORS IN NEXT-GEN HEALTHCARE AND HUMAN-MACHINE INTERACTION

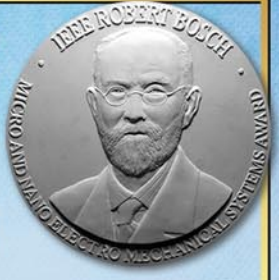
Kumar Shrestha

Kwangwoon University, KOREA

IEEE MEMS 2025

ROBERT BOSCH AWARD RECIPIENT

THE 2025 IEEE Robert Bosch MICRO and NANO ELECTRO MECHANICAL SYSTEMS AWARD



The Robert Bosch Micro and Nano Electro Mechanical Systems Award was established by the IEEE Electron Devices Society in 2014 to recognize and honor advances in the invention, design, and/or fabrication of micro- or nano-electromechanical systems and/or devices.

The 2025 Bosch Award will be presented on Monday, 20 January at 08:25.

Gwo-Bin Lee

For Contributions to Micro- and Nano-Fluidic MEMS Technologies for Biomedical Applications

Prof. Gwo-Bin Lee received his B.S. and M.S. degrees in Department of Mechanical Engineering from National Taiwan University in 1989 and 1991, respectively. He received his Ph.D. in Mechanical & Aerospace Engineering from University of California, Los Angeles (UCLA), USA in 1998 with a major on micro-electro-mechanical-systems (MEMS). He is currently a Chair Professor in Department of Power Mechanical Engineering at National Tsing Hua University, Taiwan. His research interests lie on nano-biotechnology, micro/nanofluidics and their biomedical applications.

His most significant contribution lies in his pioneering work on integrating micro/nano-fluidic systems to advance SELEX (Systematic Evolution of Ligands by Exponential Enrichment) technology, which enables the selection of high-affinity aptamers capable of binding with precision to specific targets such as proteins, small molecules, cells, and even viruses. These on-chip SELEX-derived aptamers have served as highly sensitive diagnostic tools for detecting cancer cells, viruses, and other disease biomarkers. These innovative platforms harness the unique ability of ssDNA to engage with biomolecules, influencing gene expression or blocking disease-related mechanisms. The on-chip SELEX method has emerged as a powerful tool for identifying rare and highly specific molecules from vast biological libraries.

He was an elected Fellow of Society of Theoretical and Applied Mechanics (Taiwan), Chinese Society of Mechanical Engineering (Taiwan), ASME, RSC, IET, IEEE, AIMBE and NAI. He is Editor-in-chief of Microfluidics and Nanofluidics (SCI-indexed). He was joint Editor-in-chief of Micro and Nano Letters (SCI indexed) and Associate Editor-in-chief of IEEE Transactions of Nanotechnology (SCI indexed). He was an elected member of International Academy of Engineering and European Academy of Sciences and Arts.

IEEE Electron Devices Society
with Financial support from
Robert Bosch LLC.

Oral Sessions

Oral sessions will be held in Grand Hall 301, Third Floor, with all parallel concurrent sessions in Conference Room 304, Third Floor. See floor plans at the end of this program.

Posters

Three (3) poster sessions will be held in the Hall S2, First Floor on Monday, Tuesday, and Wednesday. All posters are listed with their assigned number and day that they are on display. Authors will be available for questions during their appointed time. Posters are color coded by day and poster category.

Guide to Understanding Poster Numbering

Each poster is assigned a unique number which clearly indicates when and where the poster is presented.

Poster number: **M01-a**
The first character (i.e. **M**) indicates the day of the Conference:

M = **Monday** **T** = **Tuesday** **W** = **Wednesday**

The second character (i.e. **01**) is the poster board position on the floor plan.

The last character (i.e. **a**) is the poster category that is reflected in the Poster Topic Category chart.

Poster Topic Categories
a - Bio and Medical MEMS
b - Emerging Technologies and New Opportunities for MEMS/NEMS
c - Industry MEMS and Advancing MEMS for Products and Sustainability
d - MEMS & NEMS Materials, Fabrication and Packaging
e - MEMS Actuators and PowerMEMS
f - MEMS Physical and Chemical Sensors
g - MEMS/NEMS for Optical, RF and Electromagnetics
h - Micro- & Nanofluidics
i - Open Posters

SUNDAY

SUNDAY AT A GLANCE

12:00-19:00	Conference Registration and Check-In
13:00-17:10	Industry Session (Room 304a)
17:10-19:00	Welcome Reception (Room 305)

SUNDAY, 19 JANUARY

12:00 – 19:00 Conference Registration and Check-In

Industry Session I – AI for MEMS

Room 304a

13:00 MEMS BEYOND SENSORS
Franz Lärmer
Robert Bosch GmbH, GERMANY

13:25 MEMS SENSORS ENABLING SUSTAINABLE EDGE AI COMPUTING
Marco Ferrera
STMicroelectronics, ITALY

13:50 EDGE INTELLIGENCE FOR MEMS: ENABLING ON-DEVICE SENSOR DATA INTERPRETATION WITH TINYML
Sang Won Lee
TDK SensEI, USA

14:15 INNOVATIVE MEMS SENSORS AND AI: POWERED BY AN ULTRA-LOW POWER SENSOR HUB SoC
Jerry Chen
Upbeat Technology, TAIWAN

14:40 SPECTROCHIP X AI - EXPAND THE HORIZON OF SPECTRAL SENSING
Kevin Ko
Spectrochip, TAIWAN

15:05 Break

Industry Session II – MEMS for AI

Room 304a

15:30 **BRIDGING THE GAP: MEMS AND AI, A PERFECT PARTNERSHIP**
Jerwei Hsieh
Asia Pacific Microsystems, Inc., TAIWAN

15:50 **THE X FACTOR IN MEMS INNOVATION: BREAKTHROUGHS ACROSS THREE PRODUCT LINES WITH A SINGLE PLATFORM**
Chiung-Cheng Lo
xMEMS, USA

16:10 **AI MEETS MEMS: UNLOCKING THE MEMS INFINITY**
Mario Kiuchi
Sumitomo Precision Products Co., Ltd., JAPAN

16:30 **ACCELERATING MEMS PROTOTYPING WITH PIEZOELECTRIC THIN FILM PLATFORMS**
Zhu Yao
*Agency for Science, Technology and Research (A*STAR), SINGAPORE*

16:50 **ENHANCING AUTOMOTIVE HMI DESIGN WITH ADVANCED PIEZO-MEMS DEVICES**
Hao-Yen Tang
UltraSense Systems, USA

17:10 **Adjourn**

17:10 – 19:00 **Welcome Reception** (Room 305)

Kaohsiung Exhibition Center. *Source: Kaohsiung City Government*

SUNDAY

MONDAY AT A GLANCE

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17:00	**Adjourn for the Day**	

Kaohsiung Exhibition Center. *Source: Kaohsiung City Government*

MONDAY, 20 JANUARY

Welcome Address

Room 301

08:00 **MEMS 2025 Conference Chairs**
Hyunjoo "Jenny" Lee, *Korea Advanced Institute of Science and Technology (KAIST), KOREA*
Sheng-Shian Li, *National Tsing Hua University, TAIWAN*

• IEEE Fellows Recognition in the Field of MEMS/NEMS
• IEEE EDS Robert Bosch Micro and Nano Electro Mechanical Systems Award

Room 301

08:25 **IEEE EDS Robert Bosch Micro and Nano Electro Mechanical Systems Award Recipient**
Gwo-Bin "Vincent" Lee, *National Tsing Hua University, TAIWAN*

Plenary Presentation I

Chair: Sheng-Shian Li, *National Tsing Hua University, TAIWAN*

Room 301

08:45 **NAVIGATING THE NEW NORMAL**
Tien Wu
Advanced Semiconductor Engineering, Inc (ASE), TAIWAN

Session I - Medical MEMS

Chair: Maesoon Im, *Korea Institute of Science and Technology (KIST), KOREA*

Room 301

09:30 **THE FIRST TOOL-CHANEL TACTILE SENSOR FOR SIMULTANEOUS ACQUISITION OF TACTILE AND FORCE SENSATIONS IN MICRO AND NARROW SPACE UNDER ENDOSCOPIC SURGERY**
Keisuke Yoshimoto, Takanori Matsui, Kyohei Terao, Hideki Kobara, Hidekuni Takao
Kagawa University, JAPAN

09:45 **A DUAL-DETECTION APPROACH FOR CARDIOTOXICITY SCREENING: UTILIZING NANO SILICON STRAIN SENSOR AND MEA TO MONITOR CONTRACTILITY AND FIELD POTENTIAL IN CARDIOMYOCYTES**
Haolan Sun, Longlong Li, Dong-Weon Lee
Chonnam University, KOREA

10:00 **TRIBOELECTRIC MAT MULTIMODAL SYSTEM FOR SLEEP POSE ESTIMATION**
Jinlong Xu[1,2], Xinge Guo[1,2], Chengkuo Lee[1,2]
[1]*National University of Singapore, SINGAPORE,*
[2]*Center for Intelligent Sensors and MEMS (CISM)*

Session I - Medical MEMS (continued)

10:15 **ULTRA-SENSITIVE WIRELESS PRESSURE SENSOR FOR REAL-TIME CARDIOVASCULAR RESTENOSIS MONITORING IN SMART STENTS**
Lei Wang[1], Nomin-Erdene Oyunbaatar[1], Dong-Su Kim[2], Jinliang Wei[1], Yun-Jin Jeong[3], Heonzoo Lee[1], Su-Hwan Kim[4], Yonggwan Won[1], Kyeongha Kwon[4], In-Seok Jeong[5], Dong-Weon Lee[1]
[1]*Chonnam National University, KOREA,* [2]*Korea Institute of Industrial Technology (KITECH), KOREA,* [3]*Chosun College of Science & Technology, KOREA,* [4]*Korea Advanced Institute of Science and Technology (KAIST), KOREA,* [5]*Chonnam National University Hospital, KOREA*

10:30 **Break & Exhibit Inspection** (Hall S2)

Session II - Electromagnetic MEMS

Chair: Daisuke Yamane, *Ritsumeikan University, JAPAN*

Room 301

11:00 **DIAMAGNETICALLY LEVITATED AND TRAPPED GRAPHITE MECHANICAL RESONATORS**
Yunong Wang[1], Alexander Gage[1], Jaesung Lee[2], Philip X.-L. Feng[1]
[1]*University of Florida, USA,* [2]*University of Central Florida, USA*

11:15 **A FLEXIBLE AND ULTRASENSITIVE ARTIFICIAL COMPOUND EYE USING BIONIC MICRO-LENS ARRAY FOR DRONE VISION**
Jiachuang Wang[1,2], Fangyu Zhou[1,2], Wenyuan Liu[1,2], Nan Qin[1,2], Tiger H. Tao[1,2,3,4,5]
[1]*Chinese Academy of Sciences (CAS), CHINA,* [2]*University of Chinese Academy of Sciences, CHINA,* [3]*Neuroxess Co., Ltd., CHINA,* [4]*Guangdong Institute of Intelligence Science and Technology, CHINA,* [5]*Tianqiao and Chrissy Chen Institute for Translational Research CHINA,*

11:30 **HARNESSING MAGNETIC INTERCONNECTS FOR GENERIC FEEDTHROUGH CANCELLATION IN MEMS RESONATORS**
Zhong-Wei Lin, Anurag A. Zope, Sheng-Shian Li
National Tsing Hua University, TAIWAN

11:45 **INTEGRATED RESONANT MICRO-PLATE FOR SIMULTANEOUS DIFFERENTIAL THERMAL ANALYSIS AND THERMOGRAVIMETRIC ANALYSIS**
Yuhang Yang[1,2], Zechun Li[1,2], Hao Jia[1,2], Pengcheng Xu[1,2], Xinxin Li[1,2]
[1]*Chinese Academy of Sciences (CAS), CHINA,*
[2]*University of Chinese Academy of Sciences, CHINA*

MEMS Community Announcement

Room 301

12:00 **Clark T.-C. Nguyen,** *University of California, Berkeley, USA*

12:05 **Lunch and Exhibit Inspection** (Hall S2)

Student Mixer

Central Boulevard - West Lobby Side

12:05 **Please join us Monday during lunch for a Student Mixer.**
This opportunity is open to students and postdocs looking to connect and share inspiring ideas. Lunch will be served.

Session IIIa - Inertial MEMS

Chair: Giacomo Langfelder, *Politecnico di Milano, ITALY*

Room 304a

13:05 **MODELING ZRO TEMPERATURE DRIFTS IN GYROSCOPES WITH AND WITHOUT AUTOMATIC QUADRATURE COMPENSATION**
Luca Pileri[1], Marco De Pace[1], Gabriele Gattere[2], Luca Falorni[2], Giacomo Langfelder[1]
[1]*Politecnico di Milano, ITALY,* [2]*ST Microelectronics, ITALY*

13:20 **A SELF-POWERED INERTIAL SWITCH WITH ASYMMETRY DOUBLE-WELL POTENTIAL MECHANISM FOR ANTI-FALSE TRIGGERING**
Kai Wang[1], Chao Ren[2], Ran Zhang[1], Yaling Luo[3], Dengyin Zhang[1]
[1]*Nanjing University of Posts and Telecommunications, CHINA,* [2]*Tsinghua University, CHINA,*[3]*Suzhou Zhenlun Spinning Co., Ltd, CHINA*

13:35 **A NOVEL NEAR-ZERO STIFFNESS MEMS ACCELEROMETER BASED ON DUAL NONLINEAR CURVED BEAMS ANTI-SPRING MECHANISM**
Ruihong Xiong[1], Lihui Jin[1], Xuankai Xu[1], Wenzhen Li[1], Shihao Du[2,3], Yiwei Wang[1], Fang Chen[2,3], Tao Wu[1,2,3,4]
[1]*Shanghaitech University, CHINA,* [2]*Chinese Academy of Sciences, CHINA,* [3]*University of Chinese Academy of Sciences, CHINA,* [4]*Shanghai Engineering Research Center of Energy Efficient and Custom AI IC, CHINA*

13:50 **ACHIEVING BELOW 200PPM SCALE FACTOR TEMPERATURE STABILITY IN AN AM GYROSCOPE WITH ON-CHIP STRESS SENSING**
Mehran Hosseini-Pishrobat, Derin Erkan, Erdinc Tatar
Bilkent University, TURKEY

Session IIIb - Biomedical Sensing

Chair: Luyao Lu, *George Washington University, USA*

Room 304b

13:05 **INVITED**
MICROMACHINED SILICA RESONATORS FOR BIOSENSING APPLICATIONS
Vedant Sumaria[1], Hwall Min[2], Soheil Farazi[3], **Srinivas Tadigadapa**[3]
[1]*Iota Bioscience, USA,* [2]*Illumina, USA,* [3]*Northeastern University, USA*

13:35 **MICRODEVICE FOR SYNTHESIS OF BIOGLASS AND ITS BIOACTIVITY STUDY**
Lakshmi Krishnan[1], Abinaya Rajendran[1], Kavitha Govarthanan[1], Moteo Nagai[3], Srabani Kar[3], Suresh Rao[1], Tuhin Subhra Santra[1]
[1]*Indian Institute of Technology, Madras, INDIA,* [2]*Toyohashi University of Technology, JAPAN,* [3]*Indian Institute of Technology, Hyderabad, INDIA*

Session IIIb - Biomedical Sensing (continued)

13:50 **A BIOCHEMICAL SENSOR WITH TUNABLE HIGH SENSITIVITY BASED ON A REFLECTIVE SECONDARY METAGRATING**
Lijun Ma[1], Bingrui Wang[2], Liye Li[1], Yunhao Cao[1], Long Rong[2], Wengang Wu[1]
[1]*Peking University, CHINA,* [2]*Peking University First Hospital, CHINA*

14:05 **Transition**

Session IVa - 3D MEMS

Chair: Tao Li, *University of Cincinnati, USA*

Room 304a

14:10 **INVITED**
3D PRINTED MEMS
Po-Han Huang[1], Lee-Lun Lai[2], Theocharis Iordanidis[2], Shiro Watanabe[2], Göran Stemme[2], Niclas Roxhed[2], Kristinn B. Gylfason[2], **Frank Niklaus**[2]
[1]*National Tsing Hua University, Taiwan,*
[2]*KTH Royal Institute of Technology, SWEDEN*

14:40 **OPTICAL 3D μ -PRINTED PVDF PIEZOELECTRIC TRAPEZOIDAL-SHAPED MICROGRID FORCE SENSORS**
Nannan Zhou[1,2], Huimin Xie[1], Yangxi Zhang[1], Hongrui Ao[2]
[1]*Hong Kong Polytechnic University, HONG KONG,*
[2]*Harbin Institute of Technology, CHINA*

14:55 **LOW POWER SWITCHING OF A METAL AIR BATTERY TOWARDS EXTENDED LIFETIME**
Farhan Sadik Sium, Steven Tran, Khandaker Reaz Mahmud, Amirali Nikeghbal, Seungbeom Noh, Carlos Mastrangelo, Hanseup Kim
University of Utah, USA

Session IVb - In Vitro Assays

Chair: Momoko Kumemura, *Kyushu Institute of Technology, JAPAN*

Room 304b

14:10 **ON-CHIP DISASSEMBLING OF CELL-AGGREGATES FOR SEAMLESS SINGLE-CELL ANALYSIS AND HOMOGENEOUS TREATMENT**
Niko Kimura[1], Shigeo S. Sugano[2], Shinya Sakuma[3]
[1]*Tokyo University of Agriculture and Technology, JAPAN,* [2]*National Institute of Advanced Industrial Science and Technology, JAPAN,*
[3]*Kyushu University, JAPAN*

14:25 **MICROMETER-SIZED CARBON MESH ELECTRODE-BASED IN-SITU ELECTROCHEMICAL FILTER FOR ENHANCING RELIABILITY OF ELECTROCHEMICAL BIOSENSORS**
Woojae Jeong, Beomsang Kim, Akhsunkhar Khazhmurat, Heungjoo Shin
Ulsan National Institute of Science and Technology (UNIST), KOREA

MONDAY

Session IVb - In Vitro Assays (continued)

14:40 **ARRAYED ELECTRICAL STIMULATION PLATFORM FOR ACCURATE EVALUATION OF CONTRACTILE FORCE OF RING-SHAPED ENGINEREED HEART TISSUE**
Daiki Miyata[1], Akari Masuda[1], Gakuto Kagawa[1], Hidenori Tani[2], Hidetoshi Takahashi[1], Shugo Tohyama[2], Hiroaki Onoe[1]
[1]Keio University, JAPAN, [2]Fujita Health University, JAPAN

14:55 **A RETINA-ELECTRODE INTERFACE FOR LIGHT SENSING AND IMAGE RECOGNITION**
Yunxiao Lu[1], Peijie Chen[2], Zhitao Zhou[2], Xiaoling Wei[2], Tiger H. Tao[2], Lunming Qin[1], Yifei Ye[2], Liuyang Sun[2]
[1]Shanghai University of Electric Power, CHINA, [2]Chinese Academy of Sciences, CHINA[3]ShanghaiTech University, CHINA, [4]Neurxess Co.,Ltd, CHINA, [5]Guangdong Institute of Intelligence Science and Technology, CHINA, [6]Tianqiao and Chrissy Chen Institute for Translational Research, CHINA

Poster Session I

Hall S2

15:10 **Poster Session I**
Poster presentations are listed by topic category with their assigned number starting on Page 37.

15:10 **Break and Exhibit Inspection** (Hall S2)

17:00 **Adjourn for the Day**

TUESDAY AT A GLANCE

08:15-09:00	**Plenary Presentation II** (Room 301) Kurt Petersen – *Silicon Valley Band of Angels, USA*	
09:00-10:00	**Session V - Acoustic MEMS** (Room 301)	
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13:00-15:00	**Poster Session II** (Hall S2)	
14:20-14:50	**Break and Exhibit Inspection** (Hall S2)	
14:20-14:50	**Student Led Conference Session I** (Hall S2)	
15:00-16:00	**Session VIIa - MEMS for Computing** (Room 304a)	**Session VIIb - Soft MEMS** (Room 304b)
16:00-16:05	**Transition**	
16:05-16:50	**Session VIIIa - Metrology Using MEMS** (Room 304a)	**Session VIIIb - Physical Sensing** (Room 304b)
16:50	**Adjourn for the day**	
18:30-21:00	**Conference Banquet** (Marriott Hotel)	

TUESDAY, 21 JANUARY

Plenary Presentation II

Chair: Susumu Kaminaga, *Toray Industries, Inc., JAPAN*

Room 301

08:15 **MY 50 YEARS IN MEMS**
Kurt Petersen
Silicon Valley Band of Angels, USA

Session V - Acoustic MEMS

Chair: Yipeng Lu, *Peking University, CHINA*

Room 301

09:00 **MgHf CO-DOPED ALN THIN FILMS TOWARD LOW SIGNAL-TO-NOISE RATIO IN PIEZOELECTRIC MICROMACHINED ULTRASONIC TRANSDUCERS**
Hung H. Nguyen[1,2], Yosuke Takayama[1,2], Hiroki Kuwano[1,2]
[1] *Tohoku University, JAPAN,* [2] *Sendai Smart Machines Co., Ltd., JAPAN*

09:15 **SINGLE-BIAS DUAL-MODE CMUT ARRAY UTILIZING PRE-SNAPBACK REGION FOR ACOUSTIC HOLOGRAM**
Seyoung Park, Geon Kook, Chaerin Oh, Sangho Bang, Hyunjoo J. Lee
Korea Advanced Institute of Science and Technology (KAIST), KOREA

09:30 **DEVELOPMENT OF PMUT LINEAR ARRAY INCLUDED WITH FRESNEL ZONE PLATE FOCUSING FUNCTION**
Tatsuya Shimoyama, Akihiko Teshigahara, Shinya Yoshida
Shibaura Institute of Technology, JAPAN

09:45 **DUAL-ELECTRODE SC0.3AL0.7N PMUT WITH ULTRA-HIGH OUTPUT PRESSURE FOR LONG DISTANCE RANGING**
Qing Xin Zhang[1], Peter Hyun Kee Chang[1], Merugu Srinivas[1], Domenico Giusti[3], Alberto Leotti[2], Yul Koh[1], Yao Zhu[1]
[1] *Agency for Science, Technology and Research (A*STAR), SINGAPORE,* [2] *STMicroelectronics, SINGAPORE,* [3] *STMicroelectronics, ITALY*

10:00 **Break and Exhibit Inspection** (Hall S2)

Session VI - 3D Manufacturing

Chair: Jerwei Hsieh, *Asia Pacific Microsystems, Inc., TAIWAN*

Room 301

10:30 **SELF-ASSEMBLED HIERARCHICAL NANOPOROUS STRUCTURES FOR DURABLE LUBRICANT-INFUSED SURFACES**
Joowon Lim, Geonho Lee, Beomsu Kim, Sueng Yoon Lee, Dohyun Lim, Junho Oh, Won Chul Lee
Hanyang University, KOREA

10:45 **SELECTIVE FORMATION OF LASER-INDUCED GRAPHENE (LIG) ADJACENT TO 3D METAL ELECTRODE FOR MINIATURIZED LIG-SENSOR APPLICATION**
Yoo-Kyum Shin, Mijeong Kang, Min-Ho Seo
Pusan National University, KOREA

Session VI - 3D Manufacturing (continued)

11:00 **DLP 3D-PRINTED NANOGENERATORS: RAPID AND ROBUST FABRICATION POLYMERIC MICROSTRUCTURE NANOGENERATOR FOR PORTABLE ENERGY HARVESTING AND SELF-POWERED SENSORS**
Chen-Fang Sun, Muhammad Faizul Zaki, Pin-Chuan Chen
National Taiwan University of Science and Technology, TAIWAN

11:15 **SEQUENTIAL EXPOSURE DIGITAL LIGHT PROCESSING (SDLP) 3D PRINTING FOR HIERARCHICAL MICROSTRUCTURE TACTILE SENSORS ENABLING ULTRA HIGH-SENSITIVITY, MULTIAXIAL FORCES DETECTION AND LOW CROSS-TALK**
Muhammad Faizul Zaki, Pin-Chuan Chen, Adhimoorthy Saravanan, Bohr-Ran Huang
National Taiwan University of Science and Technology, TAIWAN

11:30 **MULTILAYERED ON-LENS INDUCTOR FOR EFFICIENT WIRELESS POWERING**
Khandaker Reaz Mahmud, Farhan Sadik Sium, Seungbeom Noh, Ashrafuzzaman Bulbul, Carlos H. Mastrangelo, Hanseup Kim
University of Utah, USA

MEMS 2026 Announcement

Room 301

11:45 **Conference Chairs**
Andreu Llobera, *Silicon Austria Labs, AUSTRIA*
Ashwin Seshia, *University of Cambridge, UK*

12:05 **Lunch and Exhibit Inspection** (Hall S2)

Poster Session II

Hall S2

13:00 **Poster Session II**
Poster presentations are listed by topic category with their assigned number starting on Page 37.

14:20 **Break and Exhibit Inspection** (Hall S2)

Student Led Conference Session I

Chairs: Subeen Kim, *Korea Advanced Institute of Science & Technology (KAIST), KOREA* & **Lee-Lun Lai**, *KTH Royal Institute of Technology, SWEDEN*

Hall S2

14:20 **ENABLING ON-CHIP 3D MAGNETIC FIELD DETECTION WITH HALL EFFECT SENSORS**
Jacopo Ruggeri, Karen M. Dowling
Delft University of Technology, NETHERLANDS

14:35 **CARBON NANOTUBE RESONATOR RESEARCH**
Morten Vollmann
ETH Zurich, SWITZERLAND

Session VIIa - MEMS for Computing

Chair: Kristinn Gylfason, *KTH Royal Institute of Technoloy, SWEDEN*

Room 304a

15:00 **CMOS-MEMS PHYSICAL UNCLONABLE FUNCTIONS BASED ON UNBALANCED BIMODAL FREQUENCY COMBS**
Ting-Yi Chen, Wei-Chang Li
National Taiwan University, TAIWAN

15:15 **MICROELECTROMECHANICAL LOGIC DEVICE ENABLED BY TUNABLE TORSIONAL RESONATOR WITH LAYERED INDUCTOR**
Yohan Jung[1], Eunhwan Jo[2], Jongbaeg Kim[1]
[1] *Yonsei University, KOREA,* [2] *Kumoh National Institute of Technology, KOREA*

15:30 **PROGRAMMABLE CONNECTED 2D NETWORK OF BISTABLE ELEMENTS FOR MEMS ISING MACHINE**
Shun Yasunaga, Motohiko Ezawa, Yoshio Mita
University of Tokyo, JAPAN

15:45 **NANOPHOTONIC EDGE COMPUTING SYSTEM FOR ULTRA-LOW LATENCY HUMAN-MACHINE INTERFACE**
Zhihao Ren[1,2], Zixuan Zhang[1], Yangyang Zhuge[1], Zian Xiao[1,2], Siyu Xu[1], Jingkai Zhou1, Chengkuo Lee[1,2]
[1] *National University of Singapore, SINGAPORE,* [2] *National Centre for Advanced Integrated Photonics (NCAIP), SINGAPORE*

Session VIIb - Soft MEMS

Chair: Hiroaki Onoe, *Keio University, JAPAN*

Room 304b

15:00 **INVITED**
EMERGING TECHNOLOGY FOR THE BIOHYBRID ROBOTICS
Shoji Takeuchi[1,2]
[1] *University of Tokyo, JAPAN,* [2] *Kanagawa Institute of Industrial Science and Technology (KISTEC), JAPAN*

15:30 **A BIFUNCTIONAL ORGANOHYDROGEL-BASED TRIBOELECTRIC STRAIN SENSING GLOVE FOR SIGN LANGUAGE INTERPRETATION AND HUMAN-MACHINE INTERFACING**
Shital Sharma, Gagan Bahadur Pradhan, Trilochan Bhatta, Jae Yeong Park
Kwangwoon University, KOREA

15:45 **A DIRECT CURRENT TRIBOVOLTAIC NANOGENERATOR-DRIVEN SELF-CHARGING SUPERCAPACITOR FOR PREVENTING STRAIN INJURY**
Kumar Shrestha, Gagan Bahadur Pradhan, Jae Yeong Park
Kwangwoon University, KOREA

16:00 **Transition**

Session VIIIa - Metrology Using MEMS

Chair: Erdinc Tatar, *Bilkent University, TURKEY*

Room 304a

16:05 **LIQUID MIXTURE ANALYSIS BY SIMULTANEOUS PROPERTIES MEASUREMENTS UNDER TEMPERATURE MODULATION AND DEEP LEARNING**
Juhee Ko, Jungchul Lee
Korea Advanced Institute of Science and Technology (KAIST), KOREA

16:20 **INLINE MICROFLUIDIC THERMAL CONDUCTIVITY SENSOR USING A SUSPENDED SILICON HEATER**
Maarten J.S. Bonnema[1], Job Harbers[1], Yaxiang Zeng[1], Jarno Groenesteijn[2], Remco J. Wiegerink[1], Joost C. Lötters[1]
[1]*University of Twente, NETHERLANDS,*
[2]*Bronkhorst High-Tech B.V., NETHERLANDS*

16:35 **DETERMINING ACTIVATION ENERGY OF AMMONIUM SALTS DECOMPOSITION USING MEMS THERMOPILE-BASED DIFFERENTIAL SCANNING CALORIMETRY (DSC)**
Zechun Li[1,2], Shaokui Tan[1,3], Ming Li[1,2], Yuhang Yang[1,2], Haozhi Zhang[1,2], Pengcheng Xu[1,2], Xinxin Li[1,2]
[1]*Chinese Academy of Sciences (CAS), CHINA,* [2]*University of Chinese Academy of Sciences, CHINA,* [3]*Shanghai Normal University, CHINA*

Session VIIIb - Physical Sensing

Chair: Yao Zhu, *Institute of Microelectronics (IME), A*STAR, SINGAPORE*

Room 304b

16:05 **ENHANCED QUANTUM TEMPERATURE SENSING VIA MICROFLUIDIC-ASSISTED ASSEMBLY OF FLUORESCENT NANODIAMONDS FOR TEMPERATURE MAPPING APPLICATION**
Keita Saikawa[1], Zetsu Masaya[1], Daiki Ueshima[1], Taiichi Shikama[1], Ken-ichiro Kamei[1,2], Osamu Tabata[3], Yoshikazu Hirai[1]
[1]*Kyoto University, JAPAN,* [2]*New York University, Abu Dhabi, UAE,* [3]*Kyoto University of Advanced Science, JAPAN*

16:20 **FRICTION JOINTING OF DISTRIBUTED RIGID CAPACITORS TO STRETCHABLE LIQUID METAL COIL FOR FULL-BODY WIRELESS CHARGING CLOTHING**
Takashi Sato[1], Shinto Watanabe[2], Ryo Takahashi[3], Wakako Yukita[3], Tomoyuki Yokota[3], Takao Someya[3], Yoshihito Kawahara[3], Eiji Iwase[2], Junya Kurumida[1]
[1]*National Institute of Advanced Industrial Science and Technology (AIST), JAPAN,* [2]*Waseda University, JAPAN,* [3]*The University of Tokyo,, JAPAN*

16:35 **AN ANNULAR SLOTS BACK ISLAND MEMS HYDROPHONE WITH ULTRA-HIGH SENSITIVITY AT LOW FREQUENCY**
Lixuan Li, Zhiyong Hu, Tao Ruan, Zhiyue Yang, Hanshuo Liu, Fangtao Kuang, Bin Yang, Jingquan Liu
Shanghai Jiao Tong University, CHINA

16:50 **Adjourn for the Day**

Conference Banquet

Marriott Hotel

18:30 – 21:00 **Join us for a memorable evening of networking with colleagues.** This event is included in your registration. Guest tickets may be purchased.

Spectra Processing Unit

spectrochip

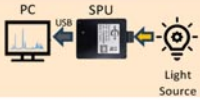
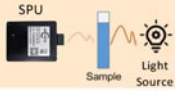
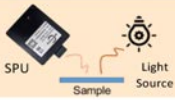
TUESDAY

SPU-M100

Features

- USB connector to PC / Mac
- USB 3.0 compliant
- Plug and play
- Compact
- Open-source imaging software
- Compatible for all OS
- Broad wavelength range
- High spectral resolution
- Real time monitor
- Diverse applications (Optics, Medical…etc)

Application Examples

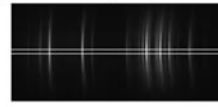
Emission Spectrum	Application
	• LED and Laser Testing • Fluorescent Material
Transmission Spectrum	**Application**
	• Water Quality Analysis • Glass and Transparent Material Inspection • Biomedical Analysis
Reflection Spectrum	**Application**
	• Food Safety and Quality Inspection • Optical Coating and Thin Film Analysis • Surface Defect Detection

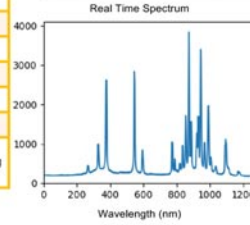
Model Number	SPU-M100
Wavelength range	300 ~ 1000 nm
Spectral Resolution	5 nm
Spectral Accuracy	+/- 0.375 nm
Stray light	0.04 %
Image sensor	AR0144 Mono
A/D Conversion	12 bits
SNR_{max}	6000 (38 dB)
Optical connector*1	SMA905 or Direct connect
Exposure time	2 ms ~ 900 ms
Gain	1 ~ 30 Level
Connector type	USB Type-C
Dimensions (W×D×H) / Weight (module + holder)	53.3 x 38 x 13.31 mm^3 / 53 g

*1 Switchable to other types of optical connectors.
*2 Depending on system performance.

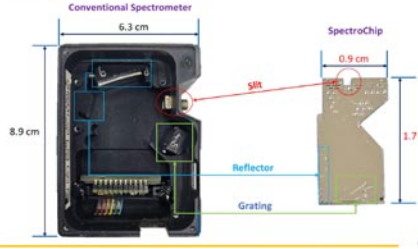
Illustration

High sensitive detection of atomic spectrum from Hg-Ar light source





Optical Configuration



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Official Website

WEDNESDAY AT A GLANCE

08:15-09:00	**Plenary Presentation III** (Room 301) Han Chung – *i3system, KOREA*	
09:00-10:00	**Session IX - Resonators** (Room 301)	
10:00-10:30	**Break and Exhibit Inspection** (Hall S2)	
10:30-11:45	**Session X - Mechanical Cell Manipulation** (Room 301)	
11:45-13:00	**Lunch and Exhibit Inspection** (Hall S2)	
11:45-13:00	**Women in Engineering Networking Luncheon** (Central Boulevard – West Lobby Side)	
13:00-14:00	**Session XIa - Neural Interface I** (Room 304a)	**Session XIb - Biomedical Ultrasound** (Room 304b)
14:00-14:10	**Transition**	
14:10-15:10	**Session XIIa - Neural Interface II** (Room 304a)	**Session XIIb - Nano Material** (Room 304b)
15:10-17:10	**Poster Session III** (Hall S2)	
16:40-17:10	**Break and Exhibit Inspection** (Hall S2)	
16:40-17:10	**Student Led Conference Session II** (Hall S2)	
17:10	**Adjourn for the day**	
18:00-20:30	**Reunion and Networking Night** (Sunset Beach)	

Kaohsiung – Siaogangshan Skywalk Park. *Source: Kaohsiung City Government*

WEDNESDAY, 22 JANUARY

Plenary Presentation III

Chair: Hyunjoo "Jenny" Lee,
Korea Advanced Institute of Science and Technology (KAIST), KOREA

Room 301

08:15 **HIGH-RESOLUTION UNCOOLED INFRARED SENSORS: INNOVATIONS IN 3D MEMS TECHNOLOGY FOR MILITARY USE**
Han Chung, Myungho Kwon, Sang-gu Kang
i3system, KOREA

Session IX - Resonators

Chair: Ashwin Seshia, *University of Cambridge, UK*

Room 301

09:00 **A QUICK-SETTLING ENHANCEMENT-MODE RESOSWITCH**
Nilabh Basu, Chun-Pu Tsai, Ting-Yi Chen, Wei-Chang Li
National Taiwan University, TAIWAN

09:15 **A NOVEL ELECTROSTATIC FREQUENCY TUNING MECHANISM BASED ON A VERTICALLY COUPLED CMOS-MEMS RESONATOR**
Wei-Hsiang Hsu[1], Hung-Yu Chen[2], Zhong-Wei Lin[1], Sheng-Shian Li[1]
[1]*National Tsing Hua University, TAIWAN,*
[2]*University of California, Berkeley, USA*

09:30 **APPROACHING ~0.1ppb FREQUENCY STABILITY IN ~11MHz AlN-ON-SI DUAL-RING BULK ACOUSTIC WAVE MEMS RESONATOR**
Connor A. Watkins[1], Tahmid Kaisar[1],
Mina Rais-Zadeh[2], Philip X.-L. Feng[1]
[1]*University of Florida, USA,* [2]*California Institute of Technology, USA*

09:45 **ULTRA-STABLE MEMS CLOCK WITH 53 PARTS-PER-TRILLION FRACTIONAL FREQUENCY STABILITY AT 8 HOURS**
Jintark Kim[1], Jie Yan[1], Rakibul Islam[1], Jiheng Jing[1], Jiawei Yang[2], Gabrielle Vukasin[2], Ryan Kwon[2], Saurabh Saxena[1,3], Thomas W. Kenny[2], Pavan K. Hanumolu[1], Gaurav Bahl[1]
[1]*University of Illinois, Urbana-Champaign, USA,* [2]*Stanford University, USA,* [3]*Indian Institute of Technology, INDIA*

10:00 **Break and Exhibit Inspection** (Hall S2)

Session X - Mechanical Cell Manipulation

Chair: Seokheun "Sean" Choi,
State University of New York, Binghamton, USA

Room 301

10:30 **FIN THRUSTER ON ACOUSTIC RESONATOR (FTAR) FOR MICRO SWIMMING ROBOTS**
Wenbo Li, Sung Kwon Cho
University of Pittsburgh, USA

Session X - Mechanical Cell Manipulation (continued)

10:45 **A CELL-SQUEEZING MECHANOPORATION DEVICE FOR INTRACELLULAR DELIVERY**
Pulasta Chakrabarty[1], Muhammad Ahtsham Iqbal[2], Ammar Ghous[2], Srikanth Vedantam[1], Moeto Nagai[2], Tuhin Subhra Santra[1]
[1]*Indian Institute of Technology, Madras, INDIA,*
[2]*Toyohashi University of Technology, JAPAN*

11:00 **PARALLEL PRODUCTION OF UNIFORM ARTIFICIAL CELL AGGREGATES USING VIBRATION-INDUCED FLOW**
Yui Katsumata, Zhitai Huang, Ryuhei Takata, Reiko Sato, Mamiko Tsugane, Hiroaki Suzuki
Chuo University, JAPAN

11:15 **CONTINUOUSLY VARIABLE ON-CHIP FLOW SWITCHER UTILIZING VORTEX GENERATIONS**
Makoto Saito, Yoko Yamanishi, Shinya Sakuma
Kyushu University, JAPAN

11:30 **3D-MICROPRINTED MICROFLUIDIC SCAFFOLDS AND THE RAPID SEEDING STRATEGY FOR ORGAN-ON-A-CHIP APPLICATIONS**
Chen-Yu Chen, Xin Xu, Ryan D. Sochol, William E. Bentley
University of Maryland, USA

11:45 **Lunch and Exhibit Inspection** (Hall S2)

Women in Engineering Networking Luncheon

Central Boulevard - West Lobby Side

11:45 **Join us to connect with Women in MEMS for career development.**
Open to all conference attendees. Lunch will be served.

Session XIa - Neural Interface I

Chair: Tuhin Subhra Santra, *Indian Institute of Technology, Madras, INDIA*

Room 304a

13:00 **SELF-ASSEMBLED ULTRA-FLEXIBLE MESH PROBES FOR STABLE NEURAL RECORDINGS**
Kejun Tu, Longchun Wang, Bin Yang, Jingquan Liu
Shanghai Jiao Tong University, CHINA

13:15 **A MEMS-BASED FLEXIBLE BIDIRECTIONAL MULTIREGION NEURAL INTERFACE FOR OLFACTORY AUGMENTATION**
Jizhi Liang[1,2], Hailang He[1,2], Yuxin Liu[1], Xiaoling Wei[1,2], Liuyang Sun[1,2], Tiger H. Tao[1,2,3,4,5,6], Zhitao Zhou[1,2]
[1]*Chinese Academy of Sciences (CAS), CHINA,* [2]*University of Chinese Academy of Sciences, CHINA,* [3]*Neuroxess Co., Ltd., CHINA,* [4]*ShanghaiTech, CHINA,* [5]*Guangdong Institute of Intelligence Science and Technology, CHINA,* [6]*Tianqiao and Chrissy Chen Institute for Translational Research, CHINA*

Session XIa - Neural Interface I (continued)

13:30 **A CEREBRAL COMPLIANCE ECOG MICROELECTRODE WITH ADAPTIVE 3D UNTETHERED STRUCTURES FOR ENHANCED NEURAL RECORDING**
Jingjing An, Longchun Wang, Kejun Tu, Mengfei Xu, Zixing Li, Haoyuan Chen, Ning Wei, Bin Yang, Jingquan Liu
Shanghai Jiao Tong University, CHINA

13:45 **AN IMPLANTABLE NANOELECTRODE FOR SIMULTANEOUS IN-SITU SELF-REFERENCING, DRUG DELIVERY, AND RELIABLE FIXED-POINT RECORDING WITHIN A SINGLE NEURON**
Zhiyuan Du[1], Qingda Xu[1], Ye Xi[1], Mengfei Xu[1], Jiawei Cao[1], Xiantao Zhu[1], Quan Peng[1], Xiuyan Li[1], Xiaolin Wang[1], Bin Yang[1], Zhihong Li[2], Jingquan Liu[1]
[1]*Shanghai Jiao Tong University, CHINA,* [2]*Peking University, CHINA*

Session XIb - Biomedical Ultrasound

Chair: Yansong Yang, *Hong Kong University of Science and Technology (HKUST), HONG KONG*

Room 304b

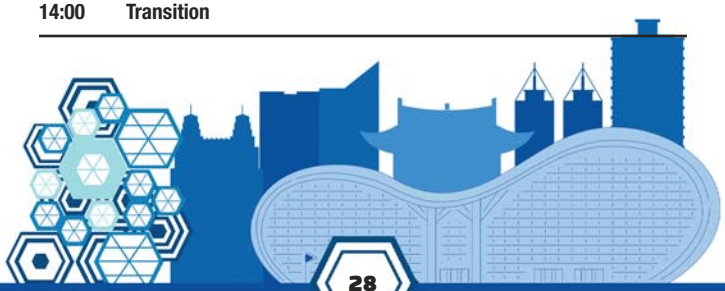
13:00 **BONE-SHAPE PMUTS WITH ENHANCED BANDWIDTH FOR DOPPLER BLOOD FLOW DETECTION**
Kai Yang, Lei Zhao, Yexing Fang, Jiao Xia, Bowen Sheng, Haixia Zhang, Yipeng Lu
Peking University, CHINA

13:15 **ALIGNMENT-FREE, NON-INVASIVE BLOOD VESSEL MONITORING BY PIEZOELECTRIC MICROMACHINED ULTRASONIC TRANSDUCERS**
Fan Xia, Yande Peng, Wei Ji, Gurnoor Saini, Yen-Chen Wang, Aalaya Wudaru, Xiaoyang Yu, Mingze Luo, Ariane De Guzman, Zihan Wang, Yuguang Yuan, Jun-Chau Chien, Liwei Lin
University of California, Berkeley, USA

13:30 **TWO-DIMENSIONAL ULTRASOUND IMAGING USING SINGLE TRANSDUCER PIXEL BASED ON SPATIAL-SPECTRUM CORRELATION METHOD**
Jinghan Gan, Aocheng Bao, Chong Yang, Yexing Fang, Junhao Wang, Jiao Xia, Bowen Sheng, Yipeng Lu
Peking University, CHINA

13:45 **MULTIELEMENT SELF-FOCUSING PIEZOELECTRIC MICRO-MACHINED TRANSDUCER FOR CROSS-TISSUE ULTRASONIC STIMULATION**
Xingyu Bai, Liyun Zhen, Lihan Yu, Meng Cui, Yiqing Shao, Jingquan Liu, Bin Yang
Shanghai Jiao Tong University, CHINA

14:00 **Transition**



Session XIIa - Neural Interface II

Chair: Sophie Giroud, *CEA-LETI, FRANCE*

Room 304a

14:10 **SELF-ROLLING HIGH CONFORMAL FLEXIBLE ELECTRODE FOR PERIPHERAL NEUROMODULATION AND RECORDING**

Jianbo Jiang[1,2], Huiran Yang[1], Ziyi Zhu[1,2], Dujuan Zou[1,2], Siyuan Ni[1,2], Zhengyu Liang[1,2], Lirui Yang[1,2], Guopei Zhou[1,4], Zhitao Zhou[1,2], Liuyang Sun[1,2], Tiger H. Tao[1,2,3,5,6,7], Xiaoling Wei[1,2]

[1]*Chinese Academy of Sciences (CAS), CHINA,* [2]*University of Chinese Academy of Sciences, CHINA,* [3]*Shanghai Tech University, CHINA,* [4]*Wuhan Research Institute of Posts and Telecommunications, CHINA,* [5]*Neuroxess Co., Ltd., CHINA,* [6]*Guangdong Instituteof Intelligence Science and Technology, CHINA,* [7]*Tianqiao and Chrissy Chen Institute for Translational Researc, CHINA*

14:25 **MULTI-STAGE SEGMENTED MEMS ELECTRODE FOR LAYER-BY-LAYER PULSED FIELD ABLATION IN CARDIAC SURGERY**

Quan Peng, Mengfei Xu, Zilang Song, Zhiyuan Du, Jingjing An, Zixing Li, Yunhe Luo, Kaijie Yang, Bin Yang, Mu Qin, Jingquan Liu

Shanghai Jiao Tong University, CHINA

14:40 **SILK-BASED SELF-UNFOLDING ELECTRODE ARRAY FOR MINIMALLY-INVASIVE LARGE-SCALE DEEP BRAIN ACTIVITY MONITORING**

Jizhi Liang[1,2], Songtao Lai[1,2], Xiner Wang[1,2], Zhaohan Chen[3], Xiaoling Wei[1,2], Liuyang Sun[1,2], Tiger H. Tao[1,2,3,4,5,6], Zhitao Zhou[1,2]

[1]*Chinese Academy of Sciences (CAS), CHINA,* [2]*University of Chinese Academy of Sciences, CHINA,* [3]*Neuroxess Co., Ltd., CHINA,* [4]*ShanghaiTech University,* [5]*Guangdong Institute of Intelligence Science and Technology, CHINA,* [6]*Tianqiao and Chrissy Chen Institute for Translational Research, CHINA*

14:55 **ONE-STEP LASER-INDUCED DISSOLVABLE PVA MASK FOR 3D SOFT CARBON ELECTRODE ARRAY**

Xuanqi Wang[1], Kai Xue[1], Ruiyu Bai[1], Ye Huang[1], Zimo Zhang[1], Xiaoli You[1], Minghao Wang[2], Honglong Chang[1], Bowen Ji[1]

[1]*Northwestern Polytechnical University, CHINA,*
[2]*Hangzhou Dianzi University, CHINA*

Session XIIb - Nano Material

Chair: Andreu Llobera, *Silicon Austria Labs, AUSTRIA*

Room 304a

14:10 **INVITED**

CARBON NANOTUBES AS CONTACT MATERIAL FOR MEMS: ENHANCING SENSITIVITY, DURABILITY, AND FLEXIBILITY

Kyubin Bae, Sangjun Sim, **Jongbaeg Kim**

Yonsei University, KOREA

14:40 **GEOMETRICALLY RECONFIGURABLE SILK-BASED ELECTRONIC IMPLANTS**

Siyuan Ni[1,2], Ziyi Zhu[1,2], Zhiwen Yan[3], Zhengyu Liang[1,2], Jianbo Jiang[1,2], Dujuan Zou[1,2], Huiran Yang[1], Zhitao Zhou[1,2], Liuyang Sun[1,2], Tiger H. Tao[1,2,4,5,6,7], Yun Qian3, Xiaoling Wei[1], Keyin Liu[1]

[1]*Chinese Academy of Sciences (CAS), CHINA,* [2]*University of Chinese Academy of Sciences, CHINA,* [3]*Jiao Tong University School of Medicine, CHINA,* [4]*ShanghaiTech University, CHINA,* [5]*Neuroxess Co., Ltd., CHINA,* [6]*Guangdong Institute of Intelligence Science and Technology, CHINA,* [7]*Tianqiao and Chrissy Chen Institute for Translational Research*

14:55 **THERMOGRAVIMETRIC ANALYSIS OF MOLYBDENUM DITELLURIDE NANOFLAKE USING INTEGRATED RESONANT MICROCANTILEVERS**

Jun Li[1,2], Hao Jia[1,3], Ruomeng Guo[1,2], Qiaoyuan Yang[1,3], Pengcheng Xu[1,3], Xinxin Li[1,3]

[1]*Chinese Academy of Sciences (CAS), CHINA,* [2]*ShanghaiTech University, CHINA,* [3]*University of Chinese Academy of Sciences, CHINA*

Poster Session III

Hall S2

15:10 **Poster Session III**

Poster presentations are listed by topic category with their assigned number starting on Page 37.

16:40 **Break and Exhibit Inspection** (Hall S2)

Student Led Conference Session II

Chairs: Zhi-Qiang Lee, *National Tsing Hua University, TAIWAN* & **Sarah O. Spector**, *Massachusetts Institute of Technology, USA*

Hall S2

16:40 **TOWARDS TACTILE SENSING HUB VIA CMOS-MEMS PLATFORM: EFFECT OF CONTACT INTERFACE MATERIAL AND COIL TURNS ON THE PERFORMANCE OF INDUCTIVE TACTILE SENSORS**

Fuchi Shih, Mei-Feng Lai, Weileun Fang

National Tsing Hua University, TAIWAN

16:55 **FROM MOTION TO MEDICINE: TRIBOELECTRIC NANOGENERATORS IN NEXT-GEN HEALTHCARE AND HUMAN-MACHINE INTERACTION**

Kumar Shrestha

Kwangwoon University, KOREA

17:10 **Adjourn for the Day**

Reunion and Networking Night

Sunset Beach

18:30 – 20:30 **Join us for the Reunion Networking Night.**
It will be held at the Sunset Beach Resort in Si-Zih Wan, a well-known summer resort in Kaohsiung.

Dagang Bridge (Great Harbor Bridge) connecting Pier-2 Art Center and Peng-lai commercial harbor in the port of Kaohsiung. *By BINGJHEN; AdobeStock*

THURSDAY AT A GLANCE

08:15-09:00	**Plenary Presentation IV** (Room 304a) Sabeth Verpoorte – *University of Groningen, NETHERLANDS*
09:00-10:00	**Session XIII - Innovative Sensor** (Room 304a)
10:00-10:30	**Break and Exhibit Inspection** (Hall S2)
10:30-11:30	**Session XIV - Environmental Sensing** (Room 304a)
11:30-12:00	**Awards Ceremony and Final Remarks** (Room 304a)
12:00	**Conference Adjourns**
13:00-16:50	**ASE Kaohsiung Technical Tour**

THURSDAY, 23 JANUARY

Plenary Presentation IV
Chair: Takehiko Kitamori, *Univeristy of Tokyo, JAPAN*

Room 304a

08:15 **WILL ORGAN-ON-A-CHIP SURVIVE THE TEST OF TIME?**
Sabeth Verpoorte
University of Groningen, NETHERLANDS

Session XIII - Innovative Sensor
Chair: Wei-Chang Li, *National Taiwan University, TAIWAN*

Room 304a

09:00 **SIMPLE FABRICATION AND INTEGRATION OF 3D ELECTRODES FOR HIGH-SENSITIVITY DROPLET DETECTION**
Byeolnim Oh[1], Moon Sung Son[1], Jaewon Park[3], Kang-Ho Lee[2], Hyun Soo Kim[1]
[1]*Kwangwoon University, KOREA,* [2]*Korea Institute of Machinery and Materials, KOREA,* [3]*Korea University, KOREA*

09:15 **DURABLE AG-COATED MICRO-CRACK VELCRO ELECTRODE FOR HI-FI BIOELECTRIC SIGNALS IN HAIRY AREAS**
Jun Guo[1], Kang Fu[1], Zimo Zhang[1], Ruiyu Bai[1], Xuanqi Wang[1], Kai Xue[1], Huazhen Chen1, Le Li[1], Huijing Hu[1], Minghao Wang[2], Honglong Chang[1], Bowen Ji[1]
[1]*Northwestern Polytechnical University, CHINA,*
[2]*Hangzhou Dianzi University, CHINA*

09:30 **IMPACT OF SKIN SURFACE PH ON INTERSTITIAL FLUID EXTRACTION BY REVERSE IONTOPHORESIS**
Wangwang Zhu, Haixia Yu, Xi Li, Youhao Liu, Chenxi Jin, Xingguo Zhang, Hao Zheng, Dachao Li, Zhihua Pu
Tianjin University, CHINA

09:45 **VISUALLY INTELLIGENT DIGITAL MICROFLUIDICS FOR GENERALIZED COLORIMETRIC ASSAYS**
Zongliang Guo[1], Rongxin Fu[1], Hanzhi Zhang[1], Fenggang Li[1], Siyi Hu[2], Hang Li[1], Hanbin Ma[2], Huikai Xie[1], Shuailong Zhang[1]
[1]*Beijing Institute of Technology, CHINA,* [2]*Guangdong ACXEL Micro & Nano Tech Co., Ltd, CHINA*

10:00 **Break and Exhibit Inspection** (Hall S2)

Session XIV - Environmental Sensing

Chair: Takashiro Tsukamoto, *Tohoku University, JAPAN*

Room 304a

10:30 **SIMULTANEOUSLY VOLUMETRIC TEMPERATURE, HUMIDITY AND PRESSURE MONITORING BASED ON ULTRASONIC SIGNALS**
Megan Teng, Peggy Tsao, Liwei Lin
University of California, Berkeley, USA

10:45 **BATTERY-LESS OUTDOOR FARMING IOT SENSING SYSTEM USING MULTIFUNCTIONAL HYDROGEL ENABLED DIRECT-CURRENT POWERING AND SELF-POWERED LEAF MONITORING CAPABILITY**
Xinge Guo, Luwei Wang, Chengkuo Lee
National University of Singapore, SINGAPORE

11:00 **INTEGRATED PRECONCENTRATOR-ENHANCED GAS SENSOR FOR LOW POWER DETECTION OF LOW CONCENTRATION TOLUENE**
Jeonghyeop Son[1], Hee-Jin Ko[1], Jaebum Jeong[2], Jun Young Kim[2], Jongbaeg Kim[1]
[1] *Yonsei University, KOREA,* [2] *Gyeongsang National University, KOREA*

11:15 **IC-COMPATIBLE FABRICATION OF UNIFORM WO3 NANOSHEETS FOR ULTRASENSITIVE ON-CHIP HYDROGEN SENSORS**
Jiyong Zhou[1], Jianyou Dai[1], Lei Shan[1], Xiaohong Wang[2], Sixing Xu[1]
[1] *Hunan University, CHINA,* [2] *Tsinghua University, CHINA*

Awards Ceremony and Final Remarks

Room 304a

11:30	**Awards Ceremony**
11:50	**Final Remarks**
12:00	**Conference Adjourns**

ASE Kaohsiung Technical Tour

Advanced Semiconductor Engineering, Inc.

13:00 – 16:50 **Join us for the Technical Tour of ASE in Kaohsiung.**

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THURSDAY

Hall S2, First Floor

MONDAY	TUESDAY	WEDNESDAY
15:10 – 17:00	13:00 – 15:00	15:10 – 17:10

POSTER TOPIC CATEGORIES

(last character of poster number)

- a - Bio and Medical MEMS
- b - Emerging Technologies and New Opportunities for MEMS/NEMS
- c - Industry MEMS and Advancing MEMS for Products and Sustainability
- d - MEMS & NEMS Materials, Fabrication and Packaging
- e - MEMS Actuators and PowerMEMS
- f - MEMS Physical & Chemical Sensors
- g - MEMS/NEMS for Optical, RF and Electromagnetics
- h - Micro- & Nanofluidics
- i - Open Posters

See poster floor plans at the end of this program.

a - Bio and Medical MEMS

Biosensors and Bioreactors

M01-a **A THIN FILM COIL WITH INTEGRATED ELECTROCHEMICAL SENSOR FOR WIRELESS AND PASSIVE BIOMARKER SENSING**
Ruitong Chen, Alexander Baldwin, Emmanuel Ramirez, Ellis Meng
University of Southern California, USA

T01-a **CRITICAL SUITABILITY EVALUATION OF CACO-2 CELLS FOR GUT-ON-A-CHIP**
Wenhong Zhang[1], Xiatong Pan[2], Zhipeng Xu[3], Jun Chen[2], Junlei Han[2,4], Li Wang[2], Jing Wang[1]
[1]*Donghua University, CHINA,* [2]*Qilu University of Technology, CHINA,* [3]*University of Sheffield, UK,* [4]*Tianjin University, China*

W01-a **MACHINE LEARNING-AIDED POLARONIC NANOANTENNAS FOR LABEL-FREE BIOIMAGING OF VIRUS MONOLAYERS**
Hong Zhou, Dongxiao Li, Zhihao Ren, Cheng Xu, Chengkuo Lee
National University of Singapore, SINGAPORE

M02-a **MACHINE LEARNING-ENHANCED OVERCOUPLED PLASMONIC RESONATORS FOR BIOMOLECULAR DETECTION**
Dongxiao Li, Hong Zhou, Zhihao Ren, Cheng Xu, Chengkuo Lee
National University of Singapore, SINGAPORE

Biosensors and Bioreactors

T02-a **SENSITIVITY ENHANCEMENT WITH NOISE SUPPRESSION OF SURFACE FUNCTIONALIZATION FOR SILICON NANOWIRE BIOSENSORS**
Dongqin Chen[1,2], Jiushuai Xu[1], Yanzhi Dou[1], Tie Li[1]
[1] *Chinese Academy of Sciences (CAS), CHINA,*
[2] *University of Chinese Academy of Sciences, CHINA*

a - Bio and Medical MEMS

Devices & Systems for Cellular and Molecular Studies

W02-a **AN AUTOMATIC DIVERTER MICROFLUIDIC CHIP WITH DUAL-CHANNEL CONCENTRATION GRADIENT FOR DRUG SCREENING OF HEAD AND NECK TUMOR CELLS**
Zhimi Zhang[1,2], Jingru Liao[1], Xiaolong Ru[1], Guiquan Zhu[1], Ling Li[2], Yuanlin Xia[1], Zhuqing Wang[1]
[1] *Sichuan University, CHINA,* [2] *University of Electronic Science and Technology of China, CHINA*

M03-a **AN INTEGRATED MICROFLUIDIC SYSTEM FOR mRNA EXTRACTION FROM IN VITRO TRANSCRIBED REACTION MIXTURE BY USING PROBE-COATED MAGNETIC BEADS**
Swati T. Gurme, Yu-Ting Su, Yi-Da Chung, Lily Hui-Ching Wang, Gwo-Bin Lee
National Tsing Hua University, TAIWAN

T03-a **MICRO-FLOWER STRUCTURE ACTIVATED PHOTOPORATION FOR LARGE SIZED BIOMOLECULAR DELIVERY IN CANCER CELLS**
Ashwini S. Shinde[1], Pallavi Shinde[1], Moeto Nagai[2], Tuhin Subhra Santra[1], Srabani Kar[3]
[1] *Indian Institute of Technology, Madras, INDIA,* [2] *Toyohashi University of Technology, JAPAN,* [3] *Indian Institute of Technology, Hyderabad, INDIA*

W03-a **MICROENVIRONMENT COMPARTMENTALIZATION FOR OPTIMIZING DIFFERENTIATION OF IPS CELLS**
Daiki Fukai[1], Yuma Abe[1], Taro Toyoda[2], Hidekuni Takao[1], Kyohei Terao[1]
[1] *Kagawa University, JAPAN,* [2] *Kyoto University, JAPAN*

M04-a **SINGLE CELL EJECTION FROM PERIPHERAL BLOOD MONONUCLEAR CELLS (PBMC) INTO OIL-COATED 96-WELL PLATE**
Kianoush Sadeghian Esfahani, Baptiste Neff, Akash Roy, Anik Sengupta, Eun S. Kim
University of Southern California, USA

a - Bio and Medical MEMS

Flexible and Wearable Devices and Systems

T04-a **A FULLY INTEGRATED, FLEXIBLE AND TUNABLE CAPACITIVE STRAIN SENSOR BASED ON MAGNETO-DIELECTRIC FOR HUMAN MOTION MONITORING**
Mujeeb Yousuf, Pushpapraj Singh
Indian Institute of Technology, New Delhi, INDIA

Flexible and Wearable Devices and Systems

W04-a **A HIGHLY MINIATURIZED, STABLE, BREATHABLE E-SKIN PATCH FOR SKIN-HYDRATION AND ECG MONITORING**
Gagan Bahadur Pradhan, SeongHoon Jeong, Sudeep Sharma, Jae Yeong Park
Kwangwoon University, KOREA

M05-a **A SELF-ASSEMBLED FLEXIBLE STRAIN AND TEMPERATURE SENSOR BASED ON THE MICROSTRUCTURE OF PYRAMIDS WITH HIGH ELASTICITY, TEMPERATURE SENSITIVITY AND WIDE RANGE**
Yangtao Yu[1], Bo Yan[1], Wenbo Cui[2], Mengqiu Li[1], Chenyuan Li[1], Faheng Zang[1], Zhuoqing Yang[1]
[1]*Shanghai Jiao Tong University, CHINA,*
[2]*Harbin Institute of Technology, CHINA*

T05-a **A WEARABLE PAPER-BASED HYBRID ENERGY HARVESTER FROM HUMAN SWEAT AND AMBIENT MOISTURE**
Yang Gao, Seokheun Choi
State University of New York, Binghamton, USA

W05-a **A WEARABLE SYSTEM FOR WIRELESS AND MULTIPLEXED MOLECULAR SENSING VIA SOLID MICRONEEDLES**
Emmanuel Ramirez[1], Christopher Larson[1], James J. Yoo[1], Chelsea Brown[2], Kevin W. Plaxco[2], Tod Kippin[2], Ellis Meng[1]
[1]*University of Southern California, USA,*
[2]*University of California, Santa Barbara, USA*

M06-a **ARTERIAL PULSE SIGNAL ACQUISITION USING FLEXIBLE SENSING DENSE ARRAY WITH HIGH SPATIAL RESOLUTION**
Yue He[1,2], Ke Sun[2], Fang Wang[2], Tiger H. Tao[2], Heng Yang[2], Yi Sun[2], Quan Wang[1], Xinxin Li[2]
[1]*Jiangsu University, CHINA,* [2]*Shanghai Institute of Microsystem and Information Technology, CHINA*

T06-a **CONFORMAL ULTRASOUND PATCH FOR REAL-TIME BLOOD FLOW MONITORING**
Taemin Lee[1], Jongcheol Park[2], Il-seop Kim[3], Sangho Bang[1], Joontaek Jung[2], Hyunjoo J. Lee[1]
[1]*Korea Advanced Institute of Science and Technology (KAIST), KOREA,*
[2]*National NanoFab Center (NNFC), KOREA,* [3]*Healcerion Co., Ltd., KOREA*

W06-a **ECO-FRIENDLY FABRICATION PROCESS OF FLEXIBLE PIEZOELECTRIC PRESSURE SENSORS: A PATH TO SUSTAINABLE ELECTRONICS**
Mujeeb Yousuf, Sazid Ali, Khanjan Joshi, Pushpapraj Singh
Indian Institute of Technology, Delhi, INDIA

M07-a **STRETCHABLE AND SELF-HEALING GRAPHITE/POLYBOROSILOXANE CONDUCTIVE COMPOSITES FOR WEARABLE STRAIN SENSORS**
Guan-Ze Song, Yi-Tsung Su, Kuan-Yu Tu, Lung-Hao Hu, Ching-Te Kuo
National Sun Yat-sen University, TAIWAN

Flexible and Wearable Devices and Systems

T07-a **STRUCTURAL AND CONSTITUENT ENGINEERING OF CONDUCTIVE POLYMER COMPOSITES TOWARDS SYNERGETIC MONITORING OF PHYSIOLOGICAL PRESSURE AND ELECTROPHYSIOLOGICAL SIGNALS**
Wanxin Zhou, Xiaoyu Wang, Yuanlin Xia, Zhuqing Wang
Sichuan University, CHINA

W07-a **TACTILE SENSING OF EXTENSOR TENDONS AND NEAR-SENSOR GESTURE RECOGNITION FOR CONTROL OF ROBOTIC HAND**
Yushen Hu[1], Zhejun Zhang[1], Tengteng Lei[1], Man Wong[1,2]
[1]*Hong Kong University of Science and Technology, CHINA,*
[2]*Guangzhou HKUST Fok Ying Tung Graduate School, CHINA*

a - Bio and Medical MEMS

Manufacturing for Bio- & Medical MEMS

M08-a **A SILK-BASED MULTIFUNCTIONAL AND BIDIRECTIONAL NEURAL INTERFACE**
Xiner Wang[1,2], Yan Wang[3], Yuxin Liu[1], Xiaoling Wei[1,2], Liuyang Sun[1,2], Tiger H. Tao[1,2,4,5,6], Zhitao Zhou[1,2]
[1]*Chinese Academy of Sciences (CAS), CHINA,* [2]*University of Chinese Academy of Sciences, CHINA,* [3]*Shanghai Normal University, CHINA,* [4]*Neuroxess Co., Ltd., CHINA,* [5]*Guangdong Institute of Intelligence Science and Technology, CHINA,* [6]*Tianqiao and Chrissy Chen Institute for Translational Research, CHINA*

T08-a **BREAKING THE DIMENSION BARRIER: VARIDEPTH NEUROELETRODE ARRAY (VD-NEA) ENABLED BY A NOVEL STEREO MASK FOR ACHIEVING ARBITRARY ELECTRODE DEPTH IN NEURAL RECORDING**
Zhitong Zhang, Zhe Huang, Lexuan Yang, Junshi Li, Yu-Qing Zheng, Zhihong Li
Peking University, CHINA

W08-a **ELECTROWETTING-ON-DIELECTRIC-BASED MICROBUBBLE PATTERNING FOR SPATIAL ULTRASOUND MODULATION**
Subeen Kim, Sangho Bang, Yehhyun Jo, Hyunjoo J. Lee
Korea Advanced Institute of Science and Technology (KAIST), KOREA

M09-a **IN-SITU RING ASSEMBLED INNER TUBULAR FABRICATION BY OPTOFLUIDIC MASKLESS LITHOGRAPHY FOR SOFT ROBOTICS AND MEDICAL DEVICES INSPIRED FROM SEGMENT CONSTRUCTION OF SHIELD TUNNEL TECHNOLOGY**
Yuki Kamiya, Yingzhe Wang, Keisuke Morishima
Osaka University, JAPAN

T09-a **MICROFLUIDIC TISSUE BARRIER SENSOR CHIP WITH INTEGRATED MICROELECTRODES AND ULTRATHIN MICROPOROUS MEMBRANE**
Pratik V. Tawade[1], Hande Aydogmus[1], Lovro Ivancevic[1], Jia-Jun Yeh[1,2], Vasiliki Gkouzioti[3], Jean-Philippe Frimat[3], Jaap den Toonder[2], Massimo Mastrangeli[1]
[1]*Delft University of Technology, NETHERLANDS,*
[2]*Eindhoven University of Technology, NETHERLANDS,*
[3]*Leiden University Medical Center, NETHERLANDS*

Manufacturing for Bio- & Medical MEMS

W09-a **SILICON-BASED WIRELESS PASSIVE LC MICROSYSTEMS WITH POTENTIAL FOR PULMONARY ARTERY PRESSURE MONITORING**
Pichao Pan[1,2], Li Wang[1,2], Min Liu[1,2], Xinxin Li[1,2]
[1] *Chinese Academy of Sciences, CHINA,*
[2] *University of Chinese Academy of Sciences, CHINA*

a - Bio and Medical MEMS

Materials for Bio- and Medical MEMS

M10-a **A HIGHLY CATALYTIC ZWITTERIONIC HYDROGEL FOR ELECTROCHEMICAL ENZYMATIC BIOSENSORS**
Chengcheng Li, Wenjun Li, Wangwang Zhu, Xingguo Zhang, Hao Zheng, Zhihua Pu, Dachao Li
Tianjin University, CHINA

T10-a **DNA-APTAMER INCORPORATED MICROGEL BEADS BY CRYOGENIC PARTICLE FABRICATION**
Momoka Minami, Satofumi Kato, Hiroaki Onoe
Keio University, JAPAN

W10-a **PHOTOLUMINESCENT POLYMER FILMS FOR HIGH-SENSITIVITY OXYGEN SENSING IN BIOMEDICAL IMPLANTS**
Julian A. Singer[1], Anton Geläschus[1], Patrick Kleinschnittger[1], Ute Schmidt[1], Matthias Kuhl[2], Andreas Bahr[3]
[1] *Hamburg University of Technology, GERMANY,* [2] *University of Freiburg, GERMANY,* [3] *Technische Universität Dresden, GERMANY*

a - Bio and Medical MEMS

Medical Microsystems

M11-a **A MEMS-BASED MINIATURIZED WIRELESS FULLY-IMPLANTABLE BRAIN-COMPUTER INTERFACE SYSTEM**
Zexi Su[1,2], Jiaqi Yang[1,2], Xiaoling Wei[1,2], Liuyang Sun[1,2], Tiger H. Tao[1,2,3,4,5,6], Zhitao Zhou[1,2]
[1] *Chinese Academy of Sciences (CAS), CHINA,* [2] *University of Chinese Academy of Sciences, CHINA,* [3] *ShanghaiTech University, CHINA,* [4] *Neuroxess Co., Ltd., CHINA,* [5] *Guangdong Institute of Intelligence Science and Technology, CHINA,* [6] *Tianqiao and Chrissy Chen Institute for Translational Research, CHINA*

T11-a **A MODIFIED ULTRA-FLEXIBLE NEURAL ELECTRODE FOR LONG-TERM DUAL-MODALITY DETECTION ACROSS MULTIPLE BRAIN REGIONS**
Guopei Zhou[1,2], Xueying Wang[2,3], Jianbo Jiang[2,3], Dujuan Zou[2,3], Zhengyu Liang[2,3], Huiran Yang[2], Ziyi Zhu[2], Siyuan Ni[2,3], Mingliang Xu[3], Fei He[2], Liuyang Sun[2,3], Zhitao Zhou[2,3], Tiger H. Tao[2,3,4,5,6], Xiaoling Wei[2,3]
[1] *Wuhan Research Institute of Posts and Telecommunications, CHINA,* [2] *Chinese Academy of Sciences, CHINA,* [3] *University of Chinese Academy of Sciences, CHINA,* [4] *Neuroxess Co., Ltd. (Jiangxi), CHINA,* [5] *Guangdong Institute of Intelligence Science and Technology, CHINA,* [6] *Tianqiao and Chrissy Chen Institute for Translational Research, CHINA*

Medical Microsystems

W11-a **A SILK-BASED MINIMALLY INVASIVE STENT-ELECTRODE SYSTEM FOR VASOSPASM MONITORING AND IN-SITU TREATMENT**

Yihan Diao[1,2], Hailang He[1,2], Zuyong Fang[1,2], Xiaoling Wei[1,2], Liuyang Sun[1,2], Tiger H. Tao[1,2,3,4,5,6], Zhitao Zhou[1,2]

[1] *Chinese Academy of Sciences (CAS), CHINA,* [2] *University of Chinese Academy of Sciences, CHINA,* [3] *ShanghaiTech University, CHINA ,* [4] *Neuroxess Co., Ltd., CHINA,* [5] *Guangdong Institute of Intelligence Science and Technology, CHINA,* [6] *Tianqiao and Chrissy Chen Institute for Translational Research, CHINA*

M12-a **BIPOLAR CONCENTRIC RING MICRONEEDLE ARRAY (BCRMA): AN ELECTRICAL STIMULATION ELECTRODE FOR PRECISE MOVEMENT CONTROL**

Jiayan Zhang, Dongxu Ma, Zhitong Zhang, Zhongyan Wang, Yuxing Pang, Junshi Li, Zhihong Li

Peking University, CHINA

T12-a **DISSOLVABLE SILK FIBROIN MICRONEEDLE (SFμN) PATCH FOR LONG-ACTING THYROID HORMONE REPLACEMENT THERAPY**

Diana V. Rodriguez De Francisco, Edwin Davidson Barahona, Omar S. Cepeda Torres, Swadeshmukul Santra, Swaminathan Rajaraman

University of Central Florida, USA

W12-a **HIGHLY SENSITIVE DRIP-PROOF TACTILE ARRAY SENSOR FOR SLIP/GRASP DETECTION UNDER LAPAROSCOPIC SURGERY**

Keisuke Yoshimoto[1], Sho Yoshikawa[1], Masao Fujiwara[2], Kyohei Terao[1], Hidekuni Takao[1]

[1] *Kagawa University, JAPAN,* [2] *Takamatsu Red Cross Hospital, JAPAN*

M13-a **IN VITRO ELECTRICAL STIMULATION SYSTEM BASED ON STRETCHABLE MICROELECTRODE ARRAY**

Yoojeong Kim[1], Byumseok Koh[2], Kiup Kim[1], Sung Bum Park[2], Ki Young Kim[2], Jeong Hyeon Jo[2,3], Hyunjoo J. Lee[1]

[1] *Korea Advanced Institute of Science and Technology (KAIST), KOREA,* [2] *Korea Research Institute of Chemical Technology (KRICT), KOREA,* [3] *Chungnam National University, KOREA*

T13-A **INTRACORTICAL FLEXIBLE MICRONEEDLE NEURAL ELECTRODE (f-μNEURODE) BASED ON PROJECTION-MICRO-STEREOLITHOGRAPHY (PμSL) TECHNOLOGY FOR CHRONIC IN-VIVO ELECTROPHYSIOLOGICAL RECORDING**

Zhe Huang[1,4], Yanran Wang[2], Junshi Li[1,4], Xinyi Ma[1,4], Zhitong Zhang[1,4], Xiaowen Sun[2], Jiayan Zhang[1,4], Dong Huang[3], Bin Yang[5], Jingquan Liu[5], Dajun Xing[2], Zhihong Li[1,4]

[1] *Peking University, CHINA,* [2] *Beijing Normal University, CHINA,* [3] *Acimicro Medical Technology Co., Ltd., CHINA,* [4] *Beijing Advanced Innovation Center for Integrated Circuits, CHINA,* [5] *Shanghai Jiao Tong University, CHINA*

Medical Microsystems

W13-a **MEMS-BASED HIGH-DENSITY ULTRA-CONFORMAL μECOG ELECTRODE ARRAY FOR REAL-TIME MOTOR DECODING**
Erda Zhou[1], Changjiang Liu[1], Xiner Wang[1], Xiaoling Wei[1], Liuyang Sun[1], Tiger H. Tao[1,2,3,4,5], Zhitao Zhou[1]
[1]*Chinese Academy of Sciences (CAS), CHINA,* [2]*University of Chinese Academy of Sciences, CHINA,* [3]*Neuroxess Co., Ltd. CHINA,* [4]*Guangdong Institute of Intelligence Science and Technology, CHINA,* [5]*Tianqiao and Chrissy Chen Institute for Translational Research, CHINA*

M14-a **MINIATURE AND WIRELESS ULTRASONIC IMAGING SYSTEM FOR WEARABLE HUMAN CAROTID ARTERY HEALTH MONITORING**
Lei Zhao, Aocheng Bao, Chong Yang, Junhao Wang, Xixin Cao, Yipeng Lu
Peking University, CHINA

T14-a **MULTIMODAL MEMS MICROWRINKLE ELECTRONICS FOR CARDIAC PULSED FIELD ABLATION AND SENSING**
Mengfei Xu[1], Quan Peng[1], Ziliang Song[1], Mu Qin[1], Yimeng Sun[2], Zhiyuan Du[1], Kunyu Zheng[1], Xiaolin Wang[1], Bin Yang[1], Jingquan Liu[1]
[1]*Shanghai Jiao Tong University, CHINA,*
[2]*Shanghai University of Electric Power, CHINA*

W14-a **SPRING-LIKE KIRIGAMI MICROELECTRODE ARRAY IN SHAPE MEMORY POLYMER FOR SPONTANEOUS ADAPTATION OF COMPLEX TOPOGRAPHY IN NEURAL IMPLANTS**
Yuanhao Xu, Stella W. Pang
City University of Hong Kong, HONG KONG

M15-a **ULTRA-FLEXIBLE HONEYCOMB DEEP BRAIN ELECTRODE FOR RESISTANCE TO BRAIN SHIFT AND EXTERNAL DISTURBANCES**
Dongyang Wen[1], Kejun Tu[1], Liyun Zhen[1], Bin Yang[1], Zhihong Li[2], Jingquan Liu[1]
[1]*Shanghai Jiao Tong University, CHINA,* [2]*Peking University, CHINA*

a - Bio and Medical MEMS

MEMS & BioMEMS for Fighting COVID-19 & Future Pandemic

T15-a **BIOCHEMICAL DETECTION BASED ON NANOPARTICLE INDUCED ULTRASONIC RAYLEIGH SCATTERING**
Wangyang Zhang, Jiaqian Yang, Haoliang Jia, Tao Liu, Yuchen Mao, Lei Ren, Ziwei Chen, Xiaojing Mu
Chongqing University, CHINA

a - Bio and Medical MEMS

MEMS & BioMEMS for Healthcare and Public Health

W15-a **INTEGRATED MICROFLUIDIC RAPID RESPONSE AND HIGHLY SENSITIVE ELECTROCHEMICAL APTASENSOR FOR SIMULTANEOUS DETECTION OF AFLATOXIN B1 AND DEOXYNVIVALENOL**
Jinlei Wu, Qinghui Jin, Ping Yang, Wanlei Gao,
Ningbo University, CHINA

MEMS & BioMEMS for Healthcare and Public Health

M16-a **A MEMS PRESSURE SENSOR ARRAY FOR SLEEP APNEA RECOGNITION AND MONITORING BASED ON THE PRINCIPLE OF TRADITIONAL CHINESE MEDICINE**
Lin Qin, Long Cheng, Xianzhang Zeng, Yuanlin Xia, Zhuqing Wang
Sichuan University, CHINA

T16-a **AN ARRAY OF SILICON DUAL MICRONEEDLE ELECTRODES INTEGRATED WITH MINI-LEDS FOR ELECTROPHYSIOLOGICAL RECORDING AND SIMULTANEOUS APPLICATION OF ELECTRICAL AND OPTICAL STIMULI TO THE RETINA FOR ARTIFICIAL VISION**
Seung-Han Chung[1], Chaesung Kim[2,3], Yong-Kweon Kim[1], Seung-Ki Lee[4], Jae-Hyoung Park[4], Mesoon Im[2,5,6]
[1]*Seoul National University, KOREA,* [2]*Korea Institute of Science and Technology, KOREA,* [3]*Korea University, KOREA,* [4]*Dankook University, KOREA,* [5]*University of Science & Technology, KOREA,* [6]*Kyung Hee University, KOREA*

W16-a **HIGH-RESOLUTION HAIR TEXTURE SENSOR WITH MONOLITHICALLY INTEGRATED GUIDING STRUCTURE FOR REALIZATION OF PRECISE EVALUATION AND SIMPLE OPERATION**
Gakuto Tanaka[1], Masahito Komatsubara[1], Ryusei Kawagoe[1], Hirotoshi Oikaze[2], Yoshiyasu Kitagawa[2], Yasunori Matsui[2], Hidekuni Takao[1]
[1]*Kagawa University, JAPAN,* [2]*Panasonic Corporation, JAPAN*

M17-a **NONPLANAR WIRELESS DIFFERENTIAL MICROSENSOR FOR INTEGRATION ON INTRAVENOUS CATHETERS FOR THERAPEUTIC DRUG MONITORING AND OTHER APPLICATIONS**
Jiaxin Jiang[1], Vidya Chidambaran[2], Tao Li[1]
[1]*University of Cincinnati, USA,* [2]*Cincinnati Children's Hospital Medical Center, USA*

T17-a **SILICON SOLAR CELL-INTEGRATED FLEXIBLE RETINAL PROSTHESIS FOR ARTIFICIAL VISION**
Chaesung Kim[1,2], Seung-Han Chung[3], Yong-Jin Kim[4], Hyeonhee Roh[1,2], Seung-Ki Lee[5], Yong-Kweon Kim[3], Hyung-Min Lee[1], Jae-Hyoung Park[5], Min-Gu Kang[4], Maesoon Im[2,6,7]
[1]*Korea University, KOREA,* [2]*Korea Institute of Science and Technology, KOREA,* [3]*Seoul National University, KOREA,* [4]*Korea Institute of Energy Research, KOREA,* [5]*Dankook University, KOREA,* [6]*University of Science and Technology, KOREA, 7Kyung Hee University, KOREA*

W17-a **WEARABLE NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY SYSTEM TO DETECT STRESS AND VIRAL BIOMARKERS, AND ILLICIT DRUGS NON-INTRUSIVELY IN VIVO**
Massood Tabib-Azar, Brian Baker
University of Utah, USA

W117-a **A HIGH-DENSITY ELECTROMYOGRAPHY SENSOR BASED ON MEMS E-SKIN FOR DETECTING ACTIVITY OF MOTOR UNITS**
Yirong Wang, Shuihan Shao, Chunpeng Jiang, Bin Yang, Jingquan Liu
Shanghai JiaoTong University, CHINA

a - Bio and Medical MEMS

Tissue Engineering

M18-a **INNOVATIVE STAMP-STRUCTURED ORGAN-ON-A-CHIP PLATFORM FOR VASCULARIZED TUMOR AND COLON MODELS**
Feifan Wang, Chenyang Zhou, Xiaolin Wang
Shanghai Jiao Tong University, CHINA

T18-a **TONGUE-LIKE BIOACTUATOR WITH MULTIPLE SKELETAL MUSCLE TISSUES**
Xuankai Gao[1], Kohei Okasaki[2], Hirono Ohashi[2], Takeshi Sakurai[2], Yuya Morimoto[1]
[1] *Waseda University, JAPAN,* [2] *Tokyo University of Agriculture, JAPAN*

b - Emerging Technologies & New Opportunities for MEMS/NEMS

Computing Devices and Systems with MEMS/NEMS

M19-b **EDGE-COMPUTING ENABLED SI PHOTONICS MULTIMODAL SENSOR WITH INTEGRATED PHOTONIC CONVOLUTIONAL PROCESSOR**
Zian Xiao[1,2], Zhihao Ren[1], Yangyang Zhuge[1], Zixuan Zhang[1], Jingkai Zhou[1], Siyu Xu[1], Cheng Xu[1], Bowei Dong[3], Chengkuo Lee[1,2,4]
[1] *National University of Singapore, SINGAPORE,* [2] *NUS Suzhou Research Institute (NUSRI), SINGAPORE,* [3] *Institute of Microelectronics, SINGAPORE,* [4] *National Centre for Advanced Integrated Photonics, SINGAPORE*

T19-b **HIGH-TEMPERATURE DUAL-RAIL CONTACTLESS MEMS LOGIC FOR INDUSTRIAL EDGE COMPUTING**
Aleksandra Markovic[1], Adrian Laborde[1], Nicolas Mauran[1], Hervé Fanet[1], Gaël Pillonnet[2], Bernard Legrand[1]
[1] *LAAS-CNRS, FRANCE,* [2] *CEA-Leti, FRANCE*

W18-b **IMPROVED LEARNING PERFORMANCE IN PHYSICAL RESERVOIR COMPUTING USING COUPLED TRIPLE MEMS NONLINEAR RESONATORS**
Kosuke Shima, Hiroki Takemura, Masaki Shimofuri, Amit Banerjee, Jun Hirotani, Toshiyuki Tsuchiya
Kyoto University, JAPAN

M20-b **NEUROMORPHIC PIEZOMEMS SENSOR USING EPITAXIAL $BiFeO_3$ THIN FILM**
Sena Yamamoto[1], Mario Kiuch[1], Takeshi Yoshimura[2]
[1] *Sumitomo Precision Products Co., LTD., JAPAN,*
[2] *Osaka Metropolitan University, JAPAN*

T20-b **REDUCING DYNAMIC MEMORY REFRESH OVERHEAD VIA READ-LESS REFRESH OPERATION USING MEMS-BASED MEMORY CELL**
Khanjan M. Joshi, Manu Garg, Mujeeb Yousuf, Pushpapraj Singh
Indian Institute of Technology, Delhi, INDIA

b - Emerging Technologies & New Opportunities for MEMS/NEMS

Internet of Things (IoT) with MEMS/NEMS

W19-b **STRETCHABLE DEVICE WITH LOW-ENERGY CONSUMPTION USING POSITIVE PIEZOCONDUCTIVE ELECTRIC COMPONENT**
Yuji Isano, Shoki Kato, Tamami Takano, Purevdorj Munkhzaya, Nyamjargal Ochirkhuyag, Hiroki Ota
Yokohama National University, JAPAN

b - Emerging Technologies & New Opportunities for MEMS/NEMS

Machine Learning (ML) & Artificial Intelligence (AI)-Enhanced MEMS/NEMS Design, Manufacturing, and Applications

M21-b **A MACHINE-LEARNING-ASSISTED SILENT SPEECH INTERFACE UTILIZING MICRO-NEEDLE-ARRAY EMG ELECTRODES AND HIGH-SENSITIVITY STRAIN SENSING ELEMENTS**
Sheng-Kai Lin[1], Yen-Chun Chen[1], Jing-Han Lin[2], Pin-Hao Lin[1], Wen-Cheng Kuo[2], Yao-Joe Yang[1]
[1]*National Taiwan University, TAIWAN,* [2]*National Kaohsiung University of Science and Technology, TAIWAN*

T21-b **DEEP REINFORCEMENT LEARNING-BASED PARAMETERS OPTIMIZE PREDICTION MODEL FOR SMOOTH-VERTICAL SIDEWALL PROFILE IN DEEP REACTIVE ION ETCHING PROCESS**
Fang Wang[1,2], Hao Yu[1,2], Yechen Miao[1,2], Yue He[1], Ke Sun[1], Yi Sun[1], Heng Yang[1,2], Xinxin Li[1,2]
[1]*Chinese Academy of Sciences (CAS), CHINA,*
[2]*University of Chinese Academy of Sciences, CHINA*

W20-b **ENHANCED REAL-TIME GAS DETECTION ACCURACY BY A SCALABLE MACHINE LEARNING SCHEME**
Yuan Gao[1], Wei Yue[1], Qiuyang Xiao[2], Peisheng He[1], Liwei Lin[1]
[1]*University of California, Berkeley, USA,* [2]*Peking University, CHINA*

b - Emerging Technologies & New Opportunities for MEMS/NEMS

MEMS/NEMS for Advancing Scientific Instrumentation and Metrology

T122-b **ULTRASONIC PARTICLE LEVITATION USING PIEZOELECTRIC MICROMACHINED ULTRASOUND TRANSDUCER ARRAY FOR NON-CONTACT PARTICLE MANIPULATION**
Sagnik Ghosh[1], David S. W. Choong[1], Jihang Liu[1], Daniel S.-H. Chen[1], Yong Shun Teo[1], Yan Hong[1], Alberto Leotti[2], Domenico Giusti[3], Ivan Vezzoli[3], Yao Zhu[1], Yul Koh[1]
[1]*Agency for Science, Technology and Research (A*STAR), SINGAPORE,* [2]*STMicroelectronics, SINGAPORE,* [3]*STMicroelectronics, ITALY*

b - Emerging Technologies & New Opportunities for MEMS/NEMS

Nonlinear Dynamics in MEMS/NEMS

T22-b **ATOMICALLY THIN NEMS FREQUENCY COMB WITH BOTH FREQUENCY TUNABILITY AND RECONFIGURABILITY VIA MECHANICAL MIXING OF TWO EXCITATIONS**
Bo Xu, Zenghui Wang
University of Electronic Science and Technology of China, CHINA

W21-b **NON-HERMITIAN MEMS DISK RESONATOR BASED ON THERMAL-ELASTIC-DAMPING-REGULATION AND DYNAMICAL INTERACTION**
Sen Zhang[1], Lei Yu[2], Kaixuan He[2], Ning Zhou[2], Xin Zhou[1]
[1]*National University of Defense Technology, CHINA,*
[2]*East China Institute of Photo-Electronic IC, CHINA*

b - Emerging Technologies & New Opportunities for MEMS/NEMS

Quantum Devices and Systems with MEMS/NEMS

M23-b **ALSCN LAMB WAVE RESONATOR BASED ON NBN SUPERCONDUCTING ELECTRODE AT CRYOGENIC TEMPERATURE**
Wenzhen Li[1], Xuankai Xu[1], Jiawei Li[1], Peng Dong[1], Yiwei Wang[1], Ruihong Xiong[1], Jun Li[1], Tao Wu[1,2,3,4]
[1]*ShanghaiTech University, CHINA,* [2]*Chinese Academy of Sciences, CHINA,* [3]*University of Chinese Academy of Sciences, CHINA,* [4]*Shanghai Engineering Research Center of Energy Efficient and Custom AI IC, CHINA*

T23-b **MINIATURE QUANTUM GRADIOMETER USING 3D INTERCONNECTED ATOMIC VAPOR CELLS**
Jianfeng Zhang, Jintang Shang
Southeast University, CHINA

c - Industry MEMS and Advancing MEMS for Products and Sustainability

Measurement Methods for Product Specs

M24-c **WAFER-LEVEL EXTRACTION OF MULTILAYER RESIDUAL STRESS IN PVD-PZT PMUTS THROUGH AN AUTOMATED COUPLED METHOD WITH FEM AND MEASUREMENT**
Prakasha Chigahalli Ramegowda[1], Shyam Trivedi[1], Sagnik Ghosh[1], David Sze Wai Choong[1],Duan Goh Jian[1], Liu Jihang[1], Qian You[1], Domenico Giust[2], Filippo D'Ercoli[2], Alberto Leotti[3], Yul Koh[1]
[1]*Agency for Science, Technology and Research (A*STAR), SINGAPORE,* [2]*STMicroelectronics, ITALY,* [3]*STMicroelectronics, SINGAPORE*

c - Industry MEMS and Advancing MEMS for Products and Sustainability

MEMS Packaging Techniques

T24-c **A SANDWICH AU-POROUS TI-DENSE TI MEMS GETTER WITH ON-CHIP SELF-HEATING AND MONITORING FUNCTIONS**
Haowen Hu[3], Chenzhe Du[1], Zhiyu Sun[1], Yufeng Jin[2,3], Qiancheng Zhao[1,2], Jian Cui[1,2]
[1]Peking University, CHINA, [2]National Key Laboratory of Advanced Micro and Nano Manufacture Technology, CHINA, [3]Peking University Shenzhen Graduate School, CHINA

W22-c **ELECTROSTATIC POLARITY SWITCHING PACKAGING FOR DEGRADATION MITIGATION IN SEAWATER USAGE**
Steven Tran, Seunbeom Noh, Hanseup Kim
University of Utah, USA

c - Industry MEMS and Advancing MEMS for Products and Sustainability

MEMS System Design and Integration Approaches

M25-c **ALL PRINTED LITHIUM ION BATTERY WITH LIQUID METAL PACKAGE**
Yuta Ozawa, Daisuke Kuse, Mizuki Funahashi, Kyohei Nagatake, Tamami Takano, Kazuhide Ueno, Hiroki Ota
Yokohama National University, JAPAN

T25-c **DESIGN AND FABRICATION OF A 2-IN-1 MEMS AUDIO TRANSDUCER FOR IN-EAR APPLICATIONS**
Yu-Chen Chen, Zih-Song Hu, Weileun Fang
National Tsing Hua University, TAIWAN

W23-c **RECONFIGURABLE NON-VOLATILE 4-WAY ROUTING SWITCH WITH ZERO STANDBY POWER**
Victor Marot, Mukesh K. Kulsreshath, Qi Tang, Manu B. Krishnan, Dinesh Pamunuwa
University of Bristol, UK

c - Industry MEMS and Advancing MEMS for Products and Sustainability

MEMS/NEMS - CMOS Integration

M26-c **A PURE CMOS STACK ELECTROSTATIC MICROMIRROR FEATURING SIMPLIFIED FABRICATION AND STRESS-ADJUSTED MODELING**
Wenhao Chen[1], Hadi Tavakkoli[1], Bin Zhao[2], Maojie Zhang[2], Wibool Piyawattanametha[3,4], Yi-Kuen Lee[1]
[1]Hong Kong University of Science and Technology, HONG KONG, [2]CanSemi Technology, Co., Ltd., CHINA, [3]King Mongkut's Institute of Technology Ladkrabang, THAILAND, [4]Michigan State University, USA

T26-c **MONOLITHIC ANEMOMETER/THERMOMETER/PRESSURE SENSING CHIP FOR AIR STATIC/DYNAMIC PRESSURE DETECTION**
Ming-Hsuan Huang, Ting-Fang Wang, Yuanyuan Huang, Mei-Feng Lai, Weileun Fang
National Tsing Hua University, TAIWAN

MEMS/NEMS - CMOS Integration

W24-c **MONOLITHIC INTEGRATED CMOS-MEMS PRESSURE SENSOR WITH PIEZORESISTORS FABRICATED BY COMBINATIONS OF P-TYPE ION IMPLANTATION IN THE STANDARD CMOS PROCESS**
Fengyang Li, Zhiheng Yu, Changyuan Mai, Jiawei Zhou, Shiyang Yuan, Xuanqing Hua, Dacheng Zhang
Peking University, CHINA

d - MEMS & NEMS Materials, Fabrication and Packaging

Advancement in Conventional Materials for MEMS & NEMS

T27-d **HIGHLY SENSITIVE CRYOGENIC TEMPERATURE SENSORS UTLIZING CUSTOM-FABRICATED RUTHENIUM OXIDE SLURRY**
Yonghao Xie, Minmin You, Yanjie Li, Yongpeng Ran, Jingquan Liu, Zude Lin
Shanghai Jiao Tong University, CHINA

W25-d **HYDROSTATIC STRENGTH AND RESONANT FREQUENCY OF LARGE AND THIN LPCVD SIN DIAPHRAGM WITH ADDED PARYLENE**
Hongxiang Gao, Junyi Wang, Kunfeng Wang, Anik Sengupta, Eun Sok Kim
University of Southern California, USA

M27-d **WAFER-SCALE DEMONSTRATION OF A HIGHLY SENSITIVE STRAIN SENSOR BASED ON POLYCRYSTALLINE VO_2**
Zahra Saadat Somaehsofla[1], Cyrille Masserey[1], Anna Varini[1], Denis Flandre[2], Adrian Mihai Ionescu[1]
[1] *École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND,*
[2] *Université Catholique de Louvain, BELGIUM*

d - MEMS & NEMS Materials, Fabrication and Packaging

Digital Micromanufacturing

T28-d **VIBRATION-BASED AIRFLOW SENSOR WITH THREE-DIMENSIONAL BLUFF BODY STRUCTURE FORMED USING LASER FOLDING TECHNIQUE ON COPPER-POLYIMIDE FILM**
Kei Ohara, Rihachiro Nakashima, Hidetoshi Takahashi
Keio University, JAPAN

W26-d **3D-PRINTED STAINLESS STEEL ELECTRODES FOR ADVANCING MEMS MICROBIAL FUEL CELLS TOWARD SUSTAINABLE ON-CHIP ENERGY**
Anwar Elhadad, Guangfa Li, Jiaqi Yang, Dehao Liu, Seokheun Choi
State University of New York, Binghamton, USA

d - MEMS & NEMS Materials, Fabrication and Packaging

Generic MEMS & NEMS Manufacturing Techniques

M28-d **A METHOD FOR IN-SITU ON-WAFER FOUR-POINT BENDING TEST OF MICROBEAMS**
Xufeng Wang, Jiakang Li, Yi Chen, Jiawei Zhou, Shiyang Yuan, Xuanqing Hua, Dacheng Zhang
Peking University, CHINA

Generic MEMS & NEMS Manufacturing Techniques

T29-d **ABNORMAL ORIENTED GRAINS(AOG) CONTROLLED OF $AL_XSC_{1-X}N$ BIMORPH STACK AND PIEZOELECTRIC PROPERTIES CHARACTERIZATION AT 8-INCH WAFER**
Yucheng Ji[1,2,3,4], Anyuan Liu[1,4], Ruixiang Yan[1,4], Songsong Zhang[2,3,4], Alex Gu[1]
[1]*Shanghai University, CHINA,* [2]*Chengdu Chimesen Technology Co., Ltd., CHINA,* [3]*Shanghai Melon Technology Co. Ltd, CHINA,* [4]*Shenghai Industrial μTechnology Research Institute (SITRI), CHINA*

W27-d **BANDWIDTH AND THERMAL STABILITY ENHANCEMENT OF POLYMER-INTEGRATED PIEZOELECTRIC MICROMACHINED ULTRASONIC TRANSDUCER ARRAY FOR AIR-COUPLED APPLICATIONS**
Alvaro Rosa, Wolfgang Müehleisen, Annalisa De pastina, Javad Abbaszadeh
Silicon Austria LAB, AUSTRIA

M29-d **CREATING DOUBLY RE-ENTRANT STRUCTURES WITH ANY THERMOSETTING POLYMER**
Qingyang Sun, Tingyi "Leo" Liu
University of Massachusetts, Amherst, USA

T30-d **EXPERIMENTS ON ANISOTROPIC WET ETCH RATE DISTRIBUTION OF GA-FACE GAN CRYSTAL AND LEVEL SET SIMULATION**
Ye Chen, Xi Chen, Yan Xing, Zaifa Zhou
Southeast University, CHINA

W28-d **RAPID HETEROGENEOUS TRANSPORT USING MICRO/NANO HIERARCHICAL DENDRITIC MESH WICK**
Xinmeng Zhai[1,2], Yan Wang[1], Dongdong Xie[1,3], Yuna Sun[1], Faheng Zang[1], Zhuoqing Yang[1], Congchun Zhang[1], Guifu Ding[1]
[1]*Shanghai Jiao Tong University, CHINA,* [2]*Harvard University, USA*

d - MEMS & NEMS Materials, Fabrication and Packaging

New & Emerging Materials for MEMS/NEMS

M30-d **BIODEGRADABLE AND SELF-HEALABLE PIEZOELECTRIC HYDROGEL FOR BIOCOMPATIBLE SOLID-STATE TRANSDUCERS**
Sujoy Kumar Ghosh, Peisheng He, Fan Xia, Wei Yue, Megan Teng, Peggy Tsao, Liwei Lin
University of California, Berkeley, USA

T31-d **FACILE IDENTIFICATION OF CARBON NANOTUBE'S CRYSTAL ORIENTATION USING EPITAXIAL GROWTH OF AUCN NANOWIRES**
Sunbin Yoon, Joowon Lim, Byeongju Hong, Wonchul Lee
Hanyang University, KOREA

W29-d **HIGHLY SENSITIVE LITHIUM NIOBATE-BASED SAW STRAIN SENSOR WITH ON-CHIP TEMPERATURE COMPENSATION**
Chunlong Cheng, Jingwen Yang, Xiaoru Li, Tong Tong, Huahuang Luo, Zekai Meng, Qingqing Ke
Sun Yat-sen University, CHINA

New & Emerging Materials for MEMS/NEMS

M31-d **IN-SITU SAW/BAW SENSORS BASED ON P(VDF-TrFE) FOR STRAIN AND TEMPERATURE MEASUREMENT**
Xiaoru Li, Chunlong Cheng, Jingwen Yang, Guoxiang Zhang, Zihan Lu, Xuefei Yan, Huahuang Luo, Zekai Meng, Qingqing Ke
Sun Yat-sen University, CHINA

T32-d **INTERACTIVE EFFECTS OF WATER MOLECULES ACROSS A SUSPENDED DOUBLE-LAYER GRAPHENE WITH ELECTRO-MODULATION**
Yu-Xuan Lu, Wei-Yu Long, Cheng-Yu Lin, Chih-Ting Lin
National Taiwan University, TAIWAN

W30-d **NANOSTRUCTURED BORON-DOPED DIAMOND ELECTRODES FOR ENHANCED HEAVY METAL SENSING**
GM Hasan Ul Banna[1], James R. Siegenthaler[1,2], Ahmed Azwad Kabir[1], Raul Murillo Martinez[1], Wen Li[1,2]
[1]*Michigan State University, USA,* [2]*Fraunhofer USA Center Midwest, USA*

M32-d **TWISTABLE POLYMER BASED ON RESIDUAL MAGNETIC FLUX VECTOR PROGRAMMING FOR MICRO MIRROR**
Yangzhi Yu, Yinfeng Xia, Kai Du, Yuanlin Xia, Zhuqing Wang
Sichuan University, CHINA

d - MEMS & NEMS Materials, Fabrication and Packaging

New Fabrication Processes for Making MEMS/NEMS

T33-d **A PIONEERING LAYER-BY-LAYER FABRICATION PROCESS FOR HIGH-DENSITY AND HIGH-RESOLUTION DOUBLE-SIDED FLEXIBLE NEURAL ELECTRODES**
Zixing Li[1], Haoyuan Chen[1], Kejun Tu[1], Jingjing An[1], Kaijie Yang[1], Longchun Wang[1], Jiawei Cao[1], Bin Yang[1], Zhihong Li[2], Jingquan Liu[1]
[1]*Shanghai Jiao Tong University, CHINA,* [2]*Peking University, CHINA*

W31-d **FEMTOSECOND LASER INDUCED GRAPHENE BASED ON DOUBLE-LINE METHOD FOR ELECTROMYOGRAPHY ELECTRODE**
Lingyu Yang, Minmin You, Shuihan Shao, Jingjing An, Bin Yang, Jingquan Liu
Shanghai Jiao Tong University, CHINA

M33-d **WAFER-SCALE FERROMAGNETIC SHADOW MASK COMPATIBLE WITH CONTACT ALIGNER FOR DRY ETCHING AND DEPOSITION**
Taeyeong Kim, Juhee Ko, Jungchul Lee
Korea Advanced Institute of Science and Technology (KAIST), KOREA

T34-d **WATER-SOLUBLE AND ENVIRONMENTALLY FRIENDLY UV PHOTODETECTOR FABRICATED THROUGH SOLVENT-FREE MATERIAL PATTERNING**
Zhiqing Xu, Qinhua Guo, Lizhou Yang, Jiajun Zhang, Xiwen Liu, Qinghao He, Man Chan, Yunda Wang
Hong Kong University of Science and Technology (HKUST), CHINA

d - MEMS & NEMS Materials, Fabrication and Packaging

Packaging & Assembly

W32-d **DEVELOPMENT OF DOUBLE-LAYER-STACKED SILICON INTERPOSER FOR 32X32 MICROMIRROR ARRAY PACKAGING**

Biyun Ling[1], Minli Cai[1,2], Dalong Chen[1], Xiaoyue Wang[1], Yuwei Han[1,2], Yaming Wu[1,2]
[1]*Chinese Academy of Sciences (CAS), CHINA,* [2]*University of Chinese Academy of Sciences, CHINA*

M34-d **EVALUATION OF MEMS GETTER PERFORMANCE BASED ON THE SURFACE ROUGHNESS AND ATOMIC-LEVEL SIMULATION THEREOF**

Haowen Hu[3], Chenzhe Du[1], Ziyu Sun[2], Yufeng Jin[2,3], Qiancheng Zhao[1,2], Jian Cui[1,2]
[1]*Peking University, CHINA,* [2]*National Key Laboratory of Advanced Micro and Nano Manufacture Technology,* [3]*Peking University Shenzhen Graduate School, CHINA*

T35-d **MEMS-IC INTEGRATION STRATEGY BY EMBEDDED SILICON FAN-OUT PACKAGE**

Bohan Zhang[1], Lang Chen[1], Chi Zhang[1,2,3], Han Xu[1], Wei Wang[1,2,3]
[1]*Peking University, CHINA,* [2]*National Key Laboratoryof Advanced Micro and Nano Manufacture Technology, CHINA,* [3]*Beijing Advanced Innovation Center for Integrated Circuits, CHINA*

e - MEMS Actuators & Power MEMS

Actuator Components & Systems

T36-e **A ROBUST ELECTROTHERMAL MICROMIRROR ARRAY BASED ON POLYIMIDE/AL BIMORPHS**

Hengzhang Yang[1,2], Qiangqiang Liu[1,2], Jihui Ni[1,2], Wenlong Jiao[1], Xiaodan Mao[1], Yingtao Ding[1,2], Anrun Ren[1,2], Hui Zhao[1,2], Shuailong Zhang[1,2,3], Huikai Xie[1,2]
[1]*Beijing Institute of Technology, CHINA,* [2]*Ministry of Education of China, CHINA,* [3]*BIT Zhengzhou Research Institute, CHINA*

W34-e **DEVELOPMENT OF LARGE-RANGE ROTARY INTERFEROMETER USING A GENETIC ALGORITHM FOR MINIATURE FTIR SPECTROMETER**

Honglin Qian[1], Huanyu Dai[1], Minjie Zhu[1], Yonggang Jiang[2], Bing Li[1], Gaopeng Xue[1]
[1]*Harbin Institute of Technology, CHINA,* [2]*Beihang University Technology and Economy Institute, CHINA*

M35-e **ELECTROSTATIC MEMS SWITCH WITH ISOLATED SWITCHING PATH AND STATE-HOLDING MECHANICAL LATCH STRUCTURES**

Yuki Okamoto[1], Ryo Oda[1,2], Jun Usami[1], Rihachiro Nakashima[1,2], Kei Ohara[1,2], Sucheta Gorwadkar[1], Yusuke Takei[1], Hironao Okada[1]
[1]*National Institute of Advanced Industrial Science and Technology (AIST), JAPAN,* [2]*Keio University, JAPAN*

Actuator Components & Systems

T37-e **HYBRID ACTUATORS WITH TRANSMISSION-SPRING FOR PIEZOELECTRIC MEMS SCANNING MIRROR**
Hao-Chien Cheng, Weileun Fang
National Tsing Hua University, TAIWAN

W35-e **SCAN-ANGLE ENHANCEMENT OF QUASI-STATIC PIEZOELECTRIC MEMS MIRROR BY MULTIPLE RING-SHAPED DESIGN AND CROSS-ELECTRODE ARRANGEMENT**
Hung-Yu Lin[1,2], Hao-Chien Cheng[1,2], Mingching Wu[2], Jerwei Hsieh[3], Mei-Feng Lai[1], Weileun Fang[1]
[1]*National Tsing Hua University, TAIWAN,* [2]*Coretronic MEMS Corporation, TAIWAN,* [3]*Asia Pacific Microsystems, TAIWAN*

M36-e **TEMPERATURE-DEPENDENCE OF STATIC AND DYNAMIC DEFLECTION OF BISTABLE PIEZOELECTRIC MEMS MEMBRANES**
Philipp Moll, Shareena Muringakodan, Ulrich Schmid, Michael Schneider
TU Wien, AUSTRIA

e - MEMS Actuators & Power MEMS

Energy Harvesting Materials, Structures, and Transducers

T38-e **A DOUBLE-WELL POTENTIAL EXPANSION MECHANISM FOR OMNI-DIRECTIONAL BROADBAND MEMS BI-STABLE ENERGY HARVESTER**
Kai Wang[1], Yuan Zhu[2], Ran Zhang[1], Dengyin Zhang[1]
[1]*Nanjing University of Posts and Telecommunications, CHINA,* [2]*Shanghai Jiao Tong University, CHINA*

W36-e **NANOPOROUS SILICON MATERIALS FORMED BY METAL-ASSISTED CHEMICAL ETCHING FOR THERMOELECTRIC GENERATOR**
Nguyen Van Toan[1], Yijie Li[1], Truong Thi Kim Tuoi[1], Khairul Fadzli Samat[2], Ngyuyen Van Hieu[3], Ioana Voiculescu[4], Takahito Ono[1]
[1]*Tohoku University, JAPAN,* [2]*Universiti Teknikal Malaysia Melaka, MALAYSIA,* [3]*Vietnam National University, VIET NAM,* [4]*Grove School of Engineering, USA*

T39-e **SELF-POWERED MOTION AND TACTILE POSITIONING BASED ON A DUAL MODE TRIBOELECTRIC SENSOR WITH CHARGE ACCUMULATING ENCLOSURE FOR SPORTS MONITORING**
Trilochan Bhatta, Gagan Bahadur Pradhan, Shital Sharma, Jae Yeong Park
Kwangwoon University, KOREA

W37-e **THERMOELECTRIC GENERATOR WITH THERMAL CONTACT AND COOLING SURFACES USING KIRIGAMI STRUCTURE STOOD UP BY STRETCHING DEFORMATION**
Atsuki Oguchi, Shingo Terashima, Eiji Iwase
Waseda University, JAPAN

e - MEMS Actuators & Power MEMS

Manufacturing for Actuators & Power MEMS

M38-e **PERFORMANCE ENHANCEMENT IN THERMOELECTRIC GENERATORS USING SELFCURLING METAL THIN FILMS**
Milad Shojaeian, Nadezda Kuznetsova, Chen Wang, Francisco Molina Lopez, Michael Kraft
KU Leuven, BELGIUM

T40-e **SPRING DIAPHRAGM STRUCTURE WITH RING ACTUATOR TO ACHIEVE WIDE BANDWIDTH AND HIGH FIDELITY MICROSPEAKER**
Chia-Hao Lin[1], Ting-Chou Wei[1], Chin Tseng[1], Tsung-Wen Tsai[1], Po-Shen Chen[1], Sung-Cheng Lo[2], Mei-Feng Lai[1], Weileun Fang[1,2]
[1]*National Tsing Hua University, TAIWAN,* [2]*Upbeat Technology, TAIWAN*

e - MEMS Actuators & Power MEMS

Materials for Actuators & Power MEMS

W38-e **CELLULOSE NANOFIBER- BISMUTH TELLURIDE COMPOSITE FILM FOR MICRO THERMOELECTRIC GENERATOR**
Jianghan Tian[1], Nguyen Van Toan[1], Keita Sakakibara[2], Takahito Ono[1]
[1]*Tohoku University, JAPAN,* [2]*National Industry of Advanced Industrial Science and Technology (AIST), JAPAN*

M39-e **DESIGN OF PIEZOELECTRIC MEMS MICROSPEAKER WITH PARYLENE SPRING FOR PERFORMANCE IMPROVEMENT**
Zih-Song Hu[1], Chia-Hao Lin[1], Sung-Cheng Lo[2], Weileun Fang[1,2]
[1]*National Tsing Hua University, TAIWAN,*
[2]*Upbeat Technology Co., Ltd., TAIWAN*

T41-e **HIGH-PERFORMANCE FLEXIBLE MICRO-SUPERCAPACITORS BASED ON NOVEL 2D MBENE AND 3D INTERDIGITATED ELECTRODES**
Yiwen Ma[1], Wenhe Xia[1], Qingfubo Geng[1], Xinyu Yao[1], Xuan Liu[1], Xiaohong Wang[2], Bingmeng Hu[1]
[1]*Minzu University of China, CHINA,* [2]*Tsinghua University, CHINA*

e - MEMS Actuators & Power MEMS

Power MEMS Components & Systems

W39-e **AN ULTRASONIC WIRELESS POWER TRANSMISSION SYSTEM WITH HIGH CONVERSION EFFICIENCY BASED ON 30% ScAlN PIEZOELECTRIC MEMS TRANSDUCERS**
Chenyuan Zhang, Zhiwei You, Jiao Xia, Yiwei Guo, Junhao Wang, Yipeng Lu
Peking University, CHINA

e - MEMS Actuators & Power MEMS

Self-Powered Devices and Microsystems

M40-e **A FLEXIBLE THERMOELECTRIC GENERATOR WITH OPTIMIZED DESIGN FOR LOW-THERMAL HEAT WASTE ENERGY HARVESTING**
Hao Lv, Yuanlin Xia, Zhuqing Wang
Sichuan University, CHINA

T42-e **A TRIBOELECTRIC-POWERED CONTINUOUS WIRELESS COMMUNICATION MICROSYSTEM WITH SYNCHRONOUS ELECTRIC CHARGE EXTRACTION POWER MANAGEMENT**
Xiangyu Zhao[1], Zerui Xu[1], Yuqi Kang[1], Ziyang Ou[1], Yisong Ling[1], Sixing Xu[2], Xiaohong Wang[1]
[1] *Tsinghua University, CHINA,* [2] *Hunan University, CHINA*

W40-e **SELF-POWERED FLEXIBLE MICRO-SUPERCAPACITOR BASED ON OPTIMIZED LASER INDUCED GRAPHENE ELECTRODES FOR SUSTAINABLE ENERGY HARVESTING AND STORAGE**
Faizan T. Beigh[1], Vishal Singh[1], Bharti Singh[2], Dhiman Mallick[1]
[1] *Indian Institute of Technology, Delhi, INDIA,*
[2] *Delhi Technological University, INDIA*

e - MEMS Actuators & Power MEMS

Other Actuators & Power MEMS

T43-e **AN ULTRA-LOW TOTAL HARMONIC DISTORTION PIEZOELECTRIC MEMS LOUDSPEAKER WITH DOUBLE-S UNIMORPH ACTUATORS**
Qincheng Zheng[1,2], Ke Cao[1,2], Ning Deng[1,2], Chenyu Bai[1,2], Yao Lu[1,2], Huikai Xie[1,2]
[1] *Beijing Institute of Technology, CHINA,*
[2] *Ministry of Education of China, CHINA*

W41-e **ELECTROSTATIC VIBRATION WITH NO ELECTRICAL SIGNAL DYNAMIC ACTUATION DRIVEN BY THE ELECTRON BEAM**
Suengyoon Lee, Sunbin Yoon, Byeongju Hong, Won Chui Lee
Hanyang University, KOREA

f - MEMS Physical & Chemical Sensors

Fluidic Sensors

T44-f **CONTACTLESS ULTRASONIC FLUID VISCOSITY AND DENSITY MONITORING**
Pei-Chi (Peggy) Tsao[1], Samantha Averitt[2], Megan Teng[1], Haoyun (Jerry) Tang[1], Ting Chen[4], Yande Peng[1], Wei Yue[1], Liwei Lin[1]
[1] *University of California, Berkeley, USA,* [2] *Stanford University, USA*

Fluidic Sensors

W42-f **GAS FLOW SENSING WITH A PIEZORESISTIVE SILICON NANOWIRE-BASED MEMS FORCE SENSOR**
Levent Demirkazik[1], Umut Kerimzade[1], Masoud Jedari Ghourichaei[1], Onur Aydin[1], Bekir Aksoy[1], Cemal Aydogan[2], Gokhan Nadar[1], Ivo W. Rangelow[2,3], Arda Deniz Yalcinkaya[4], Halil Bayraktar[5], Burhanettin Erdem Alaca[1]
[1]*Koç University, TURKEY,* [2]*Ilmenau University of Technology, GERMANY,* [3]*nano analytik GmbH, GERMANY,* [4]*Bogazici University, TURKEY,* [5]*Istanbul Technical University, TURKEY*

M42-f **LIQUID VISCOSITY DETECTION BASED ON HARMONIC ENGINEERING AND DUAL-FREQUENCY ULTRASONIC TRANSDUCER ARRAYS**
Jiao Xia, Aocheng Bao, Junhao Wang, Jinghan Gan, Bowen Sheng, Yipeng Lu
Peking University, CHINA

T45-f **PIEZOELECTRIC ACOUSTIC PRESSURE SENSORS WITH ENHANCED SENSITIVITY AND STIFFNESS BASED ON STRESS CONCENTRATION STRUCTURES AND WEDGE-SHAPE ELECTRODES**
Zhiwei You, Chong Yang, Lei Zhao, Aocheng Bao, Yipeng Lu
Peking University, CHINA

f - MEMS Physical & Chemical Sensors

Force & Displacement Sensors

W43-f **2-AXIS FORCE PLATE FOR DROPLET COLLISION MEASUREMENT USING LINE SCAN CAMERA AND SAMPLING MOIRÉ METHOD**
Yukitake Nakahara[1], Satofumi Kato[1], Hiroaki Onoe[1], Choongyeop Lee[2], YunJung Heo[2], Hidetoshi Takahashi[1]
[1]*Keio University, JAPAN,* [2]*Kyung Hee University, KOREA*

M43-f **A NOVEL MULTIPLE MODES RESONANT SENSOR FEATURING BLUE SIDEBAND EXCITATION**
Jiao Xu[1], Zhuoyue Zheng[2], Jingqian Xi[1], Ziqian Zhang[1], Huafeng Liu[1], Pan Zhang[5], Jianlin Chen[5], Chen Wang[3], Michael Kraft[3], Yuan Wang[2], R.P. Martins[2], Pui-In Mak[2]
[1]*Huazhong University of Science and Technology, CHINA,* [2]*University of Macau, CHINA,* [3]*University of Leuven, BELGIUM,* [4]*Peking University, CHINA,* [5]*Shanghai University, CHINA*

T46-f **A NOVEL PRESSURE SENSOR WITH COMPOSITE SENSITIVE FILM FOR HIGH PRECISION MEASUREMENT AT BROAD RANGE**
Xiaopeng Chen[1], Sijia Ling[1], Hanyang Tong[1], Yujing Xiao[1], Jin Zhang[2], Zhengyin Yu[1], Qinghui Jin[1]
[1]*Ningbo University, CHINA,* [2]*Chinese Academy of Sciences, CHINA*

W44-f **BIAXIAL GLASS FORCE PLATE USING INCLINED LASER INDUCED BACKSIDE WET ETCHING TROUGH A PRISM**
Nozomi Ono, Rihachiro Nakashima, Toshihiro Shiratori, Hidetoshi Takahashi
Keio University, JAPAN

Force & Displacement Sensors

M44-f **FLIP-CHIP BONDING OF TACTILE SENSORS WITH STAINLESS STEEL BUMP INTEGRATION FOR SENSING PERFORMANCE IMPROVEMENTS**
Fuchi Shih, Yi-Ming Lai, Mei-Feng Lai, Weileun Fang
National Tsing Hua University, TAIWAN

T47-f **FORCE-SENSOR INTEGRATED TOUCH-FEELING SENSOR CAPABLE OF ACQUIRING SUBTLE TEXTURE CHANGES CAUSED BY CANTACT FORCE**
Ryo Akiyama, Nachi Mise, Kyohei Terao, Hidekuni Takao
Kagawa University, JAPAN

W45-f **HIGH-FREQUENCY VISION-BASED TACTILE SENSOR WITH EMBEDDED TRANSPARENT PIEZOELECTRIC MODULE FOR HUMANOID ROBOTIC PERCEPTION**
Zhengyi Xie[1], Chunpeng Jiang[1], Haoxiang Jiang[1,2], Yimeng Sun[3], Bin Yang[1], Jingquan Liu[1]
[1]Shanghai Jiao Tong University, CHINA, [2]Zhangjiang Laboratory, CHINA, [3]Shanghai University of Electric Power, CHINA

M45-f **HYBRID ORI/KIRIGAMI STRUCTURED PIZEOELECTRIC THIN-FILM SENSORS COVERED BY ELASTOMER WITH HIGHLY DIRECTIONAL STRETCH SENSING ABILITY FOR HEARTBEAT MOTION MONITORING**
Chiranjit Das, Guo-Hua Feng
National Tsing Hua University, TAIWAN

T48-f **MICRO FORCE PLATE ARRAY FOR MEASURING 3-AXIS GROUND REACTION FORCES IN ANTS USING SAMPLING MOIRÉ METHOD**
Toshihiro Shiratori, Hidetoshi Takahashi
Keio University, JAPAN

W46-f **NANOSTRUCTURE-BASED HIGHLY SENSITIVE AND RELIABLE PIEZO-TRANSMITTANCE STRAIN SENSOR AND INTEGRATED SYSTEM**
Myung-Kun Chung[1], Su-Min Jeon[1], Jae-Soon Yang[1], Jae-Young Yoo[2], Min-Uk Kim[1], Beom-Jun Kim[1], Tae-Yeon Lee[1], Min-Seung Jo[3], Jun-Bo Yoon[1]
[1]*Korea Advanced Institute of Science and Technology (KAIST), KOREA,* [2]*Sungkyunkwan University, KOREA,* [3]*Northwestern University, USA*

M46-f **PRESSURE SENSITIVE ALUMINUM NITRIDE DRUMHEAD RESONATORS**
Seyyed Mojtaba Hassani Gangaraj[1], Tanya Chauhan[1], Mingyo Park[2], Azadeh Ansari[1]
[1]*Georgia Institute of Technology, USA,*
[2]*Pennsylvania State University, USA*

T49-f **SINGLE CRYSTAL DIAMOND MEMS FOR REVEALING THE DESORPTION OF ADSORBATES ON O-TERMINATED DIAMOND**
Keyun Gu[1,2], Zilong Zhang[3], Guo Chen[1], Wen Zhao[1], Guangchao Chen[4], Jian Huang[2], Yasuo Koide[1], Satoshi Koizumi[1], Meiyong Liao[1]
[1]*National Institute for Materials Science, JAPAN,* [2]*Shanghai University, CHINA,* [3]*Tohoku University, JAPAN,* [4]*University of Chinese Academy of Sciences, CHINA*

Force & Displacement Sensors

W47-f **STACKED MULBERRY PAPER COATED WITH MXENE FOR HIGHLY SENSITIVE PRESSURE DETECTION WITH WIDE SENSING RANGE**
Sangrim Lee[1], Chaemin Won[1], Jaebeen Ahn[1], Bowoong Heo[2], Kyubin Bae[2], Jongbaeg Kim[2], Taewook Kim[1], Changyong Yim[1], Yunsung Kang[1]
[1]*Kyungpook National University, KOREA,* [2]*Yonsei University, KOREA*

M47-f **THREE-DIMENSIONAL HALBACH ARRAY COILS FOR SENSITIVITY ENHANCEMENT OF INDUCTIVE THREE-AXIS FORCE SENSOR**
Yi-Ming Lai, Ruei-Cing Mai, Mei-Feng Lai, Weileun Fang
National Tsing Hua University, TAIWAN

f - MEMS Physical & Chemical Sensors

Gas & Chemical Sensors

T50-f **A NOVEL MEMS RESONANT PRESSURE SENSOR OPERATING IN AIR WITH THERMAL ACTUATION PIEZORESISTIVE SENSING**
Chen Wang[1], Appo van der Wiel[2], Ben Maes[2], Michiel Gidts[2], Michael Kraft[1]
[1]*KU Leuven, BELGIUM,* [2]*Melexis Company, BELGIUM*

W48-f **ACOUSTIC GAS SENSING WITH WEAKLY COUPLED MEMS RESONATORS**
Derin Erkan[1], Ahmet Arif Aslan[1], Erdinc Tatar[1,2]
[1]*Bilkent University, TURKEY,* [2]*National Nanotechnology Research Center (UNAM), TURKEY*

M48-f **ECO-FRIENDLY FABRICATION OF SUSPENDED 1D NANOHEATERS FOR ULTRALOW POWER TCD-TYPE GAS SENSORS**
Wootaek Cho, Jihyeon Yoo, Jong-Hyun Kwak, Heungjoo Shin
Ulsan National Institute of Science and Technology, KOREA

T51-f **RELIABILITY ENHANCEMENT EXPERIMENTAL STUDY FOR MEMS GAS SENSORS**
Chaoyang Huo[1], Jingxin Wu[1], Minjie Zhu[2], Yuanlin Xia[1], Zhuqing Wang[1]
[1]*Sichuan University, CHINA,* [2]*Instrumentation Technology and Economy Institute, CHINA*

W49-f **IONIC-LIQUID GATED ELECTROCHEMICAL CARBON NANOTUBE TRANSISTOR WITH HIGH ON-OFF RATIO FOR SELECTIVE GAS SENSING**
Peisheng He[1], Alex Abelson[2], Wei Yue[1], Jenny Zhou[2], Liwei Lin[1], Eric Meshot[2], Steven F. Buchsbaum[2]
[1]*University of California, Berkeley, USA,*
[2]*Lawrence Livermore National Laboratory, USA*

M49-f **ONE-DIMENSIONAL MN-BASED STACKED COORDINATION POLYMER MEMS SENSOR FOR EFFICIENT AMMONIA SENSING**
Jian Wu, Rui Yang, Xue Liu, Aochen Wang, Jingzhu Li, Yuyang Wang, Nantao Hu, Min Zeng, Jianhua Yang, Zhi Yang
Shanghai Jiao Tong University, CHINA

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T52-f **RESONANT CHEMICAL SENSOR PERFORMANCE ENHANCEMENT THROUGH 3D PRINTED SCAFFOLDS**
Biya D. Haile[1], Nikolas T. Roeske[2], Hongyu Guo[1], Omer T. Inan[1], Luke A. Beardslee[2]
[1] *Georgia Institute of Technology, USA,* [2] *Institute for Matter and Systems, USA*

W50-f **TRANSFER-FREE INTEGRATION OF GRAPHENE ON SUSPENDED MICRO-HOTPLATES FOR NO2 SENSING**
Leandro N. Sacco, Sten Vollebregt
Delft University of Technology, NETHERLANDS

M50-f **ULTRA-HIGH-SENSITIVITY HYDROGEN NANOGAP MICROSENSOR FOR ENVIRONMENTAL APPLICATIONS BASED ON CHEMICALLY ACTUATED PALLADIUM CANTILEVER BEAMS**
Amirali Nikeghbal, Rabiul Hasan, Farhan S. Sium, Fatemeh Momeni, Adwait Deshpande, Seungbeom Noh, Hanseup Kim, Carlos H. Mastrangelo
University of Utah, USA

f - MEMS Physical & Chemical Sensors

Inertial Sensors

T53-f **A LINEAR CAPACITIVE GRAVIMETER WITH PSEUDO-DIFFERENTIAL ELECTRODES CAPABLE OF MEASURING EARTH TIDES**
Mikhail Kanygin[1], Fatemeh Es.haghi[1], Sarai Montanez Munoz[1], Douglas Schouten[2], Glyn Williams-Jones[1], Behraad Bahreyni[1]
[1] *Simon Fraser University, CANADA,* [2] *Ideon Technologies Inc., CANADA*

W51-f **A NEW SINGLE CHIP HIGH-OVERLOAD TRI-AXIAL MEMS GYROSCOPE WITH MULTI-WHEEL-RING FOR Z-AXIS INPUT RANGE ENHANCEMENT**
Wenqiang Wei[1], Fang Chen[2], Huimin Tian[1], Qi Cai[1], Rang Cui[1], Xinyu Wang[1], Zhenghao Lu[3], Huiliang Cao[1]
[1] *North University of China, CHINA,* [2] *Chinese Academy of Sciences, CHINA,* [3] *Soochow University, CHINA*

M51-f **A SENSITIVE UNIT COMPENSATION METHOD FOR ENHANCING THE PERFORMANCE OF ELECTROCHEMICAL VIBRATION SENSORS**
Nan Zhang, Xiaoyu Qi, Zhenchuan Yang, Chengchen Gao
Peking University, CHINA

T54-f **A SINGLE-LOOP NARROW-BAND FORCE REBALANCE CONTROL METHOD WITH TEMPERATURE SELF-COMPENSATION FOR A MEMS GYROSCOPE**
Chunhua He[1], Yingyu Xu[1,2], Heng Wu[1], Qinwen Huang[2], Qiancheng Zhao[3,4], Guizhen Yan[3,4]
[1] *Guangdong University of Technology, CHINA,* [2] *Science and Technology on Reliability Physics and Application Technology of Electronic Component Laboratory, CHINA,* [3] *Peking University, CHINA,* [4] *National Key Lab of Micro/Nano Fabrication Technology, CHINA*

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W52-f **A WAFER-LEVEL TEST APPROACH FOR ADHESION AND WEAR CHARACTERIZATION IN MEMS ACCELEROMETERS**
Lukas Ackermann[1], Matthew Lewis[1], Gevorg Aleksanyan[1], Marvin Freier[1], Dominic Palm[1],Jens Anders[2]
[1]*Robert Bosch GmbH, GERMANY,* [2]*IIS University of Stuttgart, GERMANY*

M52-f **CRYSTALLOGRAPHIC ORIENTATION-DEPENDENT THERMAL STABILITY OF TORSION VIBRATION NATURAL FREQUENCY IN SILICON-BASED MEMS RESONATORS**
Chenzhe Du[1], Zhiyu Sun[1], Chun Xu[1], Zhenchuan Yang[1,2], Qiancheng Zhao[1,2,3], Jian Cui[1,2,3]
[1]*Peking University, CHINA,* [2]*National Key Laboratory of Advanced Micro and Nano Manufacture Technology, CHINA,* [3]*Beijing Advanced Innovation Center for Integrated Circuits, CHINA*

T55-f **DEMONSTRATION OF ±100G SENSITIVITY BY DROP IMPACT OF HIGH ACCURACY DIFFERENTIAL RESONANT ACCELEROMETER**
Kei Masunishi, Etsuji Ogawa, Daiki Ono, Fumito Miyazaki, Kengo Uchida, Jumpei Ogawa, Hideaki Murase, Fumitaka Ishibashi, Naoki Hiramatsu, Yasushi Tomizawa
Toshiba Corporation, JAPAN

W53-f **EXPLOITING SHAPED COMBS WITHIN FM ACCELEROMETERS FOR LOW-NOISE AND WIDE DYNAMIC RANGE APPLICATIONS**
Christian Padovani[1], Luca Pileri[1], Gabriele Gattere[2], Giacomo Langfelder[1]
[1]*Politecnico di Milano, ITALY,* [2]*STMicroelectronics, ITALY*

M53-f **IMPROVING THE PERFORMANCE OF MEMS RESONANT SENSORS WITH SYNCHRONIZED PIEZORESISTIVE/CAPACITIVE TRANSDUCTIONS USING SIGNAL FUSION**
Chengxin Li[1], Fan Wu[1], Chun Zhao[2], Hemin Zhang[3], Mustafa M. Torunbalci[4], Chen Wang[1], Lieven De Stryker[1], Michael Kraft[1]
[1]*KU Leuven, BELGIUM,* [2]*University of York, UK,* [3]*Northwestern Polytechnical University, CHINA,* [4]*Google, USA*

T56-f **MICROWAVE FREQUENCY COMB INTERROGATION OF HIGH-OVERTONE BULK ACOUSTIC RESONATORS FOR HIGH-SPEED, MULTI-MODAL MASS SENSING**
Liam G. Connolly[1,2], Sean M. Bresler[1,3], David A. Long[1], Jason J. Gorman[1]
[1]*National Institute of Standards and Technology (NIST), USA,* [2]*Johns Hopkins University, USA,* [3]*University of Maryland, USA*

W54-f **PHASE COMPENSATION METHOD FOR THE DRIVE LOOP OF MEMS GYROSCOPE BASED ON DUAL PHASE-LOCKED LOOP SYNCHRONOUS TRACKING**
Chun Xu[1], Qiancheng Zhao[1,2,3], Jian Cui[1,2,3]
[1]*Peking University, CHINA,* [2]*National Key Laboratory of Advanced Micro and Nano Manufacture Technology, CHINA,* [3]*Beijing Advanced Innovation Center for Integrated Circuits, CHINA*

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M54-f **ULTRA-SENSITIVE, HIGH BANDWIDTH PHOTONIC-MEMS SEISMIC SENSOR**
Farnaz Ebrahimi Argi[1,2], Ayman Manzoor[1], Hamed Sattari[1], Yves Petremand[1], Dara Bayat[1], Luigi Ferraioli[2], Antoniou Anastasios[2], Domenico Giardini[2], Katrin Plenkers[3], Arno Hoogerwerf[1], Homa Zarebidaki[1], Guido Spinola Durante[1], Amir H. Ghadimi[1], Linus Villiger[2], Stefan Wiemer[2], Michel Despont[1]
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f - MEMS Physical & Chemical Sensors

Manufacturing Techniques for Physical Sensors

T57-f **HIGHLY SENSITIVE PRESSURE SENSOR FABRICATED BY COATING MXene TO SURFACE-TREATED ECO-FLEX FOR RELIABLE NETWORK**
Dokyung Kim[1,2], Jaesam Sim[1], Dong-Weon Lee[2]
[1] *Korea Institute of Industrial Technology, KOREA,* [2] *Chonnam National University, KOREA*

W55-f **INKJET-PRINTED MN-CO-NI-O CERAMIC MICROBEADS TOWARDS HIGH-SENSITIVITY AND HIGH-STABILITY TEMPERATURE SENSING AT ROOM TEMPERATURE**
Yongpeng Ran, Yanjie Li, Xiuyan Li, Zude Lin, Bin Yang, Jingquan Liu, Minmin You
Shanghai Jiao Tong University, CHINA

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Materials for Physical Sensors

M55-f **DIAMOND MEMS MAGNETIC FORCE SENSOR TOWARD FEMTONEWTON AT ROOM TEMPERATURE**
Zilong Zhang[1], Zhijian Zhao[1], Meiyong Liao[2], Takahito Ono[1], Masaya Toda[1]
[1] *Tohoku University, JAPAN,* [2] *National Institute for Materials Science, JAPAN*

f - MEMS Physical & Chemical Sensors

Metrology and Measurement Techniques for MEMS/NEMS Sensors

T58-f **IDENTIFICATION OF STRUCTURE IMBALANCE FOR MEMS TUNING-FORK RESONATORS BASED ON MULTI TRANSFER FUNCTIONS SYNTHESIS**
Jian Cui[1,2,3], Chenzhe Du[2], Yi Tang[2], Qiancheng Zhao[1,2,3]
[1] *National Key Laboratory of Advanced Micro and Nano Manufacture Technology, CHINA,* [2] *Peking University, CHINA,* [3] *Beijing Advanced Innovation Center for Integrated Circuits, CHINA*

W56-f **OPTICAL CANTILEVER USING DIFFRACTION GRATING AND SAMPLING MOIRÉ METHOD**
Soya Sato[1], Toshihiro Shiratori[1], Tetsuo Kan[2], Hidetoshi Takahashi[1]
[1] *Keio University, JAPAN,* [2] *University of Electro-Communications, JAPAN*

Metrology and Measurement Techniques for MEMS/NEMS Sensors

M56-f **SENSITIVITY-ENHANCED SURFACE ACOUSTIC WAVE HUMIDITY SENSOR BASED ON A NONLINEAR PARITY TIME SYMMETRIC SYSTEM BIASED AT THE EXCEPTIONAL POINT**
Zhenyu Wei, Jianqiu Huang, Qing-an Huang
Southeast University, CHINA

f - MEMS Physical & Chemical Sensors

Nanoscale Physical Sensors

T59-f **GHOST TOUCH FREE WIRELESS NANOGAP CAPACITIVE PRESSURE SENSOR**
Jae-Soon Yang[1], Myung-Kun Chung[1], Jae-Young Yoo[2], Beom-Jun Kim[1], Sung-Ho Kim[1], Se-Yoon Jung[1], Tae-Yeon Lee[1], Min-Uk Kim[1], Jun-Bo Yoon[1]
[1]*Korea Advanced Institute of Science and Technology (KAIST), KOREA,* [2]*Sungkyunkwan University, KOREA*

f - MEMS Physical & Chemical Sensors

Sonic & Ultrasonic MEMS Transducers

W57-f **A CMOS-MEMS ULTRASONIC TRANSCEIVER WITH BIPOLAR-BIASED DIFFERENTIAL CMUT TRANSDUCERS**
Yu-Cheng Lin, Tzu-Yun Huang, Ming-Huang Li
National Tsing Hua University, TAIWAN

M57-f **ACOUSTICALLY DRIVEN SCANNING MIRROR ENHANCED BY HELMHOLTZ RESONATOR UNIT**
Masahiro Fukuta[1], Rihachiro Nakashima[1], Tetsuo Kan[2], Hidetoshi Takahashi[1]
[1]*Keio University, JAPAN,* [2]*University of Electro-Communications, JAPAN*

T60-f **AN ELECTROCHEMICAL VELOCITY-TYPE VECTOR HYDROPHONE FOR DIRECT DETECTION OF UNDERWATER ACOUSTIC PARTICLE VELOCITY**
Nan Zhang, Xiaoyu Qi, Zhenchuan Yang, Chengchen Gao
Peking University, CHINA

W58-f **AN IN-DEPTH ACOUSTIC CHARACTERIZATION MAP AT THE WAFER LEVEL UTILIZING ADVANCED OPTICAL MICROPHONE**
Luigi Barretta[1], Rossana Scaldaferri[1], Alessandro S. Savoia[2], Carlo L. Prelini[1], Carla M. Lazzari[1], Yul Koh[3], Sagnik Ghosh[3], Daniel S-H. Chen[3], Andrea Di Matteo[1], Marco Ferrera[1], Domenico Giusti[1]
[1]*STMicroelectronics, ITALY,* [2]*Roma Tre University, ITALY,* [3]*Agency for Science, Technology and Research (A*STAR), SINGAPORE*

M58-f **BIOLOGICAL BONE AGE ASSESSMENT VIA PMUTS**
Nikita G. Lukhanin, Fan Xia, Sean R. Isomatsu, Megan Teng, Liwei Lin
University of California, Berkeley, USA

Sonic & Ultrasonic MEMS Transducers

T61-f **DYNAMIC PMUTS PACKAGING USING SHAPE MEMORY ALLOY**
Megan Teng, Peggy Tsao, Wei Yue, Fan Xia, Peisheng He, Yande Peng, Liwei Lin
University of California, Berkeley, USA

W59-f **FABRICATION OF WAFER-BONDED 2D CMUT ARRAY WITH GLASS-FILLED TRENCHES**
Chaerin Oh[1], Seyoung Park[1], Jongcheol Park[2], Joontaek Jung[2], Hyunjoo J. Lee[1]
[1]*Korea Advanced Institute of Science and Technology (KAIST), KOREA and* [2]*National NanoFab Center, KOREA*

M59-f **MONOLITHIC INTEGRATION OF ACOUSTIC ENRICHMENT AND RESONANT SENSING FOR TRACE DETECTION OF MICRO-PLASTICS**
Yue Wang[1], Wenqi Fan[1], Liang Huang[1], Jingui Qian[1,2]
[1]*Hefei University of Technology, CHINA,* [2]*Southeast University, CHINA*

T62-f **NONINVASIVE ARTERIAL MOTION MONITORING WITH ALUMINUM NITRIDE-BASED PIEZOELECTRIC MICROMACHINED ULTRASONIC TRANSDUCER**
Yunhao Wang[1,2,3], Junxiang Cai[1,2,3], Tao Wu[1,2,3], Xinxin Li[1,2,3]
[1]*Chinese Academy of Sciences (CAS), CHINA,* [2]*ShanghaiTech University, CHINA,* [3]*University of Chinese Academy of Sciences, CHINA*

W60-f **PLANETARY GEAR FAULT DETECTION USING PMUT BASED ACOUSTIC EMISSION SENSOR**
Hanjie Dou, Tao Liu, Xiao Yang, Zhihao Li, Jixuan Zhang, Jiaqian Yang, Yuchen Mao, Xiaojing Mu
Chongqing University, CHINA

M60-f **REAL-TIME DIFFERENTIAL ULTRASONIC FLOW SENSING ENABLED BY PMUT PHASED ARRAY WITH A NOVEL V-SHAPED BEAM PATTERN**
Yufeng Gao, Xili Wang, Lei Zhao, Yipeng Lu
Peking University, CHINA

T63-f **STRAIN-INSENSITIVE, STRETCHABLE THERMOACOUSTIC LOUDSPEAKER WITH ENTANGLED CARBON NANOTUBES**
Sangjun Sim[1], Eunhwan Jo[2], Hyungyu Im[1], Kyubin Bae[1], Yunsung Kang[3], Jongbaeg Kim[1]
[1]*Yonsei University, KOREA,* [2]*Kumoh National Institute of Technology, KOREA,* [3]*Kyungpook National University, KOREA*

f - MEMS Physical & Chemical Sensors

Other Physical Sensors

W61-f **A HIGH EFFICIENCY MINIATURE MULTI-TIP CORONA CHARGER FOR NANOPARTICLE SENSORS**
Chandrashekhar Choudhary, Tao Li
University of Cincinnati, USA

Other Physical Sensors

M61-f **A HIGH SENSITIVITY SANDWICH-TYPE TERAHERTZ METASURFACE MICROFLUIDIC SENSOR FOR DIRECTLY DETEECTION OF AQUEOUS SOLUTIONS**
Yunhao Cao[1], Hongshun Sun[1], Yusa Chen[1], Lijun Ma[1], Liye Li[1], Shixiong Liang[2], Shengxiao Jin[3], Wengang Wu[1]
[1]*Peking University, CHINA,* [2]*Tianjin University, CHINA,* [3]*National Key Laboratory of Science and Technology on Space Microwave, CHINA*

T64-f **SELF-ADAPTIVE 2-DOF HYBRID WEAKLY COUPLED SYSTEM WITH MEMS BAW RESONATORS**
Bernardo P. Madeira[1], Ruopeng Chen[1], Linlin Wang[1], Chen Wang[1], Fadwa El Jaouhari[2], Yuan Wang[3], Javier Collado[1], Chun Zhao[4], Georges Gielen[1], Michael Kraft[1]
[1]*KU Leuven, BELGIUM,* [2]*University of Montpellier, FRANCE,* [3]*University of Macau, CHINA,*[4]*University of York, UK*

W62-f **HIGH-PERFORMANCE MEMS MAGNETIC SENSOR BASED ON A SMART TUNABLE RESONATOR**
Hanin Amara, Nadeem Tariq Beigh, Nouha Alcheikh
Khalifa University, UAE

M62-f **MICROELECTROMECHANICAL 2-BIT LOGIC DEVICE VIA FREQUENCY COMB GENERATION**
Hongyu Chen[1,2], Dongyang Chen[1], Chen Wang[2], Ronghua Huan[1], Michael Kraft[2], Jin Xie[1]
[1]*Zhejiang University, CHINA,* [2]*KU Leuven, BELGIUM*

T65-f **MULTI-DEGREE OF FREEDOM AND LARGE SCAN RANGE ELECTROTHERMAL MICROMIRROR INTEGRATED WITH THERMAL CONVECTION-BASED MIRROR PLATE POSITION SENSORS**
Anrun Ren[1,2], Yingtao Ding[1,2], Hengzhang Yang[1,2], Ziyue Zhang[1,2], Hui Zhao[1,2], Huikai Xie[1,2]
[1]*Beijing Institute of Technology, CHINA,*
[2]*Ministry of Education of China, CHINA*

W63-f **SURFACE INSPECTION OF LIQUID AND ICE LAYERS USING A WIDE-BANDWIDTH AND HIGHLY DIRECTIONAL ULTRASONIC TRANSDUCER**
Junhao Wang, Jiao Xia, Aocheng Bao, Chong Yang, Ting Xie, Jinghan Gan, Lei Zhao, Wei Wang, Yipeng Lu
Peking University, CHINA

g - MEMS/NEMS for Optical, RF and Electromagnetics

Electrical Field and Magnetic Field Sensors and Transducers

T66-g **A CONTACTLESS DC CURRENT SENSOR BASED ON THIN-FILM LITHIUM NIOBATE S0-MODE LAMB WAVE RESONATOR**
Wenwei Gao[1], Hanlun Guan[1], Chenyao Zhu[2], Huikai Xie[1,3], Feng Gao[4], Xiaoyi Wang[1,3]
[1]*Beijing Institute of Technology, CHINA,* [2]*Baotou INST Magnetic New Materials Co., Ltd., CHINA,* [3]*BIT Chongqing Institution of Micrelectronic and Micrsystem, CHINA,* [4]*ZJU-Hangzhou Global Scietific and Technological Innovation Center, CHINA*

g - MEMS/NEMS for Optical, RF and Electromagnetics

Free Space Optical Components & Systems

W64-g **MERGING MEMS VAPOR CELLS WITH METASURFACES FOR NEXT-GEN CHIP-SCALE ATOMIC CLOCKS**
Ponrapee Prutphongs[1], Yuto Kataoka[1], Motoaki Hara[2], Kentaro Iwami[1]
[1] *Tokyo University of Agriculture and Technology, JAPAN,* [2] *National Institute of Information and Communications Technology, JAPAN*

M63-g **MICROFABRICATED ROBOT HAND SYSTEM INTEGRATED WITH TRANSPARENT SUCTIONING HEAD AND DUAL-METALENS CAMERA**
Atsushi Hasegawa[1], Keisuke Ozawa[2], Yuki Abe[2], Koichiro Matsumoto[2], Mineki Taoka[2], Takeshi Yamagishi[2], Kentaro Iwami[1]
[1] *Tokyo University of Agriculture and Technology, JAPAN,*
[2] *Samsung R&D Institute Japan, JAPAN*

T67-g **POLARIZATION-INDEPENDENT WAVELENGTH-MULTIPLEXED FULL-COLOR METASURFACE HOLOGRAM BASED ON HIGH-ASPECT-RATIO SILICON NITRIDE NANOPILLARS**
Masakazu Yamaguchi, Tetsuhito Omori, Mitsutoshi Hada, Junpei Beppu, Kentaro Iwami
Tokyo University of Agriculture and Technology, JAPAN

W65-g **SIGNIFICANTLY ENHANCED BANDWIDTH OF A DUAL-AXIS PIEZOELECTRIC QUASI-STATIC MEMS MIRROR FOR MINIATURIZED LASER TRACKING**
Anna Li[1,2], Hao Huang[1,2], Yongquan Su[1,3], Cheng Zhang[1,2], Jiachang Zhang[1,2], Yonggui Zhang[1], Lihao Wang[1,4], Yichen Liu[1,3], Yang Wang[1,2], Zhenyu Wu[1,2,3,4,5]
[1] *Shanghai Institute of Microsystem and Information Technology, CHINA,* [2] *University of Chinese Academy of Sciences, CHINA,*
[3] *Shanghai Industrial μTechnology Research Institute, CHINA,*
[4] *Shanghai MExpert Technologies Co., Ltd, CHINA,*
[5] *Shanghai University, CHINA*

g - MEMS/NEMS for Optical, RF and Electromagnetics

Infrared (IR) Sensors and Imaging Systems

M64-g **CMOS MICROMACHINED CAPACITIVE SENSORS FOR UNCOOLED INFRARED DETECTION**
Yan-Cheng Liu, Michael S.-C. Lu
National Tsing Hua University, TAIWAN

T68-g **FABRICATION OF FLEXIBLE NEAR-INFRARED-TO-VISIBLE LIGHT UPCONVERSION DEVICE ENHANCED BY 3D PRINTED MICROLENS ARRAY FOR LOW-COST NEAR-INFRARED IMAGING SENSORS**
Nankun Zhang[1], Po-Han Huang[1,2], Jerker Widengren[1], Haichun Liu[1], Frank Niklaus[1]
[1] *KTH Royal Institute of Technology, SWEDEN,*
[2] *NTHU National Tsing Hua University, TAIWAN*

Infrared (IR) Sensors and Imaging Systems

W66-g **NARROW ELECTRODE SPACING FOR ENHANCED SENSITIVITY OF PTSI/P-SI NANOHOLE-ARRAY MID-INFRARED PHOTODETECTOR**
Elyas A. Ashenafi[1], Daiji Noda[2], Ryo Ohta[2], Tetsuo Kan[1]
[1]*University of Electro-Communications, JAPAN,*
[2]*Micromachine Center, JAPAN*

M65-g **PLASMONICALLY ENHANCED ALSCN NANOPLATES AS UNCOOLED AND ULTRA-FAST SINGLE-PIXEL DETECTORS FOR IR IMAGING**
Aurelio Venditti, Enise F. Altin, Walter Gubinelli, Farah Ben Ayed, Luca Colombo, Pietro Simeoni, Ben Davaji, Matteo Rinaldi
Northeastern University, USA

g - MEMS/NEMS for Optical, RF and Electromagnetics

Manufacturing for Electromagnetic Transducers

T69-g **MINIATURIZED ELECTROMAGNETIC ACTUATOR FOR TACTILE DISPLAY DEVICES WITH HIGH SPATIAL RESOLUTION**
Hussein S. Musa, Shamin Sadrafshari, Uriel Martinez-Hernandez, Ali Mohammadi
University of Bath, UK

g - MEMS/NEMS for Optical, RF and Electromagnetics

MEMS for Timing & Frequency Control

W67-g **GEOMETRICALLY MODIFIED SILICON RESONATORS WITH SUB-PPM LINEAR TEMPERATURE COEFFICIENT OF FREQUENCY**
Ashudeep[1], Azadeh Jafari[1], Abid Ali[1], Amirmohammad Zare[1], Siddharth Kumanduri[2], Anosh Daruwalla[2], Behraad Bahreyni[1]
[1]*Simon Fraser University, CANADA,* [2]*Stathera, Inc., CANADA*

M66-g **HIGH-PERFORMANCE PIEZOELECTRIC MEMS RESONATORS AND OSCILLATORS LEVERAGING ADVANCED HIGH-ORDER SUPPORT TRANSDUCER TOPOLOGIES**
You-Ting Lin, Chin-Yu Chang, Sheng-Shian Li
National Tsing Hua University, TAIWAN

T70-g **INNOVATING ST-CUT QUARTZ WITH MEMS: HIGH Q SMALL RESONATORS WITH HIGH OVEN GAIN AND LOW POWER OVENIZATION**
Bokyung Suh, Xinyi Fang, Gianluca Piazza
Carnegie Mellon University, USA

g - MEMS/NEMS for Optical, RF and Electromagnetics

Photonic Components & Systems

W68-g **A TIP-TILT-PISTON PIEZOELECTRIC MICROMIRROR WITH A DOUBLE-S SHAPED UNIMORPH SPUTTERED PZT STRUCTURE**
Ke Cao[1,2], Qincheng Zheng[1,2], Bo Xie[1,2], Ning Deng[1,2], Hui Shang[1,2], Hui Zhao[1,2], Yao Lu[1,2], Huikai Xie[1,2]
[1]*Beijing Institute of Technology, CHINA,*
[2]*Ministry of Education of China, CHINA*

Photonic Components & Systems

M67-g **ASYMMETRICAL MEMS MIRROR FOR COMPACT-SIZE AND WIDE FIELD-OF-VIEW AR DISPLAY EQUIPMENT**
Yusuke Sakata, Masaya Nakazumi, Kensuke Mihara
Panasonic Industry Co., Ltd, JAPAN

T71-g **CHARACTERIZATION OF ULTRA-SENSITIVE NEMS PHOTONIC MODULATORS – OVERCOMING PRECISION MEASUREMENT CHALLENGES**
Andrew Cochran, Harshvardhan Gupta, Maysamreza Chamanzar, Gianluca Piazza
Carnegie Mellon University, USA

W69-g **DEVELOPMENT OF THE MULTIPOINT FOCUSING METASURFACE FOR LASER-INDUCED BREAKDOWN SPECTROSCOPY**
Satoshi Ikezawa[1], Kentaro Iwami[2], Eiji Iwase[1]
[1]*Waseda University, JAPAN,* [2]*Tokyo University of Agriculture and Technology, JAPAN*

M68-g **EFFICIENT MID-INFRARED ACOUSTO-OPTIC MODULATION IN SILICON PHOTONIC DEVICES USING LITHIUM NIOBATE**
Siyu Xu[1], Weixin Liu[1], Chengkuo Lee[1,2]
[1]*National University of Singapore, SINGAPORE,* [2]*National Centre for Advanced Integrated Photonics, SINGAPORE*

T72-g **PLASMON-ENHANCED GRAPHENE PHOTOTHERMOELECTRIC DETECTOR FOR MID-INFRARED SENSING APPLICATIONS**
Pen-Sheng Lin[1], Shayan Parhizkar[2,3], Arne Quellmalz[1], Nour Negm[2,3], Stephan Suckow[3], Aron Cummings[4], Alba Centeno[5], Amaia Zurutuza[5], Max Lemme[2,3], Frank Niklaus[1], Kristinn Gylfason[1]
[1]*KTH Royal Institute of Technology, SWEDEN,* [2]*RWTH Aachen University, GERMANY,* [3]*AMO GmbH, GERMANY, 4Catalan Institute of Nanoscience and Nanotechnology, SPAIN, 5Graphenea S.A., SPAIN*

W70-g **SUB-MICRON-THICK SI MEMBRANE SURFACE PLASMON COUPLING STRUCTURE FOR REDUCING UNWANTED PROPAGATION MODES INSIDE SI**
Tetsuya Ozawa, Abubakr Eslam, Tetsuo Kan
University of Electro-Communications, JAPAN

g - MEMS/NEMS for Optical, RF and Electromagnetics

RF MEMS Components & Systems

M69-g **3.5 GHZ THERMO-ACOUSTIC PHASE MODULATOR BASED ON Z-CUT LINBO3 THIN FILM**
Xuankai Xu[1], Yushuai Liu[1], Ruihong Xiong[1], Tao Wu[1,2]
[1]*Shanghaitech University, CHINA,* [2]*Chinese Academy of Sciences, CHINA,* [3]*Shanghai Engineering Research Center of Energy Efficient and Custom AI IC, CHINA*

T73-g **6 GHZ LITHIUM NIOBATE ON INSULATOR LOW-LOSS SAW DELAY LINE ADAPTING NON-LEAKY COMPOSITE WAVEGUIDE MODE**
Zhi-Qiang Lee[1], Sung-Yuan Huang[1], Tzu-Hsuan Hsu[1,2], Joshua Campbell[2], Jack Kramer[2], Ruochen Lu[2], Ming-Huang Li[1]
[1]*National Tsing Hua University, TAIWAN,* [2]*University of Texas, Austin, USA*

RF MEMS Components & Systems

W71-g **A 4.3 GHZ LITHIUM NIOBATE ON INSULATOR WIDEBAND SURFACE ACOUSTIC WAVE DELAY LINE WITH MULTI-MODE COMPOSITION**
Sung-Yuan Huang[1], Zhi-Qiang Lee[1], Tzu-Hsuan Hsu[1,2], Joshua Campbell[2], Jack Kramer[2], Ruochen Lu[2], Ming-Huang Li[1]
[1] *National Tsing Hua University, TAIWAN,* [2] *University of Texas, Austin, USA*

M70-g **A KU-BAND ACOUSTIC FILTER WITH IL OF 2.0 DB AND FBW OF 13.1% BASED ON Z-CUT LITHIUM NIOBATE THIN FILM**
Fuhong Lin[1], Yiming Wang[1], Kai Yang[1], Jiming Fang[1], Jie Chen[1], Meijuan Li[1], Chengjie Zuo[1,2,3]
[1] *University of Science and Technology of China, CHINA,* [2] *YUNTA Technologies, CHINA,* [3] *ANUKI Technologies, CHINA*

T74-g **DESIGN AND IMPLEMENTATION OF A GUIDED SURFACE ACOUSTIC WAVE DIRECTIONAL COUPLER FOR PHONONIC INTEGRATED CIRCUITS**
Jack Guida, Siddhartha Ghosh
Northeastern University, USA

W72-g **DOUBLE-SIDED HEAT DISSIPATION FOR ACOUSTIC RESONATORS BASED ON LITHIUM NIOBATE ON SAPPHIRE**
Fangsheng Qian, Zijun Ren, Wei Wei, Jiashuai Xu, Junyan Zheng, Xingyu Liu, Yansong Yang
Hong Kong University of Science and Technology (HKUST), HONG KONG

M71-g **EXPERIMENTAL STUDY OF Q-BOOSTING IN TPOS RESONATORS USING CONVENTIONAL AND COUPLED RESONATOR ARCHITECTURE**
Raeann Jesma R[1], Ken-Wei Tang[2], Sheng-Shian Li[2], Gayathri Pillai[1]
[1] *Indian Institute of Science, INDIA,* [2] *National Tsing Hua University, TAIWAN*

T75-g **SOLIDLY MOUNTED LONGITUDINALLY EXCITED A1 MODE RESONATOR BASED ON THE $LINBO_3$/Metal/SIO_2/SIC**
Xiaoli Fang[1,2], Jinbo Wu[3], Shibin Zhang[1,2], Pengcheng Zheng[1], Xinjian Ke[1,2], Juxing He[1,2], Mijing Sun[1], Xin Ou[1,2]
[1] *Chinese Academy of Sciences (CAS), CHINA,* [2] *University of Chinese Academy of Sciences, CHINA,* [3] *Shanghai Xin Ou Integration Technology Company Ltd, CHINA*

W73-g **SEALED CAVITY BULK ACOUSTIC WAVE RESONATOR WITH COUPLING AND TCF ENHANCEMENT**
Jiashuai Xu, Zijun Ren, Yansong Yang
Hong Kong University of Science and Technology (HKUST), HONG KONG

g - MEMS/NEMS for Optical, RF and Electromagnetics

THz MEMS Components & Systems

M72-g **ANGLE-MULTIPLEXED TERAHERTZ FREQUENCY-SELECTIVE FINGERPRINT SENSOR: BROADBAND IDENTIFICATION OF CHIRAL ENANTIOMERS**

Hongshun Sun[1], Yunhao Cao[1], Yusa Chen[1], Liye Li[1], Lijun Ma[1], Shengxiao Jin[2], Guodong Gu[3], Zhihong Feng[3], Wengang Wu[1]
[1]*Peking University, CHINA,* [2]*National Key Laboratory of Science and Technology on Space Microwave, CHINA,* [3]*National Key Laboratory of Solid-State Microwave Devices and Circuits, CHINA*

g - MEMS/NEMS for Optical, RF and Electromagnetics

Other Electromagnetic MEMS/NEMS

T76-g **MULTI-DOF DYNAMIC MODELING OF FREQUENCY DRIFT AND PACKAGE OPTIMIZATION GUIDELINE FOR 2D MICROMIRRORS**

Ze-Yu Zhou, Kai-Ming Hu, Er-Qi Tu, Xiao-Yong Fang
Shanghai Jiao Tong University, CHINA

h - Micro- & Nanofluidics

Biological and Medical Microfluidics and Nanofluidics

M73-h **DRILLING BACTERIAL MOTILITY IN CONFINED SPACES NVESTIGATED USING SUB-MICRON WIDTH FLUIDIC CHANNELS**

Yoshiki Shimada, Aoba Yoshioka, Naoki Uemura, Daisuke Nakane, Tetsuo Kan
University of Electro-Communications, JAPAN

T77-h **IN VITRO STUDY OF LUNG CONNECTIVE TISSUE STIFFNESS AT VARIOUS OXYGEN TENSIONS AND GRADIENTS**

Heng-Hua Hsu[1], Ping-Liang Ko[1,2], Dao-Ming Chang[1], Yi-Chung Tung[1]
[1]*Acdemia Sinica, TAIWAN,* [2]*National Taiwan University, TAIWAN*

W74-h **LOW-COST, HIGH-PERFORMANCE DIGITAL MICROFLUIDIC CHIPS FOR REAL-TIME PCR USING REWORKABLE SUBSTRATES**

Zhaoduo Tong[1,2], Chuanjie Shen[1,2], Xin Xu[1], Weidong Yang[1,2], Yan Li[3], Fangliang Xu[1,2], Zhenhua Wu[1,2], Lin Zhou[1,2], Hongju Mao[1,2]
[1]*Chinese Academy of Sciences (CAS), CHINA,* [2]*University of Chinese Academy of Sciences, CHINA,* [3]*Fudan University, CHINA*

M74-h **MICROFLUIDIC PLATFORM FOR HIGH-RESOLUTION IMAGING OF OOMYCETE SPORES EXPOSED TO OSMOTIC STRESS**

Yiling Sun, Ayelen Tayagui, Ashley Garrill, Volker Nock
University of Canterbury, NEW ZEALAND

T78-h **SIMUTANEOUS ANALYSIS OF ALZHEIMER'S DISEASE BIOMARKERS USING CASCADED MICROFLUIDIC CAPTURE ARRAYS**

Pengcheng Zhao[1,2], Jieyu Wang[1,2], Jiangyu Ji[1,2], Huiying Liu[2], Guowu Ma[2], Hongju Mao[1,3], Jianan Hui[1,3]
[1]*Chinese Academy of Sciences (CAS), CHINA,* [2]*Dalian Medical University, CHINA,* [3]*University of Chinese Academy of Sciences, CHINA*

h - Micro- & Nanofluidics

Generic Microfluidics & Nanofluidics

W75-h **HIGH-THROUGHPUT ACOUSTIC SORTING OF CELLULAR-SIZED MICROPARTICLES IN 3D MICROFLUIDIC CHANNELS**
Akash Roy, Baptiste Neff, Kianoush Sadeghian Esfahani, Anik Sengupta, Eun S. Kim
University of Southern California, USA

h - Micro- & Nanofluidics

Integrated/Embedded Microfluidics and Nanofluidic Systems & Platforms

M75-h **GUT-ON-A-CHIP REVEALS REDUCED NANOPLASTIC-INDUCED INFLAMMATION THROUGH ENHANCED PERISTALSIS**
Junlei Han[1,2], Huimin Li[1,2], Zhipeng Xu[3], Jun Chen[1], Chaoyang Shi[2], Li Wang[1]
[1] *Qilu University of Technology, CHINA,* [2] *Tianjin University, CHINA,* [3] *University of Sheffield, UK*

T79-h **DESIGN AND STUDY OF A PUMP-FREE MICROFLUIDIC DEVICE FOR SINGLE-CELL ELECTRO-ROTATION DRIVEN BY ELECTRO-OSMOTIC FLOW**
Jianming Shu, Xijiang Wang, Yue Wang, Jingui Qian, Liang Huang
Hefei University of Technology, CHINA

W76-h **RAPID AMPLIFICATION OF SINGLE-STRANDED DNA BY ON-BEAD PLASMONIC PCR IN AN AUTOMATED MICROFLUIDIC SYSTEM**
Anni Hu, Yang Bu, Yuze Liu, Yung Ching Lee, Levent Yobas
Hong Kong University of Science and Technology (HKUST), HONG KONG

h - Micro- & Nanofluidics

Manufacturing for Micro- and Nanofluidics

M76-h **EFFICIENT FABRICATION OF SINGLE-UNIT HYBRID PAPER/PDMS MICROFLUIDICS WITH CONTROLLABLE BONDING STRENGTH FOR OIL/WATER SEPARATION AND GRADIENT GENERATOR**
Phong Vi Lam, Pin-Chuan Chen
National Taiwan University of Science and Technology, TAIWAN

T80-h **INTEGRATED NANOPORE DEVICE FOR ELECTRONIC SINGLE MOLECULE TRAPPING IN FEMTOLITRE CAVITIES FABRICATED BY SELF-ALIGNED ETCHING**
Xinxin Liu[1], Valentin Dubois[1], Shyamprasad N. Raja[1], Shaufei Cheng[2], Yuming Yeh[2], Yingzong Juang[2], Hanting Hsueh[2], Weileun Fang[3], Göran Stemme[1], Frank Niklaus[1]
[1] *KTH Royal Institute of Technology, SWEDEN,* [2] *Taiwan Semiconductor Research Institute, TAIWAN,* [3] *National Tsing Hua University, TAIWAN*

h - Micro- & Nanofluidics

Materials for Micro & Microfluidics

W77-h **FABRICATING STRETCHABLE LIQUID METAL CIRCUITS WITH A PHYSICAL SACRIFICIAL LAYER**
Kaushal J. Sumaria, Tingyi Liu
University of Massachusetts, Amherst, USA

h - Micro- & Nanofluidics

Other Micro- and Nanofluidics

M77-h **A HIGH-ACCURACY PAIR MATCHING METHOD FOR DROPLET MICROFLUIDICS WITH TWO-STATE MEASUREMENT POINTS**
Akihiro Isozaki[1], Yusuke Nasu[2,3], Naohiro Terasaka[4]
[1] *Ritsumeikan University, JAPAN,* [2] *University of Tokyo, JAPAN,* [3] *Academia Sinica, TAIWAN,* [4] *Institute of Science Tokyo, JAPAN*

T81-h **A NANOFOREST-INTEGRATED MICROFLUIDIC COOLING DEVICE FOR HIGH-POWER CHIPS**
Qirui Zhang[1,2], Zizhen Wang[1,2], Qiming Guo[1,2,3], Huabin Yang[1,2,3], Yizhi Shi[1,2,3], Na Zhou[1,2], Xiaoli Tian[1,2], Haiyang Mao[1,2]
[1] *Chinese Academy of Sciences (CAS), CHINA,* [2] *University of Chinese Academy of Sciences, CHINA,* [3] *Shangdong Key Laboratory of Intelligent Sensing Chip and Sysyem, CHINA*

W78-h **AN ELECTRO-DEWETTING BASED MICROFLUIDIC PIXEL DEVICE**
Qining Leo Wang, Chang-Jin "CJ" Kim
University of California, Los Angeles, USA

Kaohsiung – Pier 2 Art Zone. *Source: Kaohsiung City Government*

i - Open Poster

M78-i **SILICON ELECTRON EMITTER INTEGRATED WITH LED FOR X-RAY GENERATOR WITH HIGH EMISSION CURRENT AND LONG LIFETIME**
Hyo-jin Nam, Eunju Hong, Giwon Lee, Jinah Kim, Youngsik Kim, Byungkee Lee
LG Electronics, KOREA

W79-i **MICROFABRICATION OF BIORESORBABLE ZNO TFTS FOR UV-RESPONSIVE AND SUSTAINABLE ELECTRONICS**
Deniz Aktas, Levent Beker
Koç University, TURKEY

M79-i **PACKAGE STRUCTURE FOR GAS SENSOR BASED ON THERMAL INFRARED DETECTION**
Luca Maggi, Marco Del Sarto, Marco Ferrera, Michele Dellutri, Giuseppe Bruno, Silvia Nicoli, Matteo Birondi, Anita Previdi
STMicroelectronics, ITALY

W80-i **SILENT SPEECH INTERFACE ON THE HAND USING LIQUID METAL AND SOFT MATERIALS**
Yuta Kurotaki[1,2], Reitaro Yoshida[2], Shusuke Yamakoshi[1], Yutaka Isoda[1], Tamami Takano[1], Yuji Isano[1], Yusuke Miyake[2], Kentaro Kuribayashi[2], Hiroki Ota[1]
[1]*Yokohama National University, JAPAN,* [2]*GMO Pepabo, Inc., JAPAN*

M80-i **GAP VARIATION ESTIMATION IN MEMS GYROSCOPE SUBJECTED TO MECHANICAL STRESS**
Davide Bernabucci, Patrick Fedeli, Gianfranco Javier Yallico Sanchez, Luca Guerinoni, Luca Falorni
STMicroelectronics, ITALY

W81-i **A ROBUST PIEZORESISTIVE PRESSURE SENSOR**
Hung-Lin Yin, Yen-Liang Lin, Wu-Hsing Yi
Asia Pacific Microsystems, Inc, TAIWAN

M81-i **WORLD'S SMALLEST COMMERCIALIZED PARTICULATE MATTER SENSOR ENABLED BY AN INNOVATIVE SEMICONDUCTOR PACKAGE DESIGN**
Tobias Henn[1], Steve Lin[1], Nico Chou[1], Wallace Chuang[1], Chin Yi Cho[1], Anna Kamolawat[2], Martin Edel[2], Joachim Friedl[2], Florian Grabmaier[3], Robert Weiss[3]
[1]*Robert Bosch Ltd., TAIWAN,* [2]*Robert Bosch GmbH, GERMANY,* [3]*Bosch Sensortec GmbH, GERMANY*

T82-i **IMPEDANCE SENSING OF MIGRATING CELLS IN MICROCHANNEL WITH TOPOGRAPHY GUIDANCE**
Xiao Hong, Stella W. Pang
City University of Hong Kong, HONG KONG

i - Open Poster

M82-i **NUMERICAL FLUID-STRUCTURE INTERACTION WORKFLOW FOR PATTERN COLLAPSE PREDICTION DURING SEMICONDUCTOR FABRICATION**
Ashraful Islam, Gabriel Pichon, Rafael Salazar-Tio, Ganapathi Balasubramanian, Bernd Crouse, Junghan Kim, Seokwon Hwang, Yeongchan Yu
Dassault Systemes Simulia, USA

W82-i **LEAD-FREE PIEZOELECTRIC MEMS ACOUSTIC EMISSION SENSOR COMPATIBLE WITH COMMERCIAL BULK AE SENSORS**
Yongfang Li, Yuki Ueda, Takashi Usui, Kazuo Watabe
Toshiba Corporation, JAPAN

M83-i **ADVANCING MICROFLUIDIC ENCAPSULATION TECHNIQUES USING SURFACE ACOUSTIC WAVES AND MICROVALVES**
Mohammad Reza Raveshi, Ali Vafaie, Sagar N. Agnihotri, Rajneesh Bhardwaj and Adrian Neild
Monash University, AUSTRALIA

T83-i **MACHINE LEARNING TO ENABLE GAS CLASSIFICATION FOR MEMS GAS SENSING PLATFORM**
Changting Xu[1], Jiezhi Yang[1,2], Philip Papageorgiou[1], Kostadin Djordjev[1], Jim Cheng[1]
[1] *Qualcomm Technologies Inc, USA,* [2] *Harvard University, USA*

W83-i **OPTIMIZATION OF THIN-FILM MAGNETOELECTRIC CANTILEVER THROUGH DUAL MODULATION OF MAGNETIC AND ELECTRIC BIAS FIELDS**
Yuxi Wang[1,2,3,4], Lihui Jin[1], Mingye Du[1], Jiawei Li[1], Daozheng Luo[1], Ruihong Xiong[1], Tao Wu[1,2]
[1] *ShanghaiTech University, CHINA,* [2] *University of Chinese Academy of Sciences, CHINA*

M84-i **CRACK PRESERVING EFFECT INDUCED BY E-BEAM IRRADIATION IN ULTRATHIN METAL FILMS ON ELASTOMER MEMBRANES FOR FLEXIBLE SENSORS***
Benjamin Sittkus[1], Julien Petit[1], Gerald Urban[1], Ulrich Mescheder[1,2]
[1] *Furtwangen University, GERMANY,* [2] *University of Freiburg, GERMANY*

T84-i **SELF-ASSEMBLED MICRO-NANO STRUCTURES MANUFACTURING STRATEGY BASED ON CMOS-COMPATIBLE SU8 PHOTORESIST**
Zhi-Qi Dong, Kai-Ming Hu, Rui-Jia Xiang, Tian-Yu Zhao, Jun-Feng Zhou, Guang Meng, Wen-Ming Zhang
Shanghai Jiao Tong University, CHINA

i - Open Poster

W84-i **PIEZOELECTRICALLY DRIVEN INCH WORM MOTOR FOR LARGE FORCE AND STROKE APPLICATIONS IN IMPLANTS**
Ulrich Mescheder[1,2], Bahman Azarhoushang[1,2], Volker Bucher[1]
Jahangir Khosravi[1], Sonja Müller[1,2],
[1]*Furtwangen University, GERMANY,* [2]*University of Freiburg, GERMANY*

M85-i **MEMS AS ULTRAFAST OPTICS FOR MANIPULATING X-RAY PULSES WITH PICOSECOND RESOLUTION**
Jin Wang, Pice Chen, Donald. A. Walko, Il-Woong Jung,
Daniel Lopez, and Gopal K. Shenoy
Argonne National Laboratory, USA

T85-i **LASER DOPPLER VELOCIMETER USING ON-CHIP MICRO FRINGE PATTERN PROJECTOR FOR MICROFLUIDICS**
Hiroki Kumon, Masatoshi Takahashi, Kazuyoshi Hirose,
Shu Honma, Hiroki Kamei, Tomohiko Hirano,
Masakazu Katsumata, Hidenao Yamada
Hamamatsu Photonics K.K., JAPAN

W85-i **TUNABLE MEMS OSCILLATOR WITH LARGE FREQUENCY TUNING RANGE VIA NONLINEARITY**
Yu-Chi Chuang, Yuan-Chieh Lee, Zong-Xian Guan,
Hsiang-Chun Hsiao, Yi Chiu
National Yang Ming Chiao Tung University, TAIWAN

M86-i **OPTIMIZATION AND INVESTIGATION OF MINIATURIZED ELECTROSTATIC MEMS ACTUATOR TO ENABLE TUNABILITY IN GRAPHENE BASED LIGHT SOURCES**
Karman Selvam[1], Nooshin Saeidi[1,2], Maik Wiemer[1], Harald Kuhn[1,2],
Anna Kozłowska[3], Kamila Leśniewska-Matys[3], Rafał Stankiewicz[3],
Martin Kalbáč[4], Maryam Ehsani[5], Yvonne Joseph[5]
[1]*Fraunhofer Institute ENAS, GERMANY,* [2]*Chemnitz University of Technology, GERMANY,* [3]*Institute of Microelectronics and Photonics, POLAND,* [4]*J. Heyrovsky Institute of Physical Chemistry, CZECH REPUBLIC,* [5]*TU Bergakademie Freiberg, GERMANY*

T86-i **SINGLE-TRANSDUCER ULTRASONIC AIRFLOW-METER**
Stefano Sanvito[1], Marco Passoni[2], Marco Ferrera[2]
[1]*University of Bergamo, ITALY,* [2]*STMIcroelectronics, ITALY*

W86-i **PREPARING FOR NewATHENA FLIGHT PRODUCTION: RECENT DEVELOPMENTS IN UPSCALING SPO PLATE MANUFACTURING TECHNOLOGY**
Jeroen Haneveld[1], Bart Schurink[1], Marko Blom[1], Mathijs Bosman[1],
Bastiaan van Dam[1], Arenda Koelewijn[1], Jan-Joost Lankwarden[1],
Mark Olde Riekerink[1], Ronald Start[1], Maurice Wijnperle[1],
Maximilien J. Collon[2], Ramses Günther[2], Laurens Keek[2],
Boris Landgraf[2], Adam Lassise[2], Paulo da Silva Ribeiro[2],
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[1]*Micronit B.V., NETHERLANDS,* [2]*cosine, NETHERLANDS,*
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MONDAY	TUESDAY	WEDNESDAY
15:10 – 17:00	13:00 – 15:00	15:10 – 17:10

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- c - Industry MEMS and Advancing MEMS for Products and Sustainability
- d - MEMS & NEMS Materials, Fabrication and Packaging
- e - MEMS Actuators and PowerMEMS
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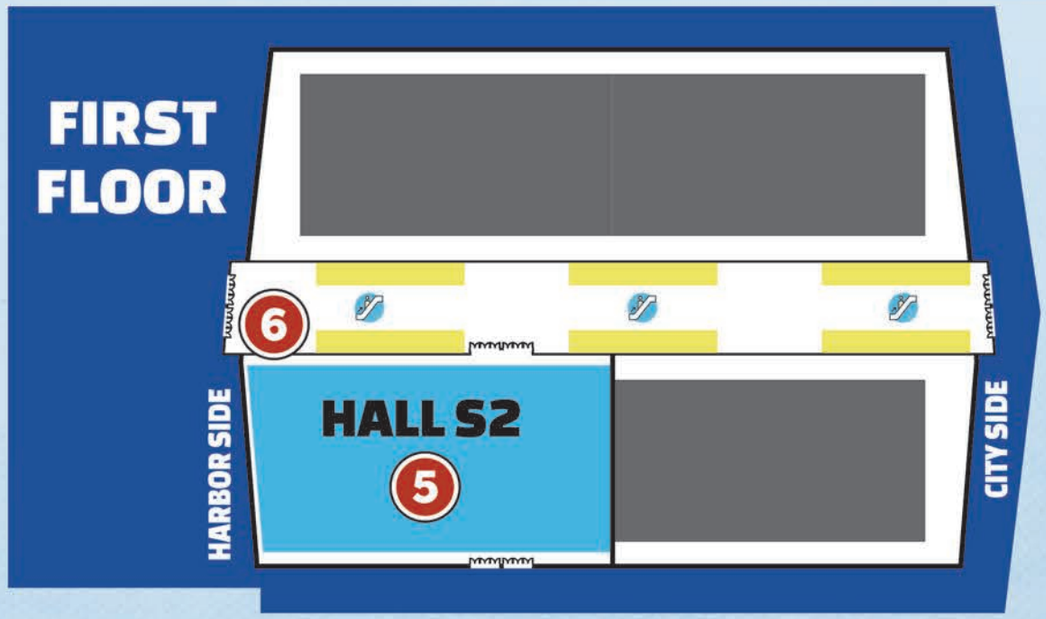
- i - Open Posters



THIRD FLOOR

1. Room 301
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   - Welcome Address & Announcements
2. Room 304a
   - Plenary Presentation IV
   - Concurrent Session A
   - Awards Ceremony
   - Industry Sessions
3. Room 304b
   - Concurrent Session B
4. Room 305
   - Welcome Reception

FIRST FLOOR

5. Hall - S2
   - Exhibits
   - Poster Sessions
   - Breaks & Lunches
6. Central Boulevard - West Lobby
   - Student Mixer
   - Women in Engineering Luncheon

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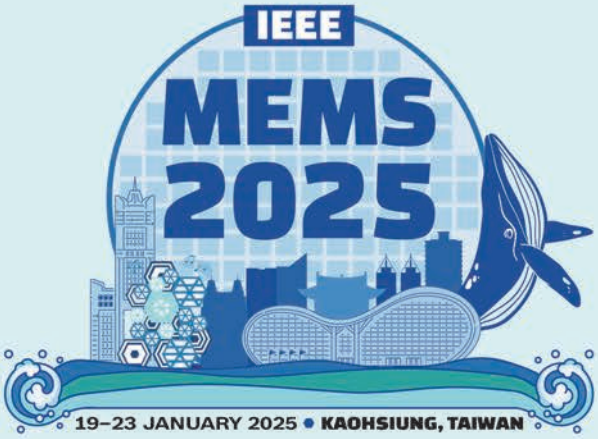
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