THE 22ND INTERNATIONAL CONFERENCE ON SOLID-STATE SENSORS, ACTUATORS AND MICROSYSTEMS

25-29 JUNE

KYOTO JAPAN

TRANSUDCERS 2023

FINAL PROGRAM

GENERAL CHAIR
Satoshi Konishi
Ritsumeikan University

EXECUTIVE PROGRAM CHAIR
Shuji Tanaka
Tohoku University

ORGANIZING COMMITTEE CHAIR
Osamu Tabata
Kyoto University of Advanced Science

SPONSOR
The Institute of Electrical Engineers of Japan

TECHNICAL CO-SPONSOR
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*Garden of irises and water lilies in Kyoto (Image by JFBRUNEAU; AdobeStock)*
Parallel Oral Sessions

Each day papers will be presented in 4 parallel sessions. There will be a total of 40 oral sessions throughout the 4 days of the Conference.

Poster Sessions

The 3 poster sessions will be held in Event Hall. Posters will be on display from Monday at 10:15 through Wednesday at 16:15. All poster papers are listed with their assigned number and presentation day. Authors will be available for questions during their appointed time.

Guide to Understanding Paper/Session Numbering

Each paper is assigned a unique number which clearly indicates when and where the paper is presented. The number of each paper is shown before the paper title.

Typical Paper Number: M4B.003

- The first letter (i.e., M) indicates the day of the Conference:
  - M = Monday
  - W = Wednesday
  - T = Tuesday
  - Th = Thursday

- The second number (i.e., 4) indicates what time during the day the session is being presented:
  - 1 = Early Morning
  - 2 = Mid Morning
  - 3 = Early Afternoon
  - 4 = Late Afternoon

- The third letter (i.e., B) shows the room location of the paper:
  - A = New Hall
  - E = Room E
  - B = Event Hall
  - F = Room B-1
  - C = Room A
  - P = Event Hall
  - D = Room D

- The number after the point (.) shows the number of the paper in the session in sequence starting at 001 (with the exception of posters).
**SUNDAY PROGRAM**

**25 JUNE**

**Special Event – Future Visions for Transducers Part I**  
Session Chair: Taeko Ando, Ritsumeikan University, JAPAN

Event Hall  
13:00 – 16:30  
Poster Presentation and Workshop

**Conference Registration and Check-In**  
New Hall Foyer  
17:00 – 20:00

**Welcome Reception**  
Swan Room and outside in the Garden  
18:00 – 20:00
# MONDAY AT A GLANCE

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<td>09:15 – 10:00</td>
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<td>Masayo Takahashi, Vision Care Inc., JAPAN</td>
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<td>10:00 – 10:15</td>
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<td>– Azadeh Ansari, Georgia Tech, USA</td>
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# MONDAY PROGRAM

## 26 JUNE

### Welcome Address and Technical Program Information

*New Hall*

**08:45 – 09:15**

**Conference Chair:** Satoshi Konishi, Ritsumeikan University, JAPAN

**Executive Program Chair:** Shuji Tanaka, Tohoku University, JAPAN

**Organizing Committee Chair:** Osamu Tabata, Kyoto University of Advanced Science, JAPAN
Plenary Presentation 1
Session Chair:
Shuji Tanaka, Tohoku University, JAPAN

New Hall
09:15 – 10:00

M1A.P1 RETINAL REGENERATION USING IPS CELLS – WITH
ROBOTIC BIOLOGY
Masayo Takahashi1,2
1 Vision Care Inc., JAPAN and 2 Ritsumeikan University, JAPAN

2023 Transducers Early Career Award Presentation
Award Recipient:
Azadeh Ansari, Georgia Tech, USA

New Hall
10:00 – 10:15

10:15 – 11:00
Break and Exhibit Inspection

Session M3A – Medical Devices I
Session Chairs:
Lourdes Basabe, University of the Basque Country, SPAIN
Tao Li, University of Cincinnati, USA

New Hall
11:00 – 11:15

M3A.01 SELF-POWERED WEARABLE BITE FORCE SENSOR FOR
CONTINUOUS BRUXISM MONITORING
Kenta Ichikawa and Wataru Hijikata
Tokyo Institute of Technology, JAPAN

11:15 – 11:30

M3A.02 A SEMI-PASSIVE SMART CONTACT LENS WITH ON-LENS
STORAGE ELEMENT
Shun-Hsi Hsu, Cheng-Wei Tsai, Yu-Chieh Huang, Guan-Ting Yeh,
Cheng-Yu Hsu, Chun-Yu Wu, Jhu-Jyun Yang, Xuan-Wei Zhang,
Yu-Hsuan Huang, and Jin-Chern Chiou
National Yang Ming Chiao Tung University, TAIWAN

11:30 – 11:45

M3A.03 AN TISSUE-ADHESIVE PIEZOELECTRIC SOFT SENSOR FOR
IN VIVO HEALTHCARE
Chan Wang1, Zhuo Liu2, Ying Liu2, Yizhu Shan2, Xuecheng Qu2,
Jiangtao Xue2, Tianyiyi He1, Hong Zhou1, Weixin Liu1,
Zhou Li1, and Chengkuo Lee1
1 National University of Singapore, SINGAPORE and
2 Chinese Academy of Sciences, CHINA
Session M3A – Medical Devices I

11:45 – 12:00

M3A.04 BALLOON CATHETER WITH IN SITU PRESSURE SENSING FUNCTION FOR EVALUATING HEMODYNAMICS
Yizhou Wang1,2,3, Chengxu Wang1,2,3, Jianrong Wang1, Lei Geng2,3, Xiangyu Cao4, and Xing Chen1
1Beihang University, CHINA, 2Tiangong University, CHINA, 3Tianjin Key Laboratory of Optoelectronic Detection Technology and Systems, CHINA, and 4Chinese PLA General Hospital, CHINA

12:00 – 12:15

M3A.05 DEVELOPMENT OF HOLLOW TYPED MICRONEEDLES PATCH WITH CONTINUOUS GLUCOSE MONITORING SENSOR BASED ON POLYLACTIC ACID
Shicheng Zhou1, Yutaro Chino2, Yoshitaka Kasama1, Ryo Miyake1, Takehiro Sato1, Shigenobu Mitsuzawa3, and Madoka Takai1
1University of Tokyo, JAPAN, 2Sanyo Chemical Industries, Ltd., JAPAN, and 3Honda Motor Co., Ltd., JAPAN

12:15 – 12:30

M3A.06 HYDROGEL MICRONEEDLE ARRAY WITH ARRANGED COLURIMETRIC GLUCOSE-SENSING MICROBEADS FOR TRANSDERMAL PATCH TESTING
Mayu Omote, Tomomi Murayama, Shuhei Takatsuka, and Hiroaki Onoe
Keio University, JAPAN

Session M3B – Polymer Fabrication Process

Session Chairs:
Jing-Quan Liu, Shanghai Jiao Tong University, CHINA
Hiroaki Onoe, Keio University, JAPAN

11:00 – 11:30

M3B.01 INVITED PRESENTATION
DIRECT INK WRITING 3D PRINTING FOR FABRICATING MICROFLUIDIC ELECTRONIC DEVICES
Michinao Hashimoto
Singapore University of Technology and Design (SUTD), SINGAPORE

11:30 – 11:45

M3B.03 MULTILEVEL MICROCHANNEL-BASED, 3D PRINTED AND LIQUID-METAL FILLED MICROELECTRODE ARRAY WITHIN A MULTIPHASE CONTROLLED MICROCHAMBER FOR ELECTROPHYSIOLOGICAL STUDIES
Jorge Manrique Castro, Isaac Johnson, and Swaminathan Rajaraman
University of Central Florida, USA
Session M3B – Polymer Fabrication Process
Continued

11:45 – 12:00
M3B.04 STRETCHABLE HEATER WITH ENTANGLED VERTICALLY ALIGNED CARBON NANOTUBES
Kyubin Bae, Sangjun Sim, and Jongbaeg Kim
Yonsei University, KOREA

12:00 – 12:15
M3B.05 BILAYER SELF-FOLDING METHOD WITH HIGH FOLDING FORCE AND ANGLE BY SUPPRESSING DELAMINATION OF SHRINK LAYER
Yusuke Sato, Takashi Sato, and Eiji Iwase
Waseda University, JAPAN

12:15 – 12:30
M3B.06 PAVING SMART ROADS: ROLL-TO-ROLL LASER MANUFACTURING OF TAR-BASED STRAIN SENSOR NETWORKS
Man Zhang, Jincai Huang, and Xining Zang
Tsinghua University, CHINA

Session M3C – Energy Harvesters I

Session Chairs:
Hiroshi Toshiyoshi, University of Tokyo, JAPAN
Fei Wang, Southern University of Science and Technology (SUSTech), CHINA

Room A

11:00 – 11:30
M3C.01 INVITED PRESENTATION
TRIBOELECTRIC NANOSensor: A PROTOTYPE OF SELF-POWERED SENSOR BASED ON CONTACT ELECTRIFICATION
Zong-Hong Lin
National Taiwan University, TAIWAN

11:30 – 11:45
M3C.03 MONOLITHIC INTEGRATION OF THICK NDFEB MICRO-MAGNETS INTO MEMS: APPLICATION TO ELECTROMAGNETIC ENERGY HARVESTING
Elías Angulo-Cervera1, Frederico Orlandini-Keller2, Iiona Lecerf1,3, Pierre Moritz1,3, Fabrice Mathieu1, David Bourrier1, Samuel Charlot1, Richard Haettel2, Thibaut Devillers2, Liviu Nicu1, Thomas Blon3, Lise-Marie Lacroix2,4, Nora M. Dempsey2, and Thierry Leichlé1,5
1LAAS-CNRS, FRANCE, 2Institut NEEL, FRANCE, 3LPCNO, FRANCE, 4IUF, FRANCE, and 5IRL Georgia Tech-CNRS, USA

11:45 – 12:00
M3C.04 OUTPUT CHARACTERISTICS ON KIRIGAMI THERMOELECTRIC GENERATOR BY THREE-DIMENSIONAL DEFORMATION AND GEOMETRIC SHAPES
Shingo Terashima and Eiji Iwase
Waseda University, JAPAN
Session M3C – Energy Harvesters I

Room A

12:00 – 12:15
M3C.05 SELF-POWERED WEARABLE LIMB MOTION MONITORING SYSTEM USING FLEXIBLE THERMOELECTRIC POWER GENERATOR
Jinfeng Yuan, Yuzhong Zhang, Caise Wei, and Rong Zhu
Tsinghua University, CHINA

12:15 – 12:30
M3C.06 TRIBOELECTRIC PRESSURE SENSOR WITH SURFACE CHARGE DENSITY CALIBRATION
Chankyu Han, Jungrak Choi, and Inkyu Park
Korea Advanced Institute of Science and Technology (KAIST), KOREA

Session M3D – Inertial Sensors

Session Chairs:
Behraad Bahreyni, Simon Fraser University, CANADA
Heng Yang, Chinese Academy of Sciences (CAS), CHINA

Room D

11:00 – 11:15
M3D.01 ELECTROCHEMICAL SEISMOSENSOR BASED ON ONE SINGLE SILICON CHIP WITH FOUR ELECTRODES
Zhenyu Sun1,2, Tian Liang1,2, Lintao Hu1,2, Maoqi Zhu1,2, Mingbo Zhang1,2, Junbo Wang1,2, Deyong Chen1,2, and Jian Chen1,2
1Chinese Academy of Sciences (CAS), CHINA and 2University of Chinese Academy of Sciences, CHINA

11:15 – 11:30
M3D.02 ULTRA-HIGH SENSITIVITY PULL-IN TIME MEMS ACCELEROMETER FOR SATELLITE GRAVIMETRY
Inês S. Garcia1, Dimitri E. Santos1, José B. Queiroz1, João T. da Encarnação2,3, Tiago Hormigo4, Jorge Cabral6, Filipe S. Alves1, and Rosana A. Dias1
1International Iberian Nanotechnology Laboratory (INL), PORTUGAL, 2Delft University of Technology, NETHERLANDS, 3University of Texas, Austin, USA, 4Spin.Works S.A., PORTUGAL, and 5University of Minho, PORTUGAL

11:30 – 11:45
M3D.03 FREQUENCY-MODULATED MEMS ACCELEROMETER WITH DUAL-LAYER PROCESS FOR MINIMUM AREA OCCUPATION OF ANCHOR POINTS
Christian Padovani1, Riccardo Nastri1, Leonardo Pagani Gaffuri1, Gabriele Gattere2, Francesco Rizzini2, and Giacomo Langfelder1
1Politecnico di Milano, ITALY and 2STMicroelectronics, ITALY

11:45 – 12:00
M3D.04 ELECTROTHERMALLY TUNABLE ACCELEROMETER WITH SMALL TUNING VOLTAGE AND VERY LARGE SENSITIVITY TUNING RANGE
Yu-Chi Chuang, Yuan-Chieh Lee, and Yi Chiu
National Yang Ming Chiao Tung University, TAIWAN
Session M3D – Inertial Sensors

Continued
Room D

12:00 – 12:15

M3D.05 DEMONSTRATION OF WIDE DYNAMIC RANGE MEASUREMENT OF A MICROCONTROLLER-BASED MEMS GYRO MODULE BY FUSING THE OUTPUTS OF TWO DIFFERENT OPERATION MODES
Yasushi Tomizawa, Fumito Miyazaki, Daiki Ono, Hideaki Murase, Jumpei Ogawa, Tazuko Tomioka, Kei Masunishi, Etsuji Ogawa, Fumitaka Ishibashi, and Kengo Uchida
Toshiba Corporation, JAPAN

12:15 – 12:30

M3D.06 HIGH-SENSITIVITY ELECTROCHEMICAL ANGULAR ACCELEROMETER RELYING ON SOI-BASED MICROELECTRODES
Tian Liang1,2, Mingbo Zhang1,2, Lintao Hu1,2, Zhenyu Sun1,2, Maoqi Zhu1,2, Deyong Chen1,2, Jian Chen1,2, and Junbo Wang1,2
1Chinese Academy of Sciences (CAS), CHINA and 2University of Chinese Academy of Sciences, CHINA

12:30 – 14:00 Lunch and Exhibit Inspection

Poster Session M4P and Exhibit Inspection
Event Hall

14:00 – 16:00
Poster presentations are listed by topic category with their assigned number starting on page 51.

Session M5A – Microfluidics I

Session Chairs:
Irene Fernandez-Cuesta, Universität Hamburg, GERMANY
Sung Kwon Cho, University of Pittsburgh, USA
New Hall

16:00 – 16:30

M5A.01 INVITED PRESENTATION
NEW OPPORTUNITIES TO DETECT DISEASE AND PROBE MICROBIALS USING LAB-ON-A-CHIP DEVICES
Amy Q. Shen
Okinawa Institute of Science and Technology Graduate University, JAPAN

16:30 – 16:45

M5A.03 SYNTHESIS AND DIRECT INSERTION OF MEMBRANE PROTEIN INTO MONODISPERSE GUVS FABRICATED BY A MICROFLUIDIC DEVICE
Satoshi Nanjo1,2, Mamiko Tsugane1, Ryotaro Yoneyama1, Ryota Ushiyama1, Tomoaki Matsuura1, and Hiroaki Suzuki1
1Chuo University, JAPAN and 2Tokyo Institute of Technology, JAPAN
Session M5A – Microfluidics I

Continued

New Hall

16:45 – 17:00

M5A.04 HIGH EFFICIENCY CELL-BEAD PAIRING VIA DIELECTROPHORESIS-CONTROLLED QUEUING PROCESS FOR SINGLE-CELL ANALYSIS
Yao Cai1, Zhuzhu Liu1, Shijia Yang2, Fei Su1, Duli Yu1, Xiaoxing Xing1, and Yuan Luo2,4
1Beijing University of Chemical Technology, CHINA, 2Chinese Academy of Sciences (CAS), CHINA, 3China-Japan Friendship Hospital, CHINA, and 4University of Chinese Academy of Sciences, CHINA

17:00 – 17:15

M5A.05 CONTINUOUS PRODUCTION OF CELL-ENCAPSULATED DROPLETS FOR MEMBRANE FUSION OF CELLS UTILIZING A MICROFLUIDIC DEVICE
Hiroki Fukunaga1, Naotomo Tottori1, Shinya Sakuma1, Tomomi Tsubouchi2, and Yoko Yamanishi3
1Kyushu University, JAPAN and 2National Institute for Basic Biology, JAPAN

17:15 – 17:30

M5A.06 OPTIMIZING SCREENING PROCESS OF APTAMERS ON A MICROFLUIDIC SYSTEM BY SHEAR FORCE CONTROL FOR APTAMERS SPECIFIC TO FOLATE RECEPTOR ALPHA
Yi-Cheng Tsai, Yang-Sheng Shao, Hung-Bin Wu, and Gwo-Bin Lee
National Tsing Hua University, TAIWAN

Session M5B – Pressure Sensors

Session Chairs:
Chang-Jin “CJ” Kim, University of California, Los Angeles, USA
Junbo Wang, Chinese Academy of Sciences (CAS), CHINA

Event Hall

16:00 – 16:30

M5B.01 INVITED PRESENTATION
ELECTRO-ACTIVE MATERIALS FOR SOFT ROBOTS AND WEARABLES
Vito Cacucciolo
Omnigrasp Srl, ITALY, Politecnico di Bari, ITALY, and Massachusetts Institute of Technology, USA

16:30 – 16:45

M5B.03 A RESONANT MICROSENSOR FOR MULTI-PARAMETER MEASUREMENT OF DIFFERENTIAL PRESSURE, TEMPERATURE AND STATIC PRESSURE
Chao Chong1,2, Jiahui Yao1,2, Han Xue1,2, Yulan Li1, Junbo Wang1,2, Deyong Chen1,2, and Jian Chen1,2
1Chinese Academy of Sciences (CAS), CHINA and 2University of Chinese Academy of Sciences, CHINA
16:45 – 17:00

**M5B.04**

A RESONANT HIGH-PRESSURE SENSOR WITH AN H-CAVITY

Jie Yu¹, Zongze Yu¹, Pan Qian¹, Yulan Lu¹, Jian Chen¹, Junbo Wang¹, and Deyong Chen¹

¹Chinese Academy of Sciences (CAS) and
²University of Chinese Academy of Sciences, CHINA

17:00 – 17:15

**M5B.05**

NOVEL THERMAL MEMS DYNAMIC PRESSURE SENSOR

Akash Gupta¹, Achim Bittner¹, and Alfons Dehé¹,²

¹Hahn-Schickard-Gesellschaft für Angewandte Forschung e.V., GERMANY and ²University of Freiburg, GERMANY

17:15 – 17:30

**M5B.06**

NONLINEARITY COMPENSATION FOR MEMS PRESSURE SENSORS WITH PIEZORESISTORS AT THE NEUTRAL POSITION

Grim Keulemans¹, Appo van der Wiel², Ben Maes², Maliheh Ramezani², Michael Kraft¹, and Chen Wang¹

¹KU Leuven, BELGIUM and ²Melexis, BELGIUM

16:00 – 16:15

**M5C.01**

CHARACTERIZATION OF PIEZOELECTRIC MICROMACHINED ULTRASONIC TRANSDUCERS FOR BIOMEDICAL APPLICATIONS

Bruno Fain, François Blard, Jean-Rémi Chatroux, Romain Liechti, Fabrice Casset, Antoine Hamelin, Jean-Claude Bastien, and Hélène Lhermet

University Grenoble Alpes, FRANCE

16:15 – 16:30

**M5C.02**

FLEXIBLE ULTRASONIC TRANSDUCER FOR RF-DATA AND ENERGY TRANSMISSION THROUGH THE METAL PIPE

Javad Abbaszadeh, Vladimir Pashchenko, Lukas Rauter, and Mohssen Moridi

Silicon Austria Labs GmbH (SAL), AUSTRIA

16:30 – 16:45

**M5C.03**

HIGH-SPL PMUT ARRAY FOR MID-AIR HAPTIC INTERFACE

Fan Xia¹, Yande Peng¹, Wei Yue¹, Chun-Ming Chen¹, Sedat Pala¹, Ryuichi Arakawa¹,², and Liwei Lin¹

¹University of California, Berkeley, USA and ²NGK Spark Plug Co., JAPAN
Session M5C – pMUT

16:45 – 17:00

M5C.04 IN-AIR LONG-RANGE ENVIRONMENTAL TEMPERATURE SENSING WITH A SINGLE SCANDIUM-DOPED ALUMINUM NITRIDE PMUT ARRAY
Mantalena Sarafianou1, Daniel Ssu-Han Chen1, David Sze Wai Choong1, Duan Jian Goh1, Jihang Liu1, Srinivas Merugu1, Qing Xin Zhang1, Huamao Lin1, Steven H.J. Lee1, Peter H.K. Chang1, Yee Lung Lee1, Carlo L. Prelini2, Filippo D’Ercoli2, Dao Hao Sim3, Alberto Leotti3, Laura Castoldi3, Domenico Giusti2, and Joshua E.-Y. Lee1
1Agency for Science, Technology and Research (A*STAR), SINGAPORE, 2STMicroelectronics, ITALY and 3STMicroelectronics, SINGAPORE

17:00 – 17:15

M5C.05 TILTABLE CANTILEVER-PLATE BASED PIEZOELECTRIC MICROMACHINED ULTRASONIC TRANSDUCERS (PMUT) WITH LARGE LINEAR VIBRATION RANGE AND HIGH OUTPUT POWER
Tingzhong Xu, Javad Abbaszadeh, Claire Bourquard, Angela Darie, and Mohssen Moridi
Silicon Austria Labs GmbH (SAL), AUSTRIA

17:15 – 17:30

M5C.06 A SINGLE-CHIP CMOS-MEMS CMUT ARRAY TRANSCIEVER WITH LOW BIAS
Hung-Yu Chen, Yung-Shun Chan, Tzu-Hsuan Hsu, Ming-Huang Li, and Sheng-Shian Li
National Tsing Hua University, TAIWAN

Session M5D – Bio Sensors

Session Chairs:
Minghao Nie, University of Tokyo, JAPAN
Yoko Yamanishi, Kyushu University, JAPAN

Room D

16:00 – 16:15

M5D.01 NANOPLASMONIC BIOSENSOR FOR CYTOKINE PROFILING IN PATIENT PLASMA
Lip Ket Chin1, Hyungsoon Im2, Sung-Gyu Park3, and Benjamin Choustermann4
1City University of Hong Kong, HONG KONG, 2Massachusetts General Hospital, USA, 3Korea Institute of Materials Science, KOREA, and 4Hôpital Lariboisière, FRANCE

16:15 – 16:30

M5D.02 LAB-ON-CMOS RESONANT MICRO-CALORIMETER
Rafel Perelló-Roig1,2, Jaume Verdú1,2, Sebastià Bota1,2, Toshikazu Nishida3, and Jaume Segura1,2
1University of the Balearic Islands, SPAIN, 2Health Research Institute of the Balearic Islands, SPAIN, and 3University of Florida, USA
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<td>A NOVEL RADIAL CHIP FOR COLLECTION OF EXHALED BREATH TO DETECT COVID-19</td>
<td>James D. Morris, Zhenzhen Xie, Jiapeng Huang, Michael H. Nantz, and Xiao-An Fu</td>
<td>University of Louisville, USA</td>
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<td>M5D.04</td>
<td>IN-VITRO REAL-TIME IDENTIFICATION OF CORONAVIRUS SPIKE PROTEINS VIA ULTRASENSITIVE MID-INFRARED HOOK NANOANTENNAS ARRAY</td>
<td>Zhihao Ren, Hong Zhou, Zixuan Zhang, Cheng Xu, and Chengkuo Lee</td>
<td>National University of Singapore, SINGAPORE</td>
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<td>A FLEXIBLE GLUCOSE SENSOR WITH ANTI-SWELLING AND CONDUCTIVITY ZWITTERIONIC HYDROGEL ENZYME MEMBRANE</td>
<td>Chengcheng Li, Zhihua Pu, Hao Zheng, Zijing Guo, Wangwang Zhu, and Dachao Li</td>
<td>Tianjin University, CHINA</td>
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<td>M5D.06</td>
<td>DUAL METHYLATED BRCA1/BRCA2 DETECTION ON AN APTAMER-BASED INTEGRATED MICROFLUIDIC SYSTEM</td>
<td>Chih-Hung Wang¹, Keng-Fu Hsu², and Gwo-Bin Lee²</td>
<td>¹National Tsing Hua University, TAIWAN and ²National Cheng Kung University, TAIWAN</td>
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**Special Event – Future Visions for Transducers Part II**

Session Chair: Taeko Ando, Ritsumeikan University, JAPAN

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<td>09:15 – 09:30</td>
<td>Transducers 2025 Announcement</td>
</tr>
<tr>
<td>09:30 – 09:45</td>
<td>Transition Break</td>
</tr>
<tr>
<td>09:45 – 10:45</td>
<td>Session T2A Cell, Session T2B Actuators I, Session T2C Environmental Sensors, Session T2D Functional Materials &amp; Fabrication I</td>
</tr>
<tr>
<td>10:45 – 11:15</td>
<td>Break and Exhibit Inspection</td>
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<td>12:45 – 14:15</td>
<td>Lunch</td>
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<tr>
<td>14:15 – 18:15</td>
<td>Poster Session T4P and Exhibit Inspection</td>
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<tr>
<td>16:15 – 17:30</td>
<td>Session T5A Medical Devices II, Session T5B Micromirrors, Session T5C Acoustic Devices, Session T5D Microfluidics II</td>
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<td>17:30 – 17:40</td>
<td>Transition Break</td>
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<tr>
<td>17:40 – 19:10</td>
<td>Special Event – Industry</td>
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<td>19:10 – 20:00</td>
<td>Tuesday Wine and Cheese Reception</td>
</tr>
</tbody>
</table>

**TUESDAY PROGRAM**

27 JUNE

Plenary Presentation 2

Session Chair: Xinxin Li, SIMIT-CASI, CHINA

New Hall

08:30 – 09:15 T1A.P2 MINIATURIZED QUANTUM SENSORS

Michelle Schweizer¹, Jixing Zhang¹, Michael Kübler¹, Magnus Benke², and Jörg Wrachtrup²

¹University of Stuttgart, GERMANY and²Max Planck Institute for Solid State Research, GERMANY
Transducers 2025 Announcement

New Hall

09:15 – 09:30

09:30 – 09:45 Transition

Session T2A – Cell

Session Chairs: Ioana Voiculescu, City University of New York, USA
José Antonio Plaza, Instituto de Microelectrónica de Barcelona (IMB-CNM (CSIC), SPAIN)

New Hall

09:45 – 10:00

T2A.01 CYTOTRANSUCERS VISUALIZE FUNCTIONS OF LIVING CELLS
Niko Kimura and Shinya Sakuma
Kyushu University, JAPAN

10:00 – 10:15

T2A.02 DIRECT MONITORING OF NEUROTRANSMITTER EXOCYTOSIS IN LIVING CELLS USING ELECTROCHEMICAL SENSORS FABRICATED WITH MIXED-DIMENSIONAL BIOSENSING NANOSTRUCTURES
Pengcheng Xu1,2, Xuefeng Wang1, Hao Jia1,2, Yuan Zhang1, and Xinxin Li1,2
1 Chinese Academy of Sciences (CAS), CHINA,
2 University of Chinese Academy of Sciences, CHINA, and
3 Shanghai University, CHINA

10:15 – 10:30

T2A.03 THE SEARCH FOR THE MAXIMUM 2D-PARTICLE SIZE THAT CAN BE INTERNALIZED BY LIVING CELLS
Marta Duch1, Ana Fernández-Escribano2, Maria Isabel Arjona1, Patricia Vázquez2, Juan Pablo Aguñil1, Mariano Redondo-Horcajo2, Adrian Rodriguez-Lau1, Ana Sánchez1, Sergi Sánchez1, Teresa Suárez2, and José Antonio Plaza1
1 Institute of Microelectronics of Barcelona, SPAIN and
2 Centre for Biological Research Margarita Salas (CSIC), SPAIN

10:30 – 10:45

T2A.04 A MICROFLUIDIC FLOW CYTOMETRY ENABLING HIGH-THROUGHPUT CHARACTERIZATION OF SINGLE-CELL IMPEDANCE AND IMAGING BASED ON CONSTRICIONAL MICROCHANNELS COUPLED WITH DEEP NEURAL NETWORKS
Xiao Chen1,2, Xukun Huang1,2, Huwen Tan1,2, Minruihong Wang1,2, Yimin Li1,2, Yuanchen Wei1, Jie Zhang1, Deyong Chen1,2, Yueying Li1, Junbo Wang1,2, and Jian Chen1,2
1 Chinese Academy of Sciences (CAS), CHINA and
2 University of Chinese Academy of Sciences, CHINA
Session T2B – Actuators I
Session Chairs:
Takeshi Hayakawa, Chuo University, JAPAN
Rong Zhu, Tsinghua University, CHINA

Event Hall

09:45 – 10:00

T2B.01 DESIGN AND EXPERIMENTAL VALIDATION OF A NEW MEMS LONG-STROKE ACTUATOR BASED ON TUNNEL-COMB FINGERS
Valentina Zega1, Andrea Opreni1, Yassine Banani1, Andrea Buffoli1, Flavia D. Mauri1, Gabriele Gattere2, Manuel Riani2, Giacomo Langfelder1, and Attilio Frangi1
1 Politecnico di Milano, ITALY and 2 STMicroelectronics, ITALY

10:00 – 10:15

T2B.02 DOWNSCALING AND TEMPERATURE HOMOGENIZATION OF TINIFI/SI SHAPE MEMORY MICROACTUATORS
Gowtham Arivanandhan1, Zixiong Li1, Sabrina M. Curtis2,3, Eckhard Quandt2, and Manfred Kohl1
1 Karlsruhe Institute of Technology (KIT), GERMANY, 2 Kiel University (CAU), GERMANY, and 3 University of Maryland, USA

10:15 – 10:30

T2B.03 3D ELECTRON-BEAM WRITING OF NANOACTUATORS IN GENETICALLY ENGINEERED SPIDER SILK PROTEINS
Nan Qin1,2, Xiawei Yue1,2, Jiachuang Wang1,2, Zening Li1,2, and Tiger H. Tao1,2,3,4,5
1 Chinese Academy of Science (CAS), CHINA, 2 University of Chinese Academy of Sciences, CHINA, 3 Neuroxess Co., Ltd., CHINA, 4 Guangdong Institute of Intelligence Science and Technology, CHINA, and 5 Tianqiao and Chrissy Chen Institute for Translational Research, CHINA

10:30 – 10:45

T2B.04 SELF-ASSEMBLED NANOSCALE CILIARY ACTUATORS
Minsu Kang1, Hosup Jung3, Moon Kyu Kwak3, and Hoon Eui Jeong1
1 Ulsan National Institute of Science & Technology (UNIST), KOREA, 2 Seoul National University, KOREA, and 3 Kyungpook National University, KOREA

Session T2C – Environmental Sensors
Session Chairs:
Andreas Hierlemann, ETH Zurich, SWITZERLAND
Chung Hoon Lee, Marquette University, USA

Room A

09:45 – 10:00

T2C.01 HIGH-PERFORMANCE SILICON CARBIDE-ON-INSULATOR THERMORESISTIVE HIGH-TEMPERATURE SENSOR UP TO 750 °C
Baoyun Sun, Jiariu Mo, Willem D. van Driel, and Guoqi Zhang
Delft University of Technology, NETHERLANDS
Session T2C – Environmental Sensors

Continued

Room A

10:00 – 10:15
T2C.02 MOSFET-BASED AND P-N DIODE BASED TEMPERATURE SENSORS IN A 4H-SIC CMOS TECHNOLOGY
Jiarui Mo1, Jinglin Li1, Yaqian Zhang1, Alexander May2, Tobias Erlbacher2, Guoqi Zhang1, and Sten Vollebregt1
1Delft University of Technology, NETHERLANDS and 2Fraunhofer Institute for Integrated System and Devices Technology IISB, GERMANY

10:15 – 10:30
T2C.03 DEVELOPMENT OF A HIGH SENSITIVITY PELTIER TYPE SOIL WATER CONTENT SENSOR FOR MONITORING AGRICULTURAL MEDIA
Masato Futagawa, Haruki Sato, Kisho Sakamoto, and Satoshi Ota
Shizuoka University, JAPAN

10:30 – 10:45
T2C.04 ALGAN/GAN SPLIT-ELECTRODE SECTORIAL SENSOR ARRAY FOR ULTRA-LOW MAGNETIC FIELD DETECTION AT 8 μT
Lingxi Xia1,2 and Yung C. Liang1,2
1National University of Singapore, SINGAPORE and 2National University of Singapore, Suzhou, CHINA

Session T2D – Functional Materials & Fabrication I

Session Chairs:
Naoki Inomata, Tohoku University, JAPAN
Da-Jeng Yao, National Tsing Hua University, TAIWAN

Room D

09:45 – 10:00
T2D.01 HYBRID MICROFABRICATION, AND ELECTROCHEMICAL ANALYSIS OF NONAGONAL 2D/3D MICROELECTRODE ARRAYS, WITH MULTI-METALLIC INTERFACES
Charles M. Didier1, Maria Corina Garcia-Chaulbad2, Julia F. Orrico1, Jorge Manrique Castro3, and Swaminathan Rajaraman1
1University of Central Florida, USA and 2Polytechnic University of Puerto Rico, PUERTO RICO

10:00 – 10:15
T2D.02 MANUFACTURING OF FLEXIBLE METALLIC AEROGEL BY ICE-TEMPLATED ASSEMBLY OF NANOWIRES AND ITS APPLICATIONS
Donghyun Lee and Jungwook Choi
Chung-Ang University, KOREA
Session T2D – Functional Materials & Fabrication I

Room D

10:15 – 10:30
T2D.03 SIMPLE FABRICATION OF PARYLENE-BASED SLIPPERY LIQUID-INFUSED POROUS SURFACES FOR HEALTHCARE APPLICATIONS
Kuang-Ming Shang1, Haixu Shen1, Hiroyuki Kato2, Suhash Aravindan1, Hirotake Komatsu2, and Yu-Chong Tai1
1 California Institute of Technology, USA and 2 Arthur Riggs Diabetes & Metabolism Research Institute at City of Hope, USA

10:30 – 10:45
T2D.04 APPLYING GRAYSCALE DIGITAL MASKS AND DEFOCUSING METHOD TO DIGITAL LIGHT PROCESSING STEREOLITHOGRAPHY FOR RAPID MANUFACTURE OF MICROLENSES ARRAYS
Chih-Yu Hsieh1, Pin-Chuan Chen1, Pai-Shan Chen2, and Yi-Hsin Liu3
1 National Taiwan University of Science and Technology, TAIWAN, 2 National Taiwan University, TAIWAN, and 3 National Taiwan Normal University, TAIWAN

Session T3A – Tissue Engineering I

Session Chairs:
Fernando Benito-Lopez, University of the Basque Country, SPAIN
Frank Niklaus, KTH – Royal Institute of Technology, SWEDEN

New Hall

11:15 – 11:45
T3A.01 INVITED PRESENTATION
ORGAN-ON-CHIP FOR PHYSIOLOGY AND DEVELOPMENT OF NEW THERAPIES
Karen Cheung
University of British Columbia, CANADA

11:45 – 12:00
T3A.03 TARGETING NANOCARRIERS COMBINED WITH PHOTOTHERMAL THROMBOLYTIC THERAPY TESTED FROM IN VITRO, AND THROMBOSIS VESSEL-ON-A-CHIP TO IN VIVO
Kuan-Ting Liu1, Er-Yuan Chuang2, Yu-Jui Fan3, and Jiashing Yu1
1 National Taiwan University, TAIWAN and 2 Taipei Medical University, TAIWAN

12:00 – 12:15
T3A.04 A HIGHLY SENSITIVE CAPACITIVE DISPLACEMENT SENSOR FOR FORCE MEASUREMENT INTEGRATED IN AN ENGINEERED HEART TISSUE PLATFORM
Milica Dostanić1,2, Filippo Pfaiffer1, Mahdieh Shojaei-Baghini1, Laura M. Windt3, Maury Wiendels2, Berend J. van Meer1, Christine L. Mummery2,3, Pasqualina M. Sarro1, and Massimo Mastrangeli1
1 TU Delft, NETHERLANDS, 2 Leiden University Medical Center, NETHERLANDS, and 3University of Twente, NETHERLANDS
Session T3A – Tissue Engineering I

New Hall

12:15 – 12:30

T3A.05 HIGH THROUGHPUT, MULTIMODAL, MICROCHAMBER BIOSENSORS FOR IN VITRO SELECTIVE LOCALIZATION OF KILLIFISH CARDIAC MODELS
Andre Childs1, Isaac Johnson1, Benjamin Dubansky2, and Swaminathan Rajaraman1
1 University of Central Florida, USA and 2 Louisiana State University, USA

12:30 – 12:45

T3A.06 REAL-TIME ASSESSMENT OF MATURITY BY MICROFIBER-SHAPED iPSCS-DERIVED CARDIAC TISSUE
Akari Masuda1, Shun Itai1, Yuta Kurashina2, Shugo Tohyama1, and Hiroaki Onoe1
1 Keio University, JAPAN and 2 Tokyo University of Agriculture and Technology, JAPAN

Session T3B – Nanoscale Materials & Fabrication

Session Chairs: Inkyu Park, Korea Advanced Institute of Science and Technology (KAIST), KOREA
Michael Kraft, KU Leuven, BELGIUM

Event Hall

11:15 – 11:30

T3B.01 SILICON-NANODOT-INDUCED STRENGTH CONTROL FOR SILICON MEMS
Abbiraj Singh, Shingo Kammachi, and Takahiro Namazu
Kyoto University of Advanced Science, JAPAN

11:30 – 11:45

T3B.02 DISSIPATION AND LOSS ANGLE IN TWO-DIMENSIONAL MOLYBDENUM DITELLURIDE NANOELECTROMECHANICAL RESONATORS
Pengcheng Zhang1, Yueyang Jia1, Zuheng Liu1, and Rui Yang1,2
1 University of Michigan – Shanghai Jiao Tong University Joint Institute, Shanghai Jiao Tong University, CHINA and 2 Shanghai Jiao Tong University (SJTU), CHINA

11:45 – 12:00

T3B.03 LONG-WAVE INFRARED GRAPHENE PHOTODETECTORS FOR POLARIZATION DETECTION AND GAS SENSING
Junsheng Xie, Zihao Ren, Jingxuan Wei, Weixin Liu, Jingkai Zhou, and Chengkuo Lee
National University of Singapore, SINGAPORE
Session T3B – Nanoscale Materials & Fabrication
Continued

12:00 – 12:15
T3B.04 DEMONSTRATION OF A NON-VOLATILE ANTIFERROELECTRIC PYROELECTRIC SWITCH
Patrick D. Lomenzo, Songrui Li, Thomas Mikolajick, and Uwe Schroeder
1NaMLab gGmbH, GERMANY and 2TU Dresden, GERMANY

12:15 – 12:30
T3B.05 HIGH-SA/V-RATIO TiO2-NANOPARTICLE-ENCAPSULATING HYDROGEL UNIT PROMOTES EFFICIENT LIGHT-DRIVEN SELF-ASSEMBLY
Natsumi Watanabe and Hiroaki Onoe
Keio University, JAPAN

12:30 – 12:45
T3B.06 TITANIUM/SILICA BIOMICROCOMPATIBLE NANOIMPRINTED PARTICLES WITH TUNABLE EXOTHERMIC CHARACTERISTICS FOR FUTURE HYPTHERMIA TECHNOLOGY
Kingkarn Khotchasing, Michiko Shindo, and Takahiro Namazu
Kyoto University of Advanced Science, JAPAN

Session T3C – Energy Harvesters II

Session Chairs:
Philippe Basset, Université Gustave Eiffel, FRANCE
Peter Woias, University of Freiburg, GERMANY

11:15 – 11:30
T3C.01 MEMS ELECTROSTATIC ENERGY HARVESTER WITH RECHARGEABLE ELECTRET BY BUILT-IN CORONA TIPS
Anxin Luo, Mingjie Li, Wenxin Luo, Xiaojiang Liu, and Fei Wang
Southern University of Science and Technology, CHINA

11:30 – 11:45
T3C.02 DUAL-PHASE ROPE-SPUN ELECTRET ROTARY GENERATOR FOR MORPHING WING ENERGY HARVESTING AND DEFORMATION MONITORING
Huipeng Zhou, Xinhui Mao, Zhe Zhao, Yu Liu, Weizheng Yuan, Honglong Chang, and Kai Tao
Northwestern Polytechnical University, CHINA

11:45 – 12:00
T3C.03 ORIGAMI-INSPIRED TRANSFORMABLE ELECTRET GENERATOR FOR FLAPPING-LEAF WIND ENERGY HARVESTING
Boming Lyu, Yangyang Gao, Zhaoshu Yang, Jin Wu, Honglong Chang, Weizheng Yuan, and Kai Tao
1Northwestern Polytechnical University, CHINA
2China Astronaut Research and Training Center, CHINA, and
3Sun Yat-sen University, CHINA
### Session T3C – Energy Harvesters II

**Room A**

**12:00 – 12:15**

**T3C.04 SELF-POWERED DUST REMOVAL SYSTEM FOR SOLAR PANELS DRIVEN BY A ROTARY FREESTANDING-ELECTRET GENERATOR**
Rong Ding, Junchi Teng, Zeyuan Cao, Zibo Wu, Kang Deng, Xiangzhu Yuan, Yujia Cao, and Xiongying Ye
Tsinghua University, CHINA

**12:15 – 12:30**

**T3C.05 FREQUENCY TRACKING OF VIBRATIONAL ENERGY HARvester USING PHASE-LOCKED LOOP (PLL)**
Yuto Akai, Hiroaki Honma, and Hiroshi Toshiyoshi
University of Tokyo, JAPAN

**12:30 – 12:45**

**T3C.06 SUPPRESSING THE AIR-BREAKDOWN PHENOMENON OF ELECTROSTATIC GENERATOR FOR EFFICIENT ENERGY HARVESTING**
Zeyuan Cao, Rong Ding, Junchi Teng, Zibo Wu, and Xiongying Ye
Tsinghua University, CHINA

### Session T3D – Force Sensors

**Session Chairs:**
Honglong Chang, Northwestern Polytechnical University, CHINA
Valentina Zega, Politecnico di Milano, ITALY

**Room D**

**11:15 – 11:45**

**T3D.01 INVITED PRESENTATION**
MEMS SENSOR DRIFT COMPENSATION WITH ON-CHIP STRESS SENSING
Erdinc Tatar
Bilkent University, TURKEY

**11:45 – 12:00**

**T3D.03 AN ACTIVE-MATRIX PIEZOELECTRIC TACTILE SENSOR ARRAY WITH IN-PIXEL AMPLIFIER AND NON-UNIFORMITY COMPENSATION**
Tengteng Lei, Yushen Hu, Xinying Xie, and Man Wong
Hong Kong University of Science and Technology, HONG KONG

**12:00 – 12:15**

**T3D.04 MONOLITHICALLY VERTICAL INTEGRATION WITH CAPACITIVE PROXIMITY AND INDUCTIVE FORCE SENSOR WITH SENSING RANGE ENHANCEMENT**
Ruei-Cing Mai1, Fuchi Shih1, Yuanyuan Huang1, Yu-Hsuan Li1, I-Yu Huang2, Yu-Cheng Lin2, and Wei-leun Fang3
1National Tsing Hua University, TAIWAN, 2National Sun Yat-sen University, TAIWAN, and 3National Cheng Kung University, TAIWAN
Session T3D – Force Sensors

Continued

Room D

12:15 – 12:30  
T3D.05  A LOW POWER AND ULTRATHIN FLEXIBLE SHEAR STRESS SENSOR WITH HIGH SENSITIVITY SUSPENDED OVER A FLEXIBLE SUBSTRATE  
Xiangyu Song, Ke Xiao, and Wei Xu  
Shenzhen University, CHINA

12:30 – 12:45  
T3D.06  A STRAIN-INSENSITIVE STRETCHABLE PATCH SENSOR FOR SIMULTANEOUS MONITORING OF BODY TEMPERATURE AND ECG  
Sudeep Sharma, Ashok Chhetry, Seonghoon Jeong, and Jae Yeong Park  
Kwangwoon University, KOREA

12:45 – 14:15  Lunch and Exhibit Inspection

Poster Session T4P and Exhibit Inspection  
Event Hall

14:15 – 16:15  
Poster presentations are listed by topic category with their assigned number starting on page 51.

Session T5A – Medical Devices II  
Session Chairs:
  Eiji Iwase, Waseda University, JAPAN  
  Michael Kraft, KU Leuven, BELGIUM

New Hall

16:15 – 16:30  
T5A.01  HYBRID BIODEGRADABLE POLYMER STENT FABRICATION USING 3D PRINTERS AND INTEGRATION WITH WIRELESS SENSORS FOR REAL-TIME PRESSURE MONITORING IN BLOOD VESSELS  
Jin-liang Wei, Nomin-Erdene Oyunbaatar, Dong-Su Kim, and Dong-Weon Lee  
Chonnam National University, KOREA

16:30 – 16:45  
T5A.02  A SENSOR-INTEGRATED “SMART” URETERAL STENT AND WIRELESS IN-VITRO TEST FOR REAL-TIME OBSTRUCTION DETECTION  
Mohammad Reza Yousefi Darestani, Dirk Lange, Ben H. Chew, and Kenichi Takahata  
University of British Columbia, CANADA
Session T5A – Medical Devices II
Continued
New Hall

16:45 – 17:00
T5A.03 ULTRA-SOFT NEURAL PROBE WITH A TEMPORARY HIGH-STRENGTH U-SECTION COATING BY PICOSECOND LASER MICROMACHINING
Fanqi Sun1, Xiaoli You1, Yuhao Zhou2, Mengfei Xu3, Xichen Yuan3, Honglong Chang4, Jingquan Liu3, and Bowen Ji1
1Northwestern Polytechnical University, CHINA,
2Hangzhou Dianzi University, CHINA, and
3Shanghai Jiao Tong University, CHINA

17:00 – 17:15
T5A.04 SELF-STRETCHABLE CHRISTMAS-TREE-SHAPED ULTRAFlexible NEURAL PROBES
Ye Tian1,2, Cunkai Zhou1, Kuikui Zhang4, Huiran Yang1, Zhaohan Chen1, Zhilao Zhou1,2, Xiaoling Wei1,2, Tiger H. Tao1,2,3,4, and Liuyang Sun1,2,3
1Chinese Academy of Sciences (CAS), CHINA,
2University of Chinese Academy of Sciences, CHINA,
3Shanghai University of Electric Power, CHINA,
4Nanjing Tech University, CHINA,
5Shanghai Normal University, CHINA,
6Neuroxess Co., Ltd. (Jiangxi), CHINA,
7Guangdong Institute of Intelligence Science and Technology, CHINA, and
8Tianqiao and Chrissy Chen Institute for Translational Research, CHINA

17:15 – 17:30
T5A.05 BIOMIMETIC FLEXIBLE NEURO-PROBE SYSTEM FOR EARLY WARNING WITH FORCE FEEDBACK TO AVOID VASCULAR DAMAGE
Yu Zhou1,2, Huiran Yang1,2, Xueying Wang1,2, Heng Yang1,2, Ke Sun1,2, Zhilao Zhou1,2, Liuyang Sun1,2, Meng Li1,2, Jianlong Zhao1,2, Tiger H. Tao1,2,3,4,5, and Xiaoling Wei1,2
1Chinese Academy of Sciences (CAS), CHINA,
2University of Chinese Academy of Sciences, CHINA,
3Shanghai University of Electric Power, CHINA,
4Nanjing Tech University, CHINA,
5Shanghai Normal University, CHINA,
6Neuroxess Co., Ltd. (Jiangxi), CHINA,
7Guangdong Institute of Intelligence Science and Technology, CHINA, and
8Tianqiao and Chrissy Chen Institute for Translational Research, CHINA

Session T5B – Micromirrors
Session Chairs:
Jaka Pribosek, Silicon Austria Labs GmbH, AUSTRIA
Huikai Xie, Beijing Institute of Technology, CHINA

Event Hall

16:15 – 16:30
T5B.01 INTEGRATED THERMAL CONVECTION-BASED POSITION SENSING FOR ELECTROTHERMAL MICROMIRRORS
Anrun Ren, Yingtao Ding, Hengzhang Yang, Teng Pan, and Huikai Xie
Beijing Institute of Technology, CHINA
Session T5B – Micromirrors
Continued

T5B.02 MEMS SCANNING GRATING BASED COMPACT DIFFUSE REFLECTANCE SPECTROSCOPIC MODULE FOR SKIN ANALYSIS
Jaehun Jeon, Jung-Woo Park, Gi Beom Kim, and Ki-Hun Jeong
Korea Advanced Institute of Science and Technology (KAIST), KOREA

16:45 – 17:00

T5B.03 NOVEL BOW-SHAPE TRANSMISSION SPRINGS FOR PIEZOELECTRIC MEMS MIRROR WITH 180-DEGREES OPTICAL SCANNING ANGLE
Si-Han Chen¹, Shih-Chi Liu¹, Hung-Yu Lin¹, Jerwei Hsieh², and Weileun Fang³
¹National Tsing Hua University, TAIWAN and
²Asia Pacific Microsystems, Inc., TAIWAN

T5B.04 DESIGN OF A BI-AXIAL PIEZOELECTRIC MEMS SCANNER WITH TRI-GIMBAL STRUCTURE FOR SCANNING PATTERN ENHANCEMENT
Chih-Chen Hsu¹, Hao-Chien Cheng¹², Shi-Chi Liu¹, Hung-Yu Lin¹, Mingching Wu², Kai-Chih Liang³, and Weileun Fang¹
¹National Tsing Hua University, TAIWAN and
²Coretronic MEMS Corporation, TAIWAN

17:15 – 17:30

T5B.05 FABRICATION AND CHARACTERIZATION OF A NOVEL PIEZOELECTRIC MEMS MIRROR WITH HIGH FILL FACTOR AND HIGH SPEED
Yang Wang¹, LiHao Wang¹, Hao Zhang³, YiChen Liu¹, YuYao Zhang³, WeiHong Zhu¹, YongGui Zhang³, and Zhenyu Wu¹²³⁴
¹Shanghai Institute of Microsystem and Information Technology, CHINA, ²Shanghai Industrial Technology Research Institute, CHINA, ³Shanghai University, CHINA, ⁴University of Chinese Academy of Sciences, CHINA, and ²Chinese Academy of Sciences (CAS), CHINA
Session T5C – Acoustic Devices

Session Chairs:
Sid Ghosh, Northeastern University, USA
Göran Stemme, KTH – Royal Institute of Technology, SWEDEN

Room A

16:15 – 16:30
T5C.01 LOW DIELECTRIC LOSS TANGENT, HIGHLY SCANCIUM DOPED ALUMINUM NITRIDE THIN FILM FOR ACOUSTIC DEVICES
Takahiro Higuchi1, Akihiko Teshigahara1, Kenji Kijima1, Takashi Kakefuda2, Takahide Usui2, Yusuke Kawai1, Takashi Omichi2, and Hiroyuki Wado1
1 MIRISE Technologies Corporation, JAPAN and 2 Nisshinbo Micro Devices Inc., JAPAN

16:30 – 16:45
T5C.02 HOW TO TURN A MEMS MICROPHONE INTO A PHOTOACOUSTIC SENSOR: AN EXPERIMENTAL STUDY
Thomas Strahl1,2, Jonas Steinbrunner2, Christian Weber1,2, Jürgen Wöllenstein1,2, and Katrin Schmitt1,2
1 University of Freiburg, GERMANY and 2 Fraunhofer Institute for Physical Measurement Techniques IPM, GERMANY

16:45 – 17:00
T5C.03 WAFER-SCALE TRANSFER-FREE GRAPHENE MEMS CONDENSER MICROPHONES
Roberto Pezone, Gabriele Baglioni, Leonardo di Paola, Pasqualina M. Sarro, Peter G. Steeneken, and Sten Vollebregt
Delft University of Technology, NETHERLANDS

17:00 – 17:15
T5C.04 A NOVEL HIGH-SNR FULL BANDWIDTH PIEZOELECTRIC MEMS MICROPHONE BASED ON A FULLY CLAMPED ALUMINUM NITRIDE CORRUGATED MEMBRANE
Gabriele Bosetti1, Christian Breththauer2, Andreas Bogner2, Michael Krenzer2, Karolina Gierl2, Hans-Joerg Timme2, Heinrich Heiss2, and Gabriele Schrag1
1 Technical University of Munich, GERMANY and 2 Infineon Technologies AG, GERMANY

17:15 – 17:30
T5C.05 DUAL-FREQUENCY ALUMINUM SCANDIUM NITRIDE PIEZOELECTRIC MICROPHONES WITH WIDE BANDWIDTH, LARGE DYNAMIC RANGE, AND HIGH SENSITIVITY FOR WIND TUNNEL TESTING
Yanfen Zhai1, Thai Anh Tuan Nguyen2, Lokesh Kumar Reddy Oneru1, Claire Bourquard1, Annalisa De-Pastina1, Alexander Shatalov1, Nikolai Andrianov1, Xuyuan Chen2, and Lixiang Wu1
1 Silicon Austria Labs GmbH (SAL), AUSTRIA and 2 University of South-Eastern Norway, NORWAY
<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>16:15</td>
<td>T5D.01 OPENABLE DOUBLE-MICROTUBES STRUCTURE DRIVEN BY PNEUMATIC BALLOON ACTUATOR ARRAYS FOR TUBULAR ORGAN-ON-A-CHIP</td>
<td>Shiho Shimizu, Keiichiro Nishizaki, and Satoshi Konishi</td>
<td>Ritsumeikan University, JAPAN</td>
</tr>
<tr>
<td>16:30</td>
<td>T5D.02 ACOUSTOFLUIDIC MICROMANIPULATION SYSTEM WITH AN OPEN MICROFLUIDIC CHIP</td>
<td>Natsumi Hirata and Takeshi Hayakawa</td>
<td>Chuo University, JAPAN</td>
</tr>
<tr>
<td>16:45</td>
<td>T5D.03 SPERM ENRICHMENT AND FOULING MITIGATION IN BUBBLE-BASED ACOUSTOFLUIDIC FILTRATION MICRODEVICE</td>
<td>Ting-Yu Wan, Tsui-Ting Lee, Hsiao-Lin Hwa, and Yen-Wen Lu</td>
<td>National Taiwan University, TAIWAN</td>
</tr>
<tr>
<td>17:00</td>
<td>T5D.04 ACOUSTIC TWEezERS USING BISYMMETRIC COHERENT SURFACE ACOUSTIC WAVES FOR RECONFIGURABLE MODULATION OF PARTICLE MULTIMERS</td>
<td>Hemin Pan, Deqing Mei, and Yancheng Wang</td>
<td>Zhejiang University, CHINA</td>
</tr>
<tr>
<td>17:15</td>
<td>T5D.05 LASER-WRITTEN CONDUCTIVE TRACKS FOR THE INTEGRATION OF SURFACE-MOUNT DEVICES INTO PMMA</td>
<td>Tina Mitteramskogler, Andreas Fuchsluger, Rafael Ecker, Andreas Tröls, and Bernhard Jakoby</td>
<td>Johannes Kepler University Linz, AUSTRIA</td>
</tr>
</tbody>
</table>
**Special Event – Industry**

**Session Chair:**
Shuji Tanaka, Tohoku University, JAPAN

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
<th>Presenter</th>
<th>Location</th>
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</thead>
<tbody>
<tr>
<td>17:40 – 18:10</td>
<td><strong>FROM MEMS-SENSORS TO BIOMEMS – INVENTED FOR LIFE</strong></td>
<td>Franz Lärmer, Robert Bosch GmbH, GERMANY</td>
<td>New Hall</td>
</tr>
<tr>
<td>18:10 – 18:40</td>
<td><strong>EPSON’S MEMS TECHNOLOGY: PRECISION CORE A NEXT-GENERATION</strong></td>
<td>Eiju Hirai, Seiko Epson Corporation, JAPAN</td>
<td>New Hall</td>
</tr>
<tr>
<td>18:40 – 19:10</td>
<td><strong>MARKET DEVELOPMENT IN THE WORLD OF MEMS AND SENSORS</strong></td>
<td>Paul Carey, SEMI MEMS &amp; Sensors Industry Group, USA</td>
<td>New Hall</td>
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</tbody>
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**Tuesday Wine and Cheese Reception**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
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<tr>
<td>19:10 – 20:00</td>
<td>End of Day</td>
</tr>
</tbody>
</table>
WEDNESDAY AT A GLANCE

08:30 – 09:15
Plenary Presentation 3
Molly S. Shoichet, University of Toronto, CANADA

09:15 – 09:30
Transition Break

09:30 – 10:45
Session W2A Fluidic Control
Session W2B Optical Devices
Session W2C Packaging & Fabrication
Session W2D Non-Linear Resonators

10:45 – 11:15
Break and Exhibit Inspection

11:15 – 12:45
Session W3A Microfluidics III
Session W3B Chemical Sensors I
Session W3C Resonating Devices
Session W3D Logic Devices & Switches

12:45 – 14:15
Lunch

14:15 – 16:15
Poster Session W4P and Exhibit Inspection

16:15 – 17:45
CONFERENCE BANQUET

18:00 – 21:00

WEDNESDAY PROGRAM

28 JUNE

Plenary Presentation 3
Session Chair:
Ellis Meng, University of Southern California, USA

New Hall

08:30 – 09:15
W1A.P3 MIMICKING THE CELLULAR MICROENVIRONMENT WITH 3D HYDROGELS ENABLES TARGET DISCOVERY AND DRUG SCREENING
Molly S. Shoichet, Arianna Skyrzinska, Laura Bahlmann, Laura Smith, Amber Xue, Roger Tam, Alexander Baker, and Alexzandria Tiffany
University of Toronto, CANADA

09:15 – 09:30
Transition
Session W2A – Fluidic Control
Session Chairs:
Hanseup Kim, University of Utah, USA
Daisuke Yamane, Ritsumeikan University, JAPAN
New Hall

09:30 – 09:45
W2A.01 MICRODROPLET REACTIONS BY HYPERBRANCHED, SPACE-FILLING OPEN MICROFLUIDIC CHANNELS
Hiroyuki Kai
Toyo University, JAPAN

09:45 – 10:00
W2A.02 CHIRALITY SENSING MECHANISM USING VERTICAL CONTACT CONTROL OF LIQUID CRYSTAL MICRO-DROPLETS
Shinji Bono1,2,3 and Satoshi Konishi1,2,3
1 Ritsumeikan University, JAPAN, 2 Ritsumeikan Advanced Research Academy, JAPAN, and 3 Ritsumeikan Global Innovation Research Organization, JAPAN

10:00 – 10:15
W2A.03 LOCALIZED ELECTROCHEMICAL DEPOSITION OF MULTI-METAL STRUCTURES BY HYDRODYNAMIC FLOW CONFINEMENT
Daniel Widerker1, Govind Kaigala1, and Moran Bercovici2
1 Technion, Israel Institute of Technology, ISRAEL and 2 University of British Columbia, CANADA

10:15 – 10:30
W2A.04 LENS-LESS ACOUSTIC TWEETERS BASED ON SPIRAL-ARM VORTEX-BEAM TRANSDUCERS CAPABLE OF LEVITATING, TRAPPING, AND MANIPULATING LARGE AND HEAVY PARTICLES
Jaehoon Lee, Kianoush Sadeghian Esfahani, Matin Barekatain, and Eun S. Kim
University of Southern California, USA

10:30 – 10:45
W2A.05 FLUORESCENCE-ACTIVATED MULTI-SORTING OF SINGLE CELLS UTILIZING HIGH-SPEED ON-CHIP FLOW CONTROL
Makoto Saito1, Niko Kimura1, Shigeo S. Sugano2, Yoko Yamanishi1, Fumihito Ara1, and Shinya Sakuma1
1 Kyushu University, JAPAN, 2 National Institute of Advanced Industrial Science and Technology (AIST), JAPAN, and 3 University of Tokyo, JAPAN
Session W2B – Optical Devices
Session Chairs:
Victor Javier Cadarso Busto, Monash University, AUSTRALIA
Ulrike Wallrabe, University of Freiburg, GERMANY

Event Hall
09:30 – 09:45
W2B.01 METAMATERIAL-ENHANCED VIBRATIONAL CIRCULAR DICHROISM FOR MID-INFRARED SPECTROSCOPIC NANSENSORS
Cheng Xu1,2, Zhihao Ren1,2, Hong Zhou1,2, Jingkai Zhou1, Chong Pei Ho2, Nan Wang2, and Chengkuo Lee1
1 National University of Singapore, SINGAPORE and 2 Agency for Science, Technology and Research (A*STAR), SINGAPORE

09:45 – 10:00
W2B.02 MULTIFUNCTIONAL METASURFACE FOR A MINIATURIZED REFLECTION-TYPE ATOMIC VAPOR CELL
Ponrapee Prutphongs1, Katsuma Aoki1, Satoshi Ikezawa1, Motoaki Hara2, and Kentaro Iwami1
1 Tokyo University of Agriculture and Technology, JAPAN and 2 National Institute of Information and Communication Technology, JAPAN

10:00 – 10:15
W2B.03 AN ALL-METAL METASURFACE FOR HIGH-EFFICIENCY REFRACTIVE INDEX SENSING BASED ON REFLECTION-TYPE SURFACE LATTICE RESONANCE
Liye Li1, Lijun Ma1, Yifan Ouyang1, Hongshun Sun1, Shengxiao Jin1, Senyong Hu1, Meizhang Wu2, Zhimei Qi3, and Wengang Wu1
1 Peking University, CHINA, 2 University of Science and Technology Beijing, CHINA, and 3 University of Chinese Academy of Sciences, CHINA

10:15 – 10:30
W2B.04 AN INTEGRATED PLATFORM FOR CAVITY OPTOMECHANICS WITH VACUUM-SEALED SILICON PHOTONIC MEMS
Pierre Edinger1, Gaehun Jo1, Simon J. Bleiker1, Alain Y. Takabayashi2, Niels Quack2, Peter Verheyen3, Umar Khan1,4, Wim Bogaerts3,4, Cleitus Antony5, Frank Niklaus1, and Kristinn B. Gylfason1
1 KTH Royal Institute of Technology, SWEDEN, 2 École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND, 3 IMEC, BELGIUM, 4 Ghent University, BELGIUM, and 5 Tyndall National Institute, IRELAND

10:30 – 10:45
W2B.05 FIRST DEMONSTRATION OF SELF-POWERED ALGAN/GAN UV PHOTODETECTOR ENABLED BY NON-PLANAR SCHOTTKY DEPLETION
Yuhan Pu1,2 and Yung C. Liang1,2
1 National University of Singapore, SINGAPORE and 2 National University of Singapore (Suzhou) Research Institute, CHINA
Session W2C – Packaging & Fabrication

Session Chairs:
Chun Wen “Emerson” Cheng, TSMC, TAIWAN
Hiromasa Yagyu, Kanto Gakuin University, JAPAN

Room A

09:30 – 09:45
W2C.01 3D PRINTING OF SILICA-HSQ COMPOSITES WITH SUB-MICROMETER RESOLUTION AND SELECTIVELY GENERATED SILICON NANOCRYSTALS
Po-Han Huang1, Miku Laakso1, Oliver Hartwig2, Georg S. Duesberg2, Göran Stemme1, Kristinn B. Gýfason1, and Frank Niklaus1
1KTH Royal Institute of Technology, SWEDEN and 2Universität der Bundeswehr Munich, GERMANY

09:45 – 10:00
W2C.02 A TIME-MATCHED SIO2-LAYER ETCH FOR ADVANCED MEMS FOUNDRY PROCESSED MULTI-PROJECT CHIP (MPC)
Sushil Kumar, Khanjan Joshi, and Pushpapraj Singh
Indian Institute of Technology Delhi, INDIA

10:00 – 10:15
W2C.03 LIQUID-IN-A-MEMS: ENCAPSULATION OF LIQUID IN A MICROCAPSULE BY INKJET PRINTING
Jongeon Park, Arnaud Bertsch, and Juergen Brugger
École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND

10:15 – 10:30
W2C.04 DOUBLE-LEVEL TEMPORARY PROTECTIVE PACKAGING OF TSV-BASED MICRO-MIRROR ARRAY FOR OPTICAL-WINDOW-FREE VERTICAL INTEGRATION
Yuhu Xia1,2, Biyun Ling1, Xiaoyue Wang1, Minli Cai1,2, and Yaming Wu1,2
1Chinese Academy of Sciences (CAS), CHINA and 2University of Chinese Academy of Sciences, CHINA

10:30 – 10:45
W2C.05 THE HETEROGENEOUS PACKAGING OF A 3 × 3 MINI-LED ARRAY FOR SMART CONTACT LENS APPLICATIONS
Cheng-Wei Tsai, Guan-Ting Yeh, Shun-Hsi Hsu, Shin-Ho Wu, Yu-Hsuan Huang, Her-Ming Chiu, and Jin-Chern Chiou
National Yang Ming Chiao Tung University, TAIWAN
Session W2D – Non-Linear Resonators

Session Chairs:
Cristina Consani, Silicon Austria Labs GmbH, AUSTRIA
Hao Jia, Chinese Academy of Sciences (CAS), CHINA

Room D

09:30 – 09:45
W2D.01 OPERATION OF ARRAYED LOGIC ELEMENTS FOR MEMS ISING MACHINE
Shun Yasunaga, Motohiko Ezawa, Keigo Tsuji, Kei Misumi, Tomoki Sawamura, Shinji Tsuboi, Ayako Mizushima, Yukinori Ochiai, Akio Higo, and Yoshio Mita
University of Tokyo, JAPAN

09:45 – 10:00
W2D.02 EFFICIENT RESERVOIR COMPUTING BY NONLINEARLY COUPLED PIEZOELECTRIC MEMS RESONATORS
Takeshi Yoshimura¹, Taiki Haga¹, Norifumi Fujimura¹, Kensuke Kanda², and Isaku Kanno³
¹Osaka Metropolitan University, JAPAN, ²University of Hyogo, JAPAN, and ³Kobe University, JAPAN

10:00 – 10:15
W2D.03 CONSTRUCTING MICROMECHANICAL FREQUENCY COMBS IN BIFURCATING ATTRACTOR BRANCHES FOR EVENT TRIGGERED SENSORS
Ting-Yi Chen, Chun-Pu Tsai, and Wei-Chang Li
National Taiwan University, TAIWAN

10:15 – 10:30
W2D.04 VIBRO-IMPACT PERTURBATION BASED ATTRACTOR EXCHANGER FOR OPEN-LOOP NONLINEAR RESONATORS
Chun-Pu Tsai and Wei-Chang Li
National Taiwan University, TAIWAN

10:30 – 10:45
W2D.05 IMPROVING THE DYNAMIC RANGE AND RESOLUTION OF MEMS RESONANT SENSORS UTILIZING NONLINEAR CANCELLATION
Chengxin Li¹, Aojie Quan¹, Hemin Zhang², Chen Wang¹, Mustafa Mert Torunbalci², Linlin Wang¹, Chenxi Wang¹, Yangyang Guan¹, Yuan Wang⁴, and Michael Kraft³
¹KU Leuven, BELGIUM, ²Northwestern Polytechnical University, CHINA, ³Broadcom, USA, and ⁴University of Macau, CHINA

10:45 – 11:15
Break and Exhibit Inspection
Session W3A – Microfluidics III

Session Chairs:
Andreu Llobera, Silicon Austria Labs GmbH, AUSTRIA
Göran Stemme, KTH – Royal Institute of Technology, SWEDEN

New Hall

11:15 – 11:45

W3A.01 INVITED PRESENTATION
FUNCTIONAL MATERIALS FOR SENSING AND ACTUATION IN MICROFLUIDICS
Sandra García-Rey, Udara Bimendra Gunatilake, Yara Alvarez-Braña, Lourdes Basabe-Desmonts, and Fernando Benito-Lopez
University of the Basque Country, SPAIN

11:45 – 12:00

W3A.03 A HIGH-THROUGHPUT UNIFORM-SIZED DROPLET GENERATOR WITH A TRIANGULAR CROSS-SECTION CHANNEL FABRICATED BY SIMPLE MEMS PROCESS AND SELF-ALIGNMENT
Byeolnim Oh¹, Youngsoo Cho², Jaewon Park³, Younghak Cho³, and Hyun Soo Kim¹
¹Kwangwoon University, KOREA, ²Seoul National University of Science and Technology, KOREA, and ³Korea University, KOREA

12:00 – 12:15

W3A.04 IONIC SIGNAL AMPLIFICATION ACTUATED BY GAS DISSOLUTION
Sangjin Seo and Taesung Kim
Ulsan National Institute of Science and Technology (UNIST), KOREA

12:15 – 12:30

W3A.05 ALGINATE HYDROGEL MICROBEADS WITH DIFFERENT MESH STRUCTURES ENABLE CONTROLLED RELEASE OF ADENO-ASSOCIATED VIRUS FOR GENE THERAPY
Aiki Hioki¹, Shuhei Takatsuka¹, Yuta Kurashina², and Hiroaki Onoe¹
¹Keio University, JAPAN and ²Tokyo University of Agriculture and Technology, JAPAN

12:30 – 12:45

W3A.06 MECHANISM OF DRUG RELEASING UNIT VIA OSCILLATING BUBBLES AND INTEGRATION WITH 3-D MICROSWIMMER
Wenbo Li, Fang-Wei Liu, and Sung Kwon Cho
University of Pittsburgh, USA
Session W3B – Chemical Sensors I

Session Chairs:
Mehdi Javanmard, Rutgers University New Brunswick, USA
Roland Zengerle, Hahn-Schickard-Gesellschaft e.V., GERMANY

Event Hall

11:15 – 11:30
W3B.01 HYDROGEN-SENSING PROPERTIES AND REDUCTION-INDUCED SENSING MECHANISM OF NICKEL OXIDE NANOPlates
Tao Zhang1,2, Ying Chen1, Ming Li1, Pengcheng Xu1,3, Xinxin Li1,3, and Dan Zheng2
1Chinese Academy of Sciences (CAS), CHINA, 2Shanghai Institute of Technology, CHINA, and 3University of Chinese Academy of Sciences, CHINA

11:30 – 11:45
W3B.02 QUANTITATIVE MEASUREMENTS OF ADSORBED OXYGEN SPECIES ON MATERIAL SURFACE FOR HIGH-PERFORMANCE GAS SENSOR DESIGN
Ruomeng Guo1,2, Xinyu Li1,3, Ming Li1,3, Ying Chen1,3, Pengcheng Xu1,3, and Xinxin Li1,3
1Chinese Academy of Sciences (CAS), CHINA, 2ShanghaiTech University, CHINA, and 3University of Chinese Academy of Sciences, CHINA

11:45 – 12:00
W3B.03 FAST AND SIMULTANEOUS GAS SENSING METHOD IN MIXED GASES USING MULTIPLE MICROMACHINED THERMAL CONDUCTIVITY DETECTORS FOR FUTURE CARBON-NEUTRAL SOCIETY
Hiroaki Yamazaki, Ping Wang, Naoya Fujiwara, Yoshihiko Kurui, Naoki Hiramatsu, Fumitaka Ishibashi, Ryota Kitagawa, and Akihiro Kojima
Toshiba Corporation, JAPAN

12:00 – 12:15
W3B.04 A CHAMELEON–INSPIRED FLEXIBLE HUMIDITY SENSOR BASED ON PEDOT: PSS–MEDIATED THERMOCHROMIC LIQUID CRYSTAL COMPOSITE MATERIALS
Chong-Ren Sun, Yu-Hsuan Cheng, and Ching-Te Kuo
National Sun Yat-sen University, TAIWAN

12:15 – 12:30
W3B.05 MONOLITHIC INTEGRATION OF GAS/HUMIDITY/TEMPERATURE SENSORS WITH THERMAL COUPLING EFFECT REDUCTION
Ch‘ir-T’e Fang1, Tung-Lin Chien1, Yung-Chen Li1, Yuanyuan Huang1, Yu-Cheng Lin2, I-Yu Huang3, and Weileun Fang2
1National Tsing Hua University, TAIWAN, 2National Cheng Kung University, TAIWAN, and 3National Sun Yat-sen University, TAIWAN
Session W3B – Chemical Sensors I
Continued
Event Hall

12:30 – 12:45

W3B.06 FABRICATION OF HIGH-RESOLUTION MULTI-ION IMAGE SENSOR USING RUBBER-BASED NEGATIVE RESIST AND EXTRACELLULAR ION IMAGING IN THE HIPPOCAMPAL SLICE
Moe Kato1, Jumpei Otsuka1, Hideo Doi1, Bijay Parajuli2, Tomoko Horio1, Eiji Shigtomi2, Yuichi Shinozaki2, Yong Joon Choi3, Kazuhiro Takahashi4, Toshiaki Hattori1, Toshihiko Noda4, Schuichi Koizumi5, and Kazuaki Sawada1
1 Toyohashi University of Technology, JAPAN and 2 University of Yamanashi, JAPAN

Session W3C – Resonating Devices
Session Chairs:
Sheng-Shian Li, National Tsing Hua University, TAIWAN
Mohssen Moridi, Silicon Austria Labs GmbH, AUSTRIA
Room A

11:15 – 11:30

W3C.01 TEMPERATURE COMPENSATION IN CMOS-MEMS OSCILLATORS VIA FOLDED-ANCHOR RESONATOR GEOMETRICAL TUNING
Rafel Perelló-Roig1,2, Salvador Barceló1,2, Jaume Verd1,2, Sebastià Bota1,2, and Jaume Segura1,2
1 University of the Balearic Islands, SPAIN and 2 Health Research Institute of the Balearic Islands, SPAIN

11:30 – 11:45

W3C.02 COMPACT MEMS TEMPERATURE SENSOR EXPLOITING A DUAL-MODE POLYSILICON RESONATOR AND PHASE-LOCKED-LOOP MULTIPLICATION
Paolo Frigerio1, Andrea Fagnani1, Valentina Zega1, Gabriele Gattere2, Attilio Frangi1, and Giacomo Langfelder1
1 Politecnico di Milano, ITALY and 2 STMicroelectronics, ITALY

11:45 – 12:00

W3C.03 LISSAJOUS-FM RESONANT MAGNETOMETER
Linxin Zhang, Takashiros Tsukamoto, and Shuji Tanaka
Tohoku University, JAPAN

12:00 – 12:15

W3C.04 EXPLOITING BLUE SIDEBAND EXCITATION TO ENHANCE MODE LOCALIZATION IN A RESONANT DOUBLE-ENDED TUNING FORK MAGNETOMETER
Yuan Wang1, Chun Zhao2, Jingqian Xi1, Huafeng Liu2, Chen Wang2, Linlin Wang2, Shaolin Zhang3, Qiu Wang4, Fangjing Hu5, and Michael Kraft6
1 University of Macau, CHINA, 2 University of York, UK, 3KU Leuven, BELGIUM, and 4 Huazhong University of Science and Technology, CHINA
Session W3C – Resonating Devices
Continued

Room A

12:15 – 12:30
W3C.05
A FREQUENCY COMB WITH HIGH RESOLUTION AND LOW THRESHOLD POWER BASED ON A SINGLE MODE CIRCULAR RESONATOR
Hongyu Chen, Dongyang Chen, Ronghua Huan, and Jin Xie
Zhejiang University, CHINA

12:30 – 12:45
W3C.06
A MASS SENSOR BASED ON 3-DOF MODE LOCALIZED BAW RESONATORS WITH ENHANCED QUALITY FACTOR AND RESOLUTION
Linlin Wang1, Chen Wang1, Aojie Quan1, Yuan Wang2, Chenxi Wang1, Bernardo P. Madeira1, Chengxin Li1, and Michael Kraft1
1KU Leuven, BELGIUM and 2University of Macau, CHINA

Session W3D – Logic Devices & Switches

Session Chairs:
Deyong Chen, University of Chinese Academy of Sciences, CHINA
Caroline Coutier, CEA Leti, FRANCE

Room D

11:15 – 11:45
W3D.01
INVITED PRESENTATION
HARDWARE PLATFORM FOR EDGE COMPUTING BASED ON NANOELECTROMECHANICAL RELAYS
Dinesh Pamunuwa1, Elliott Worsey1, Qi Tang1, Mukesh K. Kulsreshath1, Victor Marot1, Yingying Li2, and Simon Bleiker2
1University of Bristol, UK and 2Royal Institute of Technology (KTH), SWEDEN

11:45 – 12:00
W3D.03
CORRECTION OF TRANSMITTERS’ PIXEL VALUES IN AN ULTRASONIC FOURIER TRANSFORM ANALOG COMPUTING APPARATUS
Xing Haw Marvin Tan1, Daniel Ssu-Han Chen1, Zaifeng Yang1, Viet Phuong Bui1, Kevin Tshun Chuan Chai1, Ching Eng Png1, and Amit Lai2
1Agency of Science Technology and Research (A*STAR), SINGAPORE and 2Cornell University, USA

12:00 – 12:15
W3D.04
ADIABATIC LOGIC GATES FOR ULTRA-LOW-POWER OPERATION USING CONTACTLESS CAPACITIVE MEMS
Aleksandra Marković1, Laurent Mazenq1, Adrian Laborde1, Hervé Fanet2, Gaël Pillonnet2, and Bernard Legrand2
1Université de Toulouse, FRANCE and 2Université Grenoble Alpes, FRANCE
Session W3D – Logic Devices & Switches

**W3D.05** FULLY 3D-PRINTED, SEMICONDUCTOR-FREE, TRANSISTOR-LIKE LOGIC DEVICES
Jorge Cañada and Luis Fernando Velásquez-García
Massachusetts Institute of Technology, USA

12:30 – 12:45

**W3D.06** ROBUST MEMS WAVEGUIDE SWITCH FOR THZ SPECTROSCOPY IN SPACE
Sofia Rahiminejad, Sven van Berkel, Robin H. Lin, Cecile Jung-Kubiak, Goutam Chattopadhyay, and Mina Rais-Zadeh
California Institute of Technology, USA

12:45 – 14:15 Lunch and Exhibit Inspection

Poster Session W4P and Exhibit Inspection

Poster presentations are listed by topic category with their assigned number starting on page 51.

Session W5B – Chemical Sensors II

**W5B.01** INVITED PRESENTATION GAS SENSING MECHANISMS REVEALED WITH EMERGING IN-SITU CHARACTERIZATION TECHNIQUES
Pengcheng Xu¹,² and Xinxin Li¹,²
¹Chinese Academy of Sciences, CHINA and ²University of Chinese Academy of Sciences, CHINA

16:45 – 17:00

**W5B.03** HIGH-RESPONSIVITY SINGLE-CRYSTAL SILICON MEMS THERMOPILES FOR DIFFERENTIAL THERMAL ANALYSIS (DTA)
Haozhi Zhang¹,², Hao Jia¹,², Weiwén Feng¹,², Pengcheng Xu¹,², and Xinxin Li¹,²
¹Chinese Academy of Sciences (CAS), CHINA and ²University of Chinese Academy of Sciences, CHINA
**Session W5B – Chemical Sensors II**

**Continued**

**Event Hall**

**17:00 – 17:15**

**W5B.04** A NON-ENZYMATIC ELECTROCHEMICAL SENSOR BASED ON CERIUM OXIDE NANOCUBES FOR THE RAPID DETECTION OF HYDROGEN PEROXIDE RESIDUES IN FOOD SAMPLES

Xuefeng Wang\(^1\,2\), Jiaci Shi\(^3\), Wei Shen\(^1\,3\), Pengcheng Xu\(^1\,2\), and Xinxin Li\(^1\,2\)

\(^1\) Chinese Academy of Sciences (CAS), CHINA, \(^2\) University of Chinese Academy of Sciences, CHINA, and \(^3\) Shanghai Normal University, CHINA

**17:15 – 17:30**

**W5B.05** LONG-LIFE SENSING FILM STRUCTURE AND RELIABILITY EVALUATION OF PD-CU-SI-METALLIC GLASS FOR HYDROGEN SENSOR

Yumi Hayashi, Naoki Hiramatsu, Hiroaki Yamazaki, and Akihiro Kojima

Toshiba Corporation, JAPAN

**17:30 – 17:45**

**W5B.06** CMOS GAS-SENSING ARRAY BY NOVEL SENSING APPROACH USING MIXED-PIXEL ARCHITECTURE FOR DETECTION OF VARIOUS RESPONSE OF GAS-SENSITIVE MEMBRANES

Takeru Wada, Tomoki Kamijo, Yoshihiko Noda, Daisuke Akai, Takeshi Hizawa, Yasuyuki Kimura, Yong-Jooon Choi, Kazuhiro Takahasi, Kazuaki Sawada, and Yoshihiko Noda

Toyoohashi University of Technology, JAPAN

**Session W5C – RF Resonators**

**Session Chairs:**

Azadeh Ansari, Georgia Institute of Technology, USA

Ming-Huang Li, National Tsing Hua University, TAIWAN

**Room A**

**16:15 – 16:30**

**W5C.01** AN INTRINSICALLY TEMPERATURE-COMPENSATED FULLY DIFFERENTIAL CMOS-MEMS RESONATOR WITH DUAL-RESISTOR PIEZORESISTIVE DETECTION

Zhi-Qiang Lee, Jie-Sheng Jiang, Hung-Yu Chen, Sheng-Shian Li, and Ming-Huang Li

National Tsing Hua University, TAIWAN

**16:30 – 16:45**

**W5C.02** VERY HIGH FREQUENCY STABILITY OF SINGLE-CRYSTAL SILICON THERMAL-PIEZORESISTIVE RESONATORS WITH PHASE-LOCKED LOOP

Connor A. Watkins\(^1\), Jaesung Lee\(^1\), Jonathan P. McCandless\(^2\,3\), Harris J. Hali\(^4\), and Philip X.-L. Feng\(^1\,3\)

\(^1\) University of Florida, USA, \(^2\) Air Force Research Laboratory, USA, and \(^3\) Case Western Reserve University, USA
Session W5C – RF Resonators

Continued

Room A

16:45 – 17:00

W5C.03 REDUCED ORDER MODELING OF PIEZOELECTRIC RESONATORS WITH MULTI-FREQUENCY IMPEDANCE ESTIMATION
Kuan-Ting Chen, Tzu-Hsuan Hsu, Guan-Lin Wu, and Ming-Huang Li
National Tsing Hua University, TAIWAN

17:00 – 17:15

W5C.04 EXPERIMENTAL STUDY OF THE ORIGIN OF NONLINEAR DAMPING IN VERY HIGH FREQUENCY CONTOUR MODE RESONATORS
Yi Chan1, Xuetian Wang1, Juan S. Gomez-Diaz2, and Jeronimo Segovia-Fernandez3
1Beijing Institute of Technology, CHINA, 2University of California, Davis, USA, and 3Texas Instruments, USA

17:15 – 17:30

W5C.05 MICRO-TO-NANOACOUSTIC SCALN LAMB WAVE RESONATORS: FREQUENCY SCALING TOWARDS THE MM-WAVE SPECTRUM
Gabriel Giribaldi, Luca Colombo, Pietro Simeoni, and Matteo Rinaldi
Northeastern University, USA

17:30 – 17:45

W5C.06 NONLINEAR PERFORMANCE OF MONOLITHICALLY INTEGRATED SCALN-BASED GHZ ACOUSTIC FILTERS WITH RFSOI SWITCHES
Chen Liu, Ying Zhang, Xinghua Wang, Wenjia Yang, Eugene Yi Zhun Woo, Daniele Yan, Raja M. Kumarasamy, Nan Wang, and Yao Zhu
Agency of Science Technology and Research (A*STAR), SINGAPORE

Session W5D – Intelligent Bio-Chemical Sensors

Session Chairs:
Paddy French, TU Delft, NETHERLANDS
Bruno Le Pioufle, ENS Paris-Saclay, FRANCE

Room D

16:15 – 16:30

W5D.01 A MICROSYSTEM FOR NON-INVASIVE IMAGING AND SIMULTANEOUS MULTIMARKER 3D IMAGING
Erick J. Vargas-Ordaz, Terrance Lam, Bonan Liu, Fabrizio Horta, Michelle L. Halls, Adrian Neild, and Victor J. Cadarso
Monash University, AUSTRALIA

16:30 – 16:45

W5D.02 FABRICATION AND DEMONSTRATION OF FILTER-FREE WAVELENGTH IMAGE SENSOR FOR VISUALIZATION OF WAVELENGTH INFORMATION
Tomoya Ide, Yong-Joon Choi, Nakano Kakeru, Tsugumi Sakae, Ryoya Matsubara, Yasuyuki Kimura, Kensuke Murakami, Yoshiko Noda, Daisuke Akai, Takashi Hizawa, Hiromu Ishii, Kazzuhiro Takahashi, Toshikiko Noda, and Kazuaki Sawada
Toyoashi University of Technology, JAPAN
Session W5D – Intelligent Bio-Chemical Sensors

16:45 – 17:00
W5D.03 WIRELESS SOIL PH SENSING USING FULLY-DEGRADABLE SPRIT-RING-RESONATOR ARRAY WITH ISOTROPIC ELECTROMAGNETIC RESPONSE
Ken Sakabe¹, Tetsuo Kan², and Hiroaki One⁴¹
¹Keio University, JAPAN and ²University of Electro-Communications, JAPAN

17:00 – 17:15
W5D.04 MOF-INTEGRATED ULTRA-BROADBAND NANOANTENNAS FOR MACHINE-LEARNING-ENABLED VOC GAS IDENTIFICATION
Hong Zhou, Dongxiao Li, Zhihao Ren, Cheng Xu, Chan Wang, and Chengkuo Lee
National University of Singapore, SINGAPORE

17:15 – 17:30
W5D.05 TACTILE-OLFACTORY FUSION HUMANOID HAND FOR ENVIRONMENTAL SENSING WITH FAST NONLINEAR DECISION-MAKING
Jiachuang Wang¹², Xiawei Yue⁴², Shuai Wei³², Pingping Zhang³, Nan Qin³², and Tiger H. Tao¹²⁴⁵⁶
¹Chinese Academy of Sciences (CAS), CHINA, ²University of Chinese Academy of Sciences, CHINA, ³Suzhou Huiwen Nanotechnology Co., Ltd, Suzhou, CHINA, ⁴Neuroxess Co., Ltd. (Jiangxi), CHINA, ⁵Guangdong Institute of Intelligence Science and Technology, CHINA, and ⁶Tianqiao and Chrissy Chen Institute for Translational Research, CHINA

17:30 – 17:45
W5D.06 A GAS SENSOR ARRAY PACKAGED WITH A HIERARCHICAL NEURAL NETWORK FOR GAS SPECIES IDENTIFICATION AND CONCENTRATION ESTIMATION
Zong Liu¹², Gabriel E. Carranza¹, Yushen Hu¹, Fei Wang², and Man Wong¹
¹Hong Kong University of Science and Technology, CHINA and ²Southern University of Science and Technology, CHINA

Session W5E – Functional Materials & Fabrication II

Session Chairs:
Olivier Paul, University of Freiburg, GERMANY
Yi Chiu, National Yang Ming Chiao Tung University, TAIWAN

Room E

16:15 – 16:45
W5E.01 INVITED PRESENTATION
ADVANCED MICROFABRICATION OF PIEZOMEMS SENSORS AND ACTUATORS
Annalisa De-Pastina
Silicon Austria Labs GmbH, AUSTRIA
Session W5E – Functional Materials & Fabrication II

Continued

Room E

16:45 – 17:00
W5E.03 STUDY ON THE POLAR ORIENTATION OF PLASMA-DEPOSITED PIEZOELECTRIC MATERIALS
Jan-Willem Burssens¹, Chen Wang¹, Xinyu Wu¹,
Jesus Gandaro-Loe¹, Appo Van der Wiel²,
and Michael Kraft¹
¹KU Leuven, BELGIUM and ²Melexis, BELGIUM

17:00 – 17:15
W5E.04 MEASURING LIGHT PENETRATION FOR SPECTRAL ANALYSIS WITH INTERCALATED GRAPHENE/QUANTUM DOT PHOTODETECTORS
Seungbae Ahn, Ju Ying Shang, and Oscar Vazquez Mena
University of California, San Diego, USA

17:15 – 17:30
W5E.05 ISOTROPIC DEGRADABLE METAMATERIAL FOR ENVIRONMENTAL SENSING
Tatsuya Yano¹, Gaku Furusawa¹, Hiroaki Onoe²,
and Tetsuo Kan¹
¹University of Electro-Communications, JAPAN and ²Keio University, JAPAN

17:30 – 17:45
W5E.06 LIGHT-DRIVEN FLAGELLATED MICRO-GEL ROBOT MADE OF TEMPERATURE-RESPONSIVE HYDROGEL ACTUATOR
Hinako Sato¹, Yoshiyuki Yokoyama², and Takeshi Hayakawa¹
¹Chuo University, JAPAN and ²Toyama Industrial Technology Research and Development Center, JAPAN

Conference Banquet

New Hall

18:00 – 21:00

Wednesday Banquet – Calligraphy (at KICC).
THURSDAY AT A GLANCE

08:30 - 09:15
Plenary Presentation 4
Chunhai Fan, Shanghai Jiao Tong University (SJTU), CHINA

09:15 - 09:30
Transition Break

09:30 - 10:45
Session Th2C
Tissue Engineering II

Session Th2D
Soft Actuators

Session Th2E
Fluidic Sensors

Session Th2F
Wearable Devices

10:45 - 11:15
Break

11:15 - 12:45
Session Th3C
Agricultural Applications

Session Th3D
Actuators II


Session Th3E
Chemical Sensors III

Session Th3F
Flexible Devices & Fabrication

12:45 - 13:00
Transition Break

13:00 - 13:30
Best Paper Award Ceremony and Closing Remarks

THURSDAY PROGRAM

29 JUNE

Plenary Presentation 4
Session Chair:
Andreu Llobera, Silicon Austria Labs GmbH, AUSTRIA

Room A

08:30 - 09:15
Th1A.P4 NUCLEIC ACIDS-BASED INFORMATION MATERIALS
Chunhai Fan
Shanghai Jiao Tong University (SJTU), CHINA

09:15 – 09:30
Transition
Session Th2C – Tissue Engineering II

Session Chairs:
Paddy French, TU Delft, NETHERLANDS
Swaminathan Rajaraman, University of Central Florida, USA

Room A

09:30 – 09:45
Th2C.01 ON-CHIP DIFFERENTIATION OF RADially VASCULARIZED HEPATIC CORDS MIMICKING THE LIVER LOBULE
Alan Raj Jeffrey Rajendran1,2, Sakina Chantoiseau-Bensalem1, Antonietta Messina2, Nassima Benzoubir2,3, Rasta Ghasemi4, Jean-Charles Duclos-Vallée2,3, and Bruno Le Pioufle1,4
1 Université Paris-Saclay, FRANCE, 2 Université Paris-Saclay, FRANCE, 3 Hôpital Paul Brousse, FRANCE, and 4 Université Paris-Saclay, FRANCE

09:45 – 10:00
Th2C.02 EXPLORING AUTONOMOUS OPTIMAL EXPERIMENTAL CONDITIONS FOR IN VITRO TISSUE MATURATION WITH BATCH BAYESIAN OPTIMIZATION
Daiki Miyata1, Keitaro Kasahara1, Takahiro Yamada1, Yuta Tokuoka1, Yujin Taguchi1, Yuta Kurashina1, Akira Funahashi1, and Hiroaki Onoe1
1 Keio University, JAPAN and 2 Tokyo University of Agriculture and Technology, JAPAN

10:00 – 10:15
Th2C.03 AUTOMATED LARGE-SCALE SPHEROID GENERATION VIA HANGING-DROP AND EFFICIENT TRANSFER INTO PHYSIOLOGICAL MIMICKING MICROENVIRONMENT
Viktoria Zieger1, Ellen Woehr2,3, Stefan Zimmermann1, Daniel Frejek3, Peter Koltay3, Roland Zengerle1,3, and Sabrina Kartmann3
1 University of Freiburg, GERMANY, 2 University of Furtwangen, GERMANY, and 3 Hahn-Schickard, GERMANY

10:15 – 10:30
Th2C.04 MICROFLUIDIC CO-CULTURES OF CANCER SPHEROIDS AND NK CELLS FOR TESTING IMMUNOTHERAPY
Alan M. Gonzalez-Suarez, Michael Medlyn, Daheui Choi, Gulnaz Stybayeva, Daniel D. Billadeau, and Alexander Revzin
Mayo Clinic, USA

10:30 – 10:45
Th2C.05 APICAL MICROVILLI OF A HYBRID HIPSC-DERIVED PROXIMAL TUBULE MICROTISSUE REACT TO FLOW-INDUCED SHEAR STRESS IN A MICROPHYSIOLOGICAL SYSTEM
Ramin Banan Sadeghian1, Cheng Ma1, Akihiko Kawakami1, Minoru Takasato1,2,3, and Ryuji Yokokawa1
1 Kyoto University, JAPAN, 2 Institute of Physical and Chemical Research (RIKEN), JAPAN, and 3 Osaka University, JAPAN
Session Th2D – Soft Actuators
Session Chairs:
Vincent C. Lee, National University of Singapore, SINGAPORE
Yong Kyu Yoon, University of Florida, USA

Room D

09:30 – 09:45
Th2D.01 HIGH EFFICIENCY ACTUATION CONVERSION MECHANISM FOR HIGH-OUTPUT BENDING MOTION OF A SOFT INFLATABLE MICROACTUATOR
Yuto Hori, Seiji Suzuki, Tatsumi Katsura, and Satoshi Konishi
Ritsumeikan University, JAPAN

09:45 – 10:00
Th2D.02 SELF-SENSING SOFT PNEUMATIC MICRO ACTUATORS FOR HAPTIC FEEDBACK AND HUMAN-MACHINE INTERFACES
Xiayu Wang¹, Fade Hu¹, Zheng You¹, and Chuan Luo¹,²
¹ Tsinghua University, CHINA and ² Beijing Innovation Center for Future Chips, CHINA

10:00 – 10:15
Th2D.03 DEPLOYABLE SOFT MICROACTUATOR WITH WATER CIRCULATION CHANNEL AND SHAPE MEMORY POLYMER
Toshiro Yamanaka, Taosong Yu, Yuta Taniguchi, Satoshi Amaya, and Fumihiito Arai
University of Tokyo, JAPAN

10:15 – 10:30
Th2D.04 MAGNETIC CONTROLLED MULTIFUNCTIONAL THREE-DIMENSIONAL SOFT ROBOT WITH SELF-PERCEPTIVE CAPABILITY
Chen Xu, Ji Wan, Haobin Wang, Zehua Xiang, Pengcheng Zhao, Mengdi Han, and Haixia Zhang
Peking University, CHINA

10:30 – 10:45
Th2D.05 UNTETHERED SWARM ROBOTS WITH INDEPENDENT CRAWLING AND ROLLING MOTIONS
Wei Yue¹, Xinyi Zhou², Fanping Sui¹, Mingzheng Duan¹, and Liwei Lin¹
¹ University of California, Berkeley, USA and ² Peking University, CHINA

Session Th2E – Fluidic Sensors
Session Chairs:
Qiao Lin, Columbia University, USA
Ravi Selvaganapathy, McMaster University, CANADA

Room E

09:30 – 09:45
Th2E.01 A UNIVERSAL GAS SENSING CONCEPT THROUGH ACOUSTIC COUPLING IN A CAVITY
Derin Erkan, Ahmet A. Derin, and Erdinc Tatar
Bilkent University, TURKEY
Session Th2E – Fluidic Sensors

09:45 – 10:00

**Th2E.02** HIGH QUALITY FACTOR SUSPENDED NANOCHANNEL RESONATOR DEVICES, WITH SELF-OSCILLATION CAPACITY
Katell Aldrin¹, Thomas Furcatte¹, Georgios Katsikis², Guillaume Jourdan¹, Selim Oulcem², Aurélien Lepoetre¹, Jean-François Beche¹, François Boizot¹, Marc Sansa¹, Fabrice Navarro¹, Scott Manalis², and Vincent Agache¹
¹ Université Grenoble Alpes, FRANCE, ² Massachusetts Institute of Technology, USA, and ³ TRAVERA, USA

10:00 – 10:15

**Th2E.03** DROPLET AS A MECHANICAL COUPLING FOR A VIBRATIONAL SYSTEM AND ITS APPLICATION IN FLUID PROPERTY SENSING
Saravanakumar Dharmaraj and Prosenjit Sen
Indian Institute of Science, INDIA

10:15 – 10:30

**Th2E.04** AN ULTRALOW-POWER FLEXIBLE THERMAL FLOW SENSOR BASED ON ELECTROCHEMICAL IMPEDANCE
Ke Xiao¹, Xiangyu Song¹, Mingzheng Duan¹, and Wei Xu¹
¹ Shenzhen University, CHINA and ² University of California, Berkeley, USA

10:30 – 10:45

**Th2E.05** PITOT-TYPE WATERFLOW SENSOR LOGGER FOR RELATIVE WATERFLOW VELOCITY MEASUREMENT OF A SEA TURTLE
Takuto Kishimoto¹, Ryosuke Saito², Hirotaka Tanaka², Yu Naruoka², Kenta Kuroda³, Katsufumi Sato³, and Hidetoshi Takahashi³
¹ Keio University, JAPAN, ² Tokyo Institute of Technology, JAPAN, ³ Japan Aerospace Exploration (JAXA), JAPAN, and ⁴ University of Tokyo, JAPAN

Session Th2F – Wearable Devices

Session Chairs:
Eun Sok Kim, University of Southern California, USA
Andreas Weltin, University of Freiburg, GERMANY

09:30 – 09:45

**Th2F.01** A BRAIN-TO-BRAIN INTERFACE WITH A FLEXIBLE NEURAL PROBE FOR MOUSE TURNING CONTROL BY HUMAN MIND
Yifei Ye¹, Zhenyu Wang¹, Ye Tian¹,², Han Wang¹, Cunkai Zhou¹, Honglin Hu¹, Ting Zhou², Zhiaohou Zhou¹,², and Xiaoqin Wei¹,²
¹ Chinese Academy of Sciences, Shanghai, CHINA, ² University of Chinese Academy of Sciences, CHINA, ³ Shanghai University, CHINA, ⁴ ShanghaiTech University, CHINA, ⁵ Neuroxess Co., Ltd. (Jiangxi), CHINA, ⁶ Guangdong Institute of Intelligence Science and Technology, CHINA, and ⁷ Tianqiao and Chrissy Chen Institute for Translational Research, CHINA
Session Th2F – Wearable Devices
Continued
Room B-1

09:45 – 10:00
Th2F.02 ULTRA-CONFORMAL TONGUE ELECTRODE ARRAY FOR TASTE PERCEPTUAL DECODING
Xiner Wang1,2, Guo Bai1, Zhaohan Chen4, Jizhi Liang1,2, Qianyang Xie3, Meng Li1,2, Xiaoqing Wei1,2, Liuyang Sun1,2, Zhita Zhou1,2, and Tiger H. Tao1,2,5,6,7
1 Chinese Academy of Sciences (CAS), CHINA,
2 University of Chinese Academy of Sciences, CHINA,
3 Shanghai Ninth People’s Hospital, Shanghai Jiao Tong University School of Medicine, CHINA,
4 Shanghai Normal University, CHINA,
5 Neuroxess Co., Ltd. (Jiangxi), CHINA,
6 Guangdong Institute of Intelligence Science and Technology, CHINA, and
7 Tianqiao and Chrissy Chen Institute for Translational Research, CHINA

10:00 – 10:15
Th2F.03 A WEARABLE MULTISENSORY PULSE SENSOR BASED ON PIEZO-THERMIC TRANSDUCTION
Shuo Tian and Rong Zhu
Tsinghua University, CHINA

10:15 – 10:30
Th2F.04 GAIT EVENT DETECTION USING PIEZOELECTRIC FIBER EMBEDDED SMART-SOCK
Jarred W. Fastier-Wooller1,2, Nathan Lyons1, Trung-Hieu Vu1, Claudio Pizzolato1, Toshihiro Ishih2, Dzung Viet Dao1, Jayishni Maharaj1, and Van Thanh Dau1
1 Griffith University, AUSTRALIA and
2 University of Tokyo, JAPAN

10:30 – 10:45
Th2F.05 CONTINUOUS CUFFLESS MONITORING OF ARTERIAL BLOOD PRESSURE BASED ON HIGH-DENSITY FLEXIBLE SENSOR ARRAY
Fang Wang1,2, Heng Yang1,2, Ke Sun1, Yi Sun1, and Xinxin Li1,2
1 Chinese Academy of Sciences (CAS), CHINA and
2 University of Chinese Academy of Sciences, CHINA

10:45 – 11:15  Break and Exhibit Inspection

Session Th3C – Agricultural Applications
Session Chairs:
Xiao-An “Sean” Fu, University of Louisville, USA
Min Wang, Southern University of Science and Technology, CHINA
Room A

11:15 – 11:45
Th3C.01 INVITED PRESENTATION
PLANT-ON-A-CHIP TECHNOLOGIES AND ITS APPLICATIONS
Hirotaka Hida
Kobe University, JAPAN
Session Th3C – Agricultural Applications

Continued

Room A

11:45 – 12:00

Th3C.03 DEVELOPMENT OF PLANT GROWTH MONITORING SENSOR TO VISUALIZE ION DYNAMICS IN PLANTS AND ITS FUNCTIONAL VALIDATION IN LONG-TERM MEASUREMENTS
Taichi Yoshida, Yusuke Matsushita, Naoki Sakaguchi, Yong-Joon Choi, Kazuhiro Takahashi, Kotaro Takayama, Kazuaki Sawada, and Toshihiko Noda
Toyohashi University of Technology, JAPAN

12:00 – 12:15

Th3C.04 COMPACT CHLOROPHYLL MEASUREMENT SYSTEM FOR QUANTITATIVE ANALYSIS OF LEAF PHOTOSYNTHESIS IN AGRICULTURE
Ryoma Mibu, Ryosuke Ichikawa, Yong-Joon Choi, Tomoya Ide, Seltaro Toda, Kazuhiro Takahashi, Kotaro Takayama, Toshihiko Noda, and Kazuaki Sawada
Toyohashi University of Technology, JAPAN

12:15 – 12:30

Th3C.05 A PASSIVE, WIRELESS GAS SENSOR BASED ON LASER INDUCED GRAPHENE FOR SOIL AMMONIA LEVEL MONITORING
Chao Liang¹, Wei Zhou¹, Ziqi Mei², Wenqiang Zhang¹, and Xiaoguang Zhao²
¹China Agricultural University, CHINA and ²Tsinghua University, CHINA

12:30 – 12:45

Th3C.06 HIGH-SPEED ON-CHIP IN-LIQUID DISPENSING BY UTILIZING ON-DEMAND VORTEX GENERATIONS
Makoto Saito, Yoko Yamanishi, and Shinya Sakuma
Kyushu University, JAPAN

Session Th3D – Actuators II

Session Chair:
Rakesh Chand, Vanguard International Semiconductor Corporation, SINGAPORE
Jungyul Park, Sogang University, KOREA

Room D

11:15 – 11:45

Th3D.01 INVITED PRESENTATION
ZERO-POWER OPTOMECHANICAL ACTUATORS
Behraad Bahreyni
Simon Fraser University, CANADA

11:45 – 12:00

Th3D.03 DESIGN OF BI-DIRECTIONAL VO₂-KIRIGAMI ELECTROTHERMAL MICROACTUATOR WITH MILLIMETER LARGE STROKE
Masaaki Hashimoto, Tomoya Tsutsumi, and Yoshihiro Taguchi
Keio University, JAPAN
Session Th3D – Actuators II

Continued

Room D

12:00 – 12:15

Th3D.04 BANDWIDTH ENHANCEMENT OF PIEZOELECTRIC MEMS MICRO SPEAKER BY MULTIPLE PISTON-MODES AND NOVEL CROSSOVER DRIVING METHOD
Ting-Chou Wei¹, Hsu-Hsiang Cheng², Sung-Cheng Lo², Yu-Chen Chen¹, Shu-Wei Chang¹, Zih-Song Hu¹, Jerwei Hsieh³, Ruey-Shing Huang³⁴, and Weileun Fang¹
¹National Tsing Hua University, TAIWAN, ²Upbeat Technology Co., Ltd., TAIWAN, ³Asia Pacific Microsystem Inc., TAIWAN, and ⁴National Sun Yat-sen University, TAIWAN

12:15 – 12:30

Th3D.05 A MECHANICALLY-OPEN AND ACOUSTICALLY-CLOSED PIEZO-MEMS SPEAKER FOR IN-EAR APPLICATIONS
Chiara Gazzola¹, Valentina Zega¹, Fabrizio Cerini², Silvia Adorno², and Alberto Corigliano¹
¹Politecnico di Milano, ITALY and ²STMicroelectronics, ITALY

12:30 – 12:45

Th3D.06 WIRELESS ACOUSTIC AIRBORNE JET PROPELLER
Akash Roy, Matin Barekatain, Jaehoon Lee, Baptiste Neff, and Eun Sok Kim
University of Southern California, USA

Session Th3E – Chemical Sensors III

Session Chair:
Luis Velasquez-Garcia, Massachusetts Institute of Technology, USA
Pengcheng Xu, Chinese Academy of Sciences (CAS), CHINA

Room E

11:15 – 11:30

Th3E.01 MICROFLUIDIC-BASED DIFFRACTED X-RAY TRACKING METHOD FOR REAL-TIME OBSERVATION OF ION CHANNEL TWIST MOTION UNDER SEQUENTIAL CHEMICAL STIMULI
Kentaro Kotoya¹, Ikkei Yamauchi¹, Hirofumi Shimizu², and Yoshikazu Hiral¹
¹Kyoto University, JAPAN and ²University of Fukui, JAPAN

11:30 – 11:45

Th3E.02 A METAL ORGANIC FRAMEWORK DERIVED NANO POROUS CARBON (NPC)–MWCNT HETEROSTRUCTURED NANOCOMPOSITE-BASED ELECTROCHEMICAL SENSING PATCH FOR SWEAT Ca ION AND pH MONITORING
Md Asaduzzaman, Md Abu Zahed, Md Selim Reza, Seong Hoon Jeong, Hyesu Song, and Jae Yeong Park
Kwangwoon University, KOREA
Session Th3E – Chemical Sensors III
Continued
Room E

11:45 – 12:00
Th3E.03 HIGHLY CONDUCTIVE AND ENVIROMENTALLY STABLE MXENE-Ti3C2Tx NANOSHEETS FOR MULTIPLEXED DISEASE INFLAMMATORY BIOMARKER DETECTION
Md Selim Reza, Md Sharifuzzaman, Md Asaduzzaman, Seong Hoon Jeong, Hye Su Song, and Jae Yeong Park
Kwangwoon University, KOREA

12:00 – 12:15
Th3E.04 ELECTRICAL DETECTION OF DNA NANOBALLS USING IMPEDANCE SPECTROSCOPY IN A MICROFLUIDIC CHIP
Muhammad Tayyab1, Donal Barrett2, Gjs van Riel2, Shujing Liu3, Björn Reinius2, Curt Scharfe3, Peter Griffin4, Lars Steinmetz1, Vicent Pelechano2, and Mehdi Javanmard1
1Rutgers, State University of New Jersey, USA, 2Karolinska Institute, SWEDEN, 3Yale University, USA, and 4Stanford University, USA

12:15 – 12:30
Th3E.05 MONOLITHIC FABRICATION OF NANO GAP ELECTRODES FOR SINGLE-MOLECULE BIOSENSING
Ashesh Ray Chaudhuri1, Chulmin Choi2, Raymond Lobaton2, Drew A. Hall3, Prem Sinha4, Manoj Jaysankar1, Philippe Helin1, Carl W. Fuller5, Paul W. Mola2, Barry Merriman2, and Simone Severi1
1IMEC, BELGIUM, 2Roswell ME, USA, and 3University of California, San Diego, USA

12:30 – 12:45
Th3E.06 DEVELOPMENT OF AC NANOPORE MESUREMENT METHOD AND MICROBIAL IDENTIFICATION COMBINED WITH MACHINE LEARNING
Maami Sakamoto, Kosuke Hori, Ayaka Nakama, and Takatoki Yamamoto
Tokyo Institute of Technology, JAPAN

Session Th3F – Flexible Devices & Fabrication
Session Chair:
Xiaomei Yu, Peking University, CHINA
Erdinç Tatar, Bilkent University, TURKEY
Room B-1

11:15 – 11:30
Th3F.01 HIGHLY SENSITIVE AND STRETCHABLE STRAIN SENSOR BASED ON SILVER NANOWIRE/GRAPHENE HYBRID WITH A NEAR-ZERO THERMAL CROSSTALK
Leilei Wang and Jungwook Choi
Chung-Ang University, KOREA
Session Th3F – Flexible Devices & Fabrication
Continued
Room B-1

11:30 – 11:45
Th3F.02 LOCALIZED BIOMECHANICAL STRAIN SENSING WITH HIGHLY FLEXIBLE PIEZORESISTIVE GRAPHENE/SU-8 NANOCOMPOSITE ACTIVE LAYER
Faizan Tariq Beigh1, Shivam Jaisawal2, Mujeeb Youсуf2, Nadeem Tariq Beigh1, Pushpapraj Singh2, and Dhiman Mallick1
1Indian Institute of Technology Delhi, INDIA, 2Defense Institute of Advanced Technology (DIAT), INDIA, and Centre for Applied Research in Electronics (CARE), INDIA

11:45 – 12:00
Th3F.03 STRETCHABLE PEDOT: PSS-PRINTED FABRIC STRAIN SENSOR FOR HUMAN MOVEMENT MONITORING AND RECOGNITION
Caise Wei, Jinfeng Yuan, Yuzhong Zhang, and Rong Zhu
Tsinghua University, CHINA

12:00 – 12:15
Th3F.04 PLANAR METASTRUCTURE-BASED GAS SENSORS FOR HIGH STRETCHABILITY AND STABLE NO₂ SENSING
Jeonheyong Park, Hyeoncheol Lim, Chaehyun Ryu, Soon In Jung, Il Ryu Jang, and Hoe Joon Kim
Daegu Gyeongbuk Institute of Science and Technology (DGIST), KOREA

12:15 – 12:30
Th3F.05 MULTIFUNCTIONAL STRETCHABLE SENSOR FOR MONITORING HUMAN MOTION
Yuzhong Zhang, Jinfeng Yuan, Caise Wei, and Rong Zhu
Tsinghua University, CHINA

12:30 – 12:45
Th3F.06 IN-TUBE-CENTER PACKAGING OF FLEXIBLE MEMS AIRFLOW-RATE SENSOR AND ITS SENSITIVITY ENHANCEMENT
Muhammad Salman Al Farsi1, Yang Wang1, Yoshihiro Hasegawa1, Miyoko Matsushima2, Tsutomu Kawabe2, and Mitsuhiro Shikida1
1Hiroshima City University, JAPAN and 2Nagoya University, JAPAN

12:45 – 13:00 Transition

Best Paper Award Ceremony and Closing Remarks
Room A
13:00 – 13:30

13:30 Conference Adjourns
POSTER PRESENTATIONS

EVENT HALL

MONDAY 14:00 – 16:00
TUESDAY 14:15 – 16:15
WEDNESDAY 14:15 – 16:15

POSTER CATEGORIES

- Actuators and Microsystems
- Bio-Sensors and Microsystems Including In-Vitro Medical Applications
- Chemical Sensors and Microsystems
- Composite Materials, Polymers, and Fabrication Processes
- Energy, Power and Thermal Management
- Microfluidics Platform Technologies
- Nanoscale Materials and Fabrication
- Optical and Atomic Transducers
- Packaging & Solid-State Materials and Fabrication Processes
- Physical Sensors and Microsystems
- RF MEMS, Resonators and Oscillators
- Wearable and In-Vivo Medical Devices and Microsystems
- Late News

MONDAY - Actuators and Microsystems

M4P.001 ALN-BASED PMUT ARRAYS FOR DEXTEROUS CELL HANDLING
Bart P. Weekers[1,2], Liesbet Lagae[1,2], Xavier Rottenberg[3], and Veronique Rochus[2]

M4P.002 ASYMMETRICAL PMUTS FOR FOCUSED ACOUSTIC PRESSURE BY REINFORCEMENT LEARNING
Wei Yue[1], Fanping Sui[1], Yande Peng[1], Fan Xia[1], Peggy Tsao[1], Megan Teng[1], Hanxiao Liu[2], and Liwei Lin[1]
[1] University of California, Berkeley, USA and [2] Tsinghua University, CHINA

M4P.003 DEVELOPMENT, REALIZATION AND VALIDATION OF A PIEZOELECTRIC FLEXIBLE HAPTIC INTERFACE
Romain Le Magueresse[1,2], Fabrice Casset[1], Frédéric Giraud[1], Munique Kazar Mendes[1], Sébastien Brulais[1], Laure Peris Y Saborit[1], Anis Kaci[2], and Mikael Colin[1]
[1] Université Grenoble Alpes, FRANCE and [2] Université de Lille, FRANCE

M4P.004 FABRICATION AND PERFORMANCE EVALUATION OF 61-ELECTRODE PIEZOELECTRIC MEMS DEFORMABLE MIRROR BASED ON PZT FILM
Junhua Wang, Cao Xia, Yuanlin Xia, Liang He, and Zhiqing Wang
Sichuan University, CHINA
M4P.005 HIGH OUTPUT TACTILE DISPLAY USING SMA THICK FILM ACTUATOR ARRAY WITH IMPROVED THERMAL AND FREQUENCY RESPONSE
Ryo Saito, Haruto Amano, and Takashi Mineta
Yamagata University, JAPAN

M4P.006 DESIGN AND FABRICATION OF A 4-TERMINAL IN-PLANE NANOELECTROMECHANICAL RELAY
Yingying Li1, Simon J. Bleiker1, Pierre Edinger1, Elliott Worsley2, Mukesh Kumar Kulshreshth2, Qi Tang2, Alain Yuji Takabayashi1, Niels Ouack3, Peter Verheyen4, Wim Bogbaerts4,5, Kristinn B. Gyfason1, Dinesh Pamunuwa1, and Frank Niklaus1
1KTH Royal Institute of Technology, SWEDEN,
2University of Bristol, UK,
3École Polytechnique Fédérarde de Lausanne (EPFL), SWITZERLAND,
4IMEC, BELGIUM,
and 5University of Ghent, BELGIUEN

M4P.007 LESS RESONANT FREQUENCY SHIFT AND MINOR SPL ATTENUATION OF PZT MEMS SPEAKER ACHIEVED BY RIB-REINFORCED DIAPHRAGM
Hsu-Hsiang Cheng1, Sung-Cheng Lo1, Ting-Chou Wei1, Mingchung Wu2, and Weileun Fang1
1National Tsing Hua University, TAIWAN and
2CoretronicMEMS Co., Ltd., TAIWAN

M4P.008 ORIGAMI-INSPIRED FLEXURE-BASED ROBOT FOR ENDOMICROSCOPY PROBE MANIPULATION
Xu Chen, Jinshi Zhao, Khushi Vyas, Michael E. Kiziroglou, and Eric M. Yeatman
Imperial College London, UK

M4P.009 PZT MEMS TUNABLE LIQUID LENS WITH INTEGRATED PIEZORESISTIVE POSITION SENSORS
Zhengnan Tang1, Leo Soda1,2, Taiyu Okatani1, Andrea Vergara1, Yukio Suzuki1, and Shuji Tanaka1
1Tohoku University, JAPAN and
2École des Mines de Saint-Étienne, FRANCE

TUESDAY - Actuators and Microsystems

T4P.001 2-DOF MEMS MIRROR WITH LARGE MECHANICAL ANGLES USING ONE MAGNETIC FIELD FOR CLOSE RANGE SCANNING APPLICATIONS
Dang D.H. Tran1, Ludovic Rapp2, Steve Madden2, Laurence J. Walsh3,4, Heiko Spallek5, Lee Walsh6, Andrew Sutton6, Omar Zuaier6, Alaa Habe6, and Timothy R. Hirst6
1Griffith University, AUSTRALIA, 2Australian National University, AUSTRALIA, 3University of Queensland School of Dentistry, AUSTRALIA, 4University of Sydney School of Dentistry, AUSTRALIA, 5Dentroid (Emudent Technologies Pty Ltd), AUSTRALIA, and 6Platypus Technical Consultants Pty Ltd, AUSTRALIA
T4P.002 3D-PRINTED MICRO-MANIPULATOR WITH COMPLIANT MECHANISM FOR BIOLOGICAL APPLICATION
Masaru Mukai1, Yukihito Moritoki2, Takayuki Yamada2, Shinji Nishihaki3, Tomoyuki Shimono3, Tatsuko Kageyama4, Junji Fukuda4, and Shoji Maruo1
1Yokohama National University, JAPAN, 2University of Tokyo, JAPAN, 3Kyoto University, JAPAN, and 4Kanagawa Institute of Industrial Science and Technology (KISTEC), JAPAN

T4P.003 A 3D SELF-ROLL INDUCTOR BASED ON AL-SiO2 BIMORPHS
Hengzhang Yang1, Jian Gao1, Yingtao Ding1, Yuwen Su1, Yang Yang2, and Huikai Xie1,2
1Beijing Institute of Technology, CHINA and 2BIT Chongqing Institute of Microelectronics and Microsystems, CHINA

T4P.004 BENDABLE POLYMER-BASED HIGH-FREQUENCY PMUTS ON TRANSPARENT SU8 AND POLYIMIDE SUBSTRATES
Sanjog V. Joshi, Sina Sadeghpour, and Michael Kraft
KU Leuven, BELGIUM

T4P.005 CROSSTALK EFFECTS IN PMUT ARRAYS
Omer M. O. Abdalla1, Gianluca Massimino1, Cristina D’Argenzio1, Matteo Colosio1, Marco Soldo1, Fabio Quaglia1, and Alberto Cortiglano1
1Politecnico di Milano, ITALY and 2STMicroelectronics, ITALY

T4P.006 DEVELOPMENT OF PIEZOELECTRIC MICROMACHINED ULTRASONIC TRANSDUCER WITH DUAL HETEROGENEOUS PIEZOELECTRIC THIN FILM STACKING
Xuanmeng Qi1, Shinya Yoshida2, Mohssen Moridi3, Sarah Risquez2, Anirban Ghosh3, and Shuji Tanaka1
1Tohoku University, JAPAN, 2Shibaura Institute of Technology, JAPAN, and 3Silicon Austria Labs, AUSTRIA

T4P.007 ELECTRO-FORCE DISPLAY FOR NANO ROBOTICS
Kain Ichinohe, Ken Sasaki, and Takayuki Hoshino
Hirosaki University, JAPAN

T4P.008 HIGHLY MINIATURIZED IN-EAR MEMS LOUDSPEAKER FEATURING HIGH SPL
Fabian Stoppel, Johannes Fankhänel, Thorsten Giese, Christian Eiermann, Isa Pieper, Dirk Kaden, Lenny Castellanos, and Sven Gruenzig
Fraunhofer Institute for Silicon Technology, GERMANY

T4P.009 MICRO-FABRICATED BI-STABLE MECHANICAL SWITCH ACTUATED BY SINGLE THERMAL ACTUATOR
Jiacheng Liu1, Yuma Ohara2, Zerui Xu2, Ruizi Liu1, Zhangshanhao Li2, Xiaohong Wang3, Toshiyuki Tsuchiya2, and Man Wong1
1Hong Kong University of Science and Technology, Hong Kong, CHINA, 2Kyoto University, JAPAN, and 3Tsinghua University, CHINA

T4P.010 ON THE USE OF 3D-PRINTED ULTRASONIC HORNS TO TUNE THE FREQUENCY RESPONSE OF AIRBORNE MEMS TRANSDUCERS
Gabriele Bosetti, Stefan Hofstetter-Spona, and Gabriele Schrag
Technical University of Munich, GERMANY
W4P.002  CENTIMETER-SCALE CULTURED WHOLE-CUT CHICKEN MEAT FABRICATED USING A MICROFABRICATED HOLLOW FIBER BIOREACTOR
Minghao Nie, Ai Shima, and Shoji Takeuchi
University of Tokyo, JAPAN

W4P.003  DEVELOPMENT OF HAPTIC BIO-FEEDBACK RING USING ULTRA-THIN HAPTIC MEMS FILM
Toshihiro Takeshita, Zymelka Daniel, Yusuke Takei, and Takeshi Kobayashi
National Institute of Advanced Industrial Science and Technology (AIST), JAPAN

W4P.004  FABRICATION PROCESS OF CONVENTIONAL AND UNCONVENTIONAL 3D MICROCOILS BASED ON 2D ARRAY OF SU-8 MICROPOSTS STRUCTURE
Emil R. Mamleyev1, Manfred Kohl1, Jan G. Korvink1, and Kirill V. Poletkin2
1Karlsruhe Institute of Technology (KIT), GERMANY and 2Hefei University of Technology, CHINA

W4P.005  HAPTIC INTERFACE BASED ON AN INNOVATIVE “PIEZO-IN-FLEX” PIEZOELECTRIC PATCH TECHNOLOGY
Fabrice Casset, Munique Kazar Mendes, Nadine David, Rémi Franiatte, Daniel Mermin, Marc Zussy, Jérôme Dechamp, Laetitia Castagne, Jean-Charles Souriau, Kevin Benedetto, and Mikael Colin
University Grenoble Alpes, FRANCE

W4P.006  LEAD FREE KNN THIN FILMS BASED ACTUATOR DEVICES REALIZED IN A 200 MM SILICON TECHNOLOGY FOR PIEZOELECTRIC TRANSDUCER APPLICATIONS
Hugo Kuentz1,2, Alain Campo1, Christel Dieppedale1, Christophe Poulain1, Maryline Guilloux-Viry2, and Gwenael Le Rhun1
1Université Grenoble Alpes, FRANCE and 2Université de Rennes, FRANCE

W4P.007  MULTIMODE MEMS MIRROR FOR HOMOGENEOUS ILLUMINATION IN RESONANT SCANNING OPERATION
Markus Bainschab, Rodrigo T. Rocha, Clément Fleury, Takashi Sasaki, Sara Guerreiro, Anton Lagosh, and Adrien Plot
Silicon Austria Labs GmbH (SAL), AUSTRIA

W4P.008  ON MEMS WAFER ASSESSMENT FOR SWITCHING DEVICES EXPOSED TO DIRECT METAL-CONTACTS AND THERMAL HISTORIES
Sushil Kumar1, Dhairya Singh Arya2, Manu Garg1, and Pushpapraj Singh1
1Indian Institute of Technology Delhi, INDIA and 2CSIR – Central Scientific Instruments Organisation (CSIO), INDIA
**W4P.009**

**PIEZOELECTRIC MICROMACHINED ULTRASONIC TRANSDUCER ENABLES BUBBLE-BASED STIRRING AND RECONFIGURABLE PARTICLE PATTERNING**

Xianbin Li¹, Jingui Qian¹,², Junjie Zhang¹, Bowei Zhang¹, Joshua E.-Y. Lee², and Wei Zhang¹

¹Hefei University of Technology, CHINA and
²City University of Hong Kong, HONG KONG

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**W4P.010**

**WIRELESS CRAWLING OF INCHWORM-LIKE ROBOT BY INDUCTION HEATING**

Woojun Jung, Seonghyeon Lee, and Yongha Hwang

Korea University, KOREA

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**MONDAY**

**Bio-Sensors and Microsystems Including In-Vitro Medical Applications**

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**M4P.010**

**A MICROFLUIDIC FLOW CYTOMETRY WITH A UNIFORM OPTICAL FIELD ENABLING QUANTITATIVE ANALYSIS OF SINGLE-CELL PROTEINS WITH ARBITRARY DISTRIBUTIONS**

Ting Zhang¹,², Lixing Liu¹,², Yuanchen Wei¹, Chiyuan Gao¹,², Liangliang Ma¹, Mengge Gao¹, Xiaosu Zhao¹, Yixiang Wang¹, Deyong Chen¹,², Liciao Sun¹, Junbo Wang¹,², and Jian Chen¹,²

¹Chinese Academy of Sciences (CAS), CHINA, ²University of Chinese Academy of Sciences, CHINA, ³Cancer Hospital Chinese Academy of Medical Sciences, CHINA, 4National Clinical Research Center for Hematologic Disease, CHINA, and 5Peking University Hospital of Stomatology, CHINA

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**M4P.011**

**A ZnO-BASED AUTOMATED ELECTRONIC NOSE FOR VOCs DETECTION WITH HIGH-SENSITIVITY MODULATED FRONT-END ELECTRONICS**

Bianca Di Diodoro¹, Carmen Bax¹, Roberto Bernasconi¹, Alessandro Ticozzi¹, Luca Magagnini¹, Gianluigi Taverna², Fabio Grizzi³, Giacomo Langfelder¹, and Laura Capelli¹

¹Politecnico di Milano, ITALY, ²Humanitas Mater Domini Hospital, ITALY, and ³IRCCS Humanitas Research Hospital, ITALY

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**M4P.012**

**ASYMMETRICAL TITANIUM OXIDE PATTERNS FOR UNIDIRECTIONAL CELL GUIDANCE**

Yijun Cheng and Stella W. Pang

City University of Hong Kong, CHINA

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**M4P.013**

**AUTOMATIC VASCULAR LOCALIZATION WITH A FLEXIBLE TACTILE SENSING DENSE-ARRAY**

Yi Sun¹, Fang Wang², Ke Sun¹, Heng Yang¹,², and Xinxin Li¹,²

¹Chinese Academy of Sciences (CAS), CHINA and
²University of Chinese Academy of Sciences, CHINA

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**M4P.014**

**COMPACT LSPR BIOSENSOR SYSTEM FOR EARLY VIRUS DETECTION INTEGRATED WITH A FILTER-FREE WAVELENGTH SENSOR AND LED**

Tsugumi Sakae, Yong-Joon Choi, Tomoya Ide, Kazuhiro Takahashi, Toshihiko Noda, and Kazuaki Sawada

Toyohashi University of Technology, JAPAN

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**M4P.015**

**DEVELOPMENT OF A HIGH SENSITIVITY, WIDE RANGE CMOS CAPACITIVE DNA SENSOR ARRAY**

Po-Hsuan Lai, Lien-Sing Tseng, Chia-Min Yang, and Michael S.-C. Lu

National Tsing Hua University, TAIWAN
M4P.016 ELECTROCHEMICAL BIOSENSOR BASED ON DISPOSABLE PAPER-BASED LASER-INDUCED GRAPHENE
Panpan Gao, Toshihiro Kasama, Junchan Chin, Yixuan Huang, Madoka Takai, and Ryo Miyake
University of Tokyo, JAPAN

M4P.017 IN-VITRO TUMOR AND MICROENVIRONMENT RECONSTRUCTION LABCHIP APPLIED TO HIPEC DRUG SCREENING
Jing-Wen Guo1, Chin-Yung Hsu1, Zhi-Yin Chao1, Mao-Chih Hsieh2, Yu-ting Tai2, Hwan-You Chang1, Si-Jin Dong1, and Cheng-Hsien Liu1
1 National Tsing Hua University, TAIWAN and 2 Taipei Medical University, TAIWAN

M4P.018 LUNG ON CHIP WITH AIR-LIQUID INTERFACE FOR STUDYING AIR POLLUTION AND IDIOPATHIC PULMONARY FIBROSIS
Tsan-Yang Tsai1, Yi-Ting Ke1, Yu-Chueh Chu1, Kang-Yun Lee2, Hsiao-Chi Chuang2, Wei-Lun Sun1, and Cheng-Hsien Liu1
1 National Tsing Hua University, TAIWAN and 2 Taipei Medical University, TAIWAN

M4P.019 MACHINE LEARNING ASSISTED LARGE AREA CELL TRACTION STRESS MEASUREMENTS OF CONTINUOUS CELL SHEETS
Xing Haw Marvin Tan1,2, Tomohiro Yokota1, Arjun Deb1, and Pei-Yu Chiu1
1 University of California, Los Angeles, USA and 2 Agency for Science, Technology and Research (A*STAR), SINGAPORE

M4P.020 MICROFLUIDIC THERMAL MODEL FOR EARLY DETECTION OF INFECTION IN AORTIC GRAFTS
Signe L.K. Vehusheia1, Cosmin I. Roman1, Nikola Cesarovic1,2, and Christofer Hierold1
1 ETH Zürich, SWITZERLAND and 2 German Heart Center Berlin, GERMANY

M4P.021 MULTI-WAVELENGTH OPTOELECTRONIC SYSTEM WITH MACHINE LEARNING FOR ONLINE HEMODIALYSIS MONITORING
Yao-Te Wang1, Yi-Ting-Chen2, Fong-Shung Huang2, Shuei-Liow Lin2, Yu-Hsiang Chou2, Cheng-Chen Hsu1, and Yen-Wen Lu1
1 National Taiwan University, TAIWAN and 2 National Taiwan University Hospital, TAIWAN

M4P.022 MULTIFUNCTIONAL WOUND DRESSING PATCH FOR ADVANCED WOUND CARE
Ji-Hwan Ha1, Junseong Ahn1,2, Yongrok Jeong1, Byeongmin Kang1, Jun-Ho Jeong1, and Inkyu Park2
1 Korea Advanced Institute of Science and Technology (KAIST), KOREA and 2 Korea Institute of Machinery and Materials, KOREA

M4P.023 OXYGEN DETECTION OF SINGLE CELLS WITH GUIDED MOVEMENTS
Muting Wang and Stella W. Pang
City University of Hong Kong, CHINA

M4P.024 NOVEL MICROFLUIDIC DEVICE FOR EFFECTIVE ISOLATION OF CIRCULATING TUMOR CELLS BY USING MAGNETIC PEARL-LIKE BEAD-CHAIN STRUCTURES
Sasi Kiran Boilla, Yi-Cheng Tsai, and Gwo-Bin Lee
National Tsing Hua University, TAIWAN
T4P.011 A 3D ENGINEERED PLATFORM FOR FUNCTIONAL MONITORING OF IN VITRO BRAIN MODELS
Ali Maziz\textsuperscript{1}, Eduardo Martinez Marin\textsuperscript{1}, Venkata Suresh Vajrala\textsuperscript{1},
Asma Eddarir\textsuperscript{1}, Sophie Pautot\textsuperscript{2}, and Christian Bergaud\textsuperscript{1}
\textsuperscript{1}CNRS, FRANCE and \textsuperscript{2}SYNAXYS Neuro Engineering Systems, FRANCE

T4P.012 A NOVEL SPECTRAL PLATFORM FOR QUANTIFYING UROBILINOGEN USING A URINE DIPSTICK
Ciao-Ming Tsai\textsuperscript{1}, Jyun-Wei Wen\textsuperscript{1}, Wei-Yi Kong\textsuperscript{1}, Wei-Huai Chiu\textsuperscript{2},
Welleun Fang\textsuperscript{1}, and Cheng-Hao Ko\textsuperscript{2}
\textsuperscript{1}National Tsing Hua University, TAIWAN and \textsuperscript{2}National Taiwan University of Science and Technology, TAIWAN

T4P.013 QUANTITATIVE CELL MIGRATION MONITORING METHOD USING RETROREFLECTIVE JANUS PARTICLES
Eun Kyeong Yang, Kyung Won Lee, and Hyun Chul Yoon
Ajou University, KOREA

T4P.014 ACTIVE STROBE IMAGER THAT CAN MEASURE MECHANICAL IMPEDANCE BY USING INPHASE OPERATIONAL MODE
Taiki Yamaguchi\textsuperscript{1}, Osamu Fukuda\textsuperscript{1}, Hideaki Ito\textsuperscript{1}, Kensuke Harada\textsuperscript{2},
Koji Mizoue\textsuperscript{3}, and Makoto Kaneko\textsuperscript{3}
\textsuperscript{1}Saga University, JAPAN, \textsuperscript{2}Osaka University, JAPAN, \textsuperscript{3}Meijo University, JAPAN, and \textsuperscript{4}Mizoue Project Japan Corp., JAPAN

T4P.015 AN SPR MICROFLUIDIC DEVICES FOR IDENTIFICATION OF HUMAN HERPESVIRUS 4 AND SARS-COV-2
Han-Yun Hsieh\textsuperscript{1}, Ray Chang\textsuperscript{1}, Er-Yuan Chuang\textsuperscript{2}, Yu-Jui Fan\textsuperscript{2},
Pei-Kuen Wei\textsuperscript{3}, and Horn-Jiunn Sheen\textsuperscript{1}
\textsuperscript{1}National Taiwan University, TAIWAN, \textsuperscript{2}Taipei Medical University, TAIWAN, and \textsuperscript{3}Academia Sinica, TAIWAN

T4P.016 FILLING SYSTEM OF CELL-LADEN HYDROGELS IN A PDMS MICROARRAY FOR ANALYZING MULTIPLE WELLS IN ONE-SHOT OF A MICROSCOPE
Kazuki Nishimoto, Haruka Oda, and Shoji Takeuchi
University of Tokyo, JAPAN

T4P.017 ULTRASOUND TRIGGERED BUBBLE-INDUCED BLOOD-BRAIN BARRIER OPENING: A MONODISPERSE MICROBUBBLE AND ORGAN ON-CHIP STUDY
Mariia Zakharova, Martin R.P. van den Broek, Loes I. Segerink, and Tim Segers
University of Twente, NETHERLANDS

T4P.018 INVESTIGATION OF FLOW-INDUCED INTRACELLULAR Ca\textsuperscript{2+} INCREASE IN PROXIMAL TUBULE CELLS ON A MICROPHTHYSIOLOGICAL SYSTEM FOR ADPKD MODELING
Cheng Ma, Ramin Banan Sadeghian, Kazuya Fujimoto, Akihiko Kawakami, Toshikazu Arasaka, and Ryuji Yokokawa
Kyoto University, JAPAN
T4P.019 LOCAL REMOVAL TECHNIQUE OF MICROBUBBLES IN MICROFLUIDIC DEVICE THROUGH PDMS THIN WALL FOR TISSUE CULTURE
Yasunori Tokueka1, Noboru Nakaigawa2, Keiichi Kondo2, and Tadashi Ishida1
1Tokyo Institute of Technology, JAPAN and 2Yokohama City University, JAPAN

T4P.020 MEMS-BASED ULTRA-HIGH FREQUENCY WIRELESS 10X10 QCM BIOSENSOR ARRAY CHIP
Fumihito Kato1, Junki Shinohara1, Manabu Yoshino1, Manabu Suzuki1, and Hirotsugu Ogi2
1Nippon Institute of Technology, JAPAN and 2Osaka University, JAPAN

T4P.021 MICROFLUIDIC DETECTION OF < 400 CFU/ML E. COLI IN WHOLE BLOOD WITHIN ONE HOUR
Henar Marino Miguélez1, Sara Cabanas Altarriba1, Jimmy Larsson2, Johan Elf2, and Wouter M. van der Wijngaart1
1KTH Royal Institute of Technology, SWEDEN and 2Uppsala University, SWEDEN

T4P.022 MICROWELLS WITH CONNECTING CHANNEL TO MODEL METASTATIC BEHAVIOR OF NASOPHARYNGEAL CARCINOMA CELLS
Xiao Hong, Yuanhao Xu, and Stella W. Pang
City University of Hong Kong, CHINA

T4P.023 SERS DETECTION OF SINGLE METHYLATED ANDENINE IN A DNA OLIGOMER
Hiroki Ito, Tomoya Shinabe, Akio Uesugi, Koji Sugano, and Yoshitada Isono
Kobe University, JAPAN

T4P.024 SENSING BEYOND THE DEBYE LENGTH: DEVELOPMENT OF A HIGHLY SENSITIVE, WIDE-RANGE CMOS DNA SENSOR ARRAY
Lien-Sing Tseng, Po-Hsuan Lai, Chia-Min Yang, and Michael S.-C. Lu
National Tsing Hua University, TAIWAN

T4P.025 PERITONEAL TUMOR MICROENVIRONMENT LABCHIP FOR THE SELECTION OF HIPEC DRUGS
Yin-Shan Chien1, Chia-Peng Wang2, Mao-Chih Hsieh3, Yu-Ting Tai2, Jen-Tsan Ashley Chi1, Si-Jin Don3, and Cheng-Hsien Liu1
1National Tsing Hua University, TAIWAN, 2Taipei Medical University, TAIWAN, and 3Duke University, USA

W4P.011 A CORAL-ON-A-CHIP MICROFLUIDIC PLATFORM ENABLING METABOLIC ANALYSIS OF A SINGLE CORAL POLYP
Chien-Ting Kuo, Pei-Heng Tai, and Shih-hao Huang
National Taiwan Ocean University, TAIWAN

W4P.012 A FULLY PACKAGED MICROFLUIDIC THERMAL BIOSENSOR DESIGNED BASED ON MEMS TECHNOLOGY AND ITS ENZYME IMMOBILIZATION
Zhen Peng, Cao Xia, Yuanlin Xia, Liang He, and Zhuqing Wang
Sichuan University, CHINA
W4P.013 A HIGHLY EFFICIENT MICROFLUIDIC U–WELL ARRAY DEVICE FACILITATING HIGH-THROUGHPUT METASTATIC TUMOR SPHEROID CULTURE AND DRUG EVALUATION
Yu-Hsuan Cheng, Yi-Shan Huang, Meng-Hsun Wu, Ming-Hong Tai, and Ching-Te Kuo
National Sun Yat-sen University, TAIWAN

W4P.014 A NOVELTY ULTRA–MICRO SPECTRUM MEASUREMENT PLATFORM FOR MELAMINE DETECTION IN BIO-CHEMICAL APPLICATION
Wei-Yi Kong1, Wei-Huai Chiu1, Ciao-Ming Tsai2, Guan-Yi Lin3, Weileun Fang2, Chitsung Hong3, and Cheng-Hao Ko1
1National Taiwan University of Science and Technology, TAIWAN,
2National Tsing Hua University, TAIWAN, and
3SpectroChip Inc., TAIWAN

W4P.015 CYLINDRICAL NEURAL ELECTRODES USING PRE-SHAPED FLEXIBLE PRINTED CIRCUIT MADE OF LIQUID CRYSTAL POLYMER
Taichi Ishikawa1, Yoshiaki Sakai1, Noriko Tsuruoka1, Hajime Mushiake1, Tomokazu Ohshiro1, Makoto Osanai2, and Yoichi Haga1
1University of Tohoku, JAPAN and
2Osaka University, JAPAN

W4P.016 ELECTROPHYSIOLOGICAL CHARACTERIZATION OF A NOVEL, TRANSWELL-TRANSFERRED, HUMAN NEURAL NOCICEPTIVE MICROPHYSIOLOGICAL CIRCUIT ATOP POLYMER/STEEL 3D MICROELECTRODE ARRAYS
Charles M. Didier1, Kevin J. Pollard2, Alexander Bosak2, Nisha Iyer3, Randolph S. Ashton3, Michael J. Moore2, and Swaminathan Rajaraman1
1University of Central Florida, USA,
2Tulane University, USA, and
3University of Wisconsin-Madison, USA

W4P.017 HIGH-DENSITY NEURAL MICROELECTRODE ARRAYS WITH COMPLEMENTARY WEDGE-SHAPED 3D ASSEMBLY INTERFACES FOR BRAIN ACTIVITY RECORDING
Liang Geng, Yujie Yang, Dongchong Xie, Dongliang Chen, Lei Xu, and Feng Wu
University of Science and Technology of China, CHINA

W4P.018 HIGHLY STABLE PIEZOELECTRIC RESONATOR BASED AIRFLOW SENSOR USING TIME OF FLIGHT TECHNIQUE
Parvin Akhkandi, Kevin Chan, Yasaman Majd, Hakhamanesh Manoorzare, and Reza Abdolvand
University of Central Florida, USA

W4P.019 IN-VITRO MICROFLUIDIC MODEL OF SEPSIS-ASSOCIATED ACUTE KIDNEY INJURY WITH SINGLE CELL IMAGING
Yuya Araki, Tetsuya Koyama, Hidekuni Takao, Fusao Shimokawa, Daisuke Nakano, and Kyohei Terao
Kagawa University, JAPAN

W4P.020 MICROFLUIDIC BLOOD PLASMA EXTRACTOR FROM WHOLE BLOOD SAMPLE
Hogi Hartanto and Ting-Hsuan Chen
City University of Hong Kong, HONG KONG
W4P.021 MINIATURE TRANSPARENT DOPAMINE SENSOR BASED ON NANO SPHERE LITHOGRAPHY
Yoojeong Kim, Eunyoung Jang, and Hyunjoo J. Lee
Korea Advanced Institute of Science and Technology (KAIST), KOREA

W4P.022 SARS-COV-2 INFECTION CAUSED A DAMAGE ON VASCULAR BED CO-CULTURED WITH BRONCHIAL ORGANOIDS IN MICROFLUIDIC DEVICE
Kazuya Fujimoto, Yuta Nagano, Yoshikazu Kameda, Sayaka Deguchi, Kazuo Takayama, and Ryuji Yokokawa
Kyoto University, JAPAN

W4P.023 DEVELOPMENT OF NON-CONTACT ELECTRICALLY INDUCED MICROBUBBLE MICRON DISTANCE SENSOR
Yibo Ma, Wenjing Huang, Keita Ichikawa, and Yoko Yamanishi
Kyushu University, JAPAN

W4P.024 SUB-SKIN TEMPERATURE PREDICTION FROM SKIN TEMPERATURE DISTRIBUTION FOR FROSTBYTE-FREE CRYO-ANESTHESIA
Juhee Ko1, Hyunjoon Son2, Seongjin Lee2, Gun-Ho Kim2, and Jungchul Lee1
1Korea Advanced Institute of Science and Technology (KAIST), KOREA and 2Ulsan National Institute of Science and Technology (UNIST), KOREA

W4P.025 WIRELESS POWER-UP AND READOUT FROM A LABEL-FREE SENSOR RFID
Hassan Raji, Pengfei Xie, Seyed Reza Mahmoodi, and Mehdi Javanmard
Rutgers University, USA

MONDAY - Chemical Sensors and Microsystems

M4P.025 A BREATHEABLE CAPACITIVE HUMIDITY SENSOR BASED ON ELECTROSPUN PVDF/GO COMPOSITES
Yize Liu, Long Chen, Qian Zhang, and Jianqiu Huang
Southeast University, CHINA

M4P.026 DISPOSABLE IMPEDANCE SENSOR USING LASER-INDUCED GRAPHENE FOR HYDRAULIC OIL CONTAMINATION MONITORING
Yuki Okamoto1, Tomoya Muaramoto1, Yasuyuki Yamamoto1, Ryo Matsuura2, Nobuki Sasaki2, Yusuke Takei2, Toshihiro Takeshita1, Masaaki Ichiki1, and Takeshi Kobayashi1
1National Institute of Advanced Industrial Science and Technology (AIST), JAPAN and 2Yamashin-Filter Corp., JAPAN

M4P.027 FLEXIBLE NH3 SENSOR BASED ON POLYANILINE/ CARBON NANOTUBES WITH DETECTION LIMIT DOWN TO PPB-LEVEL
Xue Wang1, Changhui Zhao2, Gaoqiang Niu1, and Fei Wang1
1Southern University of Science and Technology, CHINA and 2Anhui University, CHINA
M4P.27b LOCALIZATION OF CROP DAMAGES UTILIZING A WAKE-UP GAS SENSOR NETWORK
Seungbeom Noh1, Sayali Tope1, Farhan Sadik Sium1, Shakir-ul Haque Khan1, Mohit Karkhanis1, Leo Wang1, Adwait Deshpande1, Rana Dalapati1, Ravi V. Mural2, Carlos H. Mastrangelo1, Mingyu Ji2, Ling Zang2, James C. Schnable2, and Hansuep Kim1
1University of Utah, USA and 2University of Nebraska, Lincoln, USA

M4P.029 NOVEL 3D PRINTING PAPER-BASED MICROFLUIDIC DEVICES FOR PAPER SPRAY IONIZATIONS (μPAD-MS) AND CHROMATOGRAPHY ANALYSIS OF ILLICIT DRUGS
Muhammad Faizul Zaki1, Yi-Xin Wu2, Pin-Chuan Chen1, Pai-Shan Chen2, and Yi-Hsin Liu3
1National Taiwan University of Science and Technology, TAIWAN, 2National Taiwan University, TAIWAN, and 3National Taiwan Normal University, TAIWAN

M4P.030 SIMPLE AND SMART FLOW INJECTION TYPE WATER QUALITY METER DRIVEN BY BRILLIANT COLORED REAGENT
Masayuki Kawakami1,2, Toshihiro Kasama1, Tomomi Sato1, Madoka Takai1, Daisaku Yano1, Hidekatsu Tazawa3, Kaito Maehara1, Hiroshi Murakami2, and Ryo Miyake2
1University of Tokyo, JAPAN, 2Organo Corporation, JAPAN, 3Institute of Microchemical Technology Co., Ltd., JAPAN, and 4Next Computer System Engineering Co., Ltd., JAPAN

M4P.031 STATIC AND DYNAMIC MEMS INERTIAL GAS SENSORS
Matthew Ou1, Yasser S. Shama1,2, Bhoomi Mavani1, Mohamed Arabi1, Resul Saritas1, Rana Abdelrahman1, Sasan Rahmani2, Alaaeddin Elhady1, Raafat Mansour1, Alexander Penlidis1, and Eihab M. Abdel-Rahman1
1University of Waterloo, CANADA and 2Benha University, EGYPT

M4P.032 VISUALIZATION OF FLUID MIXING USING GHZ ULTRASONIC IMAGING
Anuj Baskota, Justin Kuo, Serhan Ardanuç, and Amit Lal
Geegah Inc, USA

TUESDAY - Chemical Sensors and Microsystems

T4P.026 A PPT LEVEL PFOS (PERFLUOROOCTANESULFONIC ACID) SENSOR BASED ON AN ECO-FRIENDLY CHITOSAN BIOPOLYMER
Pawan Pathak, Pouya Borjian, Mohammadreza Chimerad, and Hyoung J. Cho
University of Central Florida, USA

T4P.027 A SINGLE-CHIP 4-CHANNEL QUADRILATERAL MOX GAS SENSOR WITH DIFFERENT SENSING MATERIALS FOR FOOD DISCRIMINATION
Ruichen Liu, Ruoyu Zhang, Dongcheng Xie, Chong Xing, Yujie Yang, Muhammad Mustafa, Lei Xu, and Feng Wu
University of Science and Technology of China, CHINA

T4P.028 COLORIMETRIC READOUT BASED PHOTOIONIZATION DETECTOR FOR GAS CHROMATOGRAPHS
Jingjin Mao1, Longze Liu1, Yahya Atwa1, Junming Hou2, and Hamza Shakeel1
1Queen’s University Belfast, UK and 2Southeast University, CHINA
T4P.029 DEVELOPMENT OF A STRIPED GATE POTASSIUM ION SENSOR WITHOUT ANION EXCLUSION MATERIAL FOR LONG-TERM MONITORING
Md Muztahidul Islam¹, Satoshi Tsuruta¹, Satoshi Ota¹, Satoshi Koike², Madoka Takai¹, and Masato Futagawa¹
¹Shizuoka University, JAPAN, ²Vegetalia, Inc., JAPAN, and ³University of Tokyo, JAPAN

T4P.030 FREQUENCY RESPONSE OF UNCOATED-MICROCANTILEVERS TO GAS FLOW AT DIFFERENT TEMPERATURES AND ITS APPLICATION IN MOISTURE SENSING
Hemant K. Verma¹, Faizan T. Beigh¹, Darkasha Khan¹, Manoj Kandpal¹, Satya N. Behra¹, Jaspreet Singh², and Akshay Naik¹
¹Indian Institute of Science, Bangalore, INDIA and ²Semi-Conductor Laboratory, INDIA

T4P.031 PROPOSAL AND EVALUATION OF DISSOLED OXYGEN IMAGE SENSOR USING IRIDIUM OXIDE AS SENSING MEMBRANE
Rena Ueda, Ryosuke Iwatsuchi, Tomoko Horio, Yoshiko Noda, Daisuke Akai, Takeshi Hizawa, Hideo Doi, Yong-Joon Chee, Kazuhiro Takahashi, Toshikiyo Noda, and Kazuaki Sawada
Toyohashi University of Technology, JAPAN

T4P.032 MULTIPLE GAS SPECTROSCOPY USING A GOLD GRATING PLASMONIC PHOTODETECTOR
Utana Yamaoka¹, Masaaki Oshita¹, Yuuki Kaneda¹, Shiro Saito², and Tetsuo Kan¹
¹University of Electro-Communications, JAPAN and ²IMRA JAPAN CO., LTD., JAPAN

W4P.026 A CMOS-MEMS BASED MULTIPIXEL GAS SENSOR DESIGN
Nishit Goel, Ilya Gurin, Stephen F. Bart, and Peter Hartwell
InvenSense Inc., USA

W4P.027 A STUDY OF GRAPHENE HYSTERESIS EFFECT IN DIFFERENT SOLVENT ENVIRONMENT WITH SUSPENDED/SUPPORTED GRAPHENE DEVICE
Yu-Xuan Lu, Ming-Hsii Tsai, and Chi-H Ting Lin
National Taiwan University, TAIWAN

W4P.028 DEVELOPING OF PORTABLE UV-STIMULATED FLUORESCENCE SPECTRUM MEASUREMENT SYSTEM USING SPECTRAL CHIP
Ciao-Ming Tsai¹, Wei-Yi Kong¹, Wei-Huai Chiu¹, Chitsung Hong¹, Cheng-Hao Ko², and Weileun Fang¹
¹National Tsing Hua University, TAIWAN and ²National Taiwan University of Science and Technology, TAIWAN

W4P.029 ELECTROCHEMICAL SENSOR WITH 4-MERCAPTOPYRIDINE MODIFICATION FOR TRACE MERCURY DETECTION
Mingjie Han¹², Yong Xie¹², Ri Wang¹², Yang Li¹, Chao Bian¹, and Shanhong Xia¹
¹Chinese Academy of Sciences (CAS), CHINA and ²University of Chinese Academy of Sciences, CHINA
W4P.030  FABRICATION OF AC-DRIVEN VARIABLE GAS PERMEATION CONTROL DEVICES AND VERIFICATION OF CONTROLLABILITY IMPROVEMENT
Naho Minowa¹, Manase Mizutani¹,², Yoshihisa Suzuki², Yong-Joon Choi¹, Kazuhiro Takahashi¹, Kazuaki Sawada¹, and Toshihiko Noda¹
¹Toyota University of Technology, JAPAN and ²Sintokogio, LTD., JAPAN

W4P.031  IN SITU INVESTIGATION OF SMALL MOLECULE MASS TRANSPORT IN SENSOR-BASED ORGAN-ON-CHIP SYSTEMS
Johannes Dornhof, Kevin Ali Beltran Ramirez, Jochen Kieninger, Stefan J. Rupitsch, Gerald A. Urban, and Andreas Weltin
University of Freiburg, GERMANY

W4P.032  MOF/PDMS HYBRID NANOFILM-BASED QCM FOR VOC SELECTIVE VIRTUAL SENSING IN HIGH-HUMIDITY ENVIRONMENTS
Mengyao Fu, Dongsheng Li, Chenyang Gao, Jin Xie, Dibo Hou, and Yunqi Cao
Zhejiang University, CHINA

W4P.033  MULTI-ION SENSOR CHIP FOR HEALTHCARE APPLICATIONS
Van Anh T. Dam and Marcel A.G. Zevenbergen
Holst Centre / imec, NETHERLANDS

M4P.033  IN-SITU FABRICATION PROCESS OF BACTERIAL CELLULOSE COMPOSITES FOR SOFT ROBOTS
Motonori Uchimura and Fujio Tsumori
Kyushu University, JAPAN

M4P.034  MICRO ADHESIVE STRUCTURE BIOINSPIRED BY TREE FROG TOE PAD -FEMTOSECOND LASER FABRICATION ON SPONGE AND FORCE EVALUATION-
Toshihiro Shiratori, Jinya Sakamoto, Yuki Kumokita, Masato Suzuki, Tomokazu Takahashi, and Seiji Aoyagi
Kansai University, JAPAN

M4P.035  MICROWAVE CHARACTERIZATION OF PARYLENE C DIELECTRIC AND BARRIER PROPERTIES
Nikolas D. Barrera¹, Jacob T. Pawlik², Eugene J. Yoon¹, James C. Booth³, Christian J. Long², Nathan D. Orloff², Ellis Meng¹, and Angela C. Stelson²
¹University of Southern California, USA and ²National Institute of Standards and Technology, USA

M4P.036  NEAR- ZERO POISSON’S RATIO AND LARGE-AREA METAMATERIAL MADE OF UV-PDMS USING 3D BACKSIDE EXPOSURE
Riku Ito¹, Ten Sekiguchi¹, Vivek Menon¹, Ryō Ichige¹, Yuya Tanaka¹, Hiroshi Toshiyoshi¹, and Takaya Suzuki¹
¹Gunma University, JAPAN and ¹University of Tokyo, JAPAN

M4P.037  SPONTANEOUS ADAPTATION OF TOPOGRAPHY IN IMPLANTABLE DEVICES BY KIRIGAMI-INSPIRED SHAPE MEMORY POLYMER BASED MICROELECTRODES
Yuanhao Xu and Stella W. Pang
City University of Hong Kong, CHINA
T4P.034 3D PRINTED FLUIDIC OSCILLATOR CIRCUITS FOR AUTONOMOUS FLOW DRIVING AND SWITCHING
Liang-Yen Liu, Cheng-Hao Sun, Cheng-Lun Shih, and Yu-Chuan Su
National Tsing Hua University, TAIWAN

T4P.035 A NOVEL NORMAL TACTILE FORCE SENSOR USING ANISOTROPIC MAGNETO-RESISTIVE (AMR) SENSING CHIP
Shihwei Lin, Yuanruan Huan, Fuchi Shih, Meifeng Lai, and Weileun Fang
National Tsing Hua University, TAIWAN

T4P.036 AUTONOMOUS SELF-HEALING, HIGHLY STRETCHABLE, AND ELASTIC CONDUCTIVE COMPOSITES FOR ARTIFICIAL SOFT ELECTRONICS
Yu-Chia Lin, Kuan-Yu Tu, Lung-Hao Hu, and Ching-Te Kuo
National Sun Yat-sen University, TAIWAN

W4P.035 MULTI-MODAL NANOWRINKLES ON TRANSPARENT AND FLEXIBLE FILMS FOR COVERT-OVERT STRUCTURAL COLORATION ACTIVELY MODULATED BY MECHANICAL BENDING
Sungjoon Ji, Jun Gyu Park, Yeong Hoon Jeong, and Taesung Kim
Ulsan National Institute of Science and Technology (UNIST), KOREA

W4P.037 POROUS PDMS MICROREACTOR ARRAY CHIP FOR DE NOVO DNA SYNTHESIS
Xiao Su, Xiaoping Li, Chunjie Sun, Duo Fu, Jiaming Ma, and Dachao Li
Tianjin University, CHINA

W4P.038 SYNTHESIS OF TiO2/MoS2/Ag NANOCOMPOSITES VIA PHOTODEPOSITION FOR ENHANCED PHOTOCATALYSIS AND FOULING RESISTANT MEMBRANE
Teayeop Kim, Yoonkyung Lee, and Kyunghoon Kim
Sungkyunkwan University, KOREA

M4P.038 3D STACKED MICRO THIN-FILM LITHIUM-ION BATTERIES FOR IMPROVING BOTH SPECIFIC CAPACITY AND CYCLING LIFE
Xinru Wu1, Lhao Wang1, Yonghe Zhuang2, Hanzi Sun1, Junfu Liu2, Chao Wang2, Nian Shi2, and Xiaodong Huang1
1Southeast University, CHINA and 2Anhui Province Key Laboratory of Micrsystem, CHINA

M4P.039 A FLEXIBLE PIEZOELECTRIC ENERGY HARVESTER SIMULTANEOUSLY SCAVENGING MECHANICAL ENERGY OF FISH MOVEMENT AND IMPACT ENERGY OF WATER FLOW
Tianyu Sheng1, Yonggang Jiang1, Qihe He1, Wengiang Zhang2, and Kensuke Kanda3
1Beihang University, CHINA, 2China Agricultural University, CHINA, and 3University of Hyogo, JAPAN
M4P.040 CIRCUIT SIMULATOR IMPLEMENTATION OF AN EQUIVALENT CIRCUIT MODEL OF SELF-ASSEMBLED ELECTRET VIBRATIONAL ENERGY HARVESTERS BASED ON AN ENERGY DIAGRAM
Kyosuke Tokuno1, Shohei Kinoshita1, Hideyuki Kayaguchi2, Keisuke Kurihara2, Hisao Ishii2, Yuya Tanaka2, and Daisuke Yamane1
1Ritsumeikan University, JAPAN, 2Chiba University, JAPAN, and 3Gunma University, JAPAN

M4P.041 EYE-TEAR-DRIVEN ELECTRET ENERGY HARVESTER FOR SMART CONTACT LENSES
Adwait Deshpande, Erfan Pourshaban, Mohit U. Karkhanis, Md. Rabiul Hasan, Chayanjit Ghosh, Hanseup Kim, and Carlos H. Mastrangelo
University of Utah, USA

M4P.042 MEMS-BASED BROAD BAND MICRO VIBRATION ENERGY HARVESTERS UTILIZING (MgHf)0.1Al0.9N
Hung H Nguyen1,2, Le V. Minh1, and Hiroki Kuwano1,2
1Tohoku University, JAPAN and 2Sendai Smart Machines Co., Ltd., JAPAN

M4P.043 METAL-ORGANIC FRAMEWORK AND MOLYBDENUM OXIDE HYBRIDIZED NANOCOMPOSITE-BASED TRIBOELECTRIC BIOMOTION SENSOR FOR WEARABLE SELF-POWERED HUMAN IOT APPLICATIONS
S M Soheli Rana, Omar Faruk, M. Robiul Islam, HongSeok Kim, Md Abu Zahed, and Jae Y. Park
Kwangwoon University, KOREA

M4P.044 MONOLITHIC INTEGRATION OF SCALN MEMS FILTER ON RF SOI USING ALD AL2O3 AS VHF BARRIER
Xinghua Wang, Ying Zhang, Chen Liu, Eugene Yi, Zhun Woo, Wenjia Yang, Nan Wang, Yao Zhu, and Qingxin Zhang
Agency for Science, Technology and Research (A*STAR), SINGAPORE

T4P.038 A HIGHLY SENSITIVE TRIBOELECTRIC QUASI-ZERO STIFFNESS VIBRATION SENSOR WITH WIDE BANDWIDTH
Pengfan Wu, Fuyang Wang, Shiwei Xu, Tao Liu, and Xiaojing Mu
Chongqing University, CHINA

T4P.039 A LIQUID METAL TRIBOELECTRIC NANGENERATOR (LM-TENG) USING CF6/O2 PLASMA TREATED NONWETTING POLYMER FRICTION LAYER AND GALLIUM ALLOY LIQUID METAL
Jinwon Jeong and Jeong Bong (JB) Lee
University of Texas, Dallas, USA

T4P.040 A MEMS VIBRATIONAL ENERGY HARVESTER CAPABLE OF RESTLESS CHARGING CAPACITOR FROM RANDOM VIBRATIONS
Hiroaki Honma, Yukiya Tohyama, and Hiroshi Toshiyoshi
University of Tokyo, JAPAN
T4P.041 ELECTROSPINNING OF CANDLE SOOT NANOPARTICLES FOR SUPERCAPACITOR APPLICATION
Sparsh Gupta1, Ankur Gupta2, Dario Mager3, Jan G. Korvink1, and Monsur Islam3
1Punjab Engineering College, INDIA, 2Indian Institute of Technology Jodhpur, INDIA, and 3Karlsruhe Institute of Technology, GERMANY

T4P.042 LIGHT-CONTROLLED PYROELECTRIC EFFECT: DIRECT CONVERSION OF LIGHT-INDUCED HEAT TO PHYSICAL ACTUATION
Rui M.R. Pinto, Mohammadmahdi Faraji, and K. B. Vinayakumar
INL - International Iberian Nanotechnology Laboratory, PORTUGAL

T4P.043 ZERO-POWER WIRELESS SENSING SYSTEM BASED ON PIEZOELECTRIC ENERGY HARVESTING TOWARDS BATTERY-FREE IOT APPLICATIONS
Fangzhi Li, Zhao Chen, Tianyu Zhang, Yongqi Cao, Honglong Chang, Weizheng Yuan, and Kai Tao
Northwestern Polytechnical University, CHINA

W4P.040 HYBRID 3D-PRINTING OF MOLten METAL MICrODROPLeTS AND PolYMERS FOR PROTOTYPEING OF PRINTED CIRCUIT BOARDs WITH INTEGRATED ELECTRICAL ENERGY STORAGE SYSTEMS
Zeba Khan1,2, Dheepesh Gururajan1, Daniel Straubinger2, Peter Koltay1, Sabrina Kartmann1,2, Roland Zengerle1,2, and Zhe Shu1,2
1University of Freiburg, GERMANY and 2Hahn-Schickard, GERMANY

W4P.041 NON-RESONANT VIBRATION ENERGY HARVESTER WITH WOUND MICRO-COIL ARRAYS
Matin Barekatain, Junyi Wang, Akash Roy, Kianoush Sadeghian Esfahani, Jae-hoon Lee, and Eun S. Kim
University of Southern California, USA

W4P.042 OPTIMIZATION OF THE ENERGY HARVESTED BY A TRIBOELECTRIC GENERATOR EXCITED WITH A SMALL NUMBER OF ACTUATIONS
Ahmad Deldani1, Naida Hodzic1, Dimitri Galayko2, Armine Karam2, Tarik Bourouina2, Malal Kane1, and Philippe Basset3
1Université Gustave Eiffel, FRANCE and 2Sorbonne Université, FRANCE

W4P.043 PIEZOELECTRIC ENERGY HARVESTER WITH ANTI-INTERFERENCE ABILITY FOR POWER LINE MONITORING APPLICATION
Shanghao Gu, Kunling Xi, Anxin Luo, and Fei Wang
Southern University of Science and Technology, CHINA

W4P.044 STRETCHABLE FLUORINATED ELECTRET FOR SKIN-ATTACHABLE ENERGY HARVESTER
Rui Wang, Kuniko Suzuki, Masaya Takebe, Yucheng Zhang, Tomoya Miyoshi, and Yuji Suzuki
University of Tokyo, JAPAN
M4P.045 A LABCHIP WITH CO-CULTURED SPHEROIDS APPLIED FOR HIPEC CANCER DRUG SCREENING
Chang-Hung Hsieh, Wei-Yu Huang, Mao-Chih Hsieh, Yu-ting Tai, Jen-Tsan Ashley Chi, Si-Jin Dong, and Cheng-Hsien Liu
1 National Tsing Hua University, TAIWAN, 2 Taipei Medical University, TAIWAN, and 3 Duke University, USA

M4P.046 HIGH-THROUGHPUT GENERATION OF GIANT LIPOSOMES UTILIZING STEP EMULSIFICATION AND PARALLELIZED DROPLET TRANSFER CHANNELS
Shota Nakagawa, Naotomo Tottori, Sakuma Shinya, and Yoko Yamanishi
Kyushu University, JAPAN

M4P.047 LIQUID METAL DROPLETS FIBER FABRICATION BY THE CO-FLOW MICROFLUIDIC SYSTEM
Xu Gao and Wei Wang
Peking University, CHINA

M4P.048 LIGHT-FIELD MICROSCOPY-BASED COUNTING OF PARTICLES MOVING IN A MICROFLUIDIC VOLUME
Xinglong Huang, Xing Cheng, and Boris Stoeber
1 University of British Columbia, CANADA and 2 Southern University of Science and Technology, CHINA

M4P.049 NEW EWOD PLATFORM FOR FREELY TRANSPORTING DROPLET IN DOUBLE-PLATES AND SINGLE-PLATE STRUCTURES
Ting-Rui Huang, Yi-Nuoeh Chang, Yi-Wei Lin, and Da-Jeng Yao
1 National Tsing Hua University, TAIWAN and 2 Industrial Technology Research Institute, TAIWAN

M4P.050 PROGRAMMABLE ACTIVE FLOW CONTROL SYSTEM FOR MICROFLUIDIC PAPER-BASED ANALYTICAL DEVICES (μPADS) BY SIMPLE SCREW DRIVE
Chia-Wen Tsao, Po-Heng Lee, Yi-Fang Lai, and Wen-Yih Chen
National Central University, TAIWAN

M4P.051 TUNABLE ACOUSTIC TWEezERS FOR DROPLET CARRIER TRANSPORTATION AND PRETREATMENT OF LOADED MICRO-ANALyTES
Huaize Lan, Jingui Qian, Hongyu Chen, Yong Wang, Liang Huang, Xuefeng Hu, and Wei Zhang
1 Hefei University of Technology, CHINA, 2 Zhejiang University, CHINA, and 3 Hangzhou City University, CHINA

MONDAY - Microfluidics Platform Technologies

TUESDAY - Microfluidics Platform Technologies

T4P.044 3D-PRINTED, INTERNALLY FED MEMS ELECTROSPRAY THRUSTER WITH PRECISE FLOW RATE CONTROL FOR HIGH-IMPULSE CUBESAT MISSIONS
Hyeonseok Kim and Luis F. Velásquez-García
Massachusetts Institute of Technology, USA
T4P.045 DUAL-GATE AND OTHER CAPILLARY FIELD EFFECT TRANSISTOR DESIGN IMPROVEMENTS FOR INCREASED SWITCHING SPEED, SEALING EFFICACY, AND LIQUID VISCOSITY RANGE
Daniel Mak1, Azadeh Hashemi1, Claude Meffan1,2, Julian Menges1, Henrieke Meijer3, Fabien Abeille3, Marko T. Blom3, Renwick Dobson1, and Volker Nock1
1University of Canterbury, NEW ZEALAND, 2Kyoto University, JAPAN, and 3Micronit B.V., NETHERLANDS

T4P.046 FRACTION COLLECTORS FOR CONDUCTING CHROMATOGRAPHY ON A CENTRIFUGAL PLATFORM
Yi-Hui Chen, Yuan-Ting Cheng, and Chih-Hsin Shih
Feng Chia University, TAIWAN

T4P.047 LATE-Stage ZEBRAFISH EMBRYO MANIPULATION AND IMAGING WITH ACOUSTIC TWEETERS BASED ON BESSEL BEAM TRAPPING
Baptiste Neff, Kianoush Sadeghian Esfahani, Matin Barekatain, Akash Roy, Jaehoon Lee, and Eun S. Kim
University of Southern California, USA

T4P.048 LOW-COST AND RAPID FABRICATION OF MICROCHANNELS BY KIRIGAMI-BASED SOOT COATING FOR THE DETECTION OF EXPLOSIVES
Wei Yue1, Hanxiao Liu1,2, Xinyu Zhou3, Chun-ming Chen4, Yande Peng1, Fanping Sui1, Ying Dong3, and Liwei Lin1
1University of California, Berkeley, USA, 2Tsinghua University, CHINA, 3Peking University, CHINA, and 4National Tsinghua University, TAIWAN

T4P.049 ULTRA-FAST ACOUSTOFLUIDIC PARTICLE FOCUSING USING LATERAL MODES OF A PLATE TRANSDUCER
Andreas Fuchsluger1, Annalisa De-Pastina2, Tina Mitteramskogler1, Rafael Ecker1, Thomas Voglhuber-Brunnmaier1, Nikolai Andrianov2, Alexander Shatalov2, Norbert Cselyuszka2, Mohssen Moridi2, and Bernhard Jakoby1
1Johannes Kepler Universität Linz, AUSTRIA and 2Silicon Austria Labs, AUSTRIA

W4P.045 3D-PRINTED POROUS MICRONEEDLES FOR WOUND HEALING
Esraa A. Faeihe, Andrés A. Aguirre-Pablo, Dana Z. Al Sulaiman, Sigurdur T. Thoroddsen, and Khaled N. Salama
King Abdullah University of Science and Technology (KAUST), SAUDI ARABIA

W4P.046 A FACILE APPROACH FOR FABRICATING ORDERED SUBMICROMETER-WIDE SURFACE PATTERNS BY IMPRINTING POLYDIMETHYLISILOXANE CRACKS
Yang Bu, Sheng Ni, and Levent Yobas
Hong Kong University of Science and Technology, HONG KONG

W4P.047 COCKTAIL DRUGS DELIVERY CHIP WITH SELECTIVELY CROSSLINKING HYDROGEL FOR COLON CANCER DRUG SCREENING
HsinYu Yang1,2 and FanGang Tseng1,2
1National Tsing Hua University, TAIWAN and 2Academia Sinica, TAIWAN
W4P.048 FABRICATION AND EVALUATION OF HIERARCHICAL SUPERHYDROPHOBIC AND SALVINIA SURFACES
Zhaohui R. Li, Xiaojie Tao, and Chang-Jin “CJ” Kim
University of California, Los Angeles, USA

W4P.049 MICROFLUIDIC THROMBUS ANALYSIS SYSTEM
Ji-Seob Choi¹, Dong-Hwi Ham¹, Jin-Ho Choi², and Woo-Tae Park¹
¹Seoul National University of Science and Technology, KOREA and
²Samsung Medical Center, KOREA

M4P.052 ELECTRENTIZATION OF NANO-THICK Al₂O₃ FILMS DURING ATOMIC LAYER DEPOSITION
Yoshito Iguchi, Momoko Narasaki, Akio Uesugi, Koji Sugano, and Yoshitada Isono
Kobe University, JAPAN

M4P.053 FABRICATION METHOD OF VERSATILE MICRO/NANO HIERARCHICAL STRUCTURE AND ITS USAGE AS SUPERHYDROPHOBIC FLEXIBLE FILM
Yongrok Jeong¹, Junseong Ahn¹, Byeongmin Kang², Ji-Hwan Ha³, Jiwoo Ko¹, Soon Hyoung Hwang³, Sohee Jeon⁴, Jun-Ho Jeong⁴, and Inkyu Park¹
¹Korea Advanced Institute of Science and Technology (KAIST), KOREA and ²Korea Institute of Machinery and Materials, KOREA

M4P.054 RESIDUE-FREE TRANSFER OF VERTICALLY ALIGNED CARBON NANOTUBE ARRAYS USING THIN ICE FILM
Hyunjun Han, Kyuhyun Hwang, Eunhwan Jo, Daeyeon Koh, and Jongbaeg Kim
Yonsei University, KOREA

M4P.055 TWO-DIMENSIONAL MOS₂-BASED FLEXIBLE SENSOR FOR SENSITIVE, REAL-TIME MONITORING OF LITHIUM-ION BATTERY TEMPERATURE
Dianhong Huo and Jungwook Choi
Chung-Ang University, KOREA

T4P.050 FLOW BEHAVIOR CHARACTERIZATION OF DNA MOLECULES IN PASSIVE NANOFUIDIC DEVICES
Franziska M. Esmek¹, Phil Grzybeck¹, Rukan Nasri²,³, Dennis H.B. Mors¹, Sadhana Tiwari¹, and Irene Fernandez-Cuesta¹,²
¹Universität Hamburg, GERMANY and ²Hamburg Centre for Ultrafast Imaging, GERMANY

T4P.051 FORMATION DYNAMICS OF DNA CONDENSATES IN MONODISPERSE GUWS TOWARD CONSTRUCTION OF ARTIFICIAL CELLS WITH NUCLEUS
Ryotaro Yoneyama¹, Ryota Ushiyama¹, Tomoya Maruyama², Masahiro Takinoue³, and Hiroaki Suzuki¹
¹Chuo University, JAPAN and ²Tokyo Institute of Technology, JAPAN
INDIVIDUALLY ADDRESSABLE, 3D-PRINTED CARBON NANOTUBE FIELD EMITTER ARRAYS FOR LARGE-AREA VACUUM ELECTRONICS
Crystal E. Owens, Alex Kachkine, Gareth H. McKinley, Luis F. Velásquez-Garcia, and A. John Hart
Massachusetts Institute of Technology, USA

NANO-WIDTH ZIGZAG FLEXURE STRUCTURES FOR HIGHLY TUNABLE GRATING PITCH
Kiryu Atsuya, Gaku Furusawa, Oshita Masaaki, and Tetsuo Kan
University of Electro-Communications, JAPAN

NANOSCALE STENCILS FABRICATED BY FOCUSED ION BEAM MILLING AND DRY TRANSFER OF SILICON-ON-NOTHING MEMBRANES
Taeyeong Kim and Jungchul Lee
Korea Advanced Institute of Science and Technology (KAIST), KOREA

CONTROLLABLY CONSTRUCTING GOLD NANOSTRUCTURES ON ELECTRODES THROUGH GROWTH OF ZINC OXIDE NANORODS AND TWO-STEP ELECTROPLATING
Shengsen Zhang, Shengjie Chen, Kunru Yu, and Rong Zhu
Tsinghua University, CHINA

DNA CROSS-LINKED MODULAR STIMULI-RESPONSIVE GEL SENSOR UTILIZING NUCLEIC ACID REACTION FOR MICROFLUIDIC SYSTEMS
Satofumi Kato¹, Yurika Ishiba¹, Masahiro Takanoue², and Hiroaki Onoe¹
¹Keio University, JAPAN and ²Tokyo Institute of Technology, JAPAN

INVESTIGATION OF ELASTIC SOFTENING AND STIFFENING EFFECT OF ALUMINUM NITRIDE UNDER STRESS LOADING BY BORN-LANDE EQUATION
Cong Chen¹, Yuwen Lu¹, Jie Zhang¹, Libing Bai¹, Jiuhao Wang¹, Yuhua Cheng¹, and Hong Zhou²
¹University of Electronic Science and Technology of China, CHINA and ²National University of Singapore, SINGAPORE

NANOGAP CONTROL OF GOLD NANOPARTICLE DIMER TOWARD ELECTRICAL AND OPTICAL SINGLE MOLECULE MEASUREMENTS
Yuanzhi Chang, Takayuki Sumitomo, Akio Uesugi, Koji Sugano, and Yoshitada Isono
Kobe University, JAPAN

NEMS PRESSURE GAUGE BASED ON 2D Ti3C2Tx RESONATORS
Bo Xu, Jiankai Zhu, Fei Xiao, Na Liu, Hujie Wan, Xu Xiao, Juan Xia, and Zenghui Wang
University of Electronic Science and Technology of China, CHINA

VISUALIZATION OF GAS SPATIOTEMPORAL DISTRIBUTION USING 2D LSPR GAS SENSOR
Masato Matsuoka, Ge Lingpu, Fumihiro Sassa, and Kenshi Hayashi
Kyushu University, JAPAN
M4P.056 A NOVEL WATER-IMMERSIBLE METAL MICRO SCANNING MIRROR BASED ON ZIGZAG BEAM STRUCTURE
Er-Qi Tu, Xin-Lu Deng, Xiao-Yong Fang, Sen-Yuan Yu, Xiang-Hao Kong, Jia-Zhe Liang, and Wen-Ming Zhang
Shanghai Jiao Tong University (SJTU), CHINA

M4P.057 A RESONANT PIEZOELECTRIC MEMS MIRROR WITH 180-DEGREE OPTICAL SCAN ANGLE UNDER ATMOSPHERE PRESSURE
Hung-Yu Lin1, Hao-Chien Cheng1,2, Shih-Chi Liu1, Chih-Chen Hsu1, Si-Han Chen1, Jerwei Hsieh3, Ruyu-Shing Huang4, Mei-Feng Lai4, and Weileun Fang1
1National Tsing Hua University, TAIWAN, 2Coretronic MEMS Corporation, TAIWAN, 3Asia Pacific Microsystems, Inc., TAIWAN, and 4National Sun Yat-sen University, TAIWAN

M4P.058 ABSOLUTE PRESSURE MEASUREMENT OF SUB-MILLIPASCAL ORDER USING LASER RADIATION FORCE
Yuki Takei, Yuki Okamoto, Masaaki Ichiki, and Hiromitsu Furukawa
National Institute of Advanced Industrial Science and Technology (AIST), JAPAN

M4P.059 COMBINING PIEZORESISTIVE AND PIEZOELECTRIC SENSING IN PZT-DRIVEN RESONANT MEMS MICROMIRRORS FOR OPTIMAL STABILITY
Paolo Frigerio1, Andrea Bertazzoni1, Roberto Carminati2, Luca Molinari2, Gianluca Mendicino2, and Giacomo Langfelder2
1Politecnico di Milano, ITALY and 2STMicroelectronics, ITALY

M4P.060 MEMS TE0-TEN MODE SELECTIVE SWITCH FOR MODE DIVISION MULTIPLEXING SYSTEMS
Haoyang Sun1, Qifeng Qiao1,2, and Guanyua Zhou1
1National University of Singapore, SINGAPORE and 2Shanghai Industrial µTechnology Research Institute, CHINA

M4P.061 MICROAPERTURE MODULATED ULTRATHIN ARRAY CAMERA FOR HIGH DYNAMIC RANGE (HDR) IMAGING
Young-Gil Cha, Hyun-Kyung Kim, Jae-Myeong Kwon, and Ki-Hun Jeong
Korea Advanced Institute of Science and Technology (KAIST), KOREA

TUESDAY - Optical and Atomic Transducers

T4P.055 A 2-AXIS SCANNING COMB-DRIVE MICROMIRROR WITH POLYMER-FILLED ISOLATION TRENCHES
Yingtiao Cao, Yingtao Ding, Yangyang Yan, and Huikai Xie
Beijing Institute of Technology, CHINA

T4P.056 A LIGHTWEIGHT MICROMIRROR MADE OF ATOMIC-LAYER-DEPOSITION ALUMINA AND SILICON WITH A HIGH ASPECT-RATIO STIFFENING STRUCTURE
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T4P.057 CURRENT SENSING BASED ON MICROFABRICATED DIAMOND QUANTUM MAGNETOMETER
Qihui Liu1,2, Hao Chen2, Fei Xie2, Yuqiang Hu3,4, Nan Wang1,2, Lihao Wang1, Yichen Liu1, Yang Wang1, Zhichao Chen1,2, Lingyun Li1,2, Jiangong Cheng3,4, and Zhenyu Wu1,2
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T4P.058 LARGE STROKE PIEZO MEMS MIRROR FOR HIGH-SPEED FOURIER TRANSFORM SPECTROSCOPY
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T4P.059 MONOLITHIC CMOS-COMPATIBLE CO2 SENSOR WITH THERMAL SOURCE AND DETECTOR
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T4P.060 OVER-COUPLED MODE BASED ON METAMATERIAL ABSORBER FOR ENHANCED MOLECULAR DETECTION
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W4P.056 A MEMS RECONFIGURABLE TERAHERTZ METAMATERIAL ABSORBER BASED ON THE TUNABLE AIR GAP
Zhenci Sun1, Chen Chen1, Xiaomeng Bian2, Yuanmu Yang1, Rui You2, Xiaoguang Zhao1, and Jiahao Zhao1
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W4P.057 CHIP-SCALE DIGITAL MID-INFRARED COMPUTATIONAL SPECTROMETER POWERED BY MEMS TECHNOLOGY
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Christian Helke1,2, Jan Seiler1,2, Marco Meinig1, Toni Großmann1,2, Thomas Werner1, Jens Bonitz1, Micha Haase1,2, Sven Zimmermann1,2, Martin Ebermann1, Steffen Kurth1, Danny Reuter1,2, and Karla Hiller1,2
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W4P.059 NOVEL TERRACED CAVITIES DESIGN ON IR-ABSORBER SURFACE FOR CMOS-MEMS THERMOELECTRIC INFRARED SENSOR
Yung-Chen Li, Yuanyuan Huang, You-An Lin, Da-Jen Yen, Mei-Feng Lai, and Welleun Fang
National Tsing Hua University, TAIWAN
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Hitesh G.B. Gowda¹, Matthias C. Wapler¹,², and Ulrike Wallrabe
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W4P.061 WIDE ANGLE AND HIGH FREQUENCY RESONANT PIEZOELECTRIC MEMS MIRROR FOR LASER BEAM SCANNING APPLICATION
Hung-Yu Lin¹, Hao-Chien Cheng¹,², Shi-Chi Liu¹, Chih-Chen Hsu¹, Si-Han Chen¹, Mingchung Wu¹, Kai-Chih Liang², Mei-Feng Lai¹, and Weileun Fang¹
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M4P.062 CROSS-SECTIONAL SHAPE CONTROL OF MICROCHANNEL ON MICROPowDER BLOWING WITH NOZZLE TILTING ANGLE
Hiromasa Yagyu, Mikinari Takada, and Mao Hamamoto
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M4P.063 FABRICATION OF HIGH-DENSITY MICRO-BUMP ARRAYS FOR 3D INTEGRATION OF MEMS AND CMOS
Yunfan Shi¹, Zilin Wang¹, Rutian Huang¹, Jin Kang², Kai Zheng², Weihai Bu², and Zheyao Wang¹,²
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M4P.064 FABRICATION OF ULTRA-LOW RESONANCE FREQUENCY INERTIAL MEMS USING THROUGH-SILICON DEEP-RIE APPLIED TO SILICON-ON-Glass
Jun Wu, Hui Zhang, and Tamio Ikehashi
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M4P.065 ON-CHIP LASER BEAM DELIVERY FOR INTEGRATED ION TRAPS
Mario Grüneberg¹, Jaka Pribošek¹, Andreu Llobera¹, Alexander Zesar², Jakob Wahi², Matthias Preidtl², Yves Colombet², Klemens Schüppert², Clemens Rössler², Philipp Hurdax², Bernhard Lamprecht¹, and Matteo Montagnese¹
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M4P.066 ULTRASONIC TEST STRUCTURES FOR NON-DESTRUCTIVE MEASUREMENT OF TRAPEZOIDAL ANGLE IN BOSCH PROCESSES
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M4P.067 ULTRATHICK LOW-STRESS POLY-SILICON FILM FOR MEMS PREPARED BY LPCVD PROCESS
Gen Shikida¹, Hideharu Itatani¹, Toshio Kudo¹, Shuntaro Machida¹, Yukio Suzuki², Shuji Tanaka², and Manabu Izumi²
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Wei Wei1, Yunlong Li2, Gauri Karve1, Lei Zhang1, Tim Stakenborg1, and Deniz S. Tezcan1
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T4P.062 A NOVEL ANISOTROPIC WET ETCHING PROCESS OF (100)-SILICON WITH AREA EFFICIENCY ON CONVEX CORNER COMPENSATION PATTERNS
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Peking University, CHINA

T4P.063 DESIGN AND FABRICATION OF A SMART VAPORASING LIQUID MICROTHRUSTER FOR CUBESAT APPLICATIONS
Georgios Spernovasilis, Henk W. van Zeijl, and Pasqualina M. Sarro
Delft University of Technology, NETHERLANDS

T4P.064 GAS PERMEABLE ENVIRONMENTAL PROTECTION CAPS FOR WAFER LEVEL CAPPING OF MEMS GAS AND PRESSURE SENSORS
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T4P.065 LARGE-SCALE AND HIGH-ASPECT-RATIO MICRO/NANO GLASS STRUCTURES VIA A REFLOW PROCESS
Minjie Zhu, Xiaohui Du, Shuai Liu, and Fanhong Chen
Instrumentation Technology and Economy Institute, CHINA

T4P.066 SINGLE-CRYSTALLINE-SILICON TSV BASED ON DRY FILLING AND OXIDATION OF SUBMICRON SILICON PARTICLES
Biyun Ling1, Biqing Zhou2, Xiaoyue Wang1, Yaming Wu1, and Gang Quan1
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W4P.062 DESIGN AND FABRICATION OF A PASSIVE PRESSURE SENSOR BASED ON BIOCOMPATIBLE ORMOCOMP
Yi Chiu1, Chun-Hsiang Liao1, Gianmario Scotti1, Parvaneh Sardarabadi1, and Cheng-Hsiun Liu1
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W4P.063 PLASMA-BASED ADDITIVE MANUFACTURING METHOD FOR MEMS USING APSLD (ATMOSPHERIC PRESSURE SPUTTERING LAYER DEPOSITION) TECHNOLOGY
Jan Bickel1, Roland Gesche2, Martin Fieber2, Joachim Scherer2, Reinhold Kovacs3, Xiaodong Hu4, and Ha Duong Ngo4
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W4P.064 SINGLE PASCAL VACUUM SEALING OF MEMS RESONATOR BY SILICON MIGRATION WAFER-LEVEL PACKAGING WITHOUT GETTER
Yukio Suzuki¹, Muhammad Jehanzeb Khan¹, Munehiro Honda², Hitoshi Miyashita², Tianjiao Gong³, Takashiro Tsuchimoto¹, and Shuji Tanaka¹
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W4P.065 ULTRAFAST DIRECT WRITING OF POLYMERS AS A SIMPLE FABRICATION METHOD FOR ORGANIC ELECTROCHEMICAL TRANSISTORS
Alessandro Enrico¹, Sebastian Buchmann¹,², Fabio De Ferrari¹, Yazhou Wang¹, Wan Yue¹, Göran Stemme¹, Frank Niklaus¹, Anna Herlind¹,², and Erica Zeglio¹,²
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M4P.068 A CMOS–MEMS THREE-AXIS MAGNETIC SENSOR WITH A FERROMAGNETIC CONCENTRATOR
Yun-Wen Lai, Yu-Lin Yang, and Shih-Jui Chen
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M4P.069 A FAST CHARACTERIZATION METHOD FOR PRESSURE SENSORS WITH CONTINUOUSLY RAMPING PRESSURE AND TEMPERATURE
Chen Wang¹, Appo van der Wie², Grim Keulemans¹, Ben Maes², Maliheh Ramezani², and Michael Kraft¹
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M4P.070 A MINIATURIZED LEAF CUVETTE FOR VOLATILE ORGANIC COMPOUND MEASUREMENT ON BROAD LEAVES
Yasmina Frey, Simon Haberstroh, Mirjam Meischner, Christiane Werner, and Ulrike Wallrabe
University of Freiburg, GERMANY

M4P.071 A RESONANT-BASED HIGHLY SENSITIVE GAS SENSOR WITH A FUNCTIONAL COMPOSITE MEMBRANE
Na Ling, Wei Zhang, Jainia Xiang, Jiayang Chen, Lijia Zhang, Cao Xia, Yuanlin Xia, and Zhuqing Wang
Sichuan University, CHINA

M4P.072 A RESONANT PRESSURE SENSOR WITH SUPER HIGH RESOLUTION AND STABILITY BASED ON NOVEL VOLUME SHRINKAGE METHOD
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M4P.073 A THREE-AXIS CO-OSCILLATING VECTOR HYDROPHONE BASED ON MEMS ELECTROCHEMISTRY
Lintao Hu¹,², Tian Liang¹,², Zhenyu Sun¹,², Maoqi Zhu¹,², Mingbo Zhang¹,², Junbo Wang¹,², Deyong Chen¹,², and Jian Chen¹,²
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M4P.074 AN ALL-SILICON RESONANT DIFFERENTIAL PRESSURE MICROSENSOR WITH TEMPERATURE COMPENSATION
Jiahui Yao1,2, Chao Cheng1,2, Han Xue1,2, Zongze Yu1,2, Yulan Lu1, Bo Xie1, Junbo Wang1,2, Deyong Chen1,2, and Jian Chen2
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M4P.075 DEVELOPMENT OF FLEXIBLE PIEZOELECTRIC HAIR-LIKE DUAL-MODE SENSOR FOR DETECTION OF AIRFLOW AND ACOUSTIC PARTICLE VELOCITY
Biao Jin, Hongchao Cao, Tianyu Sheng, Qipei He, Yansong Gai, and Yonggang Jiang
Beihang University, CHINA

M4P.076 DOUBLE-PROOF MASS SOI-BASED MATRYOSHKA-LIKE 3-AXIS MEMS ACCELEROMETER
Inês S. Garcia1, José Fernandes1, José B. Queiroz1, Carlos Calaza1, José Moreira1, Rosana A. Dias1, and Filipe S. Alves1
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M4P.077 FIRST DEMONSTRATION OF A PRINTABLE FUSED-SILICA GLASS BASED MILLI-METER SIZED RESONATOR
Yahya Atwa and Hamza Shakeel
Queen’s University Belfast, UK

M4P.078 IMPROVED REPRODUCIBILITY OF DEFLECTION CONTROL PROCESS FOR CANTILEVER-TYPE MEMS TACTILE SENSORS
Harufumi Hosokawa, Yuki Kawasaki, Yingquan Zheng, Takashi Abe, and Masayuki Sohgawa
Niigata University, JAPAN

M4P.079 NEST BOX FOR MONITORING THE MASS AND HEART RATE CHANGES OF A GROWING SEABIRD CHICK
Daiki Uematsu1, Takuto Kishimoto1, Kazuki Harada2, Shinichi Watanabe3, Katsufumi Sato2, and Hidetoshi Takahashi1
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M4P.080 OPTICALLY PUMPED SOLID STATE QUANTUM MAGNETOMETERS FOR SPACE APPLICATIONS
Andreas Gottscholl, Hannes Kraus, and Corey J. Cochrane
California Institute of Technology, USA

M4P.081 PARAMETER OPTIMIZATION FOR AMPLITUDE-MODULATED RESONANT MEMS SENSORS FEATURING BLUE SIDEBAND EXCITATION
Jingqian Xu1, Lei Xu1, Xingyin Xiong1, Xudong Zou1, Chengxin Li5, Fangjing Hu1, Yuan Wang2, Huafeng Liu1, and Chun Zhao3
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M4P.082 PRESSURE SENSOR WITH A CORRUGATED STRUCTURE UTILIZING LIG SENSING ELEMENT
Ryo Oda, Rihachiro Nakashima, and Hidetoshi Takahashi
Keio University, JAPAN
M4P.083 SLIP DETECTION USING A HEAT-FLOW-TYPE WARMTH SENSOR
Hiro Kanamori and Yoshiyuki Hata
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M4P.084 TEMPERATURE BEHAVIOUR OF RAYLEIGH, SEZAWA
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George Stavrinidis2, Dan Vasilache1, Antonis Stavrinidis2,
Adrian Dinescu1, George Konstantinidis2, and Alexandru Müller1
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M4P.085 TEXTILE-BASED STRETCHABLE STRAIN SENSOR FOR HUMAN
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Rui M.R. Pinto, Mohammadmahdi Faraji, and K.B. Vinayakumar
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M4P.086 UNIVERSAL CONCEPT FOR FABRICATING LOW RESIDUAL
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Yuh-Cherng Lai and Guo-Hua Feng
National Tsing Hua University, TAIWAN

M4P.087 UNIVERSAL OPTIMIZATION SOLUTION FOR DIELECTRIC
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Tzu-Yi Hsu1, Chieh-Cheng Wang1, Padmanabha P. Pancham1,
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T4P.067 4.51 MILLION QUALITY FACTOR IN MICRO HEMISPHERICAL
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Weiyu Zhu, Yan Shi, Xiang Xi, Kun Lu, Zhanqiang Hou,
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National University of Defense Technology, CHINA

T4P.068 A BIODEGRADABLE STACKED-INDUCTORS LC SENSOR FOR
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Li-Feng Wang, Jing-Jing Lu, Lei Dong, Qing-An Huang,
and Zhen-Xiang Yi
Southeast University, CHINA

T4P.069 A MEMS RESONANT PRESSURE SENSOR BASED ON CAVITY-SOI
Han Xue1,2, Jiahui Yao1,2, Chao Cheng1,2, Zongze Yu1,2, Yulan Lu1,
Bo Xie1,2, Junbo Wang1,2, Deyong Chen1,2, and Jian Chen1,2
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T4P.070 A SELF-ADAPTIVE PHASE DIFFERENCE MEASUREMENT SYSTEM
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Liangbo Ma1,2, Xingyin Xiong1, Zheng Wang1, Kunfeng Wang1,2,
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T4P.071 AI-ENABLED E-SKIN WITH HIGH-ACCURACY MATERIAL AND TEXTURE RECOGNITION VIA STICK-SLIP AND CONTACT ELECTRIFICATION
Jiahao Yu1, Jiyuan Zhang2, Aocheng Bao1, Jin Wu2, Bowen Ji1, Honglong Chang1, Weizheng Yuan1, and Kai Tao1
1Northwestern Polytechnical University, CHINA and 2Sun Yat-sen University, CHINA

T4P.072 A STRUCTURE-OPTIMIZED ACOUSTIC PARTICLE VELOCITY SENSOR WITH IMPROVED SENSITIVITY AND SELF-NOISE
Wangnan Chen, Zhezheng Zhu, Xu Ma, Lingmeng Yang, Lihao Ma, Wenhua Xu, Chengchen Gao, Yilong Hao, and Zhenchuan Yang Peking University, CHINA

T4P.073 EVERYTHING AT ONCE-LINEARIZING SYSTEM RESPONSE AND ENHANCING SENSITIVITY IN PHOTOACOUSTIC GAS SENSORS BY DEDICATED DEMODULATION AND FILTER TUNING METHODS
Simon Essing1, David Tumpold2, Guillaume Dumas2, Andrey Kravchenko3, Mohammadamir Ghaderi3, and Gabriele Schrag1
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T4P.074 FLEXIBLE CENTRALIZED TRI-AXIS FORCE SENSOR BASED ON CAPACITANCE AND INTRINSIC RESISTANCE OF BUMP STRUCTURE
Jie Jin, Yancheng Wang, and Deqing Mei Zhejiang University, CHINA

T4P.075 FPGA-BASED ASYNCHRONOUS SPIKE PERCEPTRON FOR TINY MEMS TACTILE SENSORS
Masanori Aoki1, Tatsuya Saito1, Mitsuhiro Ando1, Masayuki Sohgawa2, Tomonori Izumi1, Junichi Akita2, and Haruo Noma1
1Ritsumeikan University, JAPAN, 2Niigata University, JAPAN, and 3Kanazawa University, JAPAN

T4P.076 HIGH-SENSITIVE SLIP SENSOR FEATURING HIGH ASPECT RATIO MICROWALLS AND ITS MEASURING PRINCIPLE USING CONVOLUTIONAL NEURAL NETWORKS
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T4P.077 HUMAN ACTIVITY RECOGNITION USING INTELLIGENT RESONANT ACCELEROMETER EMPLOYING MEMS RESERVOIR COMPUTING
Takahiro Mizumoto, Amit Banerjee, Jun Hirotani, and Toshiyuki Tsuchiya Kyoto University, JAPAN

T4P.078 MICRO-SENSORS WITH GIANT MAGNETOELECTRICAL COEFFICIENT
KeLi Zhao, Peng Pang, Zhonggang Zhang, Guangyao Pei, Yunzhe Liu, Tao Zhang, Xingxu Zhang, Jian Luo, and Binghe Ma Northwestern Polytechnical University, CHINA
T4P.079  MICROSCOPIC BLOOD VISCOSITY MEASUREMENT USING OPTICAL FIBER TWEEZERS IMAGING SYSTEM  
Wei-Yu Chen, Ching-Jung Hung, and Cheng-Yang Liu  
National Yang Ming Chiao Tung University, TAIWAN

T4P.080  MONOLITHIC INTEGRATION OF GAS, HUMIDITY, ACCELERATION, MICROPHONE, TEMPERATURE AND PRESSURE COMPOSITE MICROCHIP  
Xiaohui Li1,2, Xiawei Yue1,2, Pingping Zhang1, Heng Yang1, Tiger H. Tao1,2,4,5, and Nan Qin1,2  
1 Chinese Academy of Sciences (CAS), CHINA, 2 University of Chinese Academy of Sciences, CHINA, 3 Suzhou Huwen Nanotechnology Co., Ltd, CHINA, 4 Neuroxess Co., Ltd. (Jiangxi), CHINA, 5 Guangdong Institute of Intelligence Science and Technology, CHINA, and 6 Tiangiao and Chrissy Chen Institute for Translational Research, CHINA

T4P.081  MULTI-MODE PIEZOELECTRIC MICROMACHINED TRANSDUCERS FOR MULTI-CHANNEL ACOUSTIC POWER TRANSFER AND DATA TELEMETRY  
Teng Zhang and Ashwin A. Seshia  
University of Cambridge, UK

T4P.082  NEAR ZERO-POWER ENVIRONMENT TEMPERATURE MICROMECHANICAL SENSOR-SWITCH ENABLED BY SUB-MICRON GAP  
Duan Jian Goh1, Yul Koh1, Sagnik Ghosh1, Jaibir Sharma1, Yong Shun Teo1, Amit La1, and Joshua E.Y. Lee1  
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T4P.083  ON-LINE LASER POWER MEASUREMENT BASED ON MICROFABRICATED SENSOR DEVICE  
Yuqiang Hu1,2,3, Fei Xie1,2, Qihui Liu1,2, Nan Wang1,2,4, Jin Zhang1,2, Yichen Liu1,2, Yongquan Su1,2,3, Lihaos Wang1,2,4, Hao Chen1,2,4, and Zhenyu Wu1,2,3,4  
1 Shanghai University, CHINA, 2 Chinese Academy of Sciences (CAS), CHINA, 3 Shanghai Industrial μTechnology Research Institute, CHINA, and 4 University of Chinese Academy of Sciences, CHINA

T4P.084  PIEZOELECTRIC MEMS ACOUSTIC EMISSION SENSOR MODULE WITH A BUILT-IN PREAMPLIFIER  
Yongfang Li, Yuki Ueda, Takaaki Usui, and Kazuo Watabe  
Toshiba Corporation, JAPAN

T4P.085  SAW PRESSURE SENSOR ON LITHIUM NIOBATE USING A TRANSFER OF SEPERATELY FABRICATED CAVITIES  
Sagun Shekhar, Ebinesh Abraham, and Prosenjit Sen  
Indian Institute of Science, INDIA

T4P.086  STIFFNESS IMBALANCE ERRORS TRIMMING FOR SILICON MEMS TUNING-FORK GYROSCOPES WITH LOW COST PICOSECOND LASERS  
Yuxian Liu, Qiancheng Zhao, Dacheng Zhang, and Jian Cui  
Peking University, CHINA
T4P.087 ULTRA-SENSITIVE PIEZORESISTIVE STRAIN SENSOR UTILISING LATERAL PHOTOVOLTAIC EFFECT IN 3C-SIC/SI HETEROJUNCTION
Tuan-Hung Nguyen¹, Cong Thanh Nguyen¹, Dang D.H. Tran¹, Trung-Hieu Vu¹, Dinh Gia Ninh¹, Toan Dinh², Van T. Dau¹, and Dzung V. Dao¹
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W4P.066 3D ANISOTROPIC TACTILE SENSORS FOR NORMAL AND SHEAR FORCE DISCRIMINATION
Kai-Ming Hu, Yi-Hang Xin, Xin-Lu Deng, Zhi-Qi Dong, Jing-Lin Ye, and Wen-Ming Zhang
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W4P.067 A FLEXIBLE, EMBROIDERED STRAIN SENSOR FOR USE WITH TEXTILES
Yoshiki Kondo, Satoko Honda, and Kuniharu Takei
Osaka Metropolitan University, JAPAN

W4P.068 A HIGHLY SENSITIVE ELECTROMECHANICAL SMALL CURRENT AMMETER
Xuecui Zou, Usman Yaqoob, Khaled Salama, and Hossein Fariborzi
King Abdullah University of Science and Technology (KAUST), SAUDI ARABIA

W4P.069 A NOVEL WALL-SHEAR STRESS SENSOR WITH A COVERING FLOATING ELEMENT FOR HARSH ENVIRONMENTS
Yunzhe Liu, Guanghui Ding, Tao Zhang, Peng Pang, Keli Zhao, Guangyao Pei, Jian Luo, and Binghe Ma
Northwestern Polytechnical University, CHINA

W4P.070 A SINGLE-INPUT SINGLE-OUTPUT SENSING SCHEME FOR MULTIPLE TRACES VIA HIGH-ORDER NONLINEAR MODE LOCALIZATION
Wei Zhang, Jiajia Xiang, Na Ling, Jiayang Chen, Lijia Zhang, Cao Xia, Yuanlin Xia, and Zhubing Wang
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W4P.071 A SELF-POWERED TACTILE SENSING INTERFACE FOR HUMAN–MACHINE INTERACTION
Yuyang Sun, Hanyang Li, Kaiyao Wang, Xiaowei Feng, Cheng Hou, Tao Chen, and Huicong Liu
Soochow University, CHINA

W4P.072 AN ULTRA-SENSITIVE HYDROGEL TACTILE SENSOR WITH MICRO-CONE STRUCTURES FOR HUMAN–MACHINE INTERFACE
Aocheng Bao¹, Jiahao Yu¹, Jiyuan Zhang¹, Jin Wu², Bowen Ji², Honglong Chang¹, Weizheng Yuan¹, and Kai Tao¹
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W4P.073 BY VARYING THE DISTANCE OF NI FLUX-GUIDE FOR OUT-OF-PLANE MAGNETIC FIELD SENSITIVITY ENHANCEMENT OF AMR SENSOR
Shihwei Lin, Meifeng Lai, and Welleun Fang
National Tsing Hua University, TAIWAN

W4P.074 DESIGN AND VALIDATION OF THE FIRST Z-AXIS MEMS ACCELEROMETER WITH IN-PLANE READOUT
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W4P.075 DEVELOPMENT OF THE NASA MINI/MEMS TRI-AXIS SENSOR SYSTEM
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1NASA Langley Research Center, USA and 2NASA Glenn Research Center, USA

W4P.076 ENHANCING LOW-FREQUENCY ACCELERATION RESOLUTION OF RESONANT ACCELEROMETERS BY MANIPULATING THE BIAS VOLTAGE NOISE
Kunfeng Wang1,2, Zheng Wang1, Liangbo Ma1,2, Zhaoyang Zhai1,2, and Xudong Zou1,2
1Chinese Academy of Sciences (CAS), CHINA and 2University of Chinese Academy of Sciences, CHINA

W4P.077 LARGE VERTICAL PIEZO-OPTOELECTRONIC EFFECT IN SiC/Si HETEROSTRUCTURE
Cong Thanh Nguyen, Gia-Ninh Dinh, Tuan-Hung Nguyen, Trung-Hieu Vu, Dang D.H. Tran, Emily Lakis, Braiden Tong, Nam-Trung Nguyen, Van Thanh Dau, and Dzung Viet Dao
Griffith University, AUSTRALIA

W4P.078 MICROSTRUCTURE-ENHANCED VISION-BASED TACTILE SENSOR
Mayue Shi, Yongqi Zhang, Xiaotong Guo, and Eric M. Yeatman
Imperial College London, UK

W4P.079 ONE STEP FABRICATION OF TRIAXIAL FORCE PLATE USING A FDM 3D PRINTER
Yukitake Nakahara and Hidetoshi Takahashi
Keio University, JAPAN

W4P.080 QUALITY FACTOR MODULATION IN MEMS RESONATORS BY ELASTIC WAVE INTERFERENCE IN THE ANCHOR REGION
Daniel Platz, Marco Stixenberger, Andre Gesing, Ioan Ignat, Hendrik Kähler, and Ulrich Schmid
TU Wien, AUSTRIA

W4P.081 SELF-HEALING METAL INTERCONNECT USING SILICONE OIL DISPERSED WITH COPPER NANO PARTICLES
Akanai Umeda, Naoki Suetsumu, Wakana Akema, and Eiji Iwase
Waseda University, JAPAN

W4P.082 SELF-OSCILLATING CALORIMETER BASED ON THERMAL-PIEZO RESISTIVE RESONATOR
Aojie Quan1, Hemin Zhang2, Chengxin Li1, Chen Wang1, Xinyu Wu1, and Michael Kraft1
1KU Leuven, BELGIUM and 2Northwestern Polytechnical University, CHINA
W4P.083  TENSION-INDUCED MOEMS GRAPHENE RESONANT PRESSURE SENSOR
Yujian Liu1, Cheng Li1,2, Zhengwei Wu3, Shangchun Fan2, Zhen Wan3, and Song Han4
1Beihang University, CHINA, 2Shenzhen Institute of Beihang University, CHINA, 3Chinese Academy of Sciences (CAS), CHINA, and 4Southern University of Science and Technology, CHINA

W4P.084  UNCERTAINTY QUANTIFICATION OF MEMS DEVICES WITH HIGH-DIMENSIONAL CORRELATED PROCESS VARIATIONS
Lin-Feng Zhao, Zai-Fa Zhou, and Qing-An Huang
Southeast University, CHINA

W4P.085  UNCLOSED HEXAGONAL PIEZOELECTRIC MEMS HYDROPHONE BASED ON RIGID-Flexible COMPOSITE MEMBRANE
Zhiyong Hu, Qi Wang, Qingda Xu, Tao Ruan, Bin Yang, and Jingquan Liu
Shanghai Jiao Tong University (SJTU), CHINA

M4P.088  FULLY IMPEDANCE-MATCHED HIGH-OVERTONE BULK ACOUSTIC WAVE RESONATORS USING 2DEG ELECTRODES
Jingjie Cheng, Jiahao Wu, Yan Qiao, Penghui Song, Wenming Zhang, and Lei Shao
Shanghai Jiao Tong University (SJTU), CHINA

M4P.089  HIGH QUALITY FACTOR ALSCN LAMB WAVE RESONATORS USING NBN/AL TOP ELECTRODES AT CRYOGENIC TEMPERATURE
Zhifang Luo1,2,3, Shuai Shao1,2, Peng Dong1, Haowen Guo1,4, Xinbo Zou1,4, Jun Li1, Chengkuo Lee5, and Tao Wu1,2,3,4
1ShanghaiTech University, CHINA, 2Chinese Academy of Sciences (CAS), CHINA, 3University of Chinese Academy of Sciences, CHINA, 4University of Chinese Academy of Sciences, CHINA, 5Shanghai Engineering Research Center of Energy Efficient and Custom AI IC, CHINA, and 6National University of Singapore, SINGAPORE

M4P.090  INVESTIGATION OF QUALITY FACTOR VARIATION BASED ON TAILED MODE SHAPE ENGINEERING FOR PIEZOELECTRIC CONTOUR MODE RESONATORS
Wei Lin and Sheng-Shiuan Li
National Tsing Hua University, TAIWAN

M4P.091  STRESS INDUCED GAP CLOSING ELECTRODES FOR SILICON RESONATORS ENABLING LOW BIAS VOLTAGE AND EQUIVALENT RESISTANCE
Hao Yu1,2, Ke Sun1, Chaoyue Zheng1,2, Fang Wang1,2, Heng Yang1,2, and Xinxin Li1,2
1Chinese Academy of Sciences (CAS), CHINA and 2University of Chinese Academy of Sciences, CHINA

T4P.088  ALUMINUM SCANDIUM NITRIDE LAMB WAVE ACOUSTIC DELAY LINES WITH OVER 6% FRACTIONAL BANDWIDTH
Zhifang Luo1,2,3, Shuai Shao1,2, Chengkuo Lee5, and Tao Wu1,2,3,4
1ShanghaiTech University, CHINA, 2Chinese Academy of Sciences (CAS), CHINA, 3University of Chinese Academy of Sciences, CHINA, 4University of Chinese Academy of Sciences, CHINA, 5Shanghai Engineering Research Center of Energy Efficient and Custom AI IC, CHINA, and 6National University of Singapore, SINGAPORE
T4P.089 AN 186GZ ALSCN FILM BULK ACOUSTIC WAVE RESONATOR WITH EPITAXIAL METAL ELECTRODES
Mingyu Park, Jialin Wang, and Azadeh Ansari
Georgia Institute of Technology, USA

T4P.090 PARAMETRIC IMPEDANCE MODULATION IN DEPLETION LAYER TRANSDUCED MICROMECHANICAL RESONATOR
Satish K. Verma and Bhaskar Mitra
Indian Institute of Technology Delhi, INDIA

T4P.091 SHEAR BULK MODE RESONATOR WITH HIGH ELECTROMECHANICAL COUPLING USING X-CUT LITHIUM NIOBATE THIN FILM FOR WIDE BAND RF APPLICATIONS
Seniz E. Kucuk Eroglu, Soumya Yandrapalli, Victor Plessky, and Luis Guillermo Villanueva
École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND

T4P.092 TEMPERATURE-COMPENSATED PURE SILICON CANTILEVER RESONATOR WITH COUPLED TORSIONAL STRUCTURE AT ANCHOR
Shunsuke Yamada and Shuji Tanaka
Tohoku University, JAPAN

W4P.086 A MECHANICALLY COUPLED PIEZOELECTRIC MEMS FILTER BASED ON SUPPORT TRANSDUCER TOPOLOGY
Ken-Wei Tang1, Anurag Zope1, Zhong-Wei Lin1, Gayathri Pillai2, and Sheng-Shian Li1
1National Tsing Hua University, TAIWAN and 2Indian Institute of Science, INDIA

W4P.087 A PIEZOELECTRIC WIDTH-FLEXURAL MODE MEMS RESONATOR WITH HIGH QUALITY FACTOR AND LOW MOTIONAL RESISTANCE
Yuhao Xiao1, Wen Chen1, Jizhao Han1, Kewen Zhu1, and Guoqiang Wu1
1Wuhan University, CHINA and 2Hubei Yangtze Memory Laboratories, CHINA

W4P.088 A THERMO-PIEZORESISTIVE RESONATOR WITH F-Q PRODUCTS OVER 4.5E14
Chaowei Si1, Yongmei Zhao1,2, Guowei Han1, Jin Ning1,2, Xiaodong Wang1,2, and Fuhua Yang1,2
1Chinese Academy of Sciences (CAS), CHINA and 2University of Chinese Academy of Sciences, CHINA

W4P.089 GRAPHENE OXIDE INTEGRATED SURFACE ACOUSTIC WAVE HUMIDITY SENSOR WITH SIMULTANEOUS MULTI-FREQUENCY OPERATION
Il Ryu Jang1, Soon In Jung1, ChaeHyun Ryu1, Jaehyung Park1, Aneeta Padhan1, Jaesok Yu1, Hohyun Keum1, and Hae Joon Kim1
1Daegu Gyeongbuk Institute of Science and Technology (DGIST), KOREA and 2Korea Institute of Industrial Technology (KITECH), KOREA
MONDAY - Wearable and In-Vivo Medical Devices and Microsystems

M4P.090 **NON-LINEARITY CORRECTIONS OF TAPERED BAW TRANSDUCERS FOR ACCURATE FFT COMPUTATION USING ULTRASONIC WAVEFRONT COMPUTING**
Zaifeng Yang¹, Xing Haw Marvin Tan¹, Daniel Ssu-Han Chen¹, Bui Viet Phuong¹, Kevin Tahun Chuan Chai¹, Ching Eng Png¹, and Amit Lal²
¹Agency of Science Technology and Research (A*STAR), SINGAPORE and ²Cornell University, USA

M4P.092 **A FLEXIBLE LC-TYPE PASSIVE WIRELESS PRESSURE SENSOR FOR ATMOSPHERIC PRESSURE DETECTION**
Yifei Pan¹, Xilin Qian¹, Bowen Tian¹, Boshuai Sheng¹, Haonan Yang¹, Zhe Wu¹, Zefang Chen¹, Jiacheng Tu¹, Chengxi Guo¹, Huiyang Yu¹, and Jianqiu Huang²
¹Nanjing Tech University, CHINA and ²Southeast University, CHINA

M4P.093 **A UNIVERSAL CAVITY-BASED FORCE SENSOR WITH RECONFIGURABLE PERFORMANCE FOR INTEGRATION WITH THIN FILM DEVICES**
Zehua Xiang, Haobin Wang, Ji Wan, Chen Xu, Pengcheng Zhao, Mengdi Han, and Haixia Zhang
Peking University, CHINA

M4P.094 **A WIRELESS BACKSCATTER, BLUETOOTH LOW ENERGY (BLE)-COMPATIBLE BIOSENSOR ACQUISITION SYSTEM FOR INTEGRATED BIOELECTRONICS**
Yashwanth Vyza, James D. Rosenthal, Alix Trouillet, Ivan Furfaro, and Stéphanie P. Lacour
École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND

M4P.095 **A WIRELESS HEADSET BIOSENSOR MEASURING VOLATILE CHEMICALS EMITTED FROM THE AURIS EXTERNA FOR MONITORING METABOLISMS**
Kenta Iitani¹, Huang Di¹, Geng Zhang¹, Koji Toma², Takahiro Arakawa³, and Kohji Mitsubayashi¹
¹Tokyo Medical and Dental University, JAPAN, ²Shibaura Institute of Technology, JAPAN, and ³Tokyo University of Technology, JAPAN

M4P.096 **AN IMPLANTABLE PASSIVE WIRELESS TEMPERATURE SENSOR FOR MULTI-NODE MONITORING OF ARTIFICIAL KNEE JOINTS**
Zi-Ang Qi, Lei Dong, Qing-An Huang, Lei Han, and Meng Nie
Southeast University, CHINA

M4P.097 **IMPLANTABLE BIOSENSOR FOR CONTINUOUS SEROTONIN DETECTION IN FREELY MOVING CRAYFISH**
Jinning Han, Tawen Ho, Justin M. Stine, Michael A. Straker, Jens Herberholz, and Reza Ghodssi
University of Maryland, USA

TUESDAY - Wearable and In-Vivo Medical Devices and Microsystems

T4P.093 **A TETRAPOLAR BIOIMPEDANCE SENSOR-INTEGRATED CAPSULE TOWARD TARGETED REAL-TIME MONITORING OF INTESTINAL TISSUES**
Brian M. Holt, Justin M. Stine, Luke A. Beardslee, and Reza Ghodssi
University of Maryland, USA
A WEARABLE TRIPLE-SPiral SENSOR FOR IN-SITU REAL TIME SWEAT ANALYSIS BASED ON LASER INDUCED GRAPHENE
Yaozheng Wang, Haobin Wang, Zehua Xiang, Pengchen Zhao, Yexing Fang, Ji Wan, Chen Xu, and Haixia Zhang
Peking University, CHINA

CALIBRATION METHOD FOR WEARABLE SENSOR USING AIRFLOW AT MOUTH FOR QUANTITATIVE MONITORING OF RESPIRATION AND HEARTBEAT
Kenta Horie1, Muhammad Salman Al Farisi1, Yoshihiro Hasegawa1, Miyoko Matsushima2, Tsutomu Kawabe2, and Mitsuhiro Shikida1
1Hiroshima City University, JAPAN and 2Nagoya University, JAPAN

CANTILEVER ACTUATOR MODULE FOR ON-COMMAND DRUG DEPLOYMENT FROM INGESTIBLE CAPSULES
University of Maryland, USA

DEVELOPMENT OF FLEX-TO-RIGID CAPACITIVE MICROMACHINED ULTRASOUND TRANSDUCER (CMUT) WITH BENDING MODULATION
Sang-Muk Lee, Taemin Lee, Chaerin Oh, and Hyunjoo J. Lee
Korea Advanced Institute of Science and Technology (KAIST), KOREA

SEROPILL: NOVEL MINIMALLY INVASIVE INGESTIBLE CAPSULE FOR SEROTONIN SENSING IN THE GI TRACT
Michael A. Straker, Joshua A. Levy, Justin M. Stine, Jining Han, Luke A. Beardslee, and Reza Ghodssi
University of Maryland, USA

SIMULTANEOUS AIRFLOW AND PRESSURE MEASUREMENTS BASED ON PITOT TUBE FOR EVALUATION OF EXPIRED AIR INSIDE LUNG AIRWAY
Aoi Miyawaki1, Muhammad Salman Al Farisi1, Yoshihiro Hasegawa1, Miyoko Matsushima2, Tsutomu Kawabe2, and Mitsuhiro Shikida1
1Hiroshima City University, JAPAN and 2Nagoya University, JAPAN

HIGH-DENSITY ULTRA-FLEXIBLE NEURAL PROBE FOR MONITORING ELECTROPHYSIOLOGICAL SIGNALS OF FREE-MOVING MICE WITH EPILEPSY
Han Wang1, Qian Cheng1, Cunkai Zhou2, Ye Tian2, Chengjian Xu2, Xiaolong Wei2, Zhita Zhou2, Tiger H. Tao2, Liuyang Sun1
1Chinese Academy of Sciences (CAS), CHINA, 2University of Chinese Academy of Sciences, CHINA, 3Shanghai University of Electric Power, CHINA, 4ShanghaiTech University, CHINA, 5Neuroxess Co., Ltd. (Jiangxi), CHINA, 6Guangdong Institute of Intelligence Science and Technology, CHINA, 7Tianqiao and Chrissy Chen Institute for Translational Research, CHINA, and 8University of Science and Technology of China, CHINA
W4P.092 IMPLANTABLE IN-VIVO PH IMAGE SENSOR WITH INTEGRATED REFERENCE ELECTRODE FOR BIOLOGICAL EXPERIMENTS ON AWAKE MOUSE
Mai Madokoro1, Yuto Nakamura1, Hiroshi Horiuchi2, Tomoko Kobayashi3, Junko Ishida2, Tomoko Horio1, Yasuyuki Kimura1, Takeshi Hizawa1, Daizuke Akai1, Hideo Doi1, Yong-Joon Choi1, Kazuhiro Takahashi1, Toshihiko Noda1, Junichi Nabeura2, and Kazuaki Sawada1
1Toyonashi University of Technology, JAPAN and
2National Institute for Physiological Sciences, JAPAN

W4P.093 MAGNETOELECTRIC NANOPARTICLE BASED WEARABLE ENERGY HARVESTER FOR POWERING BIO-MEDICAL DEVICES
Nandan Murali1, Dibyajyoti Mukherjee1, G Vijay Malhaar2, Dhiman Mallick1, and Soutik Betal1
1Indian Institute of Technology Delhi, INDIA and
2Birla Institute of Technology and Science–Pilani (BITS–Pilani), INDIA

W4P.094 MULTIFUNCTIONAL NEURAL PROBE FOR SYNCHRONIZED STIMULATION AND MONITORING MULTIPLE SIGNALS
Jiawei Cao, Longchun Wang, Zhejun Guo, Zhuo Wang, Kejun Tu, Qiondu Xu, Mengfei Xu, Junyu Xiao, Bin Yang, and Jingquan Liu
Shanghai Jiao Tong University (SJTU), CHINA

W4P.095 STRETCHABLE HYBRID ELECTRONICS BASED ON AUXETIC STRUCTURES
Daniel Zymelka, Toshihiro Takeshita, Yusuke Takei, and Takeshi Kobayashi
National Institute of Advanced Industrial Science and Technology (AIST), JAPAN

W4P.096 UTILIZING ORIGAMI INTEGRATED PIEZOELECTRIC FOIL ACOUSTIC EMISSION AND ACCELERATION SENSOR FUSED WITH OMNIDIRECTIONAL MOTION DETECTOR FOR KNEE JOINT HEALTH MONITORING
Cheng-Da Lin and Guo-Hua Feng
National Tsing Hua University, TAIWAN

W4P.097 WIRELESS URINE MONITORING FOR DIAPERS WITH PASSIVE ANTENNA USING SPLIT RING METAMATERIAL
Asishtaka Kurita1, Gaku Furusawa1, Hiroaki One1, and Tetsuo Kan1
1University of Electro-Communications, JAPAN and
2Keio University, JAPAN
A 0.6 METER LONG LARGE-AREA FLEXIBLE PRESSURE SENSORS WITH OUTSTANDING UNIFORMITY AND THERMOSTABILITY
Shoulu Gong, Ding Zhe Gan, Xinlu Deng, Wenming Zhang, and Lei Shao
Shanghai Jiao Tong University, CHINA

A MICROFLUIDIC PLATFORM FOR ENHANCED LABELLING AND DETECTION OF EXTRACELLULAR VESICLES
Shi Hu, Rui Hao, Zilong Yu, Huitao Zhang, Qisang Zu, and Hui Yang
Chinese Academy of Sciences (CAS), CHINA

A PLASMONIC-PHOTONIC HYBRID FIBER-OPTIC SENSOR FOR TUMOR MARKER DETECTION AND HETEROGENEITY CHARACTERIZING
Nanxi Wang1,2, Xin Li1,2, Yimin Shi1,2, Fei Wang1,2, Lina Zhang1,2, Mingxiao Li1, Hongyao Liu1, Yang Zhao1, Jingqian Zhang1, and Chengjun Huang1,2
1 Chinese Academy of Sciences, CHINA, 2 University of Chinese Academy of Sciences, CHINA, and 3 Beijing Chest Hospital, Capital Medical University, CHINA

A STUDY OF FERROELECTRIC POLARIZATION SWITCHING AND NEGATIVE CAPACITANCE EFFECT FOR ENHANCED ENERGY STORAGE IN ON-CHIP ELECTROSTATIC SUPERCAPACITORS
Sadegh Kamaei, Michele Ghini, Ali Gilani, Carlotta Gastaldi, and Adrian M. Ionescu
École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND

ACTIVE CONTROL OF VIBRATION-INDUCED FLOW USING A PNEUMATICALLY DRIVEN MICROBALLOON DEVICE
Taku Sato, Kanji Kaneko, Takeshi Hayakawa, and Hiroaki Suzuki
Chuo University, JAPAN

BEOL COMPATIBLE (~ 400 °C) NOVEL CROSS-POINT RRAM BASED RESISTIVE HYDROGEN SENSOR FOR DOWNSTREAM HYDROGEN USE
Subhranu Samanta, Zhixian Chen, Doris K.T. Ng, Weiguo Chen, Linfang Xu, Fiuu Ming Kai, and Yao Zhu
Agency for Science, Technology and Research (A*STAR), SINGAPORE

CRYSTALLIZATION OF DNA-FUNCTIONALIZED NANOPARTICLE IN GIANT UNILAMELLAR VESICLES
Ryuta Tetsuya1, Naotomo Tottori1, Azusa Takao1, Maasa Yokomori1, Mihoko Tagawa2, Shigeto S. Sugano2, Shin’ya Sakuma2, and Yoko Yamanishi1
1 Kyushu University, JAPAN, 2 Nagoya University, JAPAN, and 3 National Institute of Advanced Industrial Science and Technology (AIST), JAPAN

EFFECT OF VAN DER WAALS FORCES ON DYNAMIC PROPERTIES OF GRAPHENE-BASED NEMS RESONATORS
Zhi-Qi Dong, Kai-Ming Hu, Xin-Lu Deng, Yi-Hang Xin, You-Lang He, and Jing-Lin Ye
Shanghai Jiao Tong University, CHINA
M4P.106 EVALUATION METHOD OF OUT-OF-PLANE DEFORMATION ON KIRIGAMI STRUCTURE WITH REPEETITIVE SLIT PATTERNS ON CONCENTRIC CIRCLES
Miyako Mizuna and Eiji Iwase
Waseda University, JAPAN

M4P.107 FABRICATION OF A MOVING-COIL-TYPE PDMS-BASED MEMBRANE ELECTROMAGNETIC MICRO-ACTUATOR BY DOUBLE-SIDED SCREEN PRINTING TECHNOLOGY
Chao Qi, Naohiro Sugita, and Tadahiko Shinshi
Tokyo Institute of Technology, JAPAN

M4P.108 FLEXIBLE THERMOPILE-TYPE WARMTH SENSOR
Minoru Sasaki1, Yoshiyuki Hata2, and Yae Ito1
1Toyota Technological Institute, JAPAN and 2Meijo University, JAPAN

M4P.109 HIGH CRYSTALLINE QUALITY A-AXIS ORIENTED AL0.56SC0.44N FILMS FOR HIGH COUPLING SAW APPLICATIONS
Weipeng Xuan1, Weilun Xie1, Xiwei Huang1, Xingli He1, Zhen Cao1, Hao Jin3, Shurong Dong3, and Jikui Luo1
1Hangzhou Dianzi University, CHINA, 2Soochow University, CHINA and 3Zhejiang University, CHINA

M4P.110 HIGH-THROUGHPUT SPERM SORTING MICROFLUIDIC DEVICE FOR LIVESTOCK’S SPERM MOTILITY ENHANCEMENT
Nian-Je Wu1, Hsien-Chih Peng1, I-Jui Chen1, Ren-Guei Wu1, and Fan-Gang Tseng1,2,2
1National Tsing Hua University, TAIWAN and 2Academia Sinica, TAIWAN

M4P.111 IMAGING RESONANT MEMS WITH ULTRA-BROAD SPECTRAL VIBROMETRY FROM 1000 HZ TO 10 GHZ
Zhao-Liang Peng, Jing-Jie Cheng, Jia-Hao Wu, Lei Shao, and Wen-Ming Zhang
Shanghai Jiao Tong University, CHINA

M4P.112 LITHIUM NIOBATE THIN FILM RESONANT INFRARED DETECTOR
Mingye Du1, Kanglu Liu2,3,4, Jiawei Li1, Xu Yi Wang1,2,3, Yushuai Liu1,2,3, Fengyu Liu1, and Tao Wu1,2,3,4
1ShanghaiTech University, CHINA, 2Chinese Academy of Sciences (CAS), CHINA, 3University of Chinese Academy of Sciences, CHINA, and 4Shanghai Engineering Research Center of Energy Efficient and Custom Al IC, CHINA

M4P.113 MACHINE LEARNING ASISTED WAFER LEVEL BATCH FABRICATION OF AN MRI-COMPATIBLE MULTIFUNCTIONAL NEURAL PROBE
Ziqi Jia, Shuyu Shi, and Yong-Kyu “YK” Yoon
University of Florida, USA

M4P.114 MICROFLUIDIC 3D HEPATIC CULTURES INTEGRATED WITH DROPLET-BASED BIOANALYSIS UNIT FOR MONITORING GLUCOSE METABOLISM UPON HORMONAL STIMULATION
Jose M. de Hoyos-Vega1, Alan M. Gonzalez-Suarez1, Diana F. Cedillo-Alcantar1, Guiznax Stbyaveya1, Aleksey Matveyenko1, Harmeet Malhi1, Jose L. Garcia-Cordero2, and Alexander Rezvin1
1Mayo Clinic, USA and 2Centro de Investigación y de Estudios Avanzados del IPN, MEXICO
M4P.115 MULTIFUNCTIONAL SENSING AND ACTUATION MINIATURIZED SYSTEM FOR BLOOD BIOMARKERS ON A BEAD
Udara B. Gunatilake1, Adriana Caballe-Abalos1, Sandra Garcia-Rey1, Jon Mercader-Ruiz1,2, Lourdes Basabe-Desmonts1,3, and Fernando Benito-Lopez1
1University of the Basque Country, SPAIN; 2Arthroscopic Surgery Unit-UCA, SPAIN; and 3Basque Foundation of Science, IKERBASQUE, SPAIN

M4P.116 PIEZOELECTRIC MEMS OSCILLATORS BASED ON FLEXURAL MODE MEMBRANE RESONATOR ARRAY FOR RESONANT SENSORS
Hexu Luo, Menglun Zhang, Yi Gong, Yuan Ning, Xuejiao Chen, Quanning Li, and Wei Pang
Tianjin University, CHINA

M4P.117 SELF-POWERED INTRUSION DETECTING SYSTEM USING A SPRAY-PAINT COATING BASED TRIBOELECTRIC NANOGENERATOR
Jonghyeon Yun and Daewon Kim
Kyung Hee University, KOREA

M4P.118 SIZE-BASED SEPARATION OF E. COLI USING VISCOELASTIC MICROFLUIDICS
Tianlong Zhang1,2, Ling Liu1, David W. Inglis1, Yoichiroh Hosokawa2, Yaxiaer Yalikun1, and Ming Li1
1Macquarie University, AUSTRALIA and 2Nara Institute of Science and Technology, JAPAN

M4P.119 TEXTURING TO DRAMATICALLY INCREASE THERMAL DEFORMATION OF FILM AND APPLYING TO ACTUATOR
Daisuke Yamaguchi, Yuki Takahara, Shuichi Wakimoto, and Takefumi Kanda
Okayama University, JAPAN

M4P.120 THERMAL RECOVERY OF PALLADIUM NANOWIRE SENSOR FOR LONG-TERM RELIABLE HYDROGEN GAS DETECTION
Ki-Hoon Kim1, Min-Seung Jo2, Jun-Bo Yoon2, and Min-Ho Seo1
1Pusan National University, KOREA and 2Korea Advanced Institute of Science and Technology (KAIST), KOREA

M4P.121 WEARABLE AND HYBRID POWER SOURCES FOR SMART CONTACT LENSES
Shiqi Wu, Yi Ding, Lunjie Hu, Daniella Gatus, Wakutaka Nakagawa, and Takeo Miyake
Waseda University, JAPAN

T4P.100 A BIMODAL "SENSOR CHIPLET" PLATFORM APPLIED FOR ALBUMIN AND PH MULTI-CHEMICAL SENSING
Ryugo Shimamura1, Shun Yasunaga1, Kei Misumi1, Anne-Claire Eiller1, Akio Higo1, Gilgueng Hwang1,2, Ayako Mizushima1, Dongchen Zhu1, Kikuo Komori2, Yasuyuki Sakai1, Hiroshi Toshiyoshi1, Agnès Tixier-Mita1, and Yoshihito Mitata1
1University of Tokyo, JAPAN; 2Paris-Saclay University, FRANCE, and 3Kindai University, JAPAN
T4P.101 A MOLECULARLY IMPRINTED POLYMER / METHYLENE BLUE/ANODIC ALUMINUM OXIDE (MIP/MB/AAO) NANOCOMPOSITE ELECTRODE FOR THE DETECTION OF ULTRA-LOW CONCENTRATION TROPONIN T IN URINE
Chieh Chen1, Yu-Ting Cheng1, and Hsiao-En Tsai2,3
1National Yang Ming Chiao Tung University, TAIWAN, 2National Taiwan University Hospital, TAIWAN, and 3National Taiwan University College of Medicine, TAIWAN

T4P.102 A SMART REAL-TIME HUMAN RESPIRATORY MONITORING SYSTEM BASED ON A HIGH-PERFORMANCE FLOW SENSOR AND AN ACCURATE BREATHING RATE RECOGNITION ALGORITHM
Shiqian Cai, Zhongyi Liu, Gai Yang, Houbo Ding, Huikai Xie, and Xiaoyi Wang
Beijing Institute of Technology, CHINA

T4P.103 ELECTROCHEMICAL SENSOR FOR INGESTIBLE CAPSULE-BASED IN-VIVO DETECTION OF HYDROGEN SULFIDE
Justin M. Stine, Katie L. Ruland, Joshua A. Levy, Luke A. Beardslee, and Reza Ghodssi
University of Maryland, USA

T4P.104 ADEPT - AN EMBEDDED MICROSYSTEMS MULTI-ELECTRODE CONTROL PLATFORM FOR VERSATILE µM-PRECISION POSITIONAL TRAPPING AND ELECTROROTATION
Lourdes Albina Nirupa Julius, Dora Akgül, Gowri Krishnan, Henrik Scheidt, Omar Nasser, Sarai M. Torres-Delgado, Dario Mager, Vlad Badilitsa, and Jan G. Korvink
Karlsruhe Institute of Technology, GERMANY

T4P.105 BROADBAND POWER GENERATION FROM ARM SWING DURING WALKING BY REPULSIVE-TORQUE-ENHANCED ROTATIONAL ELECTRET ENERGY HARVESTER
Tomoya Miyoshi and Yuji Suzuki
University of Tokyo, JAPAN

T4P.106 DEVELOPMENT OF DIGITAL NANOPLASMONOMETRY METHOD FOR LABEL-FREE DETECTIONS OF SMALL BIOMOLECULES
Ting-Wei Chang, Sheng-Hann Wang, and Pei-Kuen Wei
Academia Sinica, TAIWAN

T4P.107 ELECTRICAL IMPEDANCE SPECTROSCOPY OF SINGLE PARTICLES BY AC NANOPORE METHOD - TOWARD EVALUATION OF DIELECTRIC PROPERTIES OF SINGLE NANOPARTICLES
Kosuke Hori, Ryusei Kowaka, Maami Sakamoto, and Takatoki Yamamoto
Tokyo Institute of Technology, JAPAN

T4P.108 EXTREMELY SMALL LIMITING-CURRENT-TYPE OXYGEN SENSOR WITH A WIDE RANGE PROPORTIONALITY OF THE OXYGEN CONCENTRATION
Shunsuke Akasaka1 and Isaku Kanno2
1ROHM Co. Ltd, JAPAN and 2Kobe University, JAPAN
T4P.109 FABRICATION OF MEMS BULK SiC-BASED ACCELEROMETER AND ITS APPLICATION IN GROUND TEST OF AERO-ENGINE
Yanxin Zhai1,2, Tiantong Xu1,2, Guoqiang Xu1,2, Hengyi Wang1,2, Xiaoda Cao1,2, and Haiwang Li1,2
1Beihang University, CHINA and 2National Key Laboratory of Science and Technology on Aero Engine Aero-Thermodynamics, CHINA

T4P.110 FLUORESCENT POLYMERIC NANO-THERMOMETER FOR 3D TEMPERATURE DISTRIBUTION AND DYNAMIC MONITORING OF CHIMERIC TUMOR MICROENVIRONMENT
Ashish Kumar1, Venkanagouda S. Goudar1, Kiran Kaladharan1, Tuvin Subhra Santra2, and Fan-Gang Tseng1,3
1National Tsing Hua University, TAIWAN, 2Indian Institute of Technology Madras, INDIA, and 3Academia Sinica, TAIWAN

T4P.111 HIGH-PERFORMANCE PIEZOELECTRIC BIOMATERIALS FOR BIOCOMPATIBLE ENERGY HARVESTERS AND SENSORS
Zhuomin Zhang1,2, Xuemu Li1,2, Zhenqi Wang1, and Zhengbao Yang1,2
1City University of Hong Kong, HONG KONG and 2Hong Kong University of Science and Technology, HONG KONG

T4P.112 HIGHLY STRETCHABLE, SUPER-TOUGH AND ANTI-BACTERIAL DEEP EUTECTIC SOLVENT IONIC GEL FOR HUMAN MOTION SENSING
Jia-Yu Yang and Cheng-Hsin Chuang
National Sun Yat-sen University, TAIWAN

T4P.113 IMMUNOGENICITY MONITORING SYSTEM INCORPORATING MICROFLUIDIC CELL CHIP AND PAPER-BASED ANALYTICAL DEVICE
Kyung Won Lee, Eun Kyeong Yang, and Hyun Chul Yoon
Ajou University, KOREA

T4P.114 LOW ELASTIC SPIN TORQUE SENSOR BASED ON ANGULAR MOMENTUM CONSERVATION LAW
Masaya Toda, Kohei Oka, and Takahito Ono
Tohoku University, JAPAN

T4P.115 MICRO PLASMA GENE TRANSFECTION SYSTEM FOR UNIFORM EXPRESSION
Selya Kato1, Yuto Ando1, Kichiro Tomoda2, Mme Kobayashi3, and Shinya Kumagai1
1Meijo University, JAPAN, 2Gladstone Institutes, USA, and 3Osaka Medical and Pharmaceutical University, JAPAN

T4P.116 MODE-MATCHED MULTI-RING DISK RESONATOR USING (100) SINGLE CRYSTAL SILICON WITH 2 PPM FREQUENCY MISMATCH
Shihe Wang, Jianlin Chen, Takahiro Tsukamoto, and Shuji Tanaka
Tohoku University, JAPAN

T4P.117 ON-CHIP DIAMOND MEMS RESONATORS MAGNETIC SENSING UP TO 500°C
Zilong Zhang1, Guo Chen1, Guangchao Chen2, Satoshi Koizumi1, Yasuo Koide1, and Meiyong Liao1
1National Institute for Materials Science (NIMS), JAPAN and 2University of Chinese Academy of Sciences, CHINA
T4P.118 RESIDUAL STRESS ANALYSIS OF THIN FILM MATERIALS FOR FABRICATING SUSPENDED LOW STRESS SiN4 WAVEGUIDES ON SAPPHIRE
Erwin Berenschot, Simen Martinussen, Kai Wang, Sonia Garcia-Blanco, Niels Tas, and Roald Tiggelaar
University of Twente, NETHERLANDS

T4P.119 SELF-POWERED WIRELESS WIND SPEED SENSOR BASED ON AN ELECTRET GENERATOR
Junchi Teng, Zeyuan Cao, Zibo Wu, Rong Ding, and Xiongying Ye
Tsinghua University, CHINA

T4P.120 SOLIDLY MOUNTED TWO-DIMENSIONAL GUIDED MODES IN 30% SCANDIUM ALUMINUM NITRIDE ON SAPPHIRE
Jack Guida, Gabriel Giribaldi, Luca Colombo, Matteo Rinaldi, and Siddhartha Ghosh
Northeastern University, USA

T4P.121 THE MAXIMUM ELECTROWETTING FORCE ON DROPLETS
Robert M. Hennig1, Vito Cacucciolo2, and Herbert Shea1
1 École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND and 2 Politecnico di Bari, ITALY

T4P.122 VIRTUAL PARTICLE VALVE TOWARD GENERATION OF DOUBLE-CELLS ENCAPSULATED MICRODROPLET
Yuma Kadomura, Naotomo Tottori, Shinya Sakuma, and Yoko Yamashita
Kyushu University, JAPAN

T4P.123 WSE2/SNSE2 HETEROSTRUCTURE TUNNEL FIELD-EFFECT TRANSISTOR FOR PH SENSING
Xian Wu1,2, Haojie Zhao1,2, and Peng Li1,2
1 Tsinghua University, CHINA and 2 Beijing Advanced Innovation Center for Integrated Circuits, CHINA

W4P.098 A MICROFLUIDIC CHIP TO BOOST SECRETION OF EXTRACELLULAR VESICLES VIA CELL SQUEEZING
Shi Hu, Rui Hao, Xi Chen, Huitao Zhang, Zitong Yu, Yi Zhang, Lin Zeng, and Hui Yang
Chinese Academy of Sciences (CAS), CHINA

W4P.099 A MONOLITHIC INTEGRATED MEMS ACOUSTIC DYADIC SENSOR
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Peking University, CHINA

W4P.100 A STRETCHABLE RESISTIVE STRAIN SENSOR BASED ON CRACK PROPAGATION, OPENING AND BLUNTING: DEVICE AND MECHANICS
Katherine Moody, Shuang Wu, and Yong Zhu
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Changhao Wang1,2, Jianlin Chen1,2, Nan Wang1,2, and Yuandong Gu1
1 Shanghai University, CHINA, 2 State Key Laboratory of Transducer Technology, CHINA, and 3 Shanghai Key Laboratory of Chips and Systems for Intelligent Connected Vehicle, CHINA

W4P.102 ADVANCING INFRARED SENSING WITH HIGH-TCF 30%-DOPED SCALN RESONATORS AND ALN METAMATERIAL ABSORBERS
Farah ben Ayed, Aurelio Venditti, Gabriel Giribaldi, Ryan Tetro, Sila Deniz Calisgan, Pietro Simeoni, Zhenyun Qian, and Matteo Rinaldi
Northeastern University, USA

W4P.103 CRYSTAL ORIENTATION AND SPECIMEN SIZE DEPENDENCES OF CREEP PROPERTIES OF MICRON-THICK SILICON FOR 3D MICROSTRUCTURED MEMS
Takanori Horikawa, Kazuma Sawada, Akio Uesugi, Koji Sugano, and Yoshitada Isono
Kobe University, JAPAN

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Liye Li1 and Wengang Wu1,2
1 Peking University, CHINA and 2 Beijing Advanced Innovation Center for Integrated Circuits, CHINA

W4P.105 ENCAPSULATION OF MICRONANAS IN EXOSOMES FOR EFFICIENT INTRACELLULAR DELIVERY BY A NANOFLOWDIC PLATFORM
Zitong Yu1, Rui Hao1, Shihui Chen2, Huitao Zhang1, Shi Hu1, Jingyi Ren1, Yanhang Hong1, Bingrun Liu2, Qisang Zuo1, and Hui Yang1
1 Chinese Academy of Sciences (CAS), CHINA and 2 SomesTech Co., Ltd., CHINA

W4P.106 FABRICATION AND CHARACTERIZATION OF POLYCARBONATE SUBSTRATES FOR HIGH YIELD ASSEMBLY OF MULTICOMPONENT BIOHYBRID MICROROBOTS
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Carnegie Mellon University, USA

W4P.107 FABRICATION OF STRAIN-INDUCED GRAPHENE RESONANT MASS SENSOR USING ELASTOMER NANOSHEET FOR MOLECULAR DETECTION
Motoki Kato1, Ken Aran1, Masato Saito2, Toshinori Fujie2, Tatsuro Goda2, Yong Joon Choi1, Toshihiko Noda1, Kazuaki Sawada1, and Kazuhiro Takahashi1
1 Toyohashi University of Technology, JAPAN, 2 Tokyo Institute of Technology, JAPAN, and 3 Toyo University, JAPAN

W4P.108 A NOVEL THERMAL NOISE ACTUATED PRESSURE SENSOR
Yan Qiao1, Alaaeldin Elhady2, Mohamed Arabi3, Eihab Abdel-Rahman3, and Wen-Ming Zhang1
1 Shanghai Jiao Tong University, CHINA, 2 University of Waterloo, CANADA, and 3 Applied Science University, BAHRAIN
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Fei Wang1,2, Xin Li1,2, Stiyuan Wang1,2, Yitao Cao1,2, Xueqing Sun1,2, Nanxi Wang1,2, Lingqian Zhang1, Hongyao Liu1, Xinchao Lu1, and Chengjun Huang1,2
1 Chinese Academy of Sciences (CAS), CHINA and 2 University of Chinese Academy of Sciences, CHINA

W4P.110 HYDROTHERMALLY MODIFIED Pd NANOPIRNTICLES DECORATED TiO2 NANOSPHERES FOR VISIBLE LIGHT INDUCED ROOM TEMPERATURE HYDROGEN SENSING
Thilini Thathsara, Christopher J. Harrison, Rosalie K. Hocking, and Mahnaz Shafiei
Swinburne University of Technology, AUSTRALIA

W4P.111 INFLUENCE OF PERMANENT MAGNETIC PROPERTIES ON MAGNETIC PATTERN TRANSFER FOR MAGNETIC MEMS
Keita Nagai, Naohiro Sugita, and Tadahiko Shinshi
Tokyo Institute of Technology, JAPAN

W4P.112 LOW-POWER CO2 GAS SENSOR BASED ON ELECTROLYSIS-INDUCED BUBBLES
Steven Tran, Seungbeom Noh, and Hanseup Kim
University of Utah, USA

W4P.113 MICROFABRICATED PLATFORM FOR DIRECTIONAL NEURAL MICROCIRCUITS IN SILICON-GLASS
Dean de Boer1, Torben W. van Voorst2, Erwin J.W. Berenschot1, L. Niels Cornelisse3, and Niels R. Tas1
1 University of Twente, NETHERLANDS and 2 Vrije Universiteit Amsterdam, NETHERLANDS

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Manu Garg1,2, Fang Wei Tsa1, Sushil Kumar1, Yi Chiu2, and Pushpapraj Singh1
1 Indian Institute of Technology Delhi (IITD), INDIA and 2 National Yang Ming Chiao Tung University, TAIWAN

W4P.115 ON-CHIP MAGNETOTHERMAL SYSTEM FOR SINGLE MICRO-PARTICLE HEATING
Lin Zeng1, Shengyu Wang1, Hongwei Guan2, Qisang Zuo1, Yi Zhang1, and Hui Yang1
1 Chinese Academy of Sciences (CAS), CHINA and 2 Dalian Maritime University, CHINA

W4P.116 SELF-HEATING GAS SENSOR USING HETEROJUNCTION NANOWIRE ARRAY FOR HIGH SENSITIVITY AND LOW POWER CONSUMPTION
Sung-Ho Kim1, Min-Seung Jo1, So-Yoon Park1, Kwang-Wook Choi1,2, Sang-Hee Kim1,2, Jae-Young Yoo1, Beom-Jun Kim1, and Jun-Bo Yoon1
1 Korea Advanced Institute of Science and Technology (KAIST), KOREA, 2 Samsung Electronics Co., Ltd, KOREA, and 3 Northwestern University, USA
W4P.117 SENSING THE POINT DEFECTS BY SINGLE-CRYSTAL DIAMOND MEMS RESONATORS
Guo Chen1,2, Zilong Zhang1, Liwen Sang1, Yasuo Koide1, Satoshi Koizumi1, Zhaohui Huang2, and Meiyong Liao1
1National Institute for Materials Science, JAPAN and 2China University of Geosciences, CHINA

W4P.118 STEP-AND-REPEAT UV NANOIMPRINT USING PFP GAS FOR REALIZING MICRONEEDLE ARRAY WITH JAGGED TIP SHAPE BIOINSPIRED BY MOSQUITO
Seiji Aoyagi, Hiroki Hamada, Tomokazu Takahashi, and Masato Suzuki
Kansai University, JAPAN

W4P.119 THE MICROFLUIDIC MICROWELL ARRAY INTEGRATING SURFACE ENHANCED RAMAN SCATTERING (SERS) PLATFORM ASSISTED WITH MACHINE LEARNING FOR BACTERIA STRAIN IDENTIFICATION
Po-Hsuan Chao and Nien-Tsu Huang
National Taiwan University, TAIWAN

W4P.120 VISUALIZATION OF ODOR SOURCE LOCALIZATION REALIZED BY SERS GAS SENSOR
Lin Chen, Hao Guo, Takuya Matsuo, Fumihiro Sassa, and Kenshi Hayashi
Kyushu University, JAPAN