

TRANSDUCERS

2025

ORLANDO, FLORIDA

29 JUNE-3 JULY, 2025

THE 23rd INTERNATIONAL CONFERENCE
ON SOLID-STATE SENSORS, ACTUATORS,
AND MICROSYSTEMS



Technical Program

All indicated times in the program are
Eastern Standard Time (EST)

The Executive Committee reserves the right to amend the program if necessary.

Sunday, 29 June

All times are Eastern Standard Time (EST)

Special Event - Future Visions for Transducers Part 1

09:00 – 12:00

Poster Session and Workshop

MEMS Industry Session

13:00 – 16:30

Welcome Reception

17:00 – 19:00

Monday, 30 June

All times are Eastern Standard Time (EST)

07:30 - 17:30 **Registration**

Welcome Address and Technical Program Introduction

08:30 – 09:00

TRF President

Reza Ghodssi, *University of Maryland, USA*

Conference Chair:

Jack Judy, *University of Florida, USA*

Executive Program Chair:

Ellis Meng, *University of Southern California, USA*

Plenary Presentation 1

Windemere W - X

09:00 - 09:45

M1A.P1 THE REVOLUTION OF SILICON PHOTONICS

Michal Lipson

Columbia University, USA

Plenary Presentation 2

Windemere W - X

09:45 - 10:30

M1A.P2a IN VIVO-MANUFACTURED ORGANIC BIOELECTRONICS FOR NEUROLOGICAL APPLICATIONS

Magnus Berggren
Linköping University, SWEDEN

10:30 - 11:00 **Break and Exhibit Inspection**

Plenary Presentation 3

Windemere W - X

11:00 - 11:45

M1A.P3 FROM FLOW CYTOMETRY TO FLOW ZOMETRY: A PARADIGM SHIFT IN HIGH-THROUGHPUT SCREENING

Keisuke Goda
University of Tokyo, JAPAN

2025 Transducers Early Career Award Presentation

11:45 - 12:00

Transducers 2027 Announcement

12:00 - 12:15

12:15 - 14:00 **Lunch and Exhibit Inspection**

Poster Session M4P and Exhibit Inspection

Regency S – V & Rotunda

14:00 - 16:00

Poster presentations are listed by topic category with their assigned number starting on page 32

Session M4A - Functional Materials

Windemere W

16:00 - 16:15

M4A.01 SILVER NANOWIRE-PATTERNED, FREEZE-CASTED PVDF AEROGELS FOR SIMULTANEOUS PASSIVE RADIATIVE COOLING AND AIRFLOW SENSING

Hyeyoung Lee¹, Donghyun Lee¹, Beom Soo Joo², Gumin Kang², and Jungwook Choi¹
¹Chung-Ang University, KOREA and ²Korea Institute of Science and Technology, KOREA

16:15 - 16:30

M4A.02 MELAMINE-DERIVED CARBON NITRIDE-FUNCTIONALIZED POLYURETHANE NANOMESH-BASED TRIBOELECTRIC NANOGENERATOR FOR SELF-POWERED RESPIRATION MONITORING

M.Robiul Islam, Omar Faruk, Md Selim Reza, Md Shofiul Alam, Seungjae Lim, Trilochan Bhatta, and Jae Yeong Park
Kwangwoon University, KOREA

16:30 - 16:45

M4A.03 LOW-VOLTAGE ELECTROMECHANICAL SWITCHING BASED ON LOW DIMENSIONAL MATERIALS

Tong Dang¹, Jinchi Han², Zhien Wang¹, Zhangqi Zheng¹, Jing Kong¹, Jeffrey H. Lang¹, and Vladimir Bulovic¹
¹Massachusetts Institute of Technology, USA and ²Peking University, CHINA

16:45 - 17:00

M4A.04 LASER-INDUCED MXENE/PVDF NANOFIBROUS-BASED ION-SELECTIVE ELECTRODE SENSOR FOR CONTINUOUS MONITORING OF NA⁺ AND K⁺ IONS IN SWEAT

Dong Yun Kim, Md Asaduzzaman, Md Selim Reza, and Ahmad Abdus Samad
Kwangwoon University, KOREA

17:00 - 17:15

M4A.05 ENHANCED UV PHOTODETECTION ON FLEXIBLE SUBSTRATE: BACK-GATED FERROELECTRIC FIELD-EFFECT TRANSISTOR UTILIZING BARIUM TITANATE MODIFIED WITH 2D WS₂ CHANNEL

Rohit Raj Padhi and Guo-Hua Feng
National Tsing Hua University, TAIWAN

17:15 - 17:30

M4A.06 GO/PYRENE BASED NANOTEXTURING SURFACE SWITCHED BY DYNAMICALLY DISPLAYING ELECTRIC FIELD

Ken Sasaki, Hisataka Maruyama, and Takayuki Hoshino
Nagoya University, JAPAN

Session M4B - PMUTs

Windemere X

16:00 - 16:15

M4B.01 A BANDWIDTH-TUNABLE ARRAY OF PIEZOELECTRIC MICROMACHINED ULTRASONIC TRANSDUCERS WITH VARIOUS DC BIAS VOLTAGE COMBINATIONS

Xili Wang, Yufeng Gao, Aocheng Bao, Chenyuan Zhang, and Yipeng Lu
Peking University, CHINA

16:15 - 16:30

M4B.02 A NOVEL RECEIVE SPATIAL BEAMFORMER FOR HIGH-RESOLUTION ULTRASONIC PLANE-WAVE IMAGING USING PMUTS

Mantalena Sarafianou¹, Gaia Giubilei^{1,2}, David Choong¹, Duan Jian Goh¹, Yul Koh¹, Luigi Barretta³, Madanagopal Kunnavakkam⁴, Domenico Giusti³, and Alberto Leotti⁴

¹*Institute of Microelectronics, SINGAPORE*, ²*Politecnico di Torino, ITALY*, ³*STMicroelectronics, ITALY*, and ⁴*STMicroelectronics, SINGAPORE*

16:30 - 16:45

M4B.03 AN ULTRASONIC ACTUATOR WITH AMPLITUDE-MODULATED QUASI-MONOPOLAR PULSES BASED ON DUAL-FREQUENCY PMUT

Xinyue Zhang, Chong Yang, Junhao Wang, Jiao Xia, Lei Zhao, Chenyuan Zhang, Wei Wang, Bowen Sheng, and Yipeng Lu

Peking University, CHINA

16:45 - 17:00

M4B.04 A NOVEL MULTIMODE CHAINRING-SHAPED PIEZOELECTRIC MICROMACHINED ULTRASONIC TRANSDUCER (PMUT) ARRAY FOR BANDWIDTH EXTENSION

Zhou Da^{1,2}, Tingzhong Xu¹, Jiapeng Xu¹, and Alessandro Stuart Savoia²

¹*Silicon Austria Labs GmbH, AUSTRIA* and ²*Roma Tre University, ITALY*

17:00 - 17:15

M4B.05 A PMUT-BASED OBSTACLE SENSING SYSTEM WITH ENHANCED DETECTION CAPABILITIES VIA A SYSTEM-LEVEL DEVELOPMENT PLATFORM

Laurentiu Acasandrei, Yuneisy Esthela Garcia Guzman, Chunlei Xu, Zhou Da, Rodrigo Tumolin Rocha, and Tingzhong Xu

Silicon Austria Labs GmbH, AUSTRIA

17:15 - 17:30

M4B.06 INVERSE DESIGN OF PMUT USING DEEP REINFORCEMENT LEARNING WITH A VIEW TO CUSTOMIZED OPERATING FREQUENCY AND BROADENED BANDWIDTH

Jiapeng Xu^{1,2}, Zhou Da^{1,3}, Gabriele Schrag², Jérémy Streque¹, and Tingzhong Xu¹

¹*Silicon Austria Labs, AUSTRIA*, ²*Technical University of Munich, GERMANY*, and ³*Roma Tre University, ITALY*

Session M4C - Cellular Systems I

Windemere Y

16:00 - 16:15

M4C.01 MICROFLUIDICS-GUIDED ASSEMBLY OF FLUORESCENT NANODIAMONDS FOR TEMPERATURE MAPPING OF A CELL AGGREGATE

Keita Saikawa¹, Masaya Zetsu¹, Daiki Ueshima¹, Taiichi Shikama¹, Ken-ichiro Kamei^{1,2}, Osamu Tabata¹, and Yoshikazu Hirai¹

¹*Kyoto University, JAPAN* and ²*New York University, Abu Dhabi, UAE*

16:15 - 16:30

M4C.02 NANO-TRANSDUCERS COMPOSED OF LIPIDS VISUALIZE POPULATION DOUBLING LEVELS OF CELLS

Niko Kimura¹, Akiko Takahashi², and Shinya Sakuma³

¹*Tokyo University of Agriculture and Technology, JAPAN*,

²*Japanese Foundation for Cancer Research, JAPAN*, and ³*Kyushu University, JAPAN*

16:30 - 16:45

M4C.03 THE EFFECT OF MICROFABRICATED CELL ADHESION AREAS ON ULTRASOUND RESPONSE OF ION CHANNEL-TYPE RECEPTOR

Lisa Mitsuda¹, Shun Koda¹, Shigenori Miura², and Yuta Kurashina¹

¹*Tokyo University of Agriculture and Technology, JAPAN* and ²*Hiroshima University, JAPAN*

16:45 - 17:00

M4C.04 A MICROPERFUSION SYSTEM OF PROMOTED CELL GROWTH USING NON-THERMAL ATMOSPHERIC PRESSURE PLASMA

Hayata Okino and Shinya Kumagai
Meijo University, JAPAN

17:00 - 17:15

M4C.05 WEAVING CONTRACTILE BOVINE MUSCLE FIBERS FOR CULTURED MEAT CONSTRUCTION

Asa Hasegawa, Kensei Okada, Byeongwook Jo, Minghao Nie, and Shoji Takeuchi
University of Tokyo, JAPAN

17:15 - 17:30

M4C.06 FORMING THREE-DIMENSIONAL CELLULAR TISSUE IN MICRO-MOLDED AGAROSE GELS USING MECHANICAL STIMULATION

Ryota Kawamae¹, Atsushi Takata², Kenjiro Takemura³, and Yuta Kurashina¹
¹*Tokyo University of Agriculture and Technology, JAPAN*, ²*Institute of Science Tokyo, JAPAN*, and ³*Keio University, JAPAN*

Session M4D - Resonators I

Windemere Z

16:00 - 16:15

M4D.01 VLSI PIEZOELECTRIC OPTOMECHANICS FOR GHZ REFERENCE OSCILLATORS

Furcatte Thomas, Munique Kazar Mendes, Mathis Lefebvre, Aude Lefevre, Sébastien Hentz, and Marc Sansa
CEA-Leti, Université Grenoble Alpes, FRANCE

16:15 - 16:30

M4D.02 TOWARDS A VOCS SENSING ARRAY VIA BATCH-COMPATIBLE POST-CMOS THIOL FUNCTIONALIZATION ON CMOS-MEMS MONOLITHIC RESONATORS

Pedro Llinàs^{1,2}, Rafel Perello-Roig^{1,2,3}, Jaume Verd^{1,2}, Bartomeu Soberats¹, Salvador Barcelo^{1,2}, Sebastian Bota^{1,2}, and Jaume Segura^{1,2}
¹*University of the Balearic Islands, SPAIN*, ²*Health Research Institute of the Balearic Islands, SPAIN*, and ³*University of Florida, USA*

16:30 - 16:45

M4D.03 MAGNETIC FIELD-TUNABLE NONRECIPROCAL ACOUSTIC TRANSDUCER WITH LORENTZ FORCE INTERACTION

Daozheng Luo¹, Yuxi Wang^{1,2}, Xuankai Xu¹, Jiawei Li^{1,2}, Lihui Jin¹, and Tao Wu^{1,2}
¹*ShanghaiTech University, CHINA* and ²*Chinese Academy of Sciences, CHINA*

16:45 - 17:00

M4D.04 SELF-FREQUENCY PUMPING FOR CHAOTIC MICROMECHANICAL FREQUENCY COMB GENERATION VIA MULTIMODAL INTERNAL RESONANCE

Ting-Yi Chen and Wei-Chang Li
National Taiwan University, TAIWAN

17:00 - 17:15

M4D.05 HEAVILY-DOPED DUAL-MODE DISTRIBUTED LAMÉ RESONATOR (DLR) FOR TEMPERATURE-COMPENSATED MEMS OSCILLATORS

Shubham Sahasrabudhe¹, Haoran Wen², Gregory V. Juneck², and Farrokh Ayazi^{1,2}
¹*Georgia Institute of Technology, USA* and ²*StethX Microsystems Inc., USA*

17:15 - 17:30

M4D.06 TEMPERATURE-COMPENSATED SELF-SENSING DIAMOND RING RESONATORS

Xintian Liu, Kevin H. Zheng, Hung-Yu Chen, and Clark T.C. Nguyen
University of California, Berkeley, USA

17:30 Adjourn for the Day

Future Visions for Transducers Part II – Panel Discussion

17:45 - 18:45

Dessert Reception on the Garden Terrace

20:00 – 22:00

Tuesday, 1 July

Session T1A - Optical & Photonic Devices

Windemere W

08:30 - 09:00

INVITED PRESENTATION

T1A.01 ADVANCED NANOSTRUCTURES FOR BIOMEDICAL SENSORS, TERAHERTZ DEVICES, AND META-DEVICES

Stella Pang
City University of Hong Kong, CHINA

09:00 - 09:15

T1A.02 OPTICAL OBSERVATION OF ULTRASOUND PHENOMENA IN NANO-SIZED SPOT BY USING SPATIOTEMPORAL ANALYSIS OF RADIAL FLUORESCENCE FLUCTUATION

Ru Konno¹, Ryuto Yamakawa¹, Yasuhiko Orita², and Yuta Kurashina¹
¹*Tokyo University of Agriculture and Technology, JAPAN and 2Institute of Science Tokyo, JAPAN*

09:15 - 09:30

T1A.03 A DUAL CHANNEL FIBER OPTICAL SPR SENSOR FOR COMBINED DETECTION OF DIABETES AND ITS COMPLICATIONS

Jiaming Ma, Ridong Wang, Dachao Li, and Kexin Xu
Tianjin University, CHINA

09:30 - 09:45

T1A.04 AN ULTRA-LARGE ARRAY SILICON NITRIDE PHOTONIC CHIP FOR ADVANCED BIO-CHEMICAL SENSING PLATFORMS

Bo Wang, He Li, Gong Jian Cheng, Chang Chen, Zi Hui Li, and Huan Liu
Chinese Academy of Sciences, CHINA

09:45 - 10:00

T1A.05 MEMS-DRIVEN ELECTRICALLY RECONFIGURABLE PLATFORM FOR PHOTONIC QUASI-BOUND STATES IN THE CONTINUUM

Hong Zhou¹, Ting-Yi Chen², Zhihao Ren¹, Dongxiao Li¹, Cheng Xu¹, Chun-Pu Tsai², Wei-Chang Li², and Chengkuo Lee¹
¹*National University of Singapore, SINGAPORE and 2National Taiwan University, TAIWAN*

Session T1B - Fabrication & Materials

Windemere X

08:30 - 09:00

INVITED PRESENTATION

T1B.01 BEYOND THE MASK: ADVANCING MICRO/NANOMANUFACTURING AND IMMERSIVE CLEANROOM LEARNING

Qinglan Shan, Berke Erbas, Jongeon Park, Pol Torres-Vila, Chenxiang Zhang, Arnaud Bertsch, □ and Juergen Brugger
École Polytechnique Fédérale de Lausanne, SWITZERLAND

09:00 - 09:15

T1B.02 CONTROLLABLE ELECTRODE PRINTING ON POROUS HYDROPHOBIC FLEXIBLE SUBSTRATE FOR BREATHABLE ELECTRONICS

Zhongxu Zhou, Xingguo Zhan, Wangwang Zhu, Hao Zheng, Wenjun Li, Chenxi Jin, Youhao Liu, Dachao Li, and Zhihua Pu
Tianjin University, CHINA

09:15 - 09:30

T1B.03 CONTOUR RECOGNITION AND FEATURE EXTRACTION OF SEM CROSS-SECTIONAL PROFILES IN DEEP REACTIVE ION ETCHING BASED ON PHYSICS-CONSTRAINED VARIATIONAL LEVEL SET AUTOENCODER

Fang Wang¹, Hao Yu¹, Ye Chen Miao¹, Ke Sun¹, Xiaoyuan Xia^{1,2}, Yemin Dong^{1,2}, Yi Sun¹, Heng Yang¹, and Xinxin Li¹

¹Chinese Academy of Sciences, CHINA and ²Shanghai Industrial Technology Research Institute, CHINA

09:30 - 09:45

T1B.04 AN IN-LINE METHOD FOR EXTRACTING AND MAPPING CD-LOSS AND SIDE-WALL ANGLE IN DRIE

Xufeng Wang, Leijian Cheng, Peng Liu, Jiakang Li, Shiyang Yuan, Xuanqing Hua, Jiawei Zhou, Yi Chen, and Dacheng Zhang

Peking University, CHINA

09:45 - 10:00

T1B.05 A NOVEL HBR-BASED HIGH SELECTIVITY NON-BOSCH DEEP SILICON ETCHING PROCESS ENHANCES MECHANICAL PERFORMANCE FOR MEMS DEVICE

Yongquan Su^{1,2}, Yichen Liu^{1,2}, Hao Huang¹, Wanzhu Qiao^{1,2,3}, Xingwang Zhu², Lihao Wang¹, and Zhenyu Wu^{1,2}

¹Chinese Academy of Sciences, CHINA, ²Shanghai Industrial μ Technology Research Institute, CHINA, and ³University of Shanghai for Science and Technology, CHINA

Session T1C - DNA Devices

Windemere Y

08:30 - 09:00

INVITED PRESENTATION

T1C.01 MICROSWIMMERS THE FLEX: HOW SOFT LITHOGRAPHY AND DNA SELF-ASSEMBLY ENABLE MICROROBOT LOCOMOTION AND RESPONSIVENESS

Rebecca Taylor

Carnegie Mellon University, USA

09:00 - 09:15

T1C.02 FEMTOMOLAR DETECTION OF BIOMARKERS BY UNIVERSAL DNA-BASED PENDULUM BIOSENSOR

Songxue Chen, Xiaoping Li, Xiaoran Wang, and Dachao Li

Tianjin University, CHINA

09:15 - 09:30

T1C.03 DNA SENSOR INTEGRATED CRISPR-CAS9 AND A FOUR-ELECTRODE PROBE

Peng Zhou, Amber McElroy, Yingming Xu, Mark Osborn, and Tianhong Cui

University of Minnesota, USA

09:30 - 09:45

T1C.04 HIGH-YIELD ELECTROCHEMICAL DNA SYNTHESIS METHOD BASED ON HYBRID SUPPORT OF GOLD NANOPARTICLES AND FUNCTIONAL POLYMERS

Chunjie Sun, Haixia Yu, and Dachao Li

Tianjin University, CHINA

09:45 - 10:00

T1C.05 NOVEL HIGH-THROUGHPUT AND HIGH-CAPACITY DNA SYNTHESIS CHIP BY INKJET PRINTING AND NANOPARTICLES SELF-ASSEMBLY

Caiqin Zhao, Xiaoping Li, and Dachao Li

Tianjin University, CHINA

Session T1D - Gas Sensing

Windemere Z

08:30 - 09:00

INVITED PRESENTATION

T1D.01 SMART ENVIRONMENTAL MONITORING BY LOW-POWER/SELF-POWERED GAS SENSORS AND AI

Inkyu Park

Korea Advanced Institute of Science and Technology (KAIST), Korea

09:00 - 09:15

T1D.02 HIGHLY ROBUST AND MECHANICALLY STABLE GAS SENSOR THROUGH SYMMETRICAL FIXED-GUIDED L-SHAPED BEAMS

Se-Yoon Jung¹, Sung-Ho Kim¹, Min-Seung Jo², Beom-Jun Kim¹, Jae-Soon Yang¹, Myung-Kun Chung¹, Tae-Soo Kim¹, Yu-Hyun Shim¹, and Jun-Bo Yoon¹

¹Korea Advanced Institute of Science and Technology (KAIST), KOREA, and ²Northwestern University, USA

09:15 - 09:30

T1D.03 HIGHLY SENSITIVE METAL-OXIDE GAS SENSOR USING THERMAL DOPING TECHNIQUE FOR HIGH DEVICE UNIFORMITY

Sung Ho Kim¹, Se-Yoon Jung¹, Jae-Young Yoo², Beom-Jun Kim¹, Jae-Soon Yang¹, Tae-Soo Kim¹, Yu-Hyun Shim¹, and Jun-Bo Yoon¹

¹Korea Advanced Institute of Science and Technology (KAIST), KOREA and

²Sungkyunkwan University, KOREA

09:30 - 09:45

T1D.04 MONOLITHICALLY INTEGRATED CMOS-MEMS MICROCANTILEVER GAS SENSOR WITH SUB-10 MILLIWATT POWER CONSUMPTION

Xuanqing Hua, Fengyang Li, Peng Liu, Shiyang Yuan, Xufeng Wang, Zhiheng Yu, and Dacheng Zhang
Peking University, CHINA

09:45 - 10:00

T1D.05 To Be Determined

10:00 - 10:30 **Break and Exhibition Inspection**

Session T2A - Resonators II

Windemere W

10:30 - 10:45

T2A.01 KU-BAND ALSCN-ON-DIAMOND SAW RESONATORS WITH PHASE VELOCITY ABOVE 8600 M/S

Tzu-Hsuan Hsu¹, Kapil Saha², Jack Kramer¹, Omar Barrera¹, Pietro Simeoni², Matteo Rinaldi², and Ruochen Lu¹

¹University of Texas, Austin, USA and ²Northeastern University, USA

10:45 - 11:00

T2A.02 SURFACE ACOUSTIC WAVE PHYSICAL RESERVOIR COMPUTER USING THERMOACOUSTIC PHASE MODULATOR

Taiki Ijima¹, Claude Meffan^{1,2}, Masaki Shimofuri¹, Amit Banerjee¹, Jun Hirotani¹, and Toshiyuki Tsuchiya¹

¹Kyoto University, JAPAN and ²University of Canterbury, NEW ZEALAND

11:00 - 11:15

T2A.03 VISUALIZATION OF DENSE SPURIOUS MODES IN A 5 GHZ LATERALLY EXCITED BULK ACOUSTIC RESONATOR USING PULSED LASER INTERFEROMETRY

Zhaoliang Peng¹, Xiyu Gu², Junfeng Zhou¹, Le Xu¹, Yan Liu³, Chengliang Sun², Wenming Zhang¹, and Lei Shao¹

¹Shanghai Jiao Tong University, CHINA, ²Wuhan University, CHINA, and ³Wuhan Textile University, CHINA

11:15 - 11:30

T2A.04 PRECISION MEMS TIMING: MICROHEATER AND MACHINE LEARNING COMPENSATION FOR 21 PPT STABILITY AT 7.5 HOURS

Jiawei Yang¹, Shrey Verma¹, Manaka Gomi¹, Jintark Kim², Jie Yan², Jiheng Jing², Gabrielle Vukasin¹, Hyun-Keun Kwon¹, Gaurav Bahl², and Thomas W. Kenny¹

¹Stanford Univeristy, USA and ²University of Illinois Urbana-Champaign, USA

11:30 - 11:45

T2A.05 PERIODICALLY POLED LAMB WAVE RESONATORS BASED ON FERROELECTRIC ALUMINUM SCANDIUM NITRIDE

Zichen Tang¹, Giovanni Esteves², Travis R. Young², Sean Yen², and Roy H. Olsson¹

¹University of Pennsylvania, USA and ²Sandia National Laboratories, USA

11:45 - 12:00

T2A.06 MULTI-INDICATOR ULTRASENSITIVE TEMPERATURE SENSING PLATFORM USING PARAMETRICALLY EXCITED RESONATORS

Yue Zheng¹, Seyyed Mojtaba Hassani Gangaraj¹, Mingyo Park², Jialin Wang¹, and Azadeh Ansari¹

¹Georgia Institute of Technology, USA and ²Pennsylvania State University, USA

Session T2B - Metasurfaces & Metamaterials

Windemere X

10:30 - 10:45

T2B.01 IMAGING-BASED TERAHERTZ FINGERPRINT SENSING USING A BI-MATERIAL MICROCANTILEVER FOCAL PLANE ARRAY

Zhanxuan Zhou¹, Jiahao Miao¹, Xueliang Wang¹, Xincheng Zhu¹, Cong Lin¹, Yang Zhong¹, Zhenwei Zhang², and Xiaomei Yu¹

¹Peking University, CHINA and ²Capital Normal University, CHINA

10:45 - 11:00

T2B.02 A MEMS TUNABLE METASURFACE ASSISTED BY THE BOUND STATES IN THE CONTINUUM

Rongbo Xie, Enze Zhou, Bingbai Li, Jiahao Zhao, Gaofei Zhang, and Xiaoguang Zhao

Tsinghua University, CHINA

11:00 - 11:15

T2B.03 LOW-LOSS PHASE CHANGE MATERIALS ON MID-INFRARED METAMATERIALS FOR NON-VOLATILE OPTICAL MEMORY AND IN-MEMORY COMPUTING

Zhihao Ren¹, Hong Zhou¹, Danian Wang², Liangge Xu³, Chaoquan Hu², and Chengkuo Lee¹

¹National University of Singapore, SINGAPORE, ²Jilin University, CHINA, and

³Harbin Institute of Technology, CHINA

11:15 - 11:30

T2B.04 HIGH-SENSITIVITY COLORIMETRIC SENSORS BASED ON REFLECTIVE GUIDED-MODE RESONANCE METASURFACES

Lijun Ma, Shuai Wang, Liye Li, Hongshun Sun, Yunhao Cao, Yusa Chen, Dingbang Liu, and Wengang Wu

Peking University, CHINA

11:30 - 11:45

T2B.05 TOPOLOGICALLY ENHANCED INFRARED SENSING THROUGH ALUMINUM SCANDIUM NITRIDE RADIOFREQUENCY PIEZOELECTRIC METAMATERIALS

Tommaso Maggioli¹, Marco Galli¹, Jacopo M. De Ponti², Marco Colangelo¹, Ghosh Siddhartha¹, and Cristian Cassella¹

¹Northeastern University, USA and ²Politecnico di Milano, ITALY

11:45 - 12:00

T2B.06 METASURFACES FOR BULK SUPPRESSION AND WAVELENGTH-DEPENDENT MID-INFRARED IMAGING

Dongxiao Li¹, Ting-Yi Chen², Chun-Pu Tsai², Cheng Xu¹, Hong Zhou¹, Zhihao Ren¹, Wei-Chang Li², and Chengkuo Lee¹

¹National University of Singapore, SINGAPORE and ²National Taiwan University, TAIWAN

Session T2C – Microfluidics I

Windemere Y

10:30 - 10:45

T2C.01 PARALLEL ANALYSIS OF EXOSOME RNA AND PROTEIN FOR CANCER DIAGNOSIS USING AN INTEGRATED ON-CHIP MICROFLUIDIC SYSTEM

Jiangyu Ji^{1,2}, Yiman Song², Jieyu Wang^{1,2}, YunXing Lu⁴, Lin Zhou¹, Weidong Yang¹, Huiying Liu², Hongju Mao¹, and Jianan Hui^{1,3}

¹Chinese Academy of Sciences, CHINA, ²Dalian Medical University, CHINA,

³Shanghai Frontier Innovation Research Institute, CHINA, and ⁴Shanghai Open University, CHINA

10:45 - 11:00

T2C.02 IMMUNOAFFINITY AND FILTRATION FOR MICROFLUIDIC ISOLATION OF CANCER CELLS

Yang Zhang, Madison L. Chubb, Kangfu Chen, Joanne Lagmay, and Hugh Z. Fan
University of Florida, USA

11:00 - 11:15

T2C.03 TUNABLE PARTICLE SEPARATION USING VIBRATION INDUCED FLOW IN DETERMINISTIC LATERAL DISPLACEMENT MICROPILLAR ARRAYS

Hiroki Fukunaga¹, Naotomo Tottori¹, Shinya Sakuma¹, Takeshi Hayakawa², and Yoko Yamanishi¹

¹Kyushu University, JAPAN and ²Chuo University, JAPAN

11:15 - 11:30

T2C.04 ANALYSIS OF THROMBUS CHARACTERISTICS UNDER SHEAR-DEPENDENT FORMATION CONDITIONS

Jiseob Choi¹, Dong-Hwi Ham¹, Jin-Ho Choi², and Woo-Tae Park¹

¹Seoul National University of Science and Technology, KOREA and ²Samsung Medical Center, KOREA

11:30 - 11:45

T2C.05 CONTINUOUS SEPARATION AND MECHANOPORATION OF WHITE BLOOD CELLS FROM A WHOLE BLOOD SAMPLE THROUGH MICROPILLAR ARRAYS

Naotomo Tottori¹, Ryo Takahashi¹, Hiroki Fukunaga¹, Satoshi Yotsumoto², Yoshitaka Shirasaki³, Shigeo Sugano⁴, Shinya Sakuma¹, and Yoko Yamanishi¹

¹Kyushu University, JAPAN, ²Tokyo University of Pharmacy and Life Sciences, JAPAN,

³The University of Tokyo, JAPAN, and

⁴The National Institute of Advanced Industrial Science and Technology, JAPAN

11:45 - 12:00

T2C.06 To Be Determined

Session T2D - Physical & Optical Sensors

Windemere Z

10:30 - 10:45

T2D.01 FIBER-OPTIC SENSORS WITH WATER-IMMERSIVE MEMBRANES FOR ULTRA-SENSITIVE LOW-FREQUENCY HYDROACOUSTIC DETECTION

Xingyu Wei, Shoulu Gong, Junfeng Zhou, Zhaoliang Peng, Lei Shao, and Wen-Ming Zhang
Shanghai Jiao Tong University, CHINA

10:45 - 11:00

T2D.02 LOW THERMAL CONDUCTIVITY UNCOOLED INFRARED BRIDGE MICROBOLOMETER BASED ON BEAMS OF CONSTANT STRENGTH

Yan Zhao, Wangnan Chen, Zirui Yang, Xiaoyu Qi, Nan Zhang, Chengchen Gao, and Zhenchuan Yang
Peking University, CHINA

11:00 - 11:15

T2D.03 THERMALLY MATCHED TWIN FOR ACCURATE BANDWIDTH SCALING IN UNCOOLED NANO-ELECTROMECHANICAL IR SENSOR

Enise F. Altin, Aurelio Venditti, Walter Gubinelli, Pietro Simeoni, Matteo Rinaldi, and Benyamin Davaji
Northeastern University, USA

11:15 - 11:30

T2D.04 MEMS ELECTRIC FIELD SENSOR WITH COMB-ACTUATED RESONANT TORSIONAL SHUTTER

Yohan Jung¹, Eunhwan Jo², and Jongbaeg Kim¹
¹Yonsei University, KOREA and ²Kumoh National Institute of Technology, KOREA

11:30 - 11:45

T2D.05 LASER-FABRICATED PIEZORESISTIVE FORCE SENSOR WITH LIQUID IMMERSION LASER SIDEWALL-DOPING

Rihachiro Nakashima¹, Yuki Okamoto², Yusuke Takei², Tetsuo Kan³, and Hidetoshi Takahashi¹
¹Keio University, JAPAN, ²National Institute of Advanced Industrial Science and Technology (AIST), JAPAN, and ³The University of Electro-Communications, JAPAN

11:45 - 12:00

T2D.06 A MEMS-BASED ELECTROCHEMICAL VIBRATION SENSORS WITH OPTIMIZED FLOW-RESISTANCE AND HIGH-RELIABILITY SENSITIVE UNIT

Nan Zhang, Xiaoyu Qi, Yan Zhao, Xu Ma, Lihao Ma, Zhenchuan Yang, and Chengchen Gao
Peking University, CHINA

12:00 - 14:00 **Lunch**

Poster

Session T3P and Exhibit Inspection

Regency S – V & Rotunda

14:00 - 16:00

Poster presentations are listed by topic category with their assigned number starting on page 32.

15:30 - 16:00 **Break**

Session T4A - Acoustic Devices

Windemere W

16:00 - 16:15

T4A.01 ENHANCEMENT OF ENERGY EXCHANGE RATE IN MODE-COUPLED MEMS FOR SUPERCONTINUUM FREQUENCY COMBS AND INJECTION LOCKING

Jiahao Wu, Penghui Song, Shuke Zang, Wenming Zhang, and Lei Shao
Shanghai Jiao Tong University, CHINA

16:15 - 16:30

T4A.02 ENABLING OPTOMECHANICAL FREQUENCY COMB THROUGH THERMAL AND OPTICAL FORCES IN NONLINEAR NANOMECHANICAL RESONATOR

Xinchen Wan, Ji Xia, Haoyang Sun, and Guangya Zhou
National University of Singapore, SINGAPORE

16:30 - 16:45

T4A.03 A MULTI-STRESS CONCENTRATED BUTTERFLY ELECTRODE MEMS ACOUSTIC SENSOR WITH HIGH SENSITIVITY TO INFRASOUND

Zhiyue Yang, Lixuan Li, Zhiyong Hu, Tao Ruan, Hanshuo Liu, Fangtao Kuang, and Jingquan Liu
Shanghai Jiao Tong University, CHINA

16:45 - 17:00

T4A.04 MULTI-FREQUENCY PMUTS FOR PORTABLE BLOOD PRESSURE MONITORING AND VASCULAR ASSESSMENT USING PHOTOACOUSTIC SENSING

Yexing Fang, Mengyue Zhang, Aocheng Bao, Jinghan Han, Jiao Xia, Bowen Sheng, Haixia Zhang, Changhui Li, and Yipeng Lu
Peking University, CHINA

17:00 - 17:15

T4A.05 TOWARDS A BIOMIMETIC MEMS MICROPHONE FEATURING TUNABLE PERFORMANCE

Zhuoyue Zheng¹, Pui-in Mak¹, Chen Wang², Luo Huahuang⁴, Pan Zhang³, Qingqing Ke⁴, Yuan Wang¹, Rui P. Martins¹, and Michael Kraft²
¹*University of Macau, CHINA*, ²*University of Leuven, BELGIUM*, ³*Peking University, CHINA*, and ⁴*Sun Yat-sen University, CHINA*

17:15 - 17:30

T4A.06 A TO-PACKAGED PHOTONIC MEMS MICROPHONE WITH OUTSTANDING SENSITIVITY BASED ON SELF-MIXING INTERFEROMETRY

Anyu Li, Junfeng Zhou, Xingyu Wei, Shoulu Gong, and Lei Shao
Shanghai Jiao Tong University, CHINA

Session T4B - Resonators III

Windemere X

16:00 - 16:15

T4B.01 A HIGH SENSITIVITY MEMS OMNIDIRECTIONAL HYDROPHONE BASED ON A VORTEX-SLIT STRUCTURE

Fangtao Kuang, Zhiyong Hu, Hanshuo Liu, Zhiyue Yang, Tao Ran, Lixuan Li, and Jingquan Liu
Shanghai Jiao Tong University, CHINA

16:15 - 16:30

T4B.02 A NOVEL THERMAL ACOUSTIC PARTICLE VELOCITY SENSOR WITH HIGH SENSITIVITY AND LOW POWER CONSUMPTION

Wangnan Chen, Yan Zhao, Zirui Yang, Xu Ma, Lihao Ma, Xiaoyu Qi, Nan Zhang, Chengchen Gao, and Zhenchuan Yang
Peking University, CHINA

16:30 - 16:45

T4B.03 TWO-DECADE-WIDE DENSE PHONONIC FREQUENCY COMBS IN A LINEAR MEMS RESONATOR USING ANALOG FEEDBACK

Shuke Zang, Jiahao Wu, Lei Shao, and Wenming Zhang
Shanghai Jiao Tong University, CHINA

16:45 - 17:00

T4B.04 A DEMONSTRATION OF ANALOG/DIGITAL CONVERTER-FREE RESERVOIR COMPUTING USING A SERIES-CONNECTED RESONATING SWITCHED MEMS COUNTER

Akihiko Yoshida, Ryosho Nakane, Shun Yasunaga, Akio Higo, and Yoshio Mita
University of Tokyo, JAPAN

17:00 - 17:15

T4B.05 SPECTRUM-CLEAN LINBO3/SIO2/SI SH-SAW RESONATORS UTILIZING COMBINED ELECTRODE APODIZATION AND PROPAGATION ANGLE TWISTING

Zhi-Qiang Lee, Ya-Ching Yu, Yi-Cheng Liao, Cheng-Chien Lin, Sung-Yuan Huang, and Ming-Huang Li
National Tsing Hua University, TAIWAN

17:15 - 17:30

T4B.06 SIGNAL-TO-NOISE RATIO ENHANCEMENT FOR MEMS RESONANT SENSORS WITH POTENTIAL BARRIER ADAPTIVE STOCHASTIC RESONANCE

Junhui Wu and Guangya Zhou
National University of Singapore, SINGAPORE

Session T4C - Biomedical Devices

Windemere Y

16:00 - 16:15

T4C.01 REALIZATION OF CMOS-BASED MULTIMODAL IMAGE SENSOR FOR THREE-DIMENSIONAL FORCE AND PH MEASUREMENT

Mami Suzuki¹, Hideo Doi¹, Hiromasa Ito¹, Tomoko Horio¹, Ken Ogasahara², Satoshi Shimizu², Daisuke Akai¹, Takeshi Hizawa¹, Yong-Joon Choi¹, Kazuhiro Takahashi¹, Toshihiko Noda¹, and Kazuaki Sawada¹
¹*Toyohashi University of Technology JAPAN and* ²*DAIKIN FINETECH, LTD., JAPAN*

16:15 - 16:30

T4C.02 A MINIATURE PHOTOACOUSTIC SYSTEM FOR SKIN MELANIN DETECTION

Yexing Fang, Aocheng Bao, Zihao Shi, Chong Yang, Ziyi Liang, Jiahao Kang, Bowen Sheng, Haixia Zhang, and Yipeng Lu
Peking University, CHINA

16:30 - 16:45

T4C.03 INTRAVASCULAR-DELIVERED HOLLOW HYDROGEL MICROFIBER WITHOUT BLOOD FLOW INTERRUPTION

Shota Sato¹, Teppei Komatsu², Hiroki Ohta², Hirotaka JAMES. Okano², and Hiroaki Onoe¹
¹*Keio University, JAPAN and* ²*Jikei University, JAPAN*

16:45 - 17:00

T4C.04 SMART STENT FOR REAL-TIME ENDOLEAK DETECTION

Trisha Mou¹, Jun Ying Tan², Subhrodeep Ray³, Haijun Liu³, Jungkwun Kim², and Albert Kim¹
¹*University of South Florida, USA,* ²*University of North Texas, USA, and* ³*Temple University, USA*

17:00 - 17:15

T4C.05 HIGHLY STRETCHABLE BUT STRAIN-INSENSITIVE PRESSURE SENSORS FOR CROSSTALK-FREE ARTERIAL PULSE MONITORING

Shoulu Gong, Xingyu Wei, Guoran Zhang, Qi Zhou, Zhiran Yi, Wenming Zhang, and Lei Shao
Shanghai Jiao Tong University, CHINA

17:15 - 17:30

T4C.06 3D-FLOWER-LIKE BIMETALLIC MXENE INCORPORATED LASER-ENGRAVED GRAPHENE-BASED PHYSIO-CHEMICAL HYBRID PATCH FOR PERSPIRATION ANALYSIS AND CARDIAC HEALTH MONITORING

Md Selim Reza, Zahidul Islam, Md Asaduzzaman, Ahmad Abdus Samad, Dongyun Kim, M. Robiul Islam, and Jae Yeong Park

Kwangwoon University, KOREA

Session T4D - Physical Sensors

Windemere Z

16:00 - 16:15

T4D.01 A HIGHLY STRETCHABLE AND ALL-DIRECTIONAL TRIBOELECTRIC STRAIN SENSOR FOR CHRONIC JOINT STRESS MONITORING

Shital Sharma, Gagan Bahadur Pradhan, Trilochan Bhatta, and Jae Yeong Park

Kwangwoon University, KOREA

16:15 - 16:30

T4D.02 DESIGN AND FABRICATION OF A THERMAL CONDUCTIVITY SENSOR WITH A MICRO-PILLAR FIN STRUCTURE TO ENHANCE HYDROGEN RESPONSE SPEED AND MINIMIZE FLOW RATE INTERFERENCE

Long Cheng, Ying Chen, Tao Jiang, Jiachou Wang, Xinxin Li, and Pengcheng Xu

Chinese Academy of Sciences, CHINA

16:30 - 16:45

T4D.03 A DUAL-AXIS MICRO THERMAL CONVECTIVE TILT SENSOR WITH HIGH SENSITIVITY AND LOW CROSS-AXIS EFFECT

Tingfeng Peng¹, Zihan Lu¹, Hongxin Xu¹, Chunlong Cheng¹, Zhiqing Zhang¹, Jingwen Yang¹, Yuan Wang², Qingqing Ke¹, and Huahuang Luo¹

¹*Sun Yat-sen University, CHINA and* ²*University of Macau, MACAO*

16:45 - 17:00

T4D.04 LIQUID METAL FLEXIBLE 3-AXIS FORCE SENSOR ON A DEFORMABLE PNEUMATIC BALLOON FOR SENSOR ATTITUDE CONTROL

Tomohiro Nakatsuka and Satoshi Konishi

Ritsumeikan University, JAPAN

17:00 - 17:15

T4D.05 PROBING THERMAL STABILITY OF MOLYBDENUM DITELLURIDE NANOFLLAKE USING MEMS THERMOGRAVIMETRIC SENSORS

Jun Li^{1,2}, Hao Jia¹, Pengcheng Xu¹, and Xinxin Li¹

¹*Chinese Academy of Sciences, CHINA and* ²*ShanghaiTech University, CHINA*

17:15 - 17:30

T4D.06 MICRO TRIAXIAL FORCE PLATE SUPPORTED BY TILTED UV-CURABLE PDMS PILLARS WITH ISOTROPIC SPRING CONSTANTS VIA LIQUID-IMMERSION INCLINED EXPOSURE

Toshihiro Shiratori, Gakuto Kagawa, and Hidetoshi Takahashi

Keio University, JAPAN

17:30 Adourn for the Day

Leti and COMSOL Events

18:00 - 20:00

Wednesday, 2 July

Session W1A - Quantum Devices

Windemere W

08:30 - 09:00

INVITED PRESENTATION

W1A.01 QUANTUM SENSORS - THE JOURNEY FROM THE LABORATORY TO A PRODUCT OF DAILY LIFE

Andre Kretschmann, Thomas Strohm, and Tino Fuchs
Robert Bosch GmbH, GERMANY

09:00 - 09:15

W1A.02 A NOVEL PHYSICS PACKAGE FOR CHIP-SCALE ATOMIC CLOCKS

Ali Darvishian¹, Peter Cash¹, Lichung Ha¹, Mark Trainoff¹, Mike Silvera¹, Luan Vo¹, Igor Kosvin¹, Jackie Ellett¹, Robert Conners¹, Mark Mescher², and Richard Overstreet¹
¹*Microchip Technology, USA and* ²*Draper, USA*

09:15 - 09:30

W1A.03 QUANTUM CAPACITIVE LACTATE DEHYDROGENASE LABEL-FREE BIOSENSOR BASED ON ONE-STEP BIOINTERFACE PREPARATION

Zening Li¹, Lin Zhou¹, Rongtao Zhang², Jianlong Zhao¹, and Hongju Mao¹
¹*Chinese Academy of Sciences, CHINA and* ²*Tianjin University of Traditional Chinese Medicine, CHINA*

09:30 - 09:45

W1A.04 FIBER-BASED HIGH-VOLTAGE GRID CURRENT MEASUREMENT USING INTEGRATED DIAMOND QUANTUM SENSOR

Yaochen Zhu¹, Qihui Liu¹, Xiao Peng¹, Nan Wang¹, Yuqiang Hu^{2,3}, Xin Luo^{2,3}, Chunji Zhang⁴, Wei Liu⁴, Hao Chen^{1,2}, Jiangong Cheng¹, and Zhenyu Wu^{1,2,3}
¹*Chinese Academy of Sciences, CHINA,* ²*Shanghai University, CHINA,* ³*Shanghai Industrial Technology Research Institute, CHINA, and* ⁴*Xi'an XD High Voltage Apparatus Co., Ltd, CHINA*

Session W1B - Microfluidics II

Windemere X

08:30 - 09:00

INVITED PRESENTATION

W1B.01 DEVELOPMENT OF INTEGRATED CHEMICAL AND ENVIRONMENTAL MICROSYSTEMS FOR ROBOTIC ASTROBIOLOGY MISSIONS

Peter A. Willis, Fernanda Mora, Aaron Noell, Mauro Ferreira Santos, Tomas Drevinskas, Andrew Berg, Vlad Cretu, Anthony Morales-Badajoz, Allison Lenhard, Taewoo Kim, Matt Keyawa, and Igor Botvinnik
Jet Propulsion Laboratory, USA

09:00 - 09:15

W1B.02 HIGH-SPEED MULTI-SORTING SYSTEM OF LARGE PARTICLES BY UTILIZING TRAVELING VORTEX GENERATIONS

Makoto Saito¹, Nariaki Kiyama¹, Yoko Yamanishi¹, Niko Kimura², Shigeo S. Sugano³, and Shinya Sakuma¹
¹*Kyushu University, JAPAN,* ²*Tokyo University of Agriculture and Technology, JAPAN, and* ³*National Institute of Advanced Industrial Science and Technology (AIST), JAPAN*

09:15 - 09:30

W1B.03 DIGITAL MICROFLUIDIC IONIZATION FOR REAL-TIME MINIATURE MASS SPECTROMETRY

Menglei Zhao, Zongliang Guo, Haobing Liu, Boyu Li, Liyuan Guo, Huikai Xie, Rongxin Fu, Hang Li, and Shuailong Zhang
Beijing Institute of Technology, CHINA

09:30 - 09:45

W1B.04 CONTINUOUS GENERATION OF DROPLETS ENCAPSULATING TWO SINGLE PARTICLES USING AN ON-CHIP “VIRTUAL PARTICLE VALVE” INTEGRATED WITH MICROPILLAR ARRAYS

Naotomo Tottori, Yuma Kadomura, Hiroki Fukunaga, Shinya Sakuma, and Yoko Yamanishi
Kyushu University, JAPAN

09:45 - 10:00

W1B.05 AN ACTIVE-MATRIX ELECTRO-DEWETTING ARRAY FOR DIGITAL MICROFLUIDICS

Xinying Xie¹, Qining Wang², Yushen Hu¹, Runxiao Shi¹, Tengeng Lei¹, Chang Jin C.J. Kim², and Man Wong¹
¹*Hong Kong University of Science and Technology, HONG KONG and*
²*University of California, Los Angeles, USA*

Session W1C - PiezoMEMS

Windemere Y

08:30 - 09:00

INVITED PRESENTATION

W1C.01 PIEZOELECTRIC AND PIEZOELECTRET SENSORS, ACTUATORS AND MICROSYSTEMS

Liwei Lin
University of California, Berkeley, USA

09:00 - 09:15

W1C.02 SCALABLE PIEZO-OPTOMECHANICAL TRANSDUCER MATCHED TO A SUPERCONDUCTING QUBIT FOR OPTICAL READ-OUT

Kiki L. Schuurman¹, Thierry C. van Thiel¹, Matthew J. Weaver¹, Federico Berto¹, Pim Duivestijn¹, Mathilde Lemang¹, Martin Zemlicka¹, Fred Hijazi¹, Alexandra C. Bernasconi¹, Cristobal Ferrer¹, Ella Lachman², Mark Field², Yuvraj Mohan², Fokko K. De Vries³, Niels Bultink³, Jules van Oven³, Josh Y. Mutus², Rob Stockill¹, and Simon Gröblacher¹
¹*QphoX, NETHERLANDS,* ²*Rigetti Computing Inc., USA, and* ³*Qblox Quantum, NETHERLANDS*

09:15 - 09:30

W1C.03 PIEZOMEMS TUNABLE ULTRA LOW-NOISE LASER

Alaina G. Attanasio¹, Andrey A. Voloshin^{2,3}, Anat Siddharth², Simone Bianconi², Andrea Bancora^{2,3}, Vladimir Shadymov^{2,3}, Sebastien Leni³, Rui N. Wang², Johann Riemensberger², Tobias J. Kippenberg², and Sunil A. Bhave¹
¹*Purdue University, USA,* ²*Swiss Federal Institute of Technology Lausanne (EPFL), SWITZERLAND, and* ³*DEEPLIGHT SA, SWITZERLAND*

09:30 - 09:45

W1C.04 WIDE SCAN ANGLE AND LARGE APERTURE (180 DEGREES/2.5MM) RESONANT PIEZOELECTRIC MEMS MIRROR

Hung-Yu Lin^{1,2}, Mingching Wu², Mei-Feng Lai¹, and Weileun Fang¹
¹*National Tsing Hua University, TAIWAN and* ²*Coretronic MEMS Corporation, TAIWAN*

09:45 - 10:00

W1C.05 BI-AXIAL PIEZOELECTRIC MEMS MICROMIRROR WITH ARCHED ACTUATOR UTILIZING D32 EFFECT FOR BOTH RASTER AND LISSAJOUS SCANNING

Hui-Ming Yang¹, Chang-I Lin¹, Po-Chun Lin¹, Wei-Kai Sung¹, Jerwei Hsieh², and Weileun Fang¹
¹*National Tsing Hua University, TAIWAN and* ²*Asia Pacific Microsystems, Inc., TAIWAN*

Session W1D - Materials Characterization

Windemere Z

08:30 - 09:00

INVITED PRESENTATION

W1D.01 CAPACITIVE SENSOR DESIGN FOR SOFT ROBOTS AND SMART GARMENTS

Damla Leblebicioglu, Immanuel Ampomah Maensah, Joseph Allen, *Ahilesh Vadivel, Nathaniel Hanson, and Kristen L. Dorsey*
Northeastern University, USA

09:00 - 09:15

W1D.02 ENHANCED CHARACTERIZATION OF PA6 CRYSTALLIZATION USING MEMS DSC INTEGRATED WITH IN SITU FTIR SPECTROSCOPY

Zechun Li¹, Shaokui Tan^{1,2}, Yuhang Yang¹, Ming Li¹, Xiaoyuan Xia^{1,3}, Yemin Dong^{1,3}, Pengcheng Xu¹, and Xinxin Li¹

¹*Chinese Academy of Sciences, CHINA*, ²*Shanghai Normal University, CHINA*, and

³*Shanghai Industrial Technology Research Institute (SITRI), CHINA*

09:15 - 09:30

W1D.03 DOUBLE-AXIS TAPERED HS-AFM NANOCANTILEVER FOR BIOMEDICAL APPLICATIONS

Eying Sim Wong¹, Aron Michael¹, Jayden Moore¹, Hemanshu Pota², and Chee Yee Kwok¹

¹*University of New South Wales (UNSW), Sydney, AUSTRALIA* and

²*University of New South Wales (UNSW), Canberra, AUSTRALIA*

09:30 - 09:45

W1D.04 IN-SITU TGA-IR MATERIAL CHARACTERIZATION SYSTEM BASED ON A RESONANT CANTILEVER AND ITS APPLICATION IN REGULATING THE PROPERTIES OF SINGLE CRYSTAL COF

Qiaoyuan Yang¹, Zijian Wu^{1,2}, Ruomeng Guo¹, Ming Li¹, Pengcheng Xu¹, and Xinxin Li¹

¹*Chinese Academy of Sciences, CHINA* and ²*Shanghai Normal University, CHINA*

09:45 - 10:00

W1D.05 A METHOD FOR IN-SITU ON-WAFER COMPRESSION TEST OF MICROBEAMS

Yi Chen and Dacheng Zhang

Peking University, CHINA

10:00 - 10:30 **Break and Exhibit Inspection**

Session W2A - Piezoelectric Devices

Windemere W

10:30 - 10:45

W2A.01 ALS-CN BASED PIEZOELECTRICALLY DRIVEN QUASI-STATIC MEMS SCANNERS WITH LARGE FIELD OF VIEW WITH SELECTABLE REGIONS OF INTEREST

Paul Raschdorf¹, Christian V. Hofen¹, Nils Voß^{1,3}, Erdem Yazar¹, Gunnar Wille¹, Jeong-Yeon Hwang¹, Fabian Lofink^{1,2}, and Shanshan Gu-Stoppel^{1,3}

¹*Fraunhofer ISIT, GERMANY*, ²*CAU Kiel, GERMANY*, and ³*FH Westküste, GERMANY*

10:45 - 11:00

W2A.02 ON THE DESIGN OF PIEZOELECTRIC MEMS SPEAKER COMBINING CENTRAL CROSS-DIAPHRAGM WITH WING-LIKE DIAPHRAGM TO IMPROVE SOUND PRESSURE LEVEL BANDWIDTH

Po-Shen Chen¹, Chia-Hao Lin¹, Chin Tseng¹, Zih-Song Hu¹, Sung-Cheng Lo², and Weileun Fang¹

¹*National Tsing Hua University, TAIWAN* and ²*Upbeat Technology Co., Ltd., TAIWAN*

11:00 - 11:15

- W2A.03 HIGH-PERFORMANCE PIEZOELECTRIC MEMS SPEAKERS FOR IN-EAR APPLICATIONS**
Fabrizio Cerini², Chiara Gazzola¹, Filippo P. Perli¹, Michele Rosso¹, Silvia Adorno², and Alberto Corigliano¹
¹Politecnico di Milano, ITALY and ²STMicroelectronics, ITALY

11:15 - 11:30

- W2A.04 PHYSICS-INFORMED NEURAL NETWORKS FOR MODAL ANALYSIS OF DIAPHRAGM-STRUCTURED MEMS WITH EXPERIMENTAL VALIDATION**
Jiapeng Xu^{1,2}, Gabriele Schrag², Zhou Da³, Yong Wang⁴, and Tingzhong Xu¹
¹Silicon Austria Labs, AUSTRIA, ²Technical University of Munich, GERMANY, ³Roma Tre University, ITALY, and ⁴University of Oxford, UK

11:30 - 11:45

- W2A.05 SPL AND THD IMPROVEMENT OF PIEZOELECTRIC MEMS MICROSPEAKER VIA PARALLEL DUAL CURVE SPRINGS WITH RING ACTUATOR**
Chia-Hao Lin¹, Chin Tseng¹, Sung-Cheng Lo², Mei-Feng Lai¹, and Weileun Fang¹
¹National Tsing Hua University, TAIWAN and ²Upbeat Technology, TAIWAN

11:45 - 12:00

- W2A.06 MICROPATTERNED PDMS DAMPING LAYER INTEGRATION TO ENHANCE THE FIDELITY OF PIEZOELECTRIC MEMS SPEAKERS WITHOUT SPL PENALTY**
Xuchen Wang¹, Yukio Suzuki¹, Chung-Min Li², and Shuji Tanaka¹
¹Tohoku University, JAPAN and ²AAC Technologies PTE.LTD, SINGAPORE

Session W2B - Bio & Chemical Sensors

Windemere X

10:30 - 10:45

- W2B.01 ELECTROCHEMICAL BIOSENSOR FOR REAL-TIME IN-VIVO MONITORING OF TUMOR PH, OXYGEN, AND ELECTRICAL CONDUCTIVITY**
Jun Ying Tan¹, Santosh Kumar Mandal², Poonam Yadav², Aabila Tharzeen³, Balasubramaniam Natarajan³, Rahul Sheth², and Jungkwun 'JK' Kim¹
¹University of North Texas, USA, ²University of Texas, USA, ³Kansas State University, USA, and ⁴George Washington University, USA

10:45 - 11:00

- W2B.02 MONITORING SINGLE-CELL NEUROTRANSMITTER EXOCYTOSIS USING CARBONIZED WOOD ELECTROCHEMICAL SENSORS REVEALS THE NEUROLOGICAL EFFECTS OF NATURAL PRODUCTS**
Xuefeng Wang¹, Zihui Li^{1,2}, Wenxue Chen^{1,3}, Haoliang Li^{1,3}, Qiongya Wan^{1,2}, Yongheng Zhu², Dan Zheng³, Pengcheng Xu¹, and Xinxin Li¹
¹Chinese Academy of Sciences, CHINA, ²Shanghai Ocean University, CHINA, and ³Shanghai Institute of Technology, CHINA

11:00 - 11:15

- W2B.03 EFFECT OF DIFFUSION AT THE AU/N-SI SCHOTTKY INTERFACE IN CURRENT DETECTION SURFACE PLASMON RESONANCE SENSORS**
Masaya Ukaji, Eslam Abubakr, Yuki Imai, and Tetsuo Kan
University of Electro-Communications, JAPAN

11:15 - 11:30

- W2B.04 A WIRELESS PAPER HUMIDITY SENSOR BASED ON COPPER-GRAPHENE COMPOSITE FOR PLANT TRANSPIRATION MONITORING**
Chao Liang¹, Yuxuan Fan², Ziqi Mei¹, Wenqiang Zhang², and Xiaoguang Zhao¹
¹Tsinghua University, CHINA and ²China Agricultural University, CHINA

11:30 - 11:45

W2B.05 LOW-COST LEAD-ION IMPRINTED POLYMER MEMBRANE MICROFLUIDIC SENSOR FOR SELECTIVE TRACE LEAD MONITORING IN WATER

Ayobami E. Oseyemi and Pouya Rezaei
York University, CANADA

11:45 - 12:00

W2B.06 ACHIEVING SELECTIVE SENSING IN MICROBIAL FUEL CELL BIOSENSORS BY DEEP-LEARNING-BASED NEURAL NETWORKS FOR DETECTION OF TETRACYCLINE AND PENICILLIN IN WATER

Fengxiang Tang, Yining Wang, Boya Liu, and Hao Ren
ShanghaiTech University, CHINA

Session W2C - Nanomaterials

Windemere Y

10:30 - 10:45

W2C.01 SUBMICROMETRIC HIERARCHICAL NANOPOROUS PATTERNS FOR LUBRICANT-INFUSED SURFACES WITH ENHANCED LUBRICANT RETENTION AND RECOVERY

Joowon Lim, Geonho Lee, Beomsu Kim, Sunbin Yoon, Sueng Yoon Lee, Byeongju Hong, Junho Oh, and Won Chul Lee
Hanyang Univeristy, KOREA

10:45 - 11:00

W2C.02 HEMISPHERICAL SILVER NANOSHELL ARRAY ON SILICON NANOSPHERES FOR SURFACE-ENHANCED RAMAN SPECTROSCOPY

Taeyeong Kim and Jungchul Lee
Korea Advanced Institute of Science and Technology (KAIST), KOREA

11:00 - 11:15

W2C.03 EPITAXIAL AUCN NANOSPRINGS ON CARBON NANOTUBES REDUCED TO AU VIA ELECTRON-BEAM-INDUCED RADIOLYSIS.

Sunbin Yoon, Joowon Lim, and Won Chul Lee
Hanyang University, KOREA

11:15 - 11:30

W2C.04 A MICROFLUIDIC PLATFORM BASED ON NANOTUBE FORESTS FOR ANTI-EVAPORATION APPLICATIONS

Jing Wen¹, Qiming Guo¹, Fei Zhan², Lei Wang², Na Zhou¹, and Haiyang Mao^{1,2}
¹Chinese Academy of Sciences, CHINA and ²Beijing Forestry University, CHINA

11:30 - 11:45

W2C.05 AN INVESTIGATION OF VO₂ NANOWIRE ARRAYS FOR INTEGRATED SENSING. FROM NON-STOCHASTIC NANOWIRES TO STOCHASTIC NANOSTRUCTURES

Vanessa Conti, Andrea Iaconeta, Cyrille Masserey, Anna Varini, Riccardo Chiesa, Andras Kis, Igor Stolichnov, and Adrian M. Ionescu
École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND

11:45 - 12:00

W2C.06 LIQUID-TO-GAS PHASE CHANGE-BASED STRETCHABLE ACTUATOR WITH INTEGRATED CARBON NANOTUBE BUNDLES

Sangjun Sim¹, Seungin Jo¹, Kyubin Bae², and Jongbaeg Kim¹
¹Yonsei University, KOREA and ²University of Texas, Austin, USA

Session W2D - Neural Interfaces

Windemere Z

10:30 - 10:45

W2D.01 THREE-DIMENSIONAL MICROELECTRODE ARRAY WITH VERTICALLY-ALIGNED CARBON NANOTUBES FOR RETINAL NEURAL SIGNAL RECORDING

Hyunjun Han¹, Sangjun Sim¹, Chaesung Kim^{2,3}, Maesoon Im^{2,4,5}, and Jongbaeg Kim¹
¹*Yonsei University, KOREA*, ²*Korea Institute of Science and Technology, KOREA*,
³*Korea University, KOREA*, ⁴*University of Science and Technology, KOREA*, and
⁵*Kyung Hee University, KOREA*

10:45 - 11:00

W2D.02 AN IMPLANTABLE MULTI-LAYER CARBON NANOELECTRODE BASED ON MPCVD AND ATMOSPHERIC PLASMA JET, FOR RECORDING OF INTRACELLULAR O₂ AND NEURAL SIGNALS

Zhiyuan Du¹, Qingda Xu¹, Ye Xi¹, Mengfei Xu¹, Kunyu Zheng¹, Ning Wei¹, Haoyuan Chen¹, Xiuyan Li¹,
Qingkun Liu¹, Xiaolin Wang¹, Bin Yang¹, Wen Li², and Jingquan Liu¹
¹*Shanghai Jiao Tong University, CHINA* and ²*Michigan State University, USA*

11:00 - 11:15

W2D.03 STRETCHABLE MICRONEEDLE ARRAY ELECTRODE FOR MOVEMENT-RESISTANT ELECTROENCEPHALOGRAPH MONITORING

Jiayan Zhang, Yunxu Zhao, Junshi Li, Zhitong Zhang, and Zhihong Li
Peking University, CHINA

11:15 - 11:30

W2D.04 A CHRONIC MULTIMODAL PLATFORM FOR SIMULTANEOUS ELECTROPHYSIOLOGY AND CALCIUM IMAGING DURING MOTOR BEHAVIOUR

Om T. Kolhe¹, Alec C. Booth^{1,2}, Hammad F. Khan¹, and Krishna Jayant¹
¹*Purdue University, USA* and ²*Indiana University School of Medicine, USA*

11:30 - 11:45

W2D.05 AN ALL-IN-ONE IMPLANTABLE FLEXIBLE PROBE WITH INTEGRATED SELF-REFERENCING ELECTRODE FOR NEURAL RECORDING, ELECTRIC STIMULATION, AND IN-SITU PH SENSING

Ning Wei, Longchun Wang, Kejun Tu, Jiawei Cao, Qingda Xu, Mengfei Xu, Chunpeng Jiang,
Haoyuan Chen, Bin Yang, Xiaolin Wang, and Jingquan Liu
Shanghai Jiao Tong University, CHINA

11:45 - 12:00

W2D.06 DEVELOPMENT OF A WIRELESS IMPLANTABLE INTRACRANIAL PRESSURE MONITORING SYSTEM

Kehui Qi, Changding Li, Nan Li, Qinggang Meng, Jian Chen, and Junbo Wang
Chinese Academy of Sciences, CHINA

12:00 - 14:00 **Lunch**

Session W3A - Ultrasonic Devices

Windemere W

14:00 - 14:15

W3A.01 GHZ ULTRASOUND FOR QUANTITATIVE OOCYTE MECHANOBIOLOGY

Yilmaz Arin Manav¹, Andrew Piasecki¹, Dori Woods¹, Amit Lal^{2,3}, and Benyamin Davaji¹
¹*Northeastern University, USA* and ²*Geegah LLC, USA*, ³*Cornell University, USA*

14:15 - 14:30

W3A.02 PIEZOELECTRIC MICROMACHINED ULTRASONIC TRANSDUCER (PMUT) BASED ON BILAYER X-CUT LITHIUM NIOBATE

Xiaoxi Zhao, Michiel Pertijs, and Tomás Manzaneque
Delft University of Technology (TU Delft), NETHERLANDS

14:30 - 14:45

W3A.03 NONLINEARITY MODULATING OF THE SCALN-BASED PIEZOELECTRIC MICROMACHINED ULTRASONIC TRANSDUCER WITH DC BIAS AND SINGLE-TONE AC DRIVING SIGNAL

Zihan Lu¹, Hongxin Xu¹, Xuefei Yan¹, Tingfeng Peng¹, Chunlong Cheng¹, Jingwen Yang¹, Zhiqing Zhang¹, Yuan Wang², Huahuang Luo¹, and Qingqing Ke¹
¹*Sun Yat-sen University, CHINA* and ²*University of Macau, MACAO*

14:45 - 15:00

W3A.04 A NOVEL VERTICAL DUAL-GAP CMOS-MEMS CMUT ENABLING LARGE FRACTIONAL BANDWIDTH

Wei-Hsiang Hsu¹, Hung-Yu Chen², and Sheng-Shian Li¹
¹*National Tsing Hua University, TAIWAN* and ²*University of California, Berkeley, USA*

15:00 - 15:15

W3A.05 LINEAR SELF-FOCUSING ACOUSTIC TRANSDUCER

Akash Roy, Kianoush Sadeghian Esfahani, Anik Sengupta, Yicheng Zhang, and Eun S. Kim
University of Southern California, USA

Session W3B - Biomedical Devices

Windemere X

14:00 - 14:15

W3B.01 ON-DEMAND ISOTROPIC OR ANISOTROPIC PERFORATION OF BIOLOGICAL TISSUE BY BI-MODAL CONTROL OF PLASMA ETCHING AND MICRO-FLUIDIC JET

Yuudai Aokusa, Yibo Ma, Shigeaki Miura, Yuma Minami, and Yoko Yamanishi
Kyushu University, JAPAN

14:15 - 14:30

W3B.02 PULSATED IN-SITU DRIED ELECTROSTRETCHING FABRICATION OF MICRONEEDLES FOR TRANSDERMAL DRUG DELIVERY

Ngoc Luan Mai¹, Thi Van Anh Hoang¹, Trung-Hieu Vu¹, Hoai-Duc Vu¹, Canh Doan¹, Yuen Yong², Thien Xuan Dinh³, Dzung Dao¹, and Van Thanh Dau¹
¹*Griffith University, AUSTRALIA*, ²*University of Newcastle, AUSTRALIA*, and ³*The Commonwealth Scientific and Industrial Research Organisation, AUSTRALIA*

14:30 - 14:45

W3B.03 QUALITY FACTOR (QF) SENSITIVE LCR PATTERNS FOR ORTHORPEDIC IMPLANT STRAIN MONITORING

Jincai Huang and Xining Zang
Tsinghua University, CHINA

14:45 - 15:00

W3B.04 IN VIVO BIO-IMPEDANCE SENSING CAPSULE STUDY FOR MONITORING MUCOSAL PERMEABILITY IN A DSS-COLITIS RAT MODEL

Mateo W. Lim, Justin M. Stine, Hamed Ayansola, Brian M. Holt, Luke A. Beardslee, Jain Kim, Jiecheng Chen, Younggeon Jin, and Reza Ghodssi
University of Maryland, USA

15:00 - 15:15

W3B.05 SELF-POWERED PEEK-BASED IMPLANTS FOR ELECTRIC-FIELD-ENHANCED OSTEOGENESIS

Jincai Huang, Yuanshuai Dai, Jia Cheng, Zhe Zhao, and Xining Zang
Tsinghua University, CHINA

15:15 - 15:30

W3B.06 MILLIMETRIC IMPLANTABLE DEVICE FOR EXTENDED IN-VIVO FLUORESCENCE RECORDING

Xu Tian¹, Argyris Spyrou², Martin Köhler², Per-Olof Berggren², Göran Stemme¹, and Niclas Roxhed¹
¹*KTH Royal Institute of Technology, SWEDEN* and ²*Karolinska Institute, SWEDEN*

Session W3C - Flow Sensors

Windemere Y

14:00 - 14:15

W3C.01 INSECT ANTENNAE-BASED SENSOR FOR ACCURATE ODOR CONCENTRATION DETERMINATION BY COMBINING AIRFLOW AND ODOR MEASUREMENT

Ryusei Ando¹, Chihiro Fukui², Kei Ohara¹, Daigo Terutsuki³, Toshiyuki Nakata², and Hidetoshi Takahashi¹
¹*Keio University, JAPAN*, ²*Chiba University, JAPAN*, and ³*Shinshu University, JAPAN*

14:15 - 14:30

W3C.02 HIGH RESOLUTION AND LARGE RANGE ULTRASONIC FLOW MONITORING BASED ON MONOLITHIC PMUT PHASED ARRAY WITH BIDIRECTIONAL BEAMS

Yufeng Gao, Xili Wang, Lei Zhao, Aocheng Bao, and Yipeng Lu
Peking University, CHINA

14:30 - 14:45

W3C.03 ROBUST PITOT-TYPE WATERFLOW SENSOR SYSTEM FOR MARINE ANIMALS IN HARSH ENVIRONMENTS

Takuto Kishimoto and Hidetoshi Takahashi
Keio University, JAPAN

14:45 - 15:00

W3C.04 PALM-SIZED WIRELESS MEMS FLOW SENSOR SYSTEM ATTACHABLE TO MEDICAL MASK FOR REAL-TIME RESPIRATION MONITORING

Muhammad Salman Al Farisi¹, Tsuyoshi Tsukada¹, Yoshihiro Hasegawa¹, Miyoko Matsushima², Shin Hasegawa³, Tsutomu Kawabe², and Mitsuhiro Shikida¹
¹*Hiroshima City University, JAPAN*, ²*Nagoya University, JAPAN*, and ³*COSMOSWEB Co., Ltd., JAPAN*

15:00 - 15:15

W3C.05 MICROFLUIDIC THERMAL FLOW SENSOR WITH EXTENDED LINEAR RANGE AND REDUCED HEAT DISSIPATION USING A SHUNT

Maarten J S. Bonnema¹, Jarno Groenesteijn², Remco J. Wiegerink¹, and Joost C. Lötters¹
¹*University of Twente, NETHERLANDS* and ²*Bronkhorst High-Tech B.V., NETHERLANDS*

15:15 - 15:30

W3C.06 MONOLITHICALLY INTEGRATED FLEXIBLE MULTI-SENSOR FOR FLOW, TEMPERATURE, AND CONDUCTIVITY MEASUREMENT IN IONIC SOLUTIONS

Haoxin Hu, Wenlin Xiao, Ke Xiao, and Wei Xu
Shenzhen University, CHINA

Session W3D - Actuators

Windemere Z

14:00 - 14:15

W3D.01 BIOHYBRID MUSCLE ACTUATOR WITH EMBEDDED SPRING-SHAPED SKELETON FOR MULTIMODAL ELEPHANT TRUNK-LIKE MOTION

Shota Nakamura, Byeongwook Jo, Minghao Nie, and Shoji Takeuchi
University of Tokyo, JAPAN

14:15 - 14:30

W3D.02 ELECTRON-DRIVEN NANOACTUATORS IN GENETICALLY ENGINEERED SPIDER SILK PROTEINS

Wenyuan Liu, Nan Qin and Tiger H. Tao
Chinese Academy of Sciences, CHINA

14:30 - 14:45

W3D.03 CANTILEVER FREE MULTISTABLE MAGNETIC LIFT ACTUATOR FOR LARGE OUT-OF-PLANE DISPLACEMENTS

Pascal M. Weber and Ulrike Wallrabe
Albert Ludwigs Universität, Freiburg, GERMANY

14:45 - 15:00

W3D.04 HEXASTABLE MEMS STAGE

Shun Yasunaga and Yoshio Mita
University of Tokyo, JAPAN

15:00 - 15:15

W3D.05 CASCADE-ACTUATION UNCOUPLED-MOTION XYZ-MICROSTAGE WITH MONOLITHIC INTEGRATION OF IN-PLANE COMB-DRIVE XY-MICROSTAGE AND OUT-OF-PLANE AL/SIO₂ BIMORPH THERMOELECTRIC ACTUATORS

Huanyu Dai, Zengyi Wang, Penghong Shi, Junyang Ding, Bing Li, and Gaopeng Xue
Harbin Institute of Technology, CHINA

15:15 - 15:30

W3D.06 SLITHER-TYPE BIOHYBRID ROBOT POWERED BY HIGHLY CONTRACTILE MUSCLE RINGS

Tomohiro Morita, Minghao Nie and Shoji Takeuchi
University of Tokyo, JAPAN

Poster Session W4P and Exhibit Inspection

Regency S – V & Rotunda

15:35 - 17:30

Poster presentations are listed by topic category with their assigned number starting on page 32.

15:30 – 16:00 **Break**

17:30 Adjourn for the Day

**Transducers 2025 Conference Banquet at
The Kennedy Space Center**

17:30 - 23:00

Thursday, 3 July

Session Th1A - Robotics & Tactile Sensing

Windemere W

08:30 - 09:00

INVITED PRESENTATION

Th1A.01 EMERGING ROBOTIC TECHNOLOGIES EXPANDING CAPABILITIES IN THE MICROSCOPIC WORLD FOR BIOMEDICAL INNOVATIONS

Fumihito Arai
University of Tokyo, JAPAN

09:00 - 09:15

Th1A.02 MULTI-UNIT TERAHERTZ FREQUENCY SELECTIVE FINGERPRINT SENSOR: WIDEBAND IDENTIFICATION OF TRACE SUBSTANCES

Hongshun Sun, Yunhao Cao, Yusa Chen, Liye Li, Lijun Ma, and Wengang Wu
Peking University, CHINA

09:15 - 09:30

Th1A.03 AN ARTERIAL COMPLIANCE MEASURING WRISTWATCH WITH FLEXIBLE TACTILE SENSING DENSE-ARRAY

Yi Sun¹, Fang Wang^{1,2}, Yue He^{1,4}, Yunhao Wang^{1,3}, Hao Yu^{1,2}, Ke Sun¹, Tiger H. Tao¹, Xiaoyuan Xia¹, Yemin Dong¹, Heng Yang^{1,2}, and Xinxin Li^{1,2}
¹Chinese Academy of Sciences, CHINA, ²University of Chinese Academy of Sciences, CHINA, ³ShanghaiTech University, CHINA, and ⁴Jiangsu University, CHINA

09:30 - 09:45

Th1A.04 ULTRA-FAST AND SCALABLE MICROFABRICATION OF FLEXIBLE TACTILE SENSORS VIA SEQUENTIAL DIGITAL LIGHT PROCESSING

Muhammad Faizul Zaki, Wan-Ru Huang, Phong Vi Lam, Chen-Fang Sun, and Pin-Chuan Chen
National Taiwan University, TAIWAN

09:45 - 10:00

Th1A.05 SENSITIVITY ENHANCEMENT IN MONOLITHICAL CMOS-MEMS TACTILE FORCE AND PROXIMITY SENSORS USING 3D TOROIDAL COILS

Ruei-Cing Mai, Yi-Ming Lai, Pei-Yun Li, Meifeng Lai, Rongshun Chen, and Weileun Fang
National Tsing Hua University, TAIWAN

Session Th1B - Energy Harvesters

Windemere X

08:30 - 09:00

INVITED PRESENTATION

Th1B.01 ADVANCE IN AI SENSOR AND AIOT TECHNOLOGY

Chengkuo Lee, Zixuan Zhang, and Dongxiao Li
National University of Singapore, SINGAPORE

09:00 - 09:15

Th1B.02 HIGH SURFACE POTENTIAL LANTHANUM ALUMINATE ELECTRET THIN FILM FOR VIBRATIONAL ENERGY HARVESTING DEVICES

Takuya Igashira¹, Daisuke Nishitani¹, Hideyuki Nagai¹, Hirokazu Nakazawa¹, Noriyuki Matsushita², Kazuhiko Kano², Yumi Tanaka³, Hiroaki Honma⁴, and Hiroyuki Wado¹
¹MIRISE Technologies Corporation, JAPAN, ²DENSO Corporation, JAPAN, ³Tokyo University of Science, JAPAN, and ⁴Kobe University, JAPAN

09:15 - 09:30

Th1B.03 A PROBIOTIC-POWERED TRANSIENT BATTERY WITH PH-RESPONSIVE BIODEGRADATION

Maryam Rezaie and Seokheun Choi
State University of New York, Binghamton, USA

09:30 - 09:45

Th1B.04 A NOVEL MULTI-OBJECTIVE OPTIMIZATION METHOD BY MACHINE LEARNING AND ITS APPLICATION IN MEMS VIBRATION ENERGY HARVESTERS DESIGN

Yisong Ling¹, Haizhao Feng¹, Ling Bu², Siyao Jiang¹, and Xiaohong Wang¹
¹Tsinghua University, CHINA and ²China University of Geosciences, CHINA

09:45 - 10:00

Th1B.05 3D MOULDED FLEXIBLE VIBRATION ENERGY HARVESTER WITH HOURGLASS BEAMS FOR MULTIMODAL RESPONSE IN LOW-FREQUENCY RANGE

Rui Jiang¹, Ling Bu¹, Shihan Yang¹, and Xiaohong Wang²
¹China University of Geosciences, CHINA and ²Tsinghua University, CHINA

Session Th1C - Environmental Sensors

Windemere Y

08:30 - 09:00

INVITED PRESENTATION

Th1C.01 ECOSENSE – SMART SENSORS ALONE IN THE FOREST

Ulrike Wallrabe, Samaneh Baghbani¹, Laura Comella^{1,2}, Yasmina Frey¹, Johannes Kapp¹, Johannes Klüppel¹, Oswald Prucker¹, Sanam Kumari Rajak¹, Jürgen Rühle¹, Stefan Rupitsch¹, Katrin Schmitt¹, Uttunga Shinde¹, Till Steinmann¹, Jürgen Wöllenstein¹, Peter Woias¹, Christiane Werner¹
University of Freiburg, GERMANY and ²University of Applied Science Karlsruhe, GERMANY

09:00 - 09:15

Th1C.02 3-D WAVE MEASUREMENT SYSTEM USING IMU AND MEMS CANTILEVER-TYPE DIFFERENTIAL PRESSURE SENSOR

Kyota Shimada, Takuto Kishimoto and Hidetoshi Takahashi
Keio University, JAPAN

09:15 - 09:30

Th1C.03 DEVELOPMENT OF A REUSABLE PM SAW SENSOR SYSTEM WITH A MICROHEATER AND POROUS MICROSTRUCTURE FILTER MEMBRANE FOR PM10 AND PM2.5 DETECTION

Faisal Nawaz, Jaepil Song, and Keekeun Lee
Ajou University, KOREA

09:30 - 09:45

Th1C.04 FULLY BIODEGRADABLE WIRELESS SOIL UREA SENSOR USING METAMATERIAL PERFECT ABSORBER FOR ROBUST MEASUREMENTS

Yu Tanaami¹, Ken Sakabe¹, Tetsuo Kan², and Hiroaki Onoe¹
¹Keio University, JAPAN and ²University of Electro-Communications, JAPAN

09:45 - 10:00

Th1C.05 MANUFACTURING OF ZINC OXIDE NANOPARTICLE-FUNCTIONALIZED CELLULOSE NANOFIBROUS AEROGEL FOR ULTRA-FINE DUST FILTRATION AND REAL-TIME NO₂ DETECTION

Yun Sik Hwang¹, Yeawan Lee², Donghyun Lee¹, Sang Bok Kim², and Jungwook Choi¹
¹Chung-Ang University, KOREA and ²Korea Institute of Machinery and Materials, KOREA

Session Th1D - MEMS CMOS Integration

Windemere Z

08:30 - 09:00

INVITED PRESENTATION

Th1D.01 ENHANCING MEMS PERFORMANCE THROUGH CMOS INTEGRATION: THE CASE OF PMUTS

Eyglis Ledesma, Ivan Zamora, Ahsan Shabeer, Mohammadamir Ghasemishabankareh, Zeyuan Hui, Francesc Torres, Arantxa Uranga and Núria Barniol Beumala
Universitat Autònoma de Barcelona, SPAIN

09:00 - 09:15

Th1D.02 CMOS-COMPATIBLE STRATEGY FOR TRANS-SCALE STRUCTURES VIA OPTICALLY PROGRAMMABLE SELF-ASSEMBLY

Zhi-Qi Dong, Kai-Ming Hu, Rui-Jia Xiang, Tian-Yu Zhao, Jun-Feng Zhou, Guang Meng, and Wen-Ming Zhang
Shanghai Jiao Tong University, CHINA

09:15 - 09:30

Th1D.03 A HIGHLY SENSITIVE CMOS-MEMS INTEGRATED SOC FOR FLOW AND TEMPERATURE SENSING USING A MICROCANTILEVER ARRAY

Feiyun Wang, Xiangyu Song, Linze Hong, and Wei Xu
Shenzhen University, CHINA

s09:30 - 09:45

Th1D.04 TOWARD A SELF-POWERED MM-SCALE MEMS SENSOR PLATFORM THROUGH HETEROGENEOUS INTEGRATION OF SC μ M AND HV SOI CMOS

Yichen Liu, Daniel Lovell, Titan Yuan, and Kristopher Pister
University of California, Berkeley, USA

09:45 - 10:00

Th1D.05 To Be Determined

10:00 – 10:30 **Break and Exhibit Inspection**

Session Th2A - Cellular Systems

Windemere W

10:30 - 10:45

Th2A.01 VISUAL FEEDBACK SYSTEM FOR ROTATIONAL ANGLE CONTROL OF A SINGLE CELL BASED ON VIBRATION-INDUCED FLOW

Hatsuhiko Ishiguro, Masatomo Arai, Hiroyasu Kobayashi, and Takeshi Hayakawa
Chuo University, JAPAN

10:45 - 11:00

Th2A.02 HIGH-QUALITY IMAGING FLOW CYTOMETRY BASED ON ACOUSTIC FOCUSING AND ITS APPLICATION IN LABEL-FREE LEUKOCYTE DIFFERENTIAL COUPLED WITH DEEP NEURAL NETWORK

Xukun Huang¹, Xiao Chen¹, Junbo Wang¹, Xuzhen Qin², Xiaoye Huo¹, Nan Li¹, and Jian Chen¹
¹Chinese Academy of Sciences, CHINA and ²Peking Union Medical College Hospital, CHINA

11:00 - 11:15

Th2A.03 EFFECT OF TITANIUM DIOXIDE NANOPARTICLES ON REACTIVE OXYGEN SPECIES GENERATION IN A HIGH-FREQUENCY ULTRASOUND RANGE

Kotaro Fujishiro¹, Satoshi Okada², Takahiro Kuchimaru³, and Yuta Kurashina¹

¹Tokyo University of Agriculture and Technology, JAPAN, ²Institute of Science Tokyo, JAPAN, and ³Jichi Medical University, JAPAN

11:15 - 11:30

Th2A.04 A 3D-PRINTED FLEXIBLE DEVICE FOR MEASURING CONCENTRIC CONTRACTILE FORCE IN IN-VITRO SMOOTH MUSCLE TISSUE MODEL

DongWoo Lee, Byeongwook Jo, Minghao Nie, and Shoji Takeuchi

University of Tokyo, JAPAN

11:30 - 11:45

Th2A.05 A HIGH-SENSITIVITY AND CLOGGING-FREE MICROFLUIDIC IMPEDANCE FLOW CYTOMETER ENABLED BY VIRTUAL CONSTRICTION MICROCHANNEL

Xiao Chen¹, Yimin Li¹, Tingxuan Fang¹, Jie Zhang², Yueying Li², Xuzhen Qin³, Junbo Wang¹, Xiaoye Huo¹, Jian Chen¹, and Nan Li¹

¹Chinese Academy of Sciences, CHINA, ²China National Center for Bioinformatics, CHINA, and ³Peking Union Medical College Hospital, CHINA

11:45 - 12:00

Th2A.06 QUANTITATIVE NANO-ARTIFACTS EXPOSURE TOWARD SINGLE CELLS UTILIZING A MICRODROPLET-BASED MICROFLUIDIC SYSTEM

Ren Takeuchi¹, Makoto Saito¹, Rinko Kurogi¹, Nariaki Kiyama¹, Yoko Yamanishi¹, Kosuke Dodo², Takashi Kamatani³, Yoshitaka Shirasaki⁴, Chia-Hung Dylan Tsai⁵, Satoshi Yotsumoto⁴, Niko Kimura⁴, Shigeo S. Sugano⁶, and Shinya Sakuma¹

¹Kyushu University, JAPAN, ²RIKEN, JAPAN, ³Institute of Science Tokyo, JAPAN,

⁴University of Tokyo, JAPAN, ⁵National Yang Ming Chiao Tung University, TAIWAN, and

⁶National Institute of Advanced Industrial Science and Technology (AIST), JAPAN

Session Th2B - Fabrication & Functional Materials

Windemere X

10:30 - 10:45

Th2B.01 EDIBLE WIRELESS CAPSULE SENSOR FOR SENSING GASTRIC DIGESTIVE FUNCTION BY ELECTROMAGNETIC RESPONSE OF SPLIT-RING RESONATOR WITH VEGETABLE SHEET

Shion Miura¹, Tetsuo Kan², and Hiroaki Onoe¹

¹Keio University, JAPAN and ²University of Electro-Communications, JAPAN

10:45 - 11:00

Th2B.02 WAFER-LEVEL MICROFABRICATION OF ZIPPING ELECTROHYDRAULIC ACTUATORS FOR SOFT MILLI-ROBOTS

Shai Shmulevich, Florian Hartmann, and Herbert Shea

École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND

11:00 - 11:15

Th2B.03 RESILIENT AND LONG-LASTING LIVING MATERIALS: BRIDGING ELECTRONICS AND BIOLOGICAL SYSTEMS

Ruohan Zhang, Yang Gao, and Seokheun Choi

State University of New York, Binghamton, USA

11:15 - 11:30

Th2B.04 NOVEL FABRICATION SCHEME USING LATERAL STACKING OF HYBRID PIEZO/FERROELECTRIC THIN-FILMS FOR MEMS RESONATORS

Linet Thomas C¹, Praveen Kumar¹, Sambuddha Khan², and Gayathri Pillai¹

¹Indian Institute of Science, INDIA and ²Tyndall National Institute, IRELAND

11:30 - 11:45

Th2B.05 HIGH ASPECT RATIO 3D CARBON MICROSTRUCTURE FOR INFRARED EMITTER USING PARYLENE CARBONIZATION

Ryo Yoshitake, Shunsuke Yamada, Shuji Tanaka, and Takashiro Tsukamoto
Tohoku University, JAPAN

11:45 - 12:00

Th2B.06 A FULLY MEMS-COMPATIBLE PROCESS FOR ULTRA-THIN PIEZOELECTRIC ACTUATORS WITH GOOD UNIFORMITY AND HIGH COUPLING EFFICIENCY

Aocheng Bao, Chong Yang, Kai Yang, Xili Wang, Yufeng Gao, and Yipeng Lu
Peking University, CHINA

Session Th2C - Accelerometers & Gyroscopes

Windemere Y

10:30 - 10:45

Th2C.01 FROM STRESS TO SUCCESS: DEMONSTRATING ULTRAHIGH QUALITY FACTOR DUAL-SHELL RESONATOR GYROSCOPES WITH LOW STRESS TOPOLOGY

Lois Meira Lopez, Austin R. Parrish, Esther Wong, Danmeng Wang, and Andrei M. Shkel
University of California, Irvine, USA

10:45 - 11:00

Th2C.02 AN ELECTROCHEMICAL ACCELEROMETER WITH OVER 1K FREQUENCY BANDWIDTH AND HIGH SENSITIVITY

Xiaoyu Qi, Nan Zhang, Yan Zhao, Wangnan Chen, Chengchen Gao, and Zhenchuan Yang
Peking University, CHINA

11:00 - 11:15

Th2C.03 HIGH SENSITIVITY AND WIDE BANDWIDTH IN MULTI-MASS MEMS ACCELEROMETERS

Inês S. Garcia¹, Mubasher Saleem¹, Filipa C. Mota¹, Nélson Castro¹, Pablo Valentim¹, Rui Madeira², Alexandre Correia², Diogo E. Aguiam¹, Rosana A. Dias¹, and Filipe S. Alves¹
¹*INL - International Iberian Nanotechnology Laboratory, PORTUGAL and*
²*BoschCar Multimédia, PORTUGAL*

11:15 - 11:30

Th2C.04 TWO-DIMENSIONAL PHONONIC CRYSTALS FOR HIGH-SENSITIVITY ACCELERATION SENSING

Xu Guo¹, Kunyang Zhang¹, Jintao Ni¹, Ye Jiang¹, Jiehe Wang¹, Yajiang Yin², Wenshuai Lu², Bo Ma¹, and Zheng You¹
¹*Huazhong University of Science and Technology, CHINA and* ²*Tsinghua University, CHINA*

11:30 - 11:45

Th2C.05 A CLOSED LOOP NEAR-ZERO STIFFNESS MEMS ACCELEROMETER BASED ON ELECTROTHERMAL BUCKLING

Yiwei Ge^{1,2}, Tiantian Huang¹, Hussein Hussein³, Yuan Wang⁴, Zhijuan Zhu¹, Michael Kraft², Zhuoyue Zheng⁴, and Chen Wang²
¹*Zhejiang University, CHINA,* ²*Katholieke Universiteit Leuven, BELGIUM,*
³*American University of Beirut, LEBANON, and* ⁴*University of Macau, CHINA*

11:45 - 12:00

Th2C.06 DIAMAGNETIC LEVITATION OF GYROSCOPES WITH DYNAMIC CONTROL

Mahtab Shakibmanesh, Lois Meira, Mark Jiang, Naji Tarabay, Andrei Shkel, and Camilo Velez
University of California, Irvine, USA

Session Th2D - Mixed

Windemere Z

10:30 - 10:45

Th2D.01 EXPERIMENTAL EVIDENCE OF TWO COMPETING EFFECTS IN THE NONLINEAR RESPONSE OF CANTILEVER BEAMS

Eliya Salman¹, Michael Feldman¹, Chun-Yu Chou², David Rosenstock¹, Danny Kassie¹, Sheng-Shian Li², and David Elata¹

¹*Technion - Israel Institute of Technology, ISRAEL* and ²*National Tsing Hua University, TAIWAN*

10:45 - 11:00

Th2D.02 ELECTRONICS INSENSITIVE TRACKING FOR ULTRA-STABLE MEMS FREQUENCY REFERENCES

Jie Yan¹, Jintark Kim¹, Rakibul Islam¹, Jiheng Jing¹, Karim Elmeligy¹, Jiawei Yang², Thomas W. Kenny², Paven K. Hanumolu¹, and Gaurav Bahl¹

¹*University of Illinois, Urbana-Champaign, USA* and ²*Stanford University, USA*

11:00 - 11:15

Th2D.03 SUSTAINED AC PLASMA GENERATION AT LOW VOLTAGE USING A MINIATURIZED HIGH-Q ROSEN TRANSFORMER

Justin R. Phelps and Reza Abdolvand

University of Central Florida, USA

11:15 - 11:30

Th2D.04 CHARACTERIZATION OF MICROREACTORS FOR NANOPARTICLE SYNTHESIS

Avery E. England, Scott D. Collins, Michael D. Mason, and Rosemary L. Smith

University of Maine, USA

11:30 - 11:45

Th2D.05 OPTIMIZING DUAL APTAMER BINDING ASSAYS FOR C-REACTIVE PROTEIN (CRP) BY BIOSTATISTICAL ANALYSIS, 3D MOLECULAR SIMULATIONS, AND SELECTION ON AN INTEGRATED MICROFLUIDIC CHIP

Chih-Hung Wang, To-Wen Chen and Gwo-Bin Lee

National Tsing Hua University, TAIWAN

11:45 - 12:00

Th2D.06 STATIC HYSTERESIS MITIGATION FOR PZT MEMS VARIFOCAL LIQUID LENS

Andrea Vergara, Zhengnan Tang, Yukio Suzuki, and Shuji Tanaka

Tohoku University, JAPAN

12:00 – 12:15 **Transition Break**

Best Paper Award Ceremony and Closing Remarks

12:15 - 12:45

12:45 **Conference Adjourns**

Optional Facility Tour

12:30 - 17:30

Poster Presentations

Regency S – V & Rotunda

All times are Eastern Standard Time (EST)

Monday, 30 June	14:00 - 16:00
Tuesday, 01 July	14:00 - 16:00
Wednesday, 02 July	15:30 – 17:30

Classification Chart

(last character of poster number)

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 4D PRINTING OF ELECTRO-PERMANENT MAGNETS VIA SELECTIVE LASER SINTERING**
Naji Tarabay, Mahtab Shakibmanesh, Mark Jiang, and Camilo Velez Cuervo
University of California, Irvine, USA
- M4P.002 A HIGH-PERFORMANCE PIEZOELECTRIC MICROMACHINED ULTRASONIC TRANSDUCER HEXAGONAL ARRAY UTILIZING SACRIFICIAL LAYER TECHNOLOGY**
Yunhao Wang^{1,2}, Ke Sun¹, Junxiang Cai², Yiwei Wang², Xiaoyuan Xia^{1,3}, Yemin Dong^{1,3}, Yi Sun¹, Tao Wu^{1,2}, and Xinxin Li^{1,2}
¹*Chinese Academy of Sciences, CHINA*, ²*ShanghaiTech University, CHINA*, and
³*Shanghai Industrial Technology Research Institute (SITRI), CHINA*
- M4P.003 AN ULTRA-SENSITIVE PMUT EXPLOITING HIGH ORDER MODE FOR LONG DISTANCE AIRBORNE RANGING**
Yiwei Wang¹, Ruihong Xiong¹, Xuankai Xu¹, Jiawei Li¹, Lihui Jin¹, Yuxi Wang^{1,2,3,4}, Fang Chen^{2,3}, and Tao Wu^{1,2,3,4}
¹*ShanghaiTech University, CHINA*, ²*Shanghai Institute of Microsystem and Information Technology*,
³*University of Chinese Academy of Sciences, CHINA*, and
⁴*Shanghai Engineering Research Center of Energy Efficient and Custom AI IC, CHINA*
- M4P.004 DIRECT BANDWIDTH MEASUREMENTS OF DYNAMIC PRESSURE SENSORS**
James L. Lambert and Mina Rais-Zadeh
Jet Propulsion Laboratory, USA
- M4P.005 HYDROGEL-POLYMER HYBRID ACTUATOR WITH TUNABLE DEFORMATION BEHAVIOR BY VARYING LATTICE SKELETON**
Haruna Kozuki¹, Koki Yoshida², Hiroki Yasuga³, and Yuta Kurashina¹
¹*Tokyo University of Agriculture and Technology, JAPAN*, ²*Institute of Science Tokyo, JAPAN*, and
³*National Institute of Advanced Industrial Science and Technology (AIST), JAPAN*
- M4P.006 MICRO-FABRICATED BI-STABLE MECHANICAL SWITCH ACTUATED BY A SINGLE THERMAL ACTUATOR**
Xudong Cai¹, Wankai Liu¹, Wing Tung Hui², Yuta Kawashima³, Zerui Xu¹, Man Wong², Toshiyuki Tsuchiya³, Renrong Liang¹, and Xiaohong Wang¹
¹*Tsinghua University, CHINA*, ²*Hong Kong University of Science and Technology, HONG KONG*, and
³*Kyoto University, JAPAN*
- M4P.007 PROPELLER OPTIMIZATION OF MICRO FLYING ROBOTS BY DEEP REINFORCEMENT LEARNING**
Yuan Gao, Fanping Sui, Wei Yue, and Liwei Lin
University of California, Berkeley, USA
- M4P.008 SELF-CLOSING KIRIGAMI GRIPPER FOR GRIPPING OF SOFT OBJECTS**
Shingo Terashima and Eiji Iwase
Waseda University, JAPAN
- M4P.009 TOWARDS UNVEILING THE HIDDEN DYNAMICS OF BACTERIORHODOPSIN WITH MEMS-BASED ATOMIC FORCE MICROSCOPY**
Suyambulingam Subramanian¹, Nicolas Mauran¹, Guillaume Jourdan², Ignacio Casuso³, and Bernard Legrand¹
¹*Université de Toulouse, FRANCE*, ²*CEA-LETI, Université Grenoble-Alps, FRANCE*, and
³*INSERM, Université Aix-Marseille, FRANCE*

Tuesday - Actuators and Microsystems

- T3P.001 A BISTABLE SHAPE MEMORY - THERMOMAGNETIC MICROACTUATOR**
Joel Joseph¹, Ruikang Wang¹, Maxim Wischniewski¹, Shuichi Miyazaki², and Manfred Kohl¹
¹Karlsruhe Institute of Technology, GERMANY and ²University of Tsukuba, JAPAN
- T3P.002 A HIGH-SENSITIVITY AIR-COUPLED PMUT WITH FORCE FEEDBACK CONTROL FOR FULL-LOOP RINGDOWN SUPPRESSION AND BANDWIDTH ENHANCEMENT**
Tingzhong Xu, Damiano Caponi, Rodrigo Tumolin Rocha, Zhou Da, and Chunlei Xu
Silicon Austria Labs GmbH, AUSTRIA
- T3P.003 BISTABLE IN-PLANE SWITCHING BY A NITICU/SI MICROACTUATOR**
Gowtham Arivanandhan¹, Elaheh Akbarjenad², Alfred Ludwig², and Manfred Kohl¹
¹Karlsruhe Institute of Technology, GERMANY and ²Ruhr University Bochum, GERMANY
- T3P.004 EXPERIMENTAL EXAMINATION OF RELATIONSHIP BETWEEN POLARIZATION STATES AND PIEZOELECTRIC PROPERTIES OF SC0.3AL0.7N FOR RECONFIGURABLE MEMS DEVICES**
Sean Jun Zhong Wong^{1,2}, Chen Liu¹, and Yao Zhu¹
¹Institute of Microelectronics, SINGAPORE and ²National University of Singapore, SINGAPORE
- T3P.005 IN-WATER CHARACTERIZATION OF CAPACITIVE MICROMACHINED ULTRASOUND TRANSDUCERS PRODUCED ON GLASS FOR MEDICAL IMAGING**
Chloe Halbach^{1,2}, Pieter Gijsenbergh¹, Veronique Rochus¹, Xavier Rottenberg¹, David Cheyns¹, and Paul Heremans^{1,2}
¹imec, BELGIUM and ²KU Leuven, BELGIUM
- T3P.006 MONOLTHIC INTEGRATION OF A FILTER FOR SWITCHING DRIVING MOTION IN PIEZOELECTRIC MEMS MICRO-SPEAKER**
Tsong-Wen Tsai¹, Chia-Hao Lin¹, Po-Shen Chen¹, Zih-Song Hu¹, Sung-Cheng Lo², and Weileun Fang¹
¹National Tsing Hua University, TAIWAN and ²Upbeat Technology Co., Ltd., TAIWAN
- T3P.007 RAPID SENSING OF EXTRUSION BASED PRINTED INK PROPERTIES USING GHZ ULTRASONIC IMAGER**
Sai Saraswathi Yarajena and Amit Lal
Cornell University, USA
- T3P.008 THE MICROSCOPIC BIOPSY DEVICE FOR THE HIGHLY VISCOELASTIC TISSUE BY USING TRANSLATIONAL/ROTATIONAL PIEZO IMPACT DRIVE MECHANISM**
Hiroki Kunii, Hirotaka Sugiura, Satoshi Amaya, and Fumihito Arai
University of Tokyo, JAPAN

Wednesday - Actuators and Microsystems

- W4P.001 A GLASS-BASED PARAFFIN MICRO ACTUATOR ARRAY FOR ULTRA-LOW FLOWRATE MICROPUMP**
Jingzhe Cao, Fade Hu, and Chuan Luo
Tsinghua University, CHINA
- W4P.002 A SEMI-ANALYTICAL METHOD FOR COMPREHENSIVE MODELING OF LEVITATING MICRO-SYSTEM ACTUATORS**
Kirill Poletkin
Hefei University of Technology, CHINA

- W4P.003 CMOS BEOL-COMPATIBLE SEE-SAW MICROELECTROMECHANICAL NON-VOLATILE MEMORY WITH LOW ON-RESISTANCE**
 Yu-Hyun Shim¹, Tae-Soo Kim¹, Seung-Jun Lee¹, Sung-Ho Kim¹, So-Young Lee¹, Se-Yoon Jung¹,
 Seung-Been Noh¹, Yong-Bok Lee², and Jun-Bo Yoon¹
¹*Korea Advanced Institute of Science and Technology (KAIST), KOREA and*
²*Chonnam National University, KOREA*
- W4P.004 HIGH-FREQUENCY AND BROADBAND PZT-BASED PMUT ARRAY WITH NEGATIVE POLING FOR ENHANCED COUPLING EFFICIENCY**
 Lei Zhao, Chong Yang, Aocheng Bao, Bowen Sheng, Xixin Cao, and Yipeng Lu
Peking University, CHINA
- W4P.005 MECHANICALLY-TOUGH FIBRIN-BASED ACTOMYOSIN SOFT ACTUATOR DRIVEN BY ATP**
 Takuro Kawasumi¹, Koki Yoshida², Yuichi Hiratsuka³, and Hiroaki Onoe¹
¹*Keio University, JAPAN, ²Institute of Science Tokyo, JAPAN, and*
³*Japan Advanced Institute of Science and Technology, JAPAN*
- W4P.006 ON THE DESIGN OF PIEZOELECTRIC MEMS SPEAKERS FOR HIGH RESOLUTION AUDIO APPLICATIONS**
 Hsu-Hsiang Cheng, Zih-Song Hu, Chia-Hao Lin, Chin Tseng, and Weileun Fang
National Tsing Hua University, TAIWAN
- W4P.007 SEALED SILICON CAVITY PIEZOELECTRIC MICROMACHINED ULTRASONIC TRANSDUCERS WITH HIGH FILL FACTOR**
 Jiashuai Xu¹, Yiwei Wang², Xiaoya Duan¹, Tao Wu², and Yansong Yang¹
¹*Hong Kong University of Science and Technology, HONG KONG and ²ShanghaiTech University, CHINA*
- W4P.008 THERMAL STRESS TUNING OF BISTABLE PIEZOELECTRIC MEMS MEMBRANES TO MAXIMIZE DYNAMIC DEFLECTIONS TOWARDS HIGHEST SWITCHING PROBABILITY**
 Philipp Moll, Shareena Muringakodan, Ulrich Schmid, and Michael Schneider
TU Wien, AUSTRIA

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

- M4P.010 ADVANCED DIGITAL MICROFLUIDIC PLATFORM WITH INTEGRATED SERS SENSOR FOR ON-SITE PROCESSING AND DETECTION**
 Wenbo Dong, Rongxin Fu, Qian Yu, and Shuailong Zhang
Beijing Institute of Technology, CHINA
- M4P.011 CMOS-BASED MULTIMODAL IMAGE SENSOR ENABLING SIMULTANEOUS DISSOLVED OXYGEN AND HYDROGEN ION MEASUREMENT**
 Yuto Ishii, Hideo Doi, Tomoko Horio, Yoshiko Noda, Daisuke Akai, Ken Hizawa, Yong joon Choi,
 Kazuhiro Takahashi, Toshihiko Noda, and Kazuaki Sawada
Toyohashi University of Technology, JAPAN
- M4P.012 DESIGN, FABRICATION, AND CHARACTERIZATION OF ALLOGRAFT REGENERATIVE PERIPHERAL-NERVE INTERFACES (A-RPNI)**
 Bassam M. Smadi^{1,2}, Kenneth A. Fluker¹, Matthew Schiefer², Harvey W M. Chim³, and Jack W. Judy¹
¹*University of Florida, USA, ²Malcom Randal Veterans Affairs Medical Center, USA, and*
³*Louisiana State University, USA*
- M4P.013 EFFECT OF ELECTRODE ARRANGEMENT ON TRANSDERMAL GLUCOSE EXTRACTION AND DETECTION BY REVERSE IONTOPHORESIS**
 Youhao Liu, Xingguo Zhang, Hao Zheng, Wangwang Zhu, Wenjun Li, Chengcheng Li, Zhongxu Zhou,
 Dachao Li, and Zhihua Pu
Tianjin University, CHINA

M4P.014 HIGH ASPECT RATIO 3D PRINTED COPPER PILLARS WITH INTEGRATED PIEZORESISTORS FOR HIGH SENSITIVITY FORCE SENSING

Isha Lodhi, Hang Chen, Devin K. Brown, Durga R. Gajula, and Azadeh Ansari
Georgia Institute of Technology, USA

M4P.015 INTEGRATING MINI-VALVES WITH ELECTRONICS/OPTICS IN A PORTABLE DEVICE FOR VIRUS DETECTION AT THE POINT-OF-CARE

George Adedokun, Gurjit Sidhu, Morteza Alipanah, John A. Lednick, Gary Wang, and Z. Hugh Fan
University of Florida, USA

M4P.016 RAPID MULTIPLEX DETECTION OF VIRAL PATHOGENS IN WHOLE BLOOD USING MICROFLUIDIC SAMPLE PROCESSOR AND SMARTPHONE-LINKED HANDHELD INSTRUMENT

Amanda Bacon, Han KeunLee, Katie Koprowski, Hieu Hoang, Ninawa Odicho, Yasmine Sidavi, Weijing Wang, Minh Do, Enrique Valera, Rashid Bashir, and Brian T. Cunningham
University of Illinois, Urbana-Champaign, USA

M4P.017 THREE-LAYERED HYDROGEL MICROFIBER FOR MAINTAINING ENCAPSULATED FIBER-SHAPED MUSCLE-TISSUE

Shohei Sasaki and Hiroaki Onoe
Keio University, JAPAN

M4P.018 WEARABLE MICRONEEDLE-INTEGRATED DISTANCE-BASED PAPER DEVICE FOR TRANSDERMAL CORTISOL AND DOPAMINE MONITORING

Danilo M. dos Santos, Kawin Khachornsakkul, and Sameer Sonkusale
Tufts University, USA

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

T3P.009 3D TISSUE MODELS WITH PENETRATING SENSORY NEURONS TOWARDS INNERVATED CULTURED SKIN

Tingyu Li, Xueer Fei, Minghao Nie, and Shoji Takeuchi
University of Tokyo, JAPAN

T3P.010 AI/ML BASED DESIGN OPTIMIZATION & FABRICATION OF ALN PIEZO-CANTILEVER ARRAY FOR COCHLEAR IMPLANT APPLICATION

Anju Sebastian, Pavitra Jain, Naveen D'Souza N, and Saurabh ARUN. Chandorkar
Indian Institute of Science, INDIA

T3P.011 CMOS-COMPATIBLE BIOSENSING PLATFORM FOR MULTIPLEXED LACTATE AND PH MONITORING IN LOW-VOLUME BIOSAMPLES

Lotte De Schrijver¹, Wim Sijbers², Ali Saeidi³, Qiuyang Lin², and Adrian M. Ionescu¹
¹*École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND* and ²*imec, BELGIUM*,
³*Xsensio SA, SWITZERLAND*

T3P.012 DETECTION OF SMALL EXTRACELLULAR VESICLE SUBPOPULATIONS USING A SILICON NANOWIRE FIELD-EFFECT TRANSISTOR BIOSENSOR

Meiyan Qin, Rui Jiang, Zizhen Wang, Jun Cheng, Yimin Shi, Lingqian Zhang, Yang Zhao, Haiyang Mao, Qingzhu Zhang, Mingxiao Li, and Chengjun Huang
Chinese Academy of Sciences, CHINA

T3P.013 ELECTROKINETIC-BASED MICRO-NANOFLUIDIC DEVICE FOR SARCOMA EXTRACELLULAR VESICLE ISOLATION FOR RAPID POINT-OF-CARE DETECTION

Premanshu K. Singh, Ali F. Usmani, Patricia Sarchet, Federica Calore, Debmalaya Halder, Raphael E. Pollock, and Shaurya Prakash
Ohio State University, USA

- T3P.014 HYDROGEL MICROWELL ARRAYS FOR OLFACTORY CELL SENSOR IN AMBIENT ENVIRONMENT.**
Shino Fujioka¹, Jin Xing¹, Chisaki Yamagata¹, Hiroaki Onoe¹, and Koji Sato²
¹Keio University, JAPAN and ²University of Tokyo, JAPAN
- T3P.015 MACHINE LEARNING-AIDED MULTIFUNCTIONAL MICROFLUIDIC PLATFORM WITH SERF ATOMIC MAGNETOMETERS FOR ACCURATE AND SENSITIVE CARDIOVASCULAR BIOMARKER DIAGNOSIS**
Bo Bao, Yuqian Zhao, Xinran Tian, Ridong Wang, and Dachao Li
Tianjin University W2A.01, CHINA
- T3P.016 SCALABLE MULTICHANNEL DIAMOND ELECTRODES FOR NEUROCHEMICAL RECORDING**
James R. Siegenthaler^{1,2}, Nick J. Lorenz^{1,3}, Viktor Oernbratt¹, Brandon Kepros¹, Nikolay Siratskiy¹, Mason L. Perillo², G M Hasan UI Banna², Robert Rechenberg¹, Michael F. Becker¹, Erin K. Purcell², and Wen Li^{1,2}
¹Fraunhofer USA, USA, ²Michigan State University, USA, and ³Karlsruhe Institute of Technology, USA
- T3P.017 TITANIUM NITRIDE-BASED CMOS ION IMAGE SENSOR WITH 4.19 μM RESOLUTION FOR BIOIMAGING**
Zhi Shun Chew, Hideo Doi, Tomoko Horio, Yong Joon Choi, Kazuhiro Takahashi, Toshihiko Noda, and Kazuaki Sawada
Toyohashi University of Technology, JAPAN
- T3P.018 WIDE LINEAR DETECTION RANGE GLUCOSE BIOSENSOR BASED ON COMPOSITE BIOACTIVE FILMS**
Zening Li¹, Lin Zhou¹, Rongtao Zhang², Jianlong Zhao¹, and Hongju Mao¹
¹Chinese Academy of Sciences, CHINA and ²Tianjin University, CHINA

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

- W4P.009 A STANDARDIZED REUSABLE MULTIORGAN-ON-A-CHIP WITH ORAL AND BRAIN MODELS LINKED BY VASCULAR FLOW**
Chen Chen^{1,2}, Lin Zhou¹, Huiying Liu², and Hongju Mao¹
Chinese Academy of Sciences, CHINA and Dalian Medical University, CHINA
- W4P.010 “CELL-CAPTURE PITFALL” BY TWO-LAYERED MICRO WELL ARRAY DEVICE FOR SINGLE-CELL DERIVED EXOSOME ANALYSIS**
Tomoharu Nakazato¹, Chisaki Yamagata¹, Yuto Hamazaki², Ayuko Hoshino², and Hiroaki Onoe¹
¹Keio University, JAPAN and ²University of Tokyo, JAPAN
- W4P.011 CORROSION PROTECTION OF MAGNETOELASTIC SENSORS FOR ENHANCING LIFETIME IN WIRELESSLY INTERROGATED BILIARY STENTS**
Zeyu Li, Ramprasad M. Nambisan and Yogesh B. Gianchandani
University of Michigan, Ann Arbor, USA
- W4P.012 DYNAMIC FLOW-CONTROLLED 3D-PRINTED CHIP WITH PUSH-PULL DESIGN FOR VASCULARIZED CARCINOMA ORGANOID**
Xinzhuo Gao^{1,2}, Shuang Li⁴, Feiyun Cui², Lei Wu¹, Jianan Hui¹, Qin Zhou², and Hongju Mao¹
¹Chinese Academy of Sciences, CHINA, ²Harbin Medical University, CHINA,
³Shanghai Frontier Innovation Research Institute, CHINA and ⁴Tianjin University, CHINA
- W4P.013 FABRICATION OF SOFT AND TRANSPARENT 3D MICROELECTRODE ARRAYS FOR IN VITRO ELECTROPHYSIOLOGICAL RECORDING**
Debarun Sengupta^{1,2}, Hande Aydogmus¹, Pratik Tawade¹, Shriya Rangaswamy¹, Jean-Philippe Frimat³, and Massimo Mastrangeli¹
¹Delft University of Technology (TU Delft), NETHERLANDS,
²Shiv Nadar Institution of Eminence, INDIA, and
³Leiden University Medical Center, NETHERLANDS

- W4P.014 IN VITRO INVESTIGATION OF LUNG CONNECTIVE TISSUE STIFFNESS UNDER VARIOUS OXYGEN TENSIONS AND GRADIENTS**
Heng-Hua Hsu¹, Ping-Liang Ko^{1,2}, Dao-Ming Chang¹, and Yi-Chung Tung¹
Academia Sinica, TAIWAN and National Taiwan University, TAIWAN
- W4P.015 ON-SITE STERILIZATION OF SMALL MEDICAL DEVICES USING DBD-GENERATED REACTIVE SPECIES AND DISPOSABLE INDICATOR**
Dai-En Li and Che-Hsin Lin
National Sun Yat-sen University, TAIWAN
- W4P.016 SURFACE-ENHANCED RAMAN SPECTROSCOPY MEASUREMENTS OF DNA WITH A SINGLE NUCLEOTIDE SPATIAL RESOLUTION AND SENSITIVITY**
Tomoya Shinabe, Shintaro Yotsuzuka, Akio Uesugi, Hiroaki Honma, Koji Sugano, and Yoshitada Isono
Kobe University, JAPAN
- W4P.017 WEARABLE AND BREATHABLE SENSOR FOR REAL-TIME PLANT MOISTURE MONITORING**
Yuanyuan Huang, Mingfu Xiao, Xiaoqi Zhou, Yi Tian, and Juntao Zhu
Southwest University, CHINA
- W4P.018 WIRELESSLY INTERROGATABLE, BIOCOMPATIBLE, IMPLANTABLE SENSOR FOR RAPID DETECTION OF PH IN EARLY ANASTOMOTIC LEAKAGE DIAGNOSIS: A PATH TOWARDS BIODEGRADABLE SOLUTIONS**
Chinaza Ogbonna, Yuheng He, Nima Ghalichechian, and Luke Beardslee
Georgia Institute of Technology, USA

Monday - Chemical Sensors and Microsystems

- M4P.019 3D-PRINTED MICRO-LATTICE GOLD ELECTRODE FOR EVALUATING REAGENT RELEASE PROPERTIES**
Satoshi Amaya¹, Mizuki Maeda², Hiroataka Sugiura¹, Fumihito Arai¹, and Hiroaki Sakamoto²
¹University of Tokyo, JAPAN and ²University of Fukui, JAPAN
- M4P.020 A SENSOR ARRAY WITH FUNCTIONALIZED GOLD NANOPARTICLES FOR DETECTION OF TOXIC VOLATILE ORGANIC COMPOUNDS IN AIR**
Sujoy Halder, Prasadanie K. Adhihetty, Michael H. Nantz, and Xiao-An Fu
University of Louisville, USA
- M4P.021 AN INTEGRATED INTELLIGENT SENSING PLATFORM FOR SPECIFIC IDENTIFICATION OF BIOCHEMICAL SUBSTANCES**
Yusa Chen¹, Dingbang Liu¹, Yunhao Cao¹, Hongshun Sun¹, Dingyi Yang², and Wengang Wu¹
¹Peking University, CHINA and ²Shandong University, CHINA
- M4P.022 ELECTRO-THERMAL-DRIVEN GRAPHENE RESONANT SENSOR FOR HIGHLY SENSITIVE VIRUS DETECTION**
Viet Khoa Pham¹, Homare Yoshida¹, Sachiko Sakai¹, Ippei Akita², Yuki Imaizumi³, Tatsuro Goda³, Yong-Joon Choi¹, Toshihiko Noda¹, Kazuaki Sawada¹, and Kazuhiro Takahashi¹
¹Toyohashi University of Technology, JAPAN, ²National Institute of Advanced Industrial Science and Technology (AIST), JAPAN, and ³Toyo University, JAPAN
- M4P.023 FUNCTIONALIZED TITANIUM CARBIDE-POLYMER NANOFIBER COMPOSITES VIA ELECTROSTATIC ASSEMBLY FOR ROOM-TEMPERATURE SUB-PPM NO₂ SENSING**
Seungjin Yang¹, Eunhwan Jo², and Jaesam Sim¹
¹Korea Institute of Industrial Technology, KOREA and ²Kumoh National Institute of Technology, KOREA

- M4P.024 HIGHLY SENSITIVE AND SELECTIVE PHOTONIC CRYSTAL-MOF COMPOSITE FLUORESCENT SENSOR FOR NEUROTOXIN DETECTION**
Wenxing Xu¹, Jiayue Han¹, Jiangong Cheng¹, and Yanyan Fu¹
Chinese Academy of Sciences, CHINA
- M4P.025 LITHOGRAPHY-FREE FABRICATION OF BIMORPH NANOSTRUCTURAL CHEMOMECHANICAL SWITCHES FOR HYDROGEN DETECTION WITH NEAR-ZERO STANDBY POWER CONSUMPTION**
Daeyeon Koh¹, Eunhwan Jo², and Jongbaeg Kim¹
¹Yonsei University, KOREA and ²Kumoh National Institute of Technology, KOREA
- M4P.026 MEASURING THE REACTION HEAT BETWEEN PALLADIUM-GOLD ALLOY NANOPARTICLES AND HYDROGEN MOLECULES USING MEMS THERMOPILE CHIPS**
Shaokui Tan^{1,2}, Zechun Li¹, Ming Li¹, Muyu Yan¹, Pengcheng Xu¹, and Xinxin Li¹
¹Chinese Academy of Sciences, CHINA and ²Shanghai Normal University, CHINA
- M4P.027 QUANTITATIVE ASSESSMENT OF CORROSION KINETICS OF SINGLE SILVER NANOWIRES INDUCED BY NO₂ MOLECULES USING RESONANT CANTILEVERS**
Muyu Yan¹, He Wang¹, Xianjun Rong², Qiaoyuan Yang¹, Ming Li¹, Ding Wang², Pengcheng Xu¹, and Xinxin Li¹
¹Chinese Academy of Sciences, CHINA and ²University of Shanghai for Science and Technology, CHINA
- M4P.028 RESOLVING NO₂, O₃, AND H₂O CONCENTRATIONS IN GAS MIXTURES WITH DUAL CNT-FET SENSORS AND MACHINE LEARNING**
Cristina Gentili, Cosmin I. Roman, Ines Kraiem, and Christofer Hierold
ETH Zürich, SWITZERLAND
- M4P.106 CHARGE AND CAPACITANCE SENSITIVE FIELD EFFECT DEVICE (CCSFET) FOR MEASUREMENTS IN GASES AND LIQUIDS**
Jamila Boudaden¹, Karl Neumeier¹, and Ignaz Eisele^{1,2}
¹Fraunhofer EMFT, GERMANY and ²University of the Bundeswehr Munich, GERMANY

Tuesday - Chemical Sensors and Microsystems

- T3P.019 A MACHINE LEARNING-DRIVEN MULTIMODAL SENSING SYSTEM FOR ADVANCED MOLD DETECTION**
Anwar Elhadad, Nicolette Cascioli, Yang Gao, and Seokheun Choi
State University of New York, Binghamton, USA
- T3P.020 A SINGLE PMUT-BASED SENSING SYSTEM FOR THE SIMULTANEOUS MEASUREMENT OF LIQUID LEVEL AND CONCENTRATION**
Long Zhang^{1,2}, Yunfei Gao^{1,2}, and Liang Lou^{1,2}
¹Shanghai University, CHINA and ²Shanghai Industrial Technology Research Institute, CHINA
- T3P.022 EXPERIMENTAL VERIFICATION OF NO_X GAS DYNAMICS AND KINETICS ON CARBON NANOTUBE (CNT) FIELD EFFECT TRANSISTOR GAS SENSORS**
Ines Kraiem, Cosmin I. Roman, Cristina Gentili, Miroslav Haluska, and Christofer Hierold
ETH Zürich, SWITZERLAND
- T3P.023 GAS CHROMATOGRAPHIC COLUMN WITH IN-SITU GROWING POROUS SILICON NANOSTRUCTURES AS STATIONARY PHASE SUPPORT LAYER**
Wenbo Li, Yuchen Zhu, Shaojie Ma, and Fei Feng
Chinese Academy of Sciences, CHINA
- T3P.024 LARGE BANDWIDTH FLUORESCENCE SPECTRUM IN SITU SENSING CHIP BASED ON ANTISYMMETRIC AWG DESIGN**
He Li¹, Bo Wang¹, Jiangong Cheng¹, Chang Chen^{1,2}, Huizi Li¹, Yanyan Fu¹, Huan Liu¹, and Yaorong Xiahou²
¹Chinese Academy of Sciences, CHINA and ²Shanghai University, CHINA

- T3P.025 LOW-COST DISPOSABLE MICROGLOW DISCHARGE CHIP ON PAPER SUBSTRATE FOR AQUEOUS SAMPLE ANALYSIS**
Manjeet Kumar and Bhaskar Mitra
Indian Institute of Technology Delhi, INDIA
- T3P.026 MEMS GAS SENSOR ARRAYS WITH MULTILAYER OF NANOMATERIALS PATTERNED BY WAFER-LEVEL PHOTOLITHOGRAPHY PROCESS**
Xitong Sun, Jin Li, Tongheng Cheng, and Fei Wang
Southern University of Science and Technology, CHINA
- T3P.027 RAPID DETECTION OF METHAMPHETAMINE USING MXENE MODIFIED ELECTROCHEMICAL SENSOR**
Ri Wang¹, Wei Xu^{1,2}, Bin Sun¹, Yingjie Zhu^{1,2}, and Yi Zhang¹
¹*Chinese Academy of Sciences, CHINA* and ²*Shenzhen University of Advanced Technology, CHINA*
- T3P.028 TERAHERTZ METASURFACE BASED ON QUASI-BIC FOR FINGERPRINT SPECTRUM RETRIEVAL OF TRACE ANALYTES**
Zijian Cui¹, Wenshuo Chen², Yue Wang², and Xiaoguang Zhao¹
¹*Tsinghua University, CHINA* and ²*Xi'an University of Technology, CHINA*

Wednesday - Chemical Sensors and Microsystems

- W4P.019 A MEMS ACETONE GAS SENSOR BASED ON ZNO NANOPINE FORESTS WITH LOW POWER CONSUMPTION**
Huabin Yang, Qirui Zhang, Xin Liu, Na Zhou, and Haiyang Mao
Chinese Academy of Sciences, CHINA
- W4P.020 AN AUTOMATED ELECTROCHEMICAL MICROFLUIDIC SENSING PLATFORM FOR CONTINUOUS HEAVY METAL ANALYSIS IN WATER/SOIL RESERVOIRS**
Mohammad Kafi Kangi¹, Vianney Medina-Gonzalez^{1,2}, Pramod Gupta², Tumi Olason², Hevar Djeza², Nathan Grimmer², Zebin Jiang¹, James R. Siegenthaler^{1,2}, and Wen Li^{1,2}
¹*Michigan State University, USA* and ²*Fraunhofer USA, USA*
- W4P.022 FLEXIBLE TACTILE-OLFACTORY FUSION GLOVE FOR GESTURE RECOGNITION AND COMBUSTIBLE DETECTION IN COMPLEX ENVIRONMENT**
Jiachuang Wang, Nan Qin, and Tiger H. Tao
Chinese Academy of Sciences, CHINA
- W4P.023 HIGHLY SENSITIVE NO₂ GAS SENSORS BY NANOPARTICLE DECORATION OF CVD GRAPHENE**
Mudassir Husain¹, Leandro N. Sacco¹, Nigel Rising², Elias Torres³, and Sten Vollebregt¹
¹*Delft University of Technology (TU Delft), NETHERLANDS*, ²*VSPARTICLE, NETHERLANDS*, and ³*Graphenea, NETHERLANDS*
- W4P.024 EFFECT OF LITHIUM MANGANESE OXIDE ON LITHIUM DETECTION IN MICROFLUIDIC ELECTROCHEMICAL SENSOR**
Ali Bank, Shapour Jafargholinejad, and Pouya Rezai
York University, CANADA
- W4P.025 MEASUREMENT OF EXOCYTOSIS IN LIVING PC12 CELLS USING ELECTROCHEMICAL SENSOR CHIPS REVEALS THE BIOLOGICAL MECHANISMS FOR ANTIPSYCHOTICS**
Xuefeng Wang¹, Wenxue Chen^{1,2}, Zihui Li^{1,3}, Haoliang Li^{1,2}, Qiongya Wan^{1,3}, Dan Zheng², Yongheng Zhu³, Pengcheng Xu¹, and Xinxin Li¹
¹*Chinese Academy of Sciences, CHINA*, ²*Shanghai Institute of Technology, CHINA*, and ³*Shanghai Ocean University, CHINA*

W4P.026 PROPOSAL FOR RECOVERY METHOD OF PH SENSOR CHARACTERISTIC FLUCTUATION DUE TO CHARGING USING STRIPED GATE ISFETS

Hiroto Takahashi, Shunya Yokoyama, Yoshiharu Naito, Satoshi Ota, and Masato Futagawa
Shizuoka University, JAPAN

W4P.027 RECURRENCE PLOTS-ASSISTED DEEP LEARNING BASED METAL OXIDE SEMICONDUCTOR SENSOR ARRAY SYSTEM

Zecong Shi^{1,2}, Huizi Li¹, Jiangong Cheng¹, and Yanyan Fu¹
¹*Chinese Academy of Sciences, CHINA* and ²*ShanghaiTech University, CHINA*

W4P.028 UV-ASSISTED AMMONIA SENSING AT ROOM TEMPERATURE USING GA₂O₃/TI₃C₂TX MXENE COMPOSITE

Dong-Su Kim¹, Goeun Cha², Jonghyeon Woo², Jeongsik Noh², and Jongsung Park²
¹*Korea Institute of Industrial Technology, KOREA* and ²*Kyungpook National University, KOREA*

Monday - Composite Materials, Polymers, and Fabrication Processes

M4P.029 A HIGHLY STRETCHABLE, ULTRA-STABLE, AND MULTIFUNCTIONAL LIQUID METAL-BASED TRIBOELECTRIC FIBER

Huiyun Zhang¹, Shengxin Xiang¹, Xiao Wei¹, Lei Liu¹, Xinkai Xie¹, Jun Wu¹, Chengkuo Lee², and Qiongfeng Shi¹
¹*Southeast University, CHINA* and ²*National University of Singapore, SINGAPORE*

M4P.030 ENHANCED STRAIN RESISTANCE OF FRACTAL FIBER LASER-INDUCED GRAPHENE FOR FLEXIBLE ELECTRODES VIA ANNEALING AND PLASMA ETCHING DUAL TREATMENT

Yanru Chen^{1,2}, Jiaqi Liu¹, Yixin Liu¹, and Min Zhang¹
¹*Tsinghua University, CHINA* and ²*University of California, San Diego, USA*

M4P.031 MICROFABRICATED BIODEGRADABLE POLY (L-LACTIC ACID) RESONATORS

Quan H. Nguyen^{1,3}, Toan V. Nguyen¹, Mitsunobu Yoshida², Taro Yamashita², Yuki Takeda², Hieu V. Nguyen³, and Takahito Ono¹
¹*Tohoku University, JAPAN*, ²*Mitsui Chemicals, Inc., JAPAN*, and ³*Vietnam National University of Ho Chi Minh City, VIETNAM*

M4P.032 PARYLENE-ENCAPSULATED SELF-HEALING METAL INTERCONNECTS USING SILICONE OIL DISPERSION

Yutaro Fukushima, Wakana Akema, Akane Umeda, and Eiji Iwase
Waseda University, JAPAN

M4P.033 RAPID PROTOTYPING OF LIQUID METAL-BASED STRETCHABLE ELECTRONICS

Kaushal J. Sumaria and Tingyi Liu
University of Massachusetts, Amherst, USA

M4P.105 OVER 90% REDUCTION OF RESPONSE TIME IN FLEXIBLE MEMS THERMAL SENSOR USING LOCALIZED BACKSIDE LASER ABLATION

Muhammad Salman Al Farisi, Yoshihiro Hasegawa, and Mitsuhiro Shikida
Hiroshima City University, JAPAN

Tuesday - Composite Materials, Polymers, and Fabrication Processes

T3P.029 A MASKLESS, EQUIPMENT-FREE APPROACH FOR FABRICATING TUNABLE MICRO-CONVEX/CONCAVE STRUCTURES USING SELF-ASSEMBLED MICROSPHERES AND PNIPAM HYDROGEL SWELLING

Abbas Jalili and Siyang Zheng
Carnegie Mellon University, USA

- T3P.030 FORCE DISTRIBUTION MEASUREMENT OF PLANT ROOT GROWTH USING GEL MEDIUM EMBEDDED WITH PHOSPHORESCENT BEADS AND SAMPLING MOIRÉ METHOD**
Gakuto Kagawa and Hidetoshi Takahashi
Keio University, JAPAN
- T3P.031 HIGH TEMPERATURE-FREQUENCY COEFFICIENT ACHIEVED IN A FULLY FLEXIBLE SURFACE ACOUSTIC WAVE TEMPERATURE SENSOR**
Jingwen Yang, Chunlong Chen, Silin Tang, Xiaoru Li, Xiaoyu Zhou, Huahuang Luo, Qingqing Ke, Zihan Lu, Zhiqing Zhang, and Tingfeng Peng
Sun Yat-sen University, CHINA
- T3P.032 POLYIMIDE COPLANAR WAVEGUIDES FOR BROADBAND DIELECTRIC SPECTROSCOPY TO MONITOR EFFECTS OF LONG-TERM FLUID EXPOSURE**
Nikolas D. Barrera¹, Jacob T. Pawlik², Nathan D. Orloff², Christian J. Long², James C. Booth², Ellis Meng¹, and Angela C. Stelson²
¹*University of Southern California, USA* and ²*National Institute of Standards and Technology, USA*
- T3P.033 SELF-HEALING AND STRETCHABLE GRAPHITE-POLYMER COMPOSITES FOR MOTION SENSING AND IMPERCEPTIBLE PULSE MEASUREMENT**
Guan-Ze Song
National Sun Yat-sen University, TAIWAN

Wednesday - Composite Materials, Polymers, and Fabrication Processes

- W4P.029 BIODEGRADABLE TRANSIENT AIRFLOW SENSOR TOWARD ECO-FRIENDLY IMPLANT FOR RESPIRATION MONITORING**
Ryusei Nakamura¹, Muhammad Salman Al Farisi¹, Yoshihiro Hasegawa¹, Miyoko Matsushima², Tsutomu Kawabe², and Mitsuhiro Shikida¹
¹*Hiroshima City University, JAPAN* and ²*Nagoya University, JAPAN*
- W4P.030 HETEROGENEOUS FILM ARRAY FABRICATION VIA OVERLAPPING PHOTOLITHOGRAPHY FOR DYNAMIC STRUCTURAL COLORATION**
Thiyagarajan Kaliannan, Sungjoon Ji, Hwisu Jeon, and Taesung Kim
Ulsan National Institute of Science and Technology, KOREA
- W4P.032 PROXY TEST STRUCTURES FOR IMPROVED HYPERELASTIC MATERIAL PARAMETER ESTIMATION FOR SOFT ROBOTIC COMPONENTS**
Florin Püntener, Sira Bielefeldt, Christofer Hierold, and Cosmin Roman
ETH Zürich, SWITZERLAND
- W4P.033 MAGNETIC SOFT ACTUATOR USING COMPOSITE ELASTOMER AND ELECTROPERMANENT MAGNET FOR HAPTIC DISPLAYS**
Htoo Wai Htet and Amal El-Ghazaly
Cornell University, USA

Monday - Energy, Power and Thermal Management

- M4P.034 A FREQUENCY UP-CONVERTING WIDEBAND VIBRATION ENERGY HARVESTER VIA 1:2 INTERNAL RESONANCE**
Haiyang Zhao, Han Gao, Zhuji Zhao, Lijia Zhang, Chunyang Li, Yuanlin Xia, Zhuqing Wang, and Cao Xia
Sichuan University, CHINA
- M4P.035 A WEARABLE SKIN CONFORMAL SELF POWERED TATTOO BASED HYDRATION SENSOR USING GRAPHENE AND CLAY NANOSHEET MEMBRANES**
Nafize Ishtiaque Hossain, Kundan Saha, Atul Sharma, Wenxin Zeng, and Sameer Sonkusale
Tufts University, USA

- M4P.036 EFFICIENT SPACE UTILIZATION OF MAGNETICS FOR WIRELESS ENERGY HARVESTING IN VOLUME-CONSTRAINED APPLICATIONS**
Zekun Li and Mark G. Allen
University of Pennsylvania, USA
- M4P.037 MICRO-CRATER GROOVED POLYVINYLCHLORIDE TRIBOELECTRIC DEVICE FOR ENERGY HARVESTING AND SELF-POWERED TACTILE SENSING**
Kai-Che Lai
National Sun Yat-sen University, TAIWAN
- M4P.038 PHYSICAL MECHANISM OF NON-INVASIVE SKIN PENETRATION ENHANCEMENT METHOD BASED ON THERMAL PERMEABILITY EFFECT**
Hao Zheng, Xueqin Wang, Zhihua Pu, Youhao Liu, Chengcheng Li, Xingguo Zhang, and Dachao Li
¹Tianjin University, CHINA, ²Tianjin Medical University, CHINA
- M4P.039 SELF-POWERED SMART FINGER RING BASED ON TRIBOELECTRIC-IONTRONIC HYBRID PRESSURE SENSOR FOR HUMAN-MACHINE INTERFACES**
Omar Faruk, Md Asaduzzaman, M. Robiul Islam, Gagan Bahadur Pradhan, Md Shofiul Alam, and Jae Yeong Park
Kwangwoon University, KOREA
- M4P.040 TRANSFORMING MOIST-ELECTRIC GENERATORS WITH FUNCTIONAL GROUP-ENRICHED BIOLOGICAL INNOVATIONS**
Yang Gao and Seokheun Choi
State University of New York, Binghamton, USA

Tuesday - Energy, Power and Thermal Management

- T3P.034 A HIGHLY BREATHABLE AND UNIFORMLY TEMPERATURE-CONTROLLING PATCH WITH BIOMIMETIC STRUCTURE FOR WEARABLE ELECTRONICS**
Hao Zheng, Xueqin Wang, Zhihua Pu, Youhao Liu, Chengcheng Li, Xingguo Zhang, and Dachao Li
Tianjin University, CHINA
- T3P.035 CMOS-COMPATIBLE ANTIFERROELECTRIC-DIELECTRIC CAPACITORS FOR MULTIFUNCTIONAL ENERGY STORAGE AND TUNABLE ELECTRONICS**
Hung-Wei Li, Cyrille Masserey, Niccolò Martinolli, Igor Stolichnov, and Adrian M. Ionescu
École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND
- T3P.036 FERROELECTRIC DIPOLE MOMENT EFFECT-ENHANCED DROPLET-BASED HYDROVOLTAIC POWER GENERATION: A NOVEL STRATEGY FOR HIGH-EFFICIENCY ENERGY CONVERSION**
Endian Cui, Fayang Wang, Pengfan Wu, Danni Yang, Chenxi Zhao, Yihui Song, and Xiaojing Mu
Chongqing University, CHINA
- T3P.037 MOISTURE-INDUCED ENERGY HARVESTERS BY WATER HARVESTING FOR CONTINUOUS ARID ENVIRONMENT OPERATIONS**
Jong Ha Park, Peisheng He, Sujoy K. Ghosh, Fan Xia, Nikita G. Lukhanin, Jundong Zhai, Ryan D. Rundle, and Liwei Lin
University of California, Berkeley, USA
- T3P.038 RESONANCE-TUNABLE PIEZOELECTRIC VIBRATION ENERGY HARVESTER WITH CORE-LESS STRUCTURE USING PRISM-ASSISTED 3D LITHOGRAPHY**
Kota Morishita¹, Yuji Takata¹, Yuya Tanaka¹, Gen Hashiguchi², Hiroshi Toshiyoshi³, and Takaaki Suzuki¹
¹Gunma University, JAPAN, ²Shizuoka University, JAPAN, and ³University of Tokyo, JAPAN
- T3P.039 SMART MAGNETOELECTRIC FLUXGUIDE ENABLES WPT SYSTEMS WITH HIGHLY-MISALIGNED COILS**
Hidelberto Macedo-Zamudio and Ulrike Wallrabe
Albert Ludwigs Universität, Freiburg, GERMANY

T3P.040 TWO-PHASE IMPINGEMENT COOLING USING NOVEC-649 WITH COPPER-INVERSE-OPAL WICK AND 3D PRINTED MICROCHANNEL MANIFOLD

Shangyang Shi¹, Jianyu Du¹, Zhou Yang¹, Wei Wang^{1,2,3}, and Chi Zhang^{1,2,3}

¹*Peking University, CHINA,*

²*National Key Laboratory of Advanced Micro and Nano Manufacture Technology, CHINA, and*

³*Beijing Advanced Innovation Center for Integrated Circuits, CHINA*

Wednesday - Energy, Power and Thermal Management

W4P.034 A MOBILE ROBOT PLATFORM FOR WIRELESS CHARGING OF AGRICULTURAL UNDERGROUND SENSOR NETWORKS

Vernon S. Crasto, Trevor B. Free, Dieter A. Steinhauser, Yiwei Bian, Daniel Pistorino, and David P. Arnold
University of Florida, USA

W4P.035 DUAL SPRING ASSISTED HYBRID ENERGY HARVESTER WITH NON-CONTACT TRIBOELECTRIC VIBRATION SENSOR FOR SELF-SUSTAINABLE VEHICLE IOTS

MoonSeong Jo, Trilochan Bhatta, and Aklesh Teli
Kwangwoon University, KOREA

W4P.036 MAGNETICALLY LEVITATED LOW STOCHASTIC WIND-DRIVEN HYBRID GENERATOR FOR SELF-SUSTAINABLE OUTDOOR IOTS

Aklesh Teli, Trilochan Bhatta, Gagan Bahadur Pradhan, Shital Sharma, and Jae Yeong Park
Kwangwoon University, KOREA

W4P.037 OUTPUT POWER IMPROVEMENT OF RUMEN BACTERIA MICROBIAL FUEL CELLS USING NI-PLATED CONDUCTIVE FOAM

Michitaka Yamamoto¹, Yasutaka Shimizu¹, Jarred W. Fastier-Wooller¹, Yoshihiro Muneta², Hiroshi Sawada², Shozo Arai², and Toshihiro Itoh¹

¹*University of Tokyo, JAPAN and* ²*National Agriculture and Food Research Organization, JAPAN*

W4P.039 THERMAL CONDUCTIVITY MEASUREMENT OF TWO-DIMENSIONAL HETEROSTRUCTURES BY TIME DIFFERENTIAL RAMAN TECHNIQUE

Hao Wei, Ying He and Ridong Wang
Tianjin University, CHINA

W4P.040 WATER EVAPORATION-INDUCED POWER GENERATION DEVICE USING CONDUCTIVE POROUS AZO FILMS

Riko Kazama¹, Ayumu Hinata¹, Takahito Ono¹, Ioana Voiculescu², and Masaya Toda¹

¹*Tohoku University, JAPAN and* ²*City College of New York, USA*

Monday - Microfluidics Platform Technologies

M4P.041 A BIOSENSOR-INTEGRATED FILTRATION DEVICE FOR INTACT HIV ISOLATION AND LABEL-FREE DETECTION IN POINT-OF-CARE ENVIRONMENTS

Leyang Liu¹, Takhmina Ayupova¹, Saurabh Umrao¹, Luke Akin¹, Han-Keun Lee¹, Joseph Tibbs¹, Xing Wang¹, Utkan Demirci², and Brian T. Cunningham¹

¹*University of Illinois, Urbana-Champaign, USA and* ²*Stanford University, USA*

M4P.042 A MINIATURIZED PLATFORM FOR INVESTIGATING THE STRENGTH OF THROMBUS INDUCED BY BLOOD SHEAR RATES

Dong-Hwi Ham¹, Seong-hyeon Lee², Jae-Hyun Choi¹, Ji-Seob Choi¹, Woo-jun Jung², Yong-ha Hwang², and Woo-Tae Park¹

¹*Seoul National University of Science and Technology, KOREA and* ²*Korea University, KOREA*

- M4P.043 CONTINUOUS AND SHEATHFLOW-LESS MICRO-/NANOPARTICLE SEPARATION COMBINING THERMOPHORESIS AND THERMOELECTRICITY WITH A 3D SPIRAL MICROCHANNEL**
Junho Kim, Hwisu Jeon, and Taesung Kim
Ulsan National Institute of Science and Technology, KOREA
- M4P.044 EFFECT OF NANOPARTICLES ON THE SUPPRESSION OF REAGENT EVAPORATION IN SINGLE-PLATE EWOD SYSTEM**
Xiaoping Li, Duo Fu, Yifu Xu, Mingrui He, and Caiqin Zhao
Tianjin University, CHINA
- M4P.045 EXPERIMENTAL EVALUATION OF MULTI-QUADRILATERAL-PILLAR ARRAY MICROFLUIDIC PLATFORM FOR OOCYTE DENUDEATION UTILIZING DEEP-LEARNING APPROACH**
Hang Nguyen Thu¹, Trung Nguyen Hoang¹, Anh Nguyen Thi Ngoc¹, Mobina Malekifar⁴, Tung Le Thanh¹, Mai Anh Tran¹, Hanh Nguyen Van², Ha Tran Thi Thuy³, Tung Thanh Bui¹, Hoang Anh Phan¹, Hung Cao⁴, Trinh Chu Duc¹, and Loc Do Quang¹
¹ *Vietnam National University(VNU), VIETNAM*, ²*Vietnam Academy of Science and Technology, VIETNAM*, ³*Posts and Telecommunications Institute of Technology, VIETNAM*, and ⁴*University of California, Irvine, USA*
- M4P.046 HOMOGENIZATION OF SOLUTE CONCENTRATION IN VERTICALLY COALESCENT DROPLETS USING ACOUSTIC WAVE**
Yoshinori Miyata, Shinji Bono, and Satoshi Konishi
Ritsumeikan University, JAPAN
- M4P.047 INTERACTION OF AN ACCELERATED LIQUID INTERFACE WITH A MESH FOR SATELLITE FREE DROPLET EJECTION.**
Imnatoshi Jamir, Bheema S R. Bapuram, and Allu S. Reddy, Prosenjit Sen
Indian Institute of Science, INDIA
- M4P.048 MICROFLUIDIC SENSOR FOR MICROPLASTIC DETECTION IN SALINE FRESHWATER: ENHANCEMENTS BY WHEATSTONE BRIDGE AND MXENE-COATED ELECTRODES**
Haider Warraich¹, Alireza Zabihhesari², Shooka Karimpour¹, and Pouya Rezaei¹
¹*York University, CANADA* and ²*Dalhousie University, CANADA*
- M4P.049 SELF-PRESSURIZING MICROFLUIDIC CHIP FOR BUBBLE SUPPRESSION**
Zizhen Wang, Meiyang Qin, Rui Jiang, Yang Zhao, Haiyang Mao, Lingqian Zhang, , Chengjun Huang, and Mingxiao Li
Chinese Academy of Sciences, CHINA

Tuesday - Microfluidics Platform Technologies

- T3P.041 A DEEP-LEARNING-BASED APPROACH FOR IN VITRO MATURATION MONITORING UTILIZING HEXAGONAL MICROPILLAR TRAP MICROFLUIDIC PLATFORM**
Hang Nguyen Thu¹, Anh Nguyen Thi Ngoc¹, Trung Nguyen Hoang¹, Junhan Xiao⁴, Tung Le Thanh¹, Hang Nguyen Thi¹, Hanh Nguyen Van², Hoang Anh Phan¹, Thien Nguyen Duy¹, Tung Thanh Bui¹, William C. Tang, Hung Cao⁴, Trinh Chu Duc¹, and Loc Do Quang¹
¹*Vietnam National University (VNU) , VIETNAM*, ²*Vietnam Academy of Science and Technology, VIETNAM*, ³*Posts and Telecommunications Institute of Technology, VIETNAM*, and ⁴*University of California, Irvine, USA*
- T3P.042 ACOUSTIC LENS INTEGRATED WITH A MICROFLUIDIC DEVICE TOWARD HIGH-POWER AND HIGH-THROUGHPUT CELL MANIPULATION**
Souta Kurihara and Takeshi Hayakawa
Chuo University, JAPAN

- T3P.043 DETECTION OF MICROPLASTIC WASTE BY USING A NOVEL MICROFLUIDIC SYSTEM WITH AN INTEGRATED OBJECT TRACKING ALGORITHM**
 Bushra B. Khalak¹, Doruk Durmaz¹, Okan Külekçioğlu¹, Ela Bahşi¹, Selin Kasap¹, Guleda O. Engin⁴, Emine U. Sarita^{1,3}, and Emine Y. Erdem^{1,2}
¹*Bilkent University, TURKEY*, ²*UNAM (National Nanotechnology Research Center), TURKEY*, ³*UMRAM (National Magnetic Resonance Research Center), TURKEY*, and ⁴*Yildiz Technical University, TURKEY*
- T3P.044 EFFICIENT HYDROPHILIC ARRAY GENERATION USING ULTRASONIC ATOMIZATION AND OFF-THE-SHELF PERFORATED MASKS**
 Xiaochen Lai, Xicheng Wang, Yanfei Sun, and Yong Zhu
Nanjing University of Information Science & Technology, CHINA
- T3P.045 FULLY 3D-PRINTED, TRIAXIAL ELECTROSPRAY MICROFLUIDICS FOR UNIFORM CORE-SHELL-SHELL MICROPARTICLE GENERATION**
 Bryan I. Quintanar^{1,2} and Luis F. Velasquez-Garcia²
¹*Tecnológico de Monterrey, MEXICO* and ²*Massachusetts Institute of Technology, USA*
- T3P.046 HYBRID DIW-SLA TISSUE PRINTING SYSTEM WITH A MULTI-MATERIAL MICROFLUIDIC NOZZLE PRINthead**
 Rifat H. Chowdhury¹, Shunya Okamoto¹, Takayuki Shibata¹, Tuhin S. Santra², and Moeto Nagai¹
¹*Toyohashi University of Technology, JAPAN* and ²*Indian Institute of Technology Madras, INDIA*
- T3P.047 LCD 3D PRINTING OF A NORMALLY CLOSED FLUIDIC TRANSISTOR VIA ADDITIVE ASSEMBLY**
 A. Muhaymin Chowdhury, Thaddaeus D. Stine, Kalp B. Upadhyay, Carolyn G. Catan, Adithya Kidambi, Althea Marielle G. Eclarin, Catherine W. Lim, Michelle Liu, and Ryan D. Sochol
University of Maryland, USA
- T3P.048 OOCYTE BIOMECHANICS USING A MICRODEVICE TO CORRELATE TRANSIENTS OF MICRO-FLOW IMPEDANCE AND ELECTRICAL IMPEDANCE**
 Osama Alalul¹, Jintian Liu¹, Markus Böl¹, Ala'aldeen Al-Halhoul², and Andreas Dietzel¹
¹*Technische Universität Braunschweig, GERMANY* and ²*German Jordanian University, JORDAN*
- T3P.049 STUDY OF RECTANGULAR MEMBRANE PMUT-BASED ACOUSTIC STREAMING MICROPUMP**
 Chen Wu^{1,2}, Grim Keulemans², Benjamin Jones², Veronique Rochus², Xavier Rottenberg², and Paul Heremans^{1,2}
¹*KU Leuven, BELGIUM* and ²*imec, BELGIUM*

Wednesday - Microfluidics Platform Technologies

- W4P.041 A FLOW FOCUSING MICROFLUIDIC DEVICE FOR PREPOLYMER DROPLET GENERATION AND IN-SITU UV POLYMERIZATION: STEPS TOWARDS FABRICATING IMPRINTED POLYMER MICROPARTICLES**
 Md Aryan Kabir, Ehsan Tabesh, and Pouya Rezai
York University, CANADA
- W4P.042 ANALYSIS OF PIEZOELECTRIC TRANSDUCERS FOR GENERATING ACOUSTIC FIELDS IN ULTRASONIC CELL MANIPULATION**
 Barbara Leikam, Shilpi Pandey, Oliver Hayden, and Gabriele Schrag
Technical University of Munich, GERMANY
- W4P.043 DROPLET FLOW SENSOR TO ACQUIRE TRANSIENT TEMPERATURE DISTRIBUTION, DROPLET POSITION, AND VELOCITY IN MICROCHANNEL**
 Masashi Kobayashi, Kohei Yamanaka, Daiki Tanaka, Risa Fujita, Shuichi Shoji, and Masahiro Furuya
Waseda University, JAPAN

W4P.044 EVALUATION OF SIZE AND SHAPE OF CELL SPHEROIDS FORMED BY USING VIBRATION-INDUCED FLOW TOWARD HIGH-THROUGHPUT AND HIGH REPRODUCIBLE SPHEROID FORMATION

Toshihiro Tanihata, Ryutaro Toyoshima, and Takeshi Hayakawa
Chuo University, JAPAN

W4P.045 HANDHELD VIBRATIONAL DROPLET GENERATOR: A SIMPLE, SCALABLE DEVICE FOR DIGITALIZING ASSAYS

Xiaochen Lai, Yong Zhu, Dingxiong Chen, Xicheng Wang, Haitao Lu, Ziang Chen, and Yanfei Sun
Nanjing University of Information Science & Technology, CHINA

W4P.046 INTEGRATED MICROFLUIDIC TISSUE BARRIER SENSOR MODULE FOR A STANDARDIZED AND MODULAR ORGAN-ON-CHIP PLATFORM

Jia-Jun Yeh^{1,2}, Pratik V. Tawade², Hande Aydogmus², Aniruddha Paul³, Germaine Aalderink⁴, Hans Bouwmeester⁴, Mathieu Odijk³, Jaap M.J. den Toonder¹, and Massimo Mastrangeli²
¹*Eindhoven University of Technology, NETHERLANDS*, ²*Delft University of Technology, NETHERLANDS*, ³*University of Twente, NETHERLANDS*, and ⁴*Wageningen University & Research, NETHERLANDS*

W4P.047 LIPID NANOPARTICLE SYNTHESIS WITH IN-SITU SIZE DETERMINATION IN A MICROFLOW ENVIRONMENT ENABLED BY 2PP

Ebrahim Taedinejad^{1,2}, Cornelius Bausch³, Jörn Wittek³, Michael Baßler³, and Andreas Dietzel^{1,2}
¹*Technische Universität Braunschweig, GERMANY*, ²*Universität Braunschweig, GERMANY*, and ³*Fraunhofer-Institut für Mikrotechnik und Mikrosysteme IMM, GERMANY*

W4P.048 REACTIVE OXYGEN SPECIES GENERATION IN MICROFLUIDICS DEVICE BY PLASMA EXCITATION VIA THIN FILM

Rentaro Yamamoto and Shinya Kumagai
Meijo University, JAPAN

W4P.049 SYNTHESIS AND CRYSTALLIZATION OF METAL COMPLEXES CONTAINING PROTEINS IN MICROFLUIDIC DEVICES DEDICATED FOR BOTH LIQUID AND SOLID

Daiki Tanaka¹, Masashi Kobayashi¹, Risa Fujita¹, Tetsushi Sekiguchi¹, Takashi Akitsu², Shuichi Shoji¹, Takashi Tani¹, and Masahiro Furuya¹
¹*Waseda University, JAPAN*, and ²*Tokyo University of Science, JAPAN*

Monday - Nanoscale Materials and Fabrication

M4P.050 A NOVEL METHOD OF SYNTHESIZING REDUCED GRAPHENE OXIDE FROM PAPER USING GAS PLASMA JET

Pn Sidhartha and Karumbaiah N. Chappanda
Southern Illinois University, Carbondale, USA

M4P.051 PERFORMANCE ENHANCEMENT OF AN INFRARED SOURCE THROUGH DEPOSITION OF CANDLE SOOT WITH A SIMPLE METHOD

Qirui Zhang, Huabin Yang, Meng Shi, Hanhui Li, Na Zhou, and Haiyang Mao
Chinese Academy of Sciences, CHINA

Tuesday - Nanoscale Materials and Fabrication

T3P.050 ECO-FRIENDLY AND LARGE-SCALE FABRICATION OF SILK-BASED ENZYMATIC BIOSENSORS THROUGH MICROELECTRONIC DEVICES

Pablo Rodríguez¹, Carla Blanes¹, Silvia Mena¹, Sebastián Gavira¹, Salvador Aznar-cervantes², Carlos Domínguez¹, Gonzalo Guirado³, Sara Santiago⁴, and Xavier Muñoz¹
¹*Microelectronics Institute of Barcelona, SPAIN*, ²*Instituto Murciano de Investigación y Desarrollo Agrario y Alimentario, SPAIN*, ³*Autonomous University of Barcelona, SPAIN*, and ⁴*Complutense University of Madrid, SPAIN*

Wednesday - Nanoscale Materials and Fabrication

W4P.050 HIGHLY PREFERRED ORIENTED TERNARY RELAXOR PB(MN,NB) O3-PB(ZR,TI)O3 THIN FILMS ON SI SUBSTRATE

Jiaqian Yang, Jixuan Zhang, Tao Liu, Hanjie Dou, Wangyang Zhang, Wanyu Xu, and Xiaojing Mu
Chongqing University, CHINA

W4P.051 WRINKLE-ASSISTED NANOCANNEL ARRAYS FOR DIFFERENTIAL RESISTIVE PULSE SENSING

Minsu Kwon, Dongwoo Seo, Sangjin Seo, and Hwisu Jeon
Ulsan National Institute of Science and Technology, KOREA

Monday - Optical and Atomic Transducers

M4P.052 2D PATTERN PROJECTION FOR MODE COUPLING ANALYSIS IN GIMBAL-LESS PIEZO-ACTUATED RESONANT SCANNING MICROMIRRORS

Adrien Piot¹, Sara R.P. Guerreiro^{1,2}, Rodrigo T. Rocha¹, Clement Fleury¹, Takashi Sasaki¹, Anton Lagosh¹, Ale Travnik¹, Dominik Holzmann¹, and Markus Bainschab¹
¹*Silicon Austria Labs, AUSTRIA*, ²*University of Tokyo, JAPAN*

M4P.053 ANGLE TUNABLE KIRIGAMI-HINGED MIRROR ARRAY FOR AUTOSTEREOSCOPIC DISPLAY USING DOUBLE REFLECTION

Taiki Sugihara, Satoshi Ikezawa, and Eiji Iwase
Waseda University, JAPAN

M4P.054 HIGH-SENSITIVITY DETECTION FOR KIDNEY CANCER CELLS USING POLARIZATION INSENSITIVE EIT-LIKE THZ METASURFACE BIOSENSOR

Yunhao Cao¹, Mingyao Gao¹, Hongshun Sun¹, Xubo Song², Zhihong Feng², Lijun Ma¹, Liye Li¹, and Wengang Wu¹
¹*Peking University, CHINA and*
²*National Key Laboratory of Solid-State Microwave Devices and Circuits, Hebei Semiconductor Research Institute, CHINA*

M4P.055 MULTI-LAYERED CHIRAL METAMATERIALS USING STANDARD CMOS FOR POLARIZATION-DEPENDENT MID-INFRARED IMAGING

Cheng Xu¹, Ting-Yi Chen², Chun-Pu Tsai², Dongxiao Li¹, Hong Zhou¹, Wei-Chang Li², and Chengkuo Lee¹
¹*National University of Singapore, SINGAPORE and* ²*National Taiwan University, TAIWAN*

M4P.056 SILICON PHOTONIC DISSOLVED CO₂ SENSING SYSTEM FOR PERFLUOROCARBON-BASED PERITONEAL OXYGENATION

Bibek Ramdam¹, Hyun-Tae Kim¹, Behzad Kadkhodaeielyaderani¹, Yejin Moon¹, Parham Rezaei¹, Melissa J. Culligan², Nosayaba Enofe², Dawn Forste², Alexis Freiling², Karen Davalos², Maria Altemos³, Joseph Friedberg², Hosam K Fathy¹, Jin-Oh Hahn¹, and Miao Yu¹
¹*University of Maryland, USA*, ²*Temple University, USA*, and ³*Thomas Jefferson University, USA*

M4P.057 SYNCHRONIZED OSCILLATION OF 2-BY-2 ELECTROSTATIC TORSIONAL MICROMIRROR ARRAY

Mikiya Oki, Masaki Shimofuri, Amit Banerjee, Jun Hirovani, and Toshiyuki Tsuchiya
Kyoto University, JAPAN

M4P.058 VERTICAL-COMB-DRIVEN TIP-TILT 32×32 MICROMIRROR ARRAY BASED ON DOUBLE-SOI AND SINGLE-CRYSTALLINE-SILICON TSV

Biyun Ling, Xiaoyue Wang, Minli Cai, Yuhu Xia, Biqing Zhou, Yuwei Han, and Yaming Wu
Chinese Academy of Sciences, CHINA

Tuesday - Optical and Atomic Transducers

- T3P.052 3D TERAHERTZ DETECTION OF INTERNAL DEFECTS WITHIN POLYMER MATERIALS USING A THERMOMECHANICAL PERFORMANCE-ENHANCED BI-MATERIAL MICROCANTILEVER FPA**
Zhanxuan Zhou¹, Jiahao Miao¹, Xueliang Wang¹, Xincheng Zhu¹, Cong Lin¹, Yang Zhong¹, Zhenwei Zhang², and Xiaomei Yu¹
¹Peking University, CHINA and ²Capital Normal University, CHINA
- T3P.053 DESIGN AND IMPLEMENTATION OF DUAL-AXIS PIEZOELECTRIC MEMS MIRROR FOR IMAGE ASPECT-RATIO SWITCHING**
Wei-Kai Sung¹, Chang-I Lin¹, Po-Chun Lin¹, Mingching Wu², Mei-Feng Lai¹, and Weileun Fang¹
National Tsing Hua University, TAIWAN and Coretronic MEMS Corporation, TAIWAN
- T3P.054 LARGE-ANGLE SCANNING AND ENHANCED ROBUSTNESS PIEZOELECTRIC BIAxIAL MEMS MIRRORS BASED ON DOUBLE CIRCULAR-ARC DESIGN**
Hao Huang¹, Lihao Wang^{1,4}, Yongquan Su¹, Yichen Liu¹, Yang Wang¹, and Zhenyu Wu^{1,2,3}
¹Chinese Academy of Sciences, CHINA, ²Shanghai University, CHINA, ³Shanghai Industrial Technology Research Institute (SITRI), CHINA, and ⁴MExpert Technologies Co., Ltd, CHINA
- T3P.056 SPLIT ACCELERATED DEGRADATION TEST PLATFORM WITHOUT ON-CHIP SENSOR FOR LONG-TERM RELIABILITY OF 2D MEMS MIRRORS**
Ze-Yu Zhou, Kai-Ming Hu, Er-qi Tu, Heng Zou, Hui-Yue Lin, and Wen-Ming Zhang
Shanghai Jiaotong University, CHINA
- T3P.057 ULTRA-HIGH RESPONSIVITY BRIDGE UNCOOLED INFRARED MICROBOLOMETERS BASED ON THIN-FILM MN-CO-NI-O**
Yan Zhao, Zirui Yang, Xiaoyu Qi, Chengchen Gao, and Zhenchuan Yang
Peking University, CHINA

Wednesday - Optical and Atomic Transducers

- W4P.052 A REUSABLE AND HIGH-SENSITIVE TERAHERTZ METASURFACE SENSOR INTERATED ULTRA-THIN MICROFLUIDIC CHANNEL FOR DETECTION OF TRACE SOLUTION**
Yunhao Cao, Hongshun Sun, Yusa Chen, Lijun Ma, Liye Li, and Wengang Wu
Peking University, CHINA
- W4P.053 ENHANCED PERFORMANCE OF FIBER-OPTIC LOCALIZED SURFACE PLASMON RESONANCE SENSOR VIA BUMPY BALL STRUCTURE BASED ON RAPID THERMAL ANNEALING**
Jong-Hyun Bang, Hyeong-Min Kim, Min-Seok Choo, Jae-Hyoung Park, and Seung-Ki Lee
Dankook University, KOREA
- W4P.054 MINIATURIZED BEAM SCANNING DEVICE ENABLED BY CASCADED METASURFACES FOR LIDAR APPLICATIONS**
Chi Zhang¹, Lingyun Zhang^{1,2}, Li Zhang¹, Rongbo Xie¹, Ziqi Mei¹, Chenzi Wang¹, Yibo Ni¹, Chensong Xiong¹, Xiaoyu Wu¹, Fei Xing¹, Zheng You¹, and Xiaoguang Zhao¹
¹Tsinghua University, CHINA and ²Huazhong University of Science and Technology, CHINA
- W4P.055 PIEZOELECTRIC MICROMIRROR WITH INTEGRATED RESONANT SENSOR**
Takashi Sasaki, Adrien Piot, Rodrigo T. Rocha, Anton Lagosh, Sara R.P. Guerreiro, Clément Fleury, Dominik Holzmann, and Aleš Travník
Silicon Austria Labs, AUSTRIA
- W4P.056 SYMMETRIC METAMATERIAL ANTENNA TO IMPROVE RESPONSIVITY OF CMOS-MEMS THERMOELECTRIC INFRARED SENSORS**
Yian Su¹, Cheng-En Yang¹, Yi Chiu², and Weileun Fang¹
¹National Tsing Hua University, TAIWAN and ²National Yang Ming Chiao Tung University, TAIWAN

W4P.057 ULTRATHIN THICKNESS DETECTION BASED ON THE WAVELENGTH- AND ANGLE-INTERROGATION OF SURFACE LATTICE RESONANCE

Liye Li, Yifan Ouyang, Hongshun Sun, Yunhao Cao, Yusa Chen, Lijun Ma, and Wengang Wu
Peking University, CHINA

Monday - Packaging & Solid-State Materials and Fabrication Processes

M4P.059 A MICRO-OVEN-CONTROLLED WAFER-LEVEL VACUUM PACKAGING PROCESS PLATFORM FOR MEMS RESONANT DEVICES

Kaixuan He^{1,2}, Rui Feng², Yu Zheng², Lijian Guo², Qichao Liao², Yuan Xiang², Hongkun Zhang², Jiachou Wang³, and Xinxin Li^{1,3}

¹*Fudan University, CHINA*, ²*East China Institute of Photo-Electron IC, CHINA*, and

³*Chinese Academy of Sciences, CHINA*

M4P.060 DEFLECTION CHARACTERISTICS OF A CIRCULAR SLIT DIAPHRAGM MEMS DEVICE

Tim J. Cheng^{1,2}, Robert D. White¹, and Kasia Oleske²

¹*Tufts University, USA* and ²*The Charles Stark Draper Laboratory, USA*

M4P.061 ELECTROHYDRODYNAMIC HIGH-PRECISION PRINTING: AN EMERGING APPROACH FOR FABRICATION OF WEARABLE MICROSENSORS

Nadine Philippin^{1,2}, Ingo Kuehne¹, Alexander Frey³, and Gabriele Schrag²

¹*Heilbronn University of Applied Sciences, GERMANY*, ²*Technical University of Munich, GERMANY* and

³*Technical University of Applied Sciences, Augsburg, GERMANY*

M4P.062 FABRICATON OF THROUGH-SILICON-VIA INDUCTORS FOR HIGH-FREQUENCY VERTICAL POWER DELIVERY

Yixiao Ding, Xuan Wang, Dengyang Lu, and Mark G. Allen

University of Pennsylvania, USA

M4P.063 INFLUENCE OF DIFFUSIVE PENETRATION OF SMALL MOLECULES/ATOMS INTO VACUUM CAVITY SEALED BY SILICON MIGRATION

Nobutoshi Nemoto, Yukio Suzuki, and Shuji Tanaka

Tohoku University, JAPAN

M4P.064 LOW-TEMPERATURE AU-IN TLP BONDING FOR COMPACT HERMETIC PACKAGING OF PIEZOELECTRIC MEMS DEVICES

Leman D. Balci^{1,2}, Ali C. Atik^{1,2}, Muhammed B. Yüksel¹, and Haluk Külah^{1,2}

¹*Middle East Technical University, TURKEY* and ²*METU MEMS Research and Application Center, TURKEY*

M4P.065 NEEDLE-TYPE OXYGEN MICROSENSOR MADE BY 3D PRINTING AND LOCALIZED 3D ELECTROLESS PLATING

Juntaro Nomaru, Taisuke Masuda, Satoshi Amaya, Kohki Tanabe, and Fumihito Arai

University of Tokyo, JAPAN

M4P.066 SIDEWALL FORCE SENSOR PACKAGING FOR MINIMALLY INVASIVE CARDIOVASCULAR TREATMENT

Chao-Wei Dong and Woo-Tae Park

Seoul National University of Science and Technology, KOREA

Tuesday - Packaging & Solid-State Materials and Fabrication Processes

T3P.058 A COST-EFFECTIVE UNIVERSAL WAFER LEVEL PACKAGING PLATFORM FOR BAW AND THIN-FILM SAW FILTERS

Ji Liang, Xiaoru Wang, Weiwei Hu, Zongmin Hong, Duan Feng, and Jie Zou

Shenzhen Newsonic Technologies Co.Ltd, CHINA

- T3P.059 A NOVEL ON-WAFER METHOD FOR BEAM SPOT INTENSITY DISTRIBUTION CHARACTERIZATION IN ELECTRON BEAM LITHOGRAPHY PROCESS**
Shiyang Yuan, Peng Liu, Fengjun Yu, Xuanqing Hua, Xufeng Wang, Zhiheng Yu, and Dacheng Zhang
Peking University, CHINA
- T3P.060 DEVELOPMENT OF CRYSTALLIZED 14 μ M THICK, HIGHLY DOPED A-SI:H LAYERS FOR SURFACE MICROMACHINING OF MEMS**
Yimei Zhang^{1,2}, Hans-Joachim Quenzer¹, Björn Jensen¹, Jens-Hendrik Zollondz¹, and Axel Müller-Groeling^{1,2}
¹*Fraunhofer Institute for Silicon Technology, GERMANY* and ²*Christian-Albrechts-Universität zu Kiel, GERMANY*
- T3P.061 FABRICATION PROCESS FOR ULTRA-RELIABLE POLYIMIDE-BASED NEURAL-INTERFACE TECHNOLOGY**
Kenneth A. Fluker, Jr. and Jack W. Judy
University of Florida, USA
- T3P.062 GLOBAL OPTIMIZATION OF THIN-FILM PROPERTIES IN PECVD SYSTEM HARNESSSED BY COMPLEX-SYSTEM-RESPONSE (CSR) PLATFORM**
Wen-Jun Chen^{1,2}, Shih-Chin Lin², Ching-Chiun Wang², Chih-Ming Ho¹, and Da-Jeng Yao^{1,2}
¹*National Tsing Hua University, TAIWAN* and ²*Industrial Technology Research Institute, TAIWAN*
- T3P.063 INFRA-RED CONCAVE LENS MOLD WITH MOTH EYE MICROSTRUCTURE REALIZED BY SUPER-CONTACT PATTERNING OF LATENT IMAGE**
Taku Sakai and Minoru Sasaki
Toyota Technological Institute, JAPAN
- T3P.064 MEMS INERTIAL SENSORS FOR EXTREME ENVIRONMENTS**
David Lin, Robert MacDonald, Emad Andarawis, and David Shaddock
GE Aerospace Research, USA
- T3P.065 NON-SOI (111) WAFER SINGLE-SIDE MICROFABRICATION OF SILICON-BASED RESONANT STRUCTURE INSIDE VACUUM CHAMBER FOR TINY-SIZE, HIGH-PERFORMANCE AND LOW-COST RESONANT DIFFERENTIAL PRESSURE SENSORS**
Yubo Tian, Jiachou Wang, and Xinxin Li
Chinese Academy of Sciences, CHINA
- T3P.066 WAFER-LEVEL FABRICATION OF ON-CHIP SINGLE/DOUBLE LAYER RECTANGULAR SPIRAL INDUCTORS FOR IMPLANTABLE BIOSENSORS**
Pichao Pan, Li Wang, Jiebin Gu, and Xinxin Li
Chinese Academy of Sciences, CHINA

Wednesday - Packaging & Solid-State Materials and Fabrication Processes

- W4P.058 A LOW-COST BATCH FABRICATION METHOD FOR ESTABLISHING ELECTRICAL CONNECTIONS IN THROUGH-SILICON VIAS FOR CHIP INTEGRATION ENABLING IN SITU PRESSURE MONITORING**
Sanjana Afrin Raisa¹, Khandaker Reaz Mahmud¹, Steven M. Tran¹, Farhan Sadik Sium¹, Austin Johnson², Sam Larson², Seungbeom Noh¹, and Hanseup Kim¹
University of Utah, USA
- W4P.059 A PSPI/PSEP/PSPI NANOCOMPOSITE POLYMER INTERPOSER TECHNOLOGY FOR WIRELESS EDGE-AI MICROSYSTEM INTEGRATION**
Yu-Chia Chang¹, Ting-Yu You¹, Yun-Chien Tseng¹, Shih-Chieh Chen¹, Pin-Cheng Tseng¹, Yu-Ting Cheng¹, Chien-Nan Kuo¹, Der-Hsien Lien¹, Chung-Tse Wu², and Yu-Tao Yang³
¹*National Yang Ming Chiao Tung University, TAIWAN*, ²*National Taiwan University, TAIWAN*, and ³*Mediatek Company, TAIWAN*

W4P.060 ELECTRODE DEPENDENT THERMAL STABILITY OF PZT THIN FILM FOR POST-PIEZOELECTRIC PROCESS

Chong Yang, Aocheng Bao, Ping Yin, Jin You, Bowen Sheng, and Yipeng Lu
Peking University, CHINA

W4P.061 EXPLORING ENERGY LOSS MECHANISM OF ZERO-THERMAL-EXPANSION AND OTHER GLASSES AS MATERIALS OF MEMS RESONATORS

Kouta Koshiro, Shuji Tanaka, and Takashiro Tsukamoto
Tohoku University, JAPAN

W4P.062 HIGH DENSITY DIRECT AU-AU INTERCONNECTS USING THERMAL COMPRESSION BONDING FOR HETEROGENEOUS INTEGRATION

Nishant Kumar Sharma, Ankit Priya, and Prosenjit Sen
Indian Institute of Science, INDIA

W4P.063 LASER-ASSISTED MEMS WAFER-LEVEL VACUUM PACKAGING USING ULTRATHIN TI LAYER FOLLOWING IN-AIR OPTICAL ALIGNMENT

Shumpei Ii¹, Yoshinori Ikagawa¹, Hiroshi Yamabe¹, Yukio Suzuki², and Shuji Tanaka²
¹TAZMO, Co, Ltd., JAPAN and ²Tohoku University, JAPAN

W4P.064 MINIATURIZED, RF-BASED, AND BATTERY-FREE STIMULATORS PACKAGED WITH POLYMER-METAL FLEX CIRCUITS FOR IMPLANT APPLICATIONS

Kenneth A. Fluker, Jr., Sultan Mahmud, Han Wu, Ladan Jiracek-Sapieha, Adam Khalifa, and Jack W. Judy
University of Florida, USA

W4P.065 PT-PT BONDING FOR HIGH-TEMPERATURE INTEGRATED RESONANT PRESSURE SENSORS

Tanya Chauhan, Seyyed Mojtaba Hassani Gangaraj, and Azadeh Ansari
Georgia Institute of Technology, USA

Monday - Physical Sensors and Microsystems

M4P.067 A BATTERYLESS UV DOSE SENSOR FOR INTELLIGENT FOOD PACKAGING ENABLED BY LASER-INDUCED GRAPHENE AND SUSTANABLE MATERIALS

Mohammadreza Chimehrad, Pouya Borjian, and Hyoung Jin Cho
University of Central Florida, USA

M4P.068 A FORCE SENSOR FOR MULTI-PHYSICS DETECTIONS AND THEIR DECOUPLING IN PRACTICAL FIELD APPLICATIONS

Chieh-Cheng Wang and Cheng-Yao Lo
National Tsing Hua University, TAIWAN

M4P.069 A HIGH-SENSITIVITY TEMPERATURE/STRAIN SENSOR BASED ON A SINGLE-PORT SAW RESONATOR FEATURING ON-CHIP COMPENSATION CAPABILITY

Chunlong Cheng, Yanxin Liu, Jingwen Yang, Xiaoru Li, Tong Tong, Huahuang Luo, Zihan Lu, Zhiqing Zhang, Tingfeng Peng, and Qingqing Ke
Sun Yat-sen University, CHINA

M4P.070 A NOVEL FLEXIBLE VITAL SIGNS AND SLEEP MONITORING BELT BASED ON A MEMS IMU AND PRESSURE SENSORS FOR EICU AIRBED APPLICATION

Chunhua He¹, Jian Zhan¹, Xin Fang¹, Heng Wu¹, Songqing Deng², Zhengfei Yang², and Maojin Liang²
¹Guangdong University of Technology, CHINA and ²Sun Yat-Sen University, CHINA

- M4P.071 A REAL-TIME TILT SENSOR BASED ON A PIEZOELECTRIC MEMS RESONANT ACCELEROMETER THROUGH DEMODULATED AMPLITUDE DETECTION**
Sanket Shivaji Suryawanshi, Jyoti Satija, Hsuan-Cheng Lin, Chin-Yu Chang, Anurag A. Zope, and Sheng Shian Li
National Tsing Hua University, TAIWAN
- M4P.072 A SILICON RESONANT PRESSURE SENSOR WITH 180 MPA CAPABILITY FOR EXTREME ENVIRONMENTS**
Pengxiang Ye, Zongze Yu, Zhaoyuan Tan, Bo Xie, Yulan Lu, Nan Li, Deyong Chen, Junbo Wang, and Jian Chen
Chinese Academy of Sciences, CHINA
- M4P.073 ADVANCED THREE-DIMENSIONAL ACOUSTIC VECTOR SENSOR SYSTEM: PHYSICALLY-INFORMED MACHINE LEARNING-DRIVEN FREQUENCY RESPONSE FLATTENING AND MULTI-AXIS CORRELATION NOISE OPTIMIZATION**
Lihao Ma, Xu Ma, Beining Wang, Wangnan Chen, Nan Zhang, Xiaoyu Qi, Yan Zhao, Chengchen Gao, and Zhenchuan Yang
Peking University, CHINA
- M4P.074 DUAL-MODE ELECTRIC POWER SENSING BASED ON MEMS RESONATORS**
Xuecui Zou¹, Nizar Jaber³, Yuan Liu¹, Dongxiang Luo⁴, Hossein Fariborzi², and Khaled Salama²
¹*Guangdong University of Technology, CHINA,*
²*King Abdullah University of Science and Technology, SAUDI ARABIA,*
³*Aramco, SAUDI ARABIA, and* ⁴*Guangdong University, CHINA*
- M4P.075 FABRICATION OF WAFER-LEVEL VACUUM PACKAGED POLY-SI/SIC BEAM RESONATORS WITH STRAIN SENSITIVITY LARGER THAN 1 KHZ/ μ**
Sergio Sapienza¹, Luca Belsito¹, Matteo Ferri¹, Ivan Elmi¹, Marcin Zielinski², and Alberto Roncaglia¹
¹*National Research Council, ITALY and* ²*Soitec, FRANCE*
- M4P.0756 FREQUENCY-CODED FLEXIBLE MICROFLUIDIC RFID SENSOR FOR SIMULTANEOUS TEMPERATURE AND DEFORMATION MEASUREMENT**
Sheikh Dobir Hossain, Samuel A. Jiron, and Robert C. Roberts
University of Texas, El Paso, USA
- M4P.077 HIGH-Q DIAMAGNETICALLY LEVITATED MECHANICAL RESONATORS WITH TIME-DOMAIN RING-DOWN MEASUREMENTS**
Samira Yasmin¹, Pooja Roy¹, Yunong Wang², Philip Feng², and Jaesung Lee¹
¹*University of Central Florida, USA and* ²*University of Florida, USA*
- M4P.078 MACHINE LEARNING-ASSISTED NONLINEARITY DECOUPLING FOR MEMS RESONATORS WITHIN CLOSED-LOOP CONFIGURATION**
Chengxin Li¹, Fan Wu¹, Mustafa Mert Torunbalci², Hemin Zhang³, Ruo Chen Ding¹, Milad Shojaeian¹, Helin Li¹, Chen Wang¹, Lieven D.E. Strycker¹, and Michael Kraft¹
¹*KU Leuven, BELGIUM,* ²*Google, USA, and* ³*Northwestern Polytechnical University, CHINA*
- M4P.079 MONOLITHIC CMOS-MEMS TACTILE FORCE/PROXIMITY SENSORS WITH FULL WHEATSTONE BRIDGE AND SHIELDING ELECTRODE**
Pei Yun Li, Rwei-Cing Mai, Yi-Ming Lai, Meifeng Lai, and Weileun Fang
National Tsing Hua University, TAIWAN
- M4P.080 NEUROMORPHIC ACOUSTIC SENSORS USING PIEZOELECTRIC MEMS RESONATORS WITH EPITAXIALLY GROWN BIFEO₃ FILMS**
Sena Yamamoto¹, Mario Kiuch¹, Sengsavang Aphayvong², Meika Takagi², Yohane Fujibayashi², and Takeshi Yoshimura²
¹*Sumitomo Precision Products Co., LTD., JAPAN and* ²*Osaka Metropolitan University, JAPAN*
- M4P.081 NOVEL TACTILE-TEXTURE SENSING SYSTEM WITH SUPER-HUMAN SENSING PERFORMANCE VIA DEEP LEARNING**
Shuta Kanda¹, Yusaku Maeda^{1,2}, Kyohei Terao¹, Mayu Ikeda¹, Kazuhiro Kubo¹, and Hidekuni Takao¹
¹*Kagawa University, JAPAN and* ²*National Institute of Technology, Kagawa College, JAPAN*

- M4P.082 PLANAR SINGLE-LAYER LITHIUM NIOBATE PIEZOELECTRIC TRANSDUCER WITH NO PASSIVE LAYER**
Vakhtang Chulukhadze, Ziqian Yao, Naveed Ahmed, Zihuan Liu, Xiaoyu Niu, Tzu-Hsuan Hsu, Neal Hall, and Ruochen Lu
University of Texas, Austin, USA
- M4P.083 SIMULTANEOUS ACQUISITION OF VISCOUS AND ELASTIC PROPERTIES BY SINGLE MEASUREMENT SCAN OF FINGERTIP-TYPE TACTILE SENSOR**
Aoi Itou, Adila Azhar, Kyohei Terao, and Hidekuni Takao
Kagawa University, JAPAN
- M4P.084 THERMALLY INSENSITIVE PRESSURE SENSOR WITH HIGH SENSITIVITY AND BROAD DETECTION RANGE FOR STATUS MONITORING OF BATTERY MODULE**
Donghyun Lee¹, Seongbeom Heo¹, Gyeongwan Lee¹, Janghyeon Lee², Dong Gu Kim², Deok Woo Yun², Yoonhyuk Kang², and Jungwook Choi¹
¹*Chung-Ang University, KOREA and* ²*Hyundai Motor Company, KOREA*
- M4P.085 TOWARDS ENCODER-LIKE TACTILE SENSING VIA CONDUCTIVE BEAM BUCKLING**
Lilly Rizvi, Ibrahim Abubakar, and Kris Dorsey
Northeastern University, USA
- M4P.086 ULTRA-HIGH FREQUENCY AND SMALL APERTURE SIZE CIRCULAR ARRAY BASED ON PIEZOELECTRIC POLYMER FOR INTRAVASCULAR ULTRASOUND IMAGING**
Zhiqing Zhang, Guoxiang Zhang, Weiting Liu, Kanjie Du, Zihan Lu, Chunlong Cheng, Jingwen Yang, Tingfeng Peng, Huahuang Luo, and Qingqing Ke
Sun Yat-sen University, CHINA
- M4P.087 ACCURATE ACQUISITION OF PRESSURE SIGNALS WITH OPTIMAL AMPLITUDE USING FLEXIBLE TACTILE SENSOR ARRAY**
Tengteng Lei, Boyi Zhu, Yushen Hu, and Man Wong
Hong Kong University of Science and Technology, HONG KONG

Tuesday - Physical Sensors and Microsystems

- T3P.067 A COMPACT THREE-DIMENSIONAL ACOUSTIC VECTOR SENSOR WITH STEPPED DOUBLE SEMI-CONE TUBE HORN**
Lihao Ma, Xu Ma, Beining Wang, Wangnan Chen, Nan Zhang, Xiaoyu Qi, Yan Zhao, Chengchen Gao, and Zhenchuan Yang
Peking University, CHINA
- T3P.068 A HIGH-FLATNESS PMUT-BASED HYDROPHONE SYSTEM FOR LARGE BANDWIDTH UNDERWATER ACOUSTIC DETECTION**
Hanshuo Liu, Tao Ruan, Zhiyong Hu, Lixuan Li, Zhiyue Yang, Fangtao Kuang, Ning Wei, and Jingquan Liu
Shanghai Jiao Tong University, CHINA
- T3P.069 A LOW FREQUENCY MEMS THERMAL VECTOR HYDROPHONE WITH ACOUSTIC VELOCITY HORN**
Xu Ma, Lihao Ma, Wangnan Chen, Beining Wang, Xiaoyu Qi, Nan Zhang, Chengchen Gao, and Zhenchuan Yang
Peking University, CHINA
- T3P.070 A NOVEL HIGH-SENSITIVITY RESONANT ELECTRIC FIELD MICROSENSOR WITH NONLINEAR ENHANCED SENSITIVITY**
Junpeng Wang, Iacheng Li, Wenjie Liu, Jiahao Luo, Zhengwei Wu, and Chunrong Peng
Chinese Academy of Sciences, CHINA

- T3P.071 A PRACTICAL RESONANT MEMS THERMOMETER FOR CRYOGENIC TEMPERATURE APPLICATIONS**
Yueyang Li¹, Benhao Huo¹, Yuan Wang¹, Pui-In Mak¹, Michael Kraft², Yatao Peng¹, Wang Chen², and Pan Zhang³
¹University of Macau, MACAO, ²KU Leuven, BELGIUM, and ³Peking University, CHINA
- T3P.072 A STABILIZED-FLOW PACKAGING METHOD FOR ENHANCED INTERFERENCE RESISTANCE IN ELECTROCHEMICAL VELOCITY-TYPE VECTOR HYDROPHONES**
Nan Zhang, Xiaoyu Qi, Lihao Ma, Yan Zhao, Xu Ma, Zhenchuan Yang, and Chengchen Gao
Peking University, CHINA
- T3P.073 ATO THIN-FILM STRAIN GAUGE: A BREAKTHROUGH IN ULTRA-HIGH-TEMPERATURE SENSING**
Nan Zhao¹, Yusen Wang², Congchun Zhang¹, and Guifu Ding¹
¹Shanghai Jiao Tong University, CHINA and
²Shanghai Aerospace Electronic Technology Institute, CHINA
- T3P.074 DEMONSTRATION OF >30K-CYCLE STABILITY OF A PRINTED-CIRCUIT-BOARD-BASED NETWORK TACTILE SENSOR WITH EMBEDDED SENSOR PLATFORM LSI**
Jorge E. Lopez, Masanori Muroyama, Takashiro Tsukamoto, and Shuji Tanaka
Tohoku University, JAPAN
- T3P.075 DEVELOPMENT OF A VACUUM SUCTION MICRO CUP ARRAY FEATURING VISIONBASED TACTILE SENSING FOR ROBOTIC MANIPULATION - CHARACTERIZATION OF A TRI-AXIAL FORCE DISTRIBUTION SENSOR -**
Yuma Kanazawa¹, Yukiya Matsumura¹, Kazuki Yokohata¹, Sho Ohira¹, Toshihiro Shiratori², Masato Suzuki¹, Tomokazu Takahashi¹, and Seiji Aoyagi¹
¹Kansai University, JAPAN and ²Keio University, JAPAN
- T3P.076 FIRST DEMONSTRATION OF SILICON CARBIDE MICROPHONE**
Siti Aisyah Zawawi¹, Azrul Azlan Hamzah², Burhanuddin Yeop Majlis², and Faisal Mohd-Yasin³
¹Universiti Teknologi MARA, MALAYSIA, ²Universiti Kebangsaan Malaysia, MALAYSIA, and
³Griffith University, AUSTRALIA
- T3P.077 HIGH-INTER-AXIAL-ORTHOGONALITY TRIAXIAL GYROSCOPE WITH BUILDING-BLOCK SENSORS AND COMPENSATION ALGORITHM**
Ipppei Takahashi¹, Hirofumi Funabashi¹, Shota Harada², and Teruhisa Akashi¹
¹Toyota Central R&D Labs., INC., JAPAN and ²MIRISE Technologies Corporation, JAPAN
- T3P.078 INNOVATIVE APPROACH TO CONTACT POSITION AND AREA ESTIMATION VIA RESPONSE MAPPING OF TACTILE SENSOR WITH MICRO CANTILEVERS EMBEDDED IN ELASTOMER**
Ryusuke Mitobe, Harufumi Hosokawa, Takashi Abe, and Masayuki Sohgawa
Niigata University, JAPAN
- T3P.079 MAGNETORESISTIVE SENSORS FOR MICROROBOTICS USING AMORPHOUS OXIDE SEMICONDUCTORS**
Pin-Chun Huang, Guoduan Liu, Rohit Amba, Juan Sanchez, and Camilo Velez Cuervo
University of California, Irvine, USA
- T3P.080 MULTI-AXIS LARGE-RANGE SILICON MICROMACHINED FORCE SENSING SYSTEM**
Lars Holm, Remco J. Wiegerink, and Dennis Alveringh
University of Twente, NETHERLANDS
- T3P.081 NONLINEAR MEMS RESONATOR BASED PROGRAMMABLE PRESSURE SWITCH**
Xuecui Zou¹, Nizar Jaber³, Yuan Liu¹, Dongxiang Luo⁴, Hossein Fariborzi², and Khaled Salama²
¹Guangdong University of Technology, CHINA,
²King Abdullah University of Science and Technology, SAUDI ARABIA,
³Aramco, SAUDI ARABIA, and ⁴Guangdong University, CHINA

- T3P.082 NUCLEAR MAGNETIC RESONANCE FORCE DETECTION USING A MICRO-GLASS-TUBE RESONATOR**
Ryosuke Shibaki, Zilong Zhang, Takahito Ono, and Masaya Toda
Tohoku University, JAPAN
- T3P.083 REDUCING DRIFTS OF MEMS PIEZORESISTIVE GYROSCOPES IN UNCONTROLLED ENVIRONMENT**
Gabriele Laita¹, Francesco Tubaro¹, Andrea Buffoli², Philippe Robert², and Giacomo Langfelder¹
¹Politecnico di Milano, ITALY and ²CEA-Leti, FRANCE
- T3P.084 STUDY ON THERMALLY TUNED ASYMMETRICAL COUPLED RESONATOR AND ITS GAS SENSING APPLICATION**
Zhengliang Fang^{1,4}, Bernardo P. Madeira², Chen Wang², Yuan Wang³, Chun Zhao⁴, Stephanos Theodossiades¹, and Amal Z. Hajjaj¹
¹Loughborough University, UK, ²University of Leuven, BELGIUM, ³University of Macau, CHINA, and ⁴York University, UK
- T3P.085 THREE-DEGREE-OF-FREEDOM MODE LOCALIZED SENSING WITHIN A SINGLE MEMS RESONATOR ENABLED BY TWO PARAMETRIC MODULATION SIGNALS**
Erion Uka¹, Jingqian Xi^{1,2}, and Chun Zhao¹
¹University of York, UK and ²Huazhong University of Science and Technology, CHINA
- T3P.086 TUNABLE FABRICATION OF FLEXIBLE RESISTIVE PRESSURE SENSORS VIA VAPOR-INDUCED PHASE SEPARATION FOR HIGH SENSITIVITY AND WIDE LINEAR DETECTION RANGE**
Seongbeom Heo, Donghyun Lee, Seokmin Kim, and Jungwook Choi
Chung-Ang University, KOREA
- T3P.087 ULTRA-HIGH SENSITIVE IONOTRONIC PRESSURE SENSOR BASED ON ZIF-67 DECORATED PVDF-HFP@IL NANOFIBERS FOR LIP MOTION DETECTION**
Sagar Sapkota, Gagan Bahadur Pradhan, Shital Sharma, and Jae Yeong Park
Kwangwoon University, KOREA

Wednesday - Physical Sensors and Microsystems

- W4P.066 2D CALORIMETRIC THERMAL FLOWMETER WITH INTEGRATED THERMAL CONDUCTIVITY SENSOR**
Jarno Groenesteijn¹, Victor Winnen^{1,2}, and Wouter Sparreboom¹
¹Bronkhorst High-Tech B.V., NETHERLANDS and ²University of Twente, NETHERLANDS
- W4P.067 A DUAL MOTOR TEETER-TOTTER INERTIAL SENSOR WITH HIGH SNR AND WIDE BANDWIDTH FOR BONE-CONDUCTED VOICE DETECTION**
Shubham Shubham, Mohammad F. Zaman, Evan Llamas-Young, Michael L. Kuntzman, Jing Ouyang, and Michael Pedersen
Syntiant Corporation, USA
- W4P.068 A HIGH-SENSITIVITY ELECTROCHEMICAL VIBRATION SENSOR WITH FAST RESPONSE AND HIGH OVERLOAD RESISTANCE CAPABILITY**
Xiaoyu Qi, Nan Zhang, Yan Zhao, Wangnan Chen, Beining Wang, Chengchen Gao, and Zhenchuan Yang
Peking University, CHINA
- W4P.069 A MEMS ACCELEROMETER WITH IN-SENSOR NEUROMORPHIC COMPUTING CAPABILITY**
Yunlong Bai^{1,2}, Wuhaoyang¹, Bingchen Zhu^{1,2}, Zheng Wang², and Xudong Zou^{1,2}
¹Chinese Academy of Sciences, CHINA and ²QiLu Aerospace Information Research Institute, CHINA

- W4P.070 A RESONANT MEMS ELECTRIC FIELD SENSOR BASED ON FEEDBACK CAPACITOR CLOSED-LOOP AND NEURAL NETWORK METHOD FOR TEMPERATURE COMPENSATION**
Jiacheng Li^{1,2}, Junpeng Wang^{1,2}, Jiahao Luo^{1,2}, Wenjie Liu^{1,2}, Zhengwei Wu¹, Ren Ren¹,
and Chunrong Peng¹
¹Aerospace Information Research Institute, CHINA and ²Chinese Academy of Sciences, CHINA
- W4P.071 A RESONANT PRESSURE SENSOR BASED ON WEDGE-SHAPED COMB EXITATIONS**
Wei Jiang, Yulan Lu, Bo Xie, Deyong Chen, Junbo Wang, Jian Chen, and Nan Li
Chinese Academy of Sciences, CHINA
- W4P.072 A STUDY ON THE PHOTOELECTRIC EFFECT OF A MEMS RESONATOR AT CRYOGENIC TEMPERATURE**
Yueyang Li¹, Yancheng Lian¹, Yuan Wang¹, Pui-In Mak¹, Chen Wang², Pan Zhang³, and Yatao Peng¹
¹University of Macau, MACAO, ²KU Leuven, BELGIUM, and ³Peking University, CHINA
- W4P.073 CHARACTERIZATION AND MODELING METHOD OF ELECTRICAL AND MECHANICAL COUPLINGS FOR A MEMS CAPACITIVE GYROSCOPE**
Chunhua He¹, Yingyu Xu¹, Jing Lin¹, Qinwen Huang², Qiancheng Zhao³, Guizhen Yan³, Yanchao Ren⁴,
and Guodong Duan⁴
¹Guangdong University of Technology, CHINA, ²Ministry of Industry and Information Technology, CHINA, ³Peking University, CHINA, and ⁴Hunan VanGuard Group Co.Ltd, CHINA
- W4P.074 DESIGN AND IMPLEMENTATION OF PZT PIEZOELECTRIC MICROMACHINED ULTRASONIC TRANSDUCERS FOR DISTANCE SENSING**
Cheng-Yang Chang¹, Sheng-Hsiang Tseng¹, Yi-Jen Wang¹, Chin-Te Hsin¹, You Qian², Sagnik Ghosh²,
Yao Zhu², Ying-Zong Juang¹, and Tuo-Hung Hou¹
¹Taiwan Semiconductor Research Institute, TAIWAN and ²Institute of Microelectronics, SINGAPORE
- W4P.075 EXTRACTION OF THERMAL PACKAGING STRESS VIA INTRINSIC SILICON ON GLASS STRESS MEASUREMENT**
Ahmet Arif Aslan¹ and Erdinc Tatar^{1,2}
¹Bilkent University, TURKEY and ²National Nanotechnology Research Center (UNAM), TURKEY
- W4P.0756 FREQUENCY DYNAMICS OF MICRO-PERFORATED THERMAL SENSORS: UNLOCKING POTENTIAL IN ACOUSTIC SENSING**
Akash Gupta¹, Achim Bittner¹, and Ing Alfons Dehé^{1,2}
¹Hahn-Schickard-Gesellschaft für angewandte Forschung, GERMANY, and ²University of Freiburg, GERMANY
- W4P.077 HIGH-PERFORMANCE OSCILLATION TRACKING AND FREQUENCY READOUT SYSTEM FOR ALL-QUARTZ MONOLITHIC MEMS RESONANT ACCELEROMETERS ENABLES ULTRA-HIGH STABILITY**
Kai Bu^{1,2}, Cun Li^{1,2}, Yulong Zhao^{1,2}, Hong Xue^{1,2}, Jiabin Ai^{1,2}, Shengxiang Zhou^{1,2}, and Zichao Zhang^{1,2}
¹Xi'an Jiaotong University, CHINA and ²State Key Laboratory for Manufacturing Systems Engineering, CHINA
- W4P.078 INTEGRATED DIAMOND MAGNETOMETER FOR VECTOR MAGNETIC MEASUREMENT**
Xiao Peng¹, Fei Xie¹, Yaochen Zhu¹, Xin Luo^{2,3}, Qihui Liu¹, Yuqiang Hu^{2,3}, Jiachen Han^{2,3}, Lingyun Li¹,
Hao Chen¹, Jiangong Cheng¹, and Zhenyu Wu^{1,2,3}
¹Chinese Academy of Sciences, CHINA, ²Shanghai University, CHINA, and ³Shanghai Industrial Technology Research Institute (SITRI), CHINA
- W4P.079 MEMS MICROPHONE-DRIVEN NEAR-SENSOR RESERVOIR COMPUTING FOR LIGHTWEIGHT TOOL WEAR CLASSIFICATION IN MILLING**
Shang-Yu Lin, Po-Han Chen, Ting-Yi Chen, Pei-Zen Chang, and Wei-Chang Li
National Taiwan University, TAIWAN
- W4P.080 NEAR ZERO-POWER OMNIDIRECTIONAL, IN-PLANE PULL-IN-BASED MEMS SWITCH**
Inês S. Garcia¹, Filipa C. Mota¹, Jorge M. Pereira¹, Fahimullah Khan¹, Carlos Ferreira², Jorge Cabral²,
José Fernandes¹, Rosana A. Dias¹, and Filipe S. Alves¹
¹INL - International Iberian Nanotechnology Laboratory, PORTUGAL and ²Ceiiã, PORTUGAL

- W4P.081 NOVEL DIAMOND NANOWIRE FIELD EMISSION TRIODES AND THEIR APPLICATION AS BUFFER AMPLIFIERS AND VACUUM SWITCHES**
 Yang Wang, Rui Tang and Jinwen Zhang
Peking University, CHINA
- W4P.082 PARAMETRICALLY ACTUATED RESONANT ELECTRIC FIELD MICROSENSOR IN THE DUFFING REGIME**
 Guijie Wang¹, Shenglin Hou², Lifang Ran¹, Jianhua Li¹, Bo Zhang¹, Xiaolong Wen^{1,2}, Najib Kacem³, and Ashwin A. Seshia²
¹University of Science and Technology, Beijing, CHINA, ²University of Cambridge, UK, and ³University of Franche-Comté, Besançon, FRANCE
- W4P.083 SAMPLING-MOIRÉ-METHOD FORCE PLATE ARRAY VIA SINGLE-STEP 3D-PRINTING**
 Ohga Nomura, Yukitake Nakahara, Ami Ogawa, and Hidetoshi Takahashi
Keio University, JAPAN
- W4P.084 SURFACE-MICROMACHINED CMOS-MEMS CAPACITIVE PRESSURE SENSOR WITH ENHANCED SENSITIVITY FOR LOW-PRESSURE APPLICATIONS**
 Feiyun Wang, Xuan Ouyang, and Wei Xu
Shenzhen University, CHINA
- W4P.085 TOWARD ZERO-POWER FEATURE EXTRACTION FOR SPEECH WAKEUP USING HELMHOLTZ RESONATOR ARRAY**
 Po-Han Chen¹, Ting-Yi Chen¹, Shang-Yu Lin¹, Pei-Zen Chang¹, Tay-Jyi Lin², and Wei-Chang Li¹
¹National Taiwan University, TAIWAN and ²National Chung Cheng University, TAIWAN
- W4P.086 TUNABLE PIEZOELECTRIC MEMS MICROPHONE BASED ON INVERSE PIEZOELECTRIC EFFECT**
 Zhuoyue Zheng¹, Xinyu Wu², Chen Wang², Luo Huahuang⁴, Pan Zhang³, Qingqing Ke⁴, Yuan Wang¹, Rui P. Martins¹, and Pui-in Mak Mak¹
¹University of Macau, CHINA, ²University of Leuven, BELGIUM, ³Peking University, CHINA, and ⁴Sun Yat-sen University, CHINA
- W4P.087 ULTRASOUND-BASED BATTERY STATE-OF-CHARGE MONITORING AND HEALTH EVALUATION USING HIGH DIRECTIVITY MEMS TRANSDUCER**
 Jiao Xia, Junhao Wang, Chong Yang, Yinjun Wu, Peng Huang, and Yipeng Lu
Peking University, CHINA

Monday - RF MEMS, Resonators and Oscillators

- M4P.088 EMERGENCE OF EXCEPTIONAL POINTS IN HYBRID COUPLED RESONATORS THROUGH UNI-DIRECTIONAL NEGATIVE DIGITAL SPRING**
 Bernardo P. Madeira¹, Yuan Wang², Chun Zhao³, Xinyu Wu¹, Michael Kraft¹, and Chen Wang¹
¹KU Leuven, BELGIUM, ²University of Macau, CHINA, and ³University of York, UK
- M4P.089 EXPERIMENTAL OBSERVATION OF THE ACOUSTOELECTRIC EFFECT IN MONOLITHICALLY INTEGRATED ALSN/SIC HETEROSTRUCTURES**
 Xingyu Du¹, Chin-Yu Chang¹, Yunfei He¹, Chloe Leblanc¹, Matthew Eichenfield^{2,3}, Deep Jariwala¹, and Roy Olsson¹
¹University of Pennsylvania, USA, ²University of Arizona, USA, and ³Sandia National Labs, USA
- M4P.090 GIGAHERTZ FOCUSING ACOUSTIC DELAY LINES FOR PHONONIC INTEGRATED CIRCUITS**
 Jiawei Li^{1,2}, Yang Li^{1,2}, Daozheng Luo^{1,2}, and Tao Wu^{1,2,3}
¹ShanghaiTech University, CHINA, and ²Shanghai Engineering Research Center of Energy Efficient and Custom AI IC, CHINA

- M4P.091 INTEGRATING A MEMS SPEAKER WITH A SLOT DIPOLE ANTENNA: A WIRELESS AND BATTERYLESS ACOUSTIC TRANSDUCER**
Raul Ruiz, Daniyal Khosh Maram, Xavier Cartoixa and Gabriel Abadal
Universitat Autònoma de Barcelona, SPAIN
- M4P.092 MAGNETICALLY TUNABLE GIGAHERTZ PHASE SHIFTERS UTILIZING MULTIFERROIC COMPOSITE THIN FILM STRUCTURES**
Mingye Du³, Chuang Man¹, Yuxi Wang³, Xuankai Xu¹, Daozheng Luo¹, Jiawei Li³, Yang Li¹, Fengyu Liu¹, Lu Sun¹, Yumeng Yang², and Tao Wu⁴
¹*ShanghaiTech University, CHINA*, ²*Chinese Academy of Sciences, CHINA*,
³*University of Chinese Academy of Sciences, CHINA* and
⁴*Shanghai Engineering Research Center of Energy Efficient and Custom AI IC, CHINA*
- M4P.093 NEW METHOD FOR EVALUATING INTRINSIC MECHANICAL Q FACTOR OF SCALN, GAN, METAL FILMS BY GHZ ULTRASONIC PULSE-ECHO TECHNIQUE**
Cocono Mita^{1,2}, Yohkoh Shimano^{1,2}, and Takahiko Yanagitani^{1,2}
¹*Waseda University, JAPAN* and ²*ZAIKEN, JAPAN*
- M4P.094 SAW EXCITATION BY SOLID FLAT ELECTRODE ON PERIODICALLY POLARIZATION INVERTED STRUCTURE FOR NOVEL RF FILTER**
Yuichiro Hidaka^{1,2}, Satoshi Matumura^{1,2}, Naoki Ono^{1,2}, Yohkoh Shimano^{1,2}, and Takahiko Yanagitani^{1,2}
¹*Waseda University, JAPAN* and ²*ZAIKEN, JAPAN*
- M4P.095 SURFACE ACOUSTIC WAVE / SPIN WAVE COUPLING BEHAVIOUR OF SCALN/SI BASED SAW DEVICES AT CRYOGENIC TEMPERATURES**
Ioana Zdru¹, Claudia Nastase¹, Andrei Florescu¹, George Boldeiu¹, Daniele Narducci², Monica Nedelcu¹, Dan Vasilache¹, Sergiu Iordanescu¹, Alexandra Nicoloiu¹, Christoph Adelmann², Adrian Dinescu¹, Mathias Weiler³, Florin Ciubotaru², Phillipp Pirro³, and Alexandru Müller¹
¹*IMT Bucharest, ROMANIA*, ²*imec, BELGIUM*, and
³*Fachbereich Physik and Landesforschungszentrum OPTIMAS, RPTU Kaiserslautern-Landau, GERMANY*
- M4P.096 THIN-FILM SCANDIUM ALUMINUM NITRIDE BULK ACOUSTIC RESONATOR WITH HIGH Q OF 208 AND K2 OF 9.5% AT 12.5 GHZ**
Sinwoo Cho¹, Yinan Wang¹, Eugene Kwon², Lezli Matto², Omar Barrera¹, Michael Liao², Jack Kramer¹, Tzu-Hsuan Hsu¹, Vakhtang Chulukhadze¹, Ian Anderson¹, Mark Goorsky² and Ruo Chen Lu¹
¹*University of Texas, Austin, USA* and ²*University of California, Los Angeles, USA*

Tuesday - RF MEMS, Resonators and Oscillators

- T3P.088 A 16 GHZ TOPOLOGICAL ELECTRICAL CIRCUIT USING INTERCHIP MUTUAL INDUCTANCE FABRICATED BY DUAL-DAMASCENE PROCESS**
Ryohei Takahashi, Shun Yasunaga, Tetsuya Iizuka, Akio Higo, Ryosho Nakane, Motohiko Ezawa, and Yoshio Mita
University of Tokyo, JAPAN
- T3P.089 BAW TRANSFORMER FOR RECTENNA USING 12-LAYER POLARIZATION INVERTED STRUCTURE**
Yuichiro Hidaka^{1,2}, Sarina Kinoshita^{1,2}, Yohkoh Shimano^{1,2}, and Takahiko Yanagitani^{1,2}
¹*Waseda University, JAPAN* and ²*ZAIKEN, JAPAN*
- T3P.090 GEOMETRICAL MODE-MATCHING IN A (100) SINGLE-CRYSTALLINE SILICON, SMOOTH-QUATREFOIL DISK RESONATOR**
Danny A. Kassie¹, Gabrielle D. Haddon-Vukasin², Michael Feldman¹, Thomas W. Kenny², and David Elata¹
¹*Technion - Israel Institute of Technology, ISRAEL* and ²*Stanford University, USA*
- T3P.091 HIGH SENSITIVITY OF FILM BULK ACOUSTIC RESONATOR SENSORS BASED ON NONLINEAR PT SYMMETRIC SYSTEM**
Zhenyu Wei, Jianqiu Huang, and Qing'an Huang
Southeast University, CHINA

- T3P.092 LITHIUM NIOBATE ACOUSTIC RESONATORS OPERATING BEYOND 900 °C**
Walter Gubinelli¹, Hasan Karaca², Ryan Tetro¹, Sariha N. Azad², Philip Feng², Luca Colombo¹, and Mattero Rinadli¹
¹Northeastern University, USA and ²University of Florida, USA
- T3P.093 MOS2 NANO-RESONANT SENSOR BASED ON INTERNAL RESONANCE STATE EXCITATION FREQUENCY COMB**
Zhuji Zhao, Lijia Zhang, Jiajia Xiang, Hongyang Xiao, Maogang Li, Yizhou Wang, Hao Lyu, Yuanlin Xia, Zhuqing Wang, and Cao Xia
Sichuan University, CHINA
- T3P.094 NOVEL TESTBED FOR ACOUSTOELECTRIC LOSS ANALYSIS IN LAMB WAVE LITHIUM NIOBATE ON SILICON DELAY LINES**
Tanvir Hasan, Hakhamanesh Mansoorzare, and Reza Abdolvand
University of Central Florida, USA
- T3P.095 SCALABLE 3D MICROPILLAR FREQUENCY SELECTIVE DEVICES FOR LOW-LOSS TERAHERTZ BANDPASS APPLICATIONS**
Md Mufassal Ahmad¹, Danil Khaiumov¹, Jun Ying Tan¹, Cheolbok Kim², Jens Neu¹, and Jungkwun 'JK' Kim¹
¹University of North Texas, USA and ²Corning Incorporated, USA
- T3P.096 THERMAL RESILIENCE OF SUSPENDED THIN-FILM LITHIUM NIOBATE ACOUSTIC RESONATORS UP TO 550 °C**
Mihir Chaudhari, Naveed Ahmed, Vivek Tallavajhula, Joshua Campbell, Yinan Wang, Ziran Du, and Ruochen Lu
University of Texas, Austin, USA
- T3P.097 WIDE-BAND ACOUSTIC DELAY LINES BASED ON DUAL SINGLE-PHASE UNIDIRECTIONAL TRANSDUCERS**
Yang Li¹, Jiawei Li¹, and Tao Wu^{1,2,3}
¹ShanghaiTech University, CHINA, ²Chinese Academy of Sciences, CHINA, and ³Shanghai Engineering Research Center of Energy Efficient and Custom AI IC, CHINA

Wednesday - RF MEMS, Resonators and Oscillators

- W4P.088 A SPURIOUS-MODE-SUPPRESSED AND Q-ENHANCED CIRCULAR-CRESTED LAMB WAVE RESONATOR**
Xianzheng Lu¹, Liang Lou^{2,3}, and Hao Ren¹
¹ShanghaiTech University, CHINA, ²Shanghai University, CHINA, and ³Shanghai Industrial Technology Research Institute, CHINA
- W4P.089 ENHANCED FREQUENCY STABILITY IN A BLUE-SIDEBAND EXCITED MEMS RESONATOR WITH PHONONIC-FREQUENCY-COMBS-LIKE BEHAVIOUR**
Jingqian Xi^{1,2}, Erion Uka², and Chun Zhao¹
¹University of York, UK and ²Huazhong University of Science and Technology, CHINA
- W4P.090 GIGAHERTZ BENDING ACOUSTIC WAVEGUIDES IN ALUMINUM SCANDIUM NITRIDE FILM**
Yang Li^{1,2,3}, Lihui Jin^{1,2,3}, Jiawei Li^{1,2,3}, and Daozheng Luo^{1,2,3}
¹ShanghaiTech University, CHINA, ²Chinese Academy of Sciences, CHINA, and ³University of Chinese Academy of Sciences
- W4P.091 HIGH-PERFORMANCE SOLIDLY MOUNTED BIDIMENSIONAL MODE RESONATORS (S2MRS) OPERATING AROUND 16 GHz**
Luca Spagnuolo, Luca Colombo, Kapil Saha, Gabriel Giribaldi, Pietro Simeoni, and Matteo Rinaldi
Northeastern University, USA

W4P.092 LITHIUM TANTALATE BULK ACOUSTIC RESONATOR FOR PIEZOELECTRIC POWER CONVERSION

Ziqian Yao¹, Clarissa Daniel², Eric Stolt², Vakhtang Chulukhadze¹, Juan Rivas Davila², and Ruo Chen Lu¹
¹University of Texas, Austin, USA and ²Stanford University, USA

W4P.093 NBN SUPERCONDUCTING ELECTRODES FOR CRYOGENIC LAMB WAVE RESONATORS ON LITHIUM NIOBATE WITH ENHANCED QUALITY FACTORS

Wenzhen Li¹, Yushuai Liu¹, Jiawei Li¹, Peng Dong¹, Jun Li¹, and Tao Wu^{1,2}
¹ShanghaiTech University, CHINA and ²Chinese Academy of Sciences, CHINA

W4P.094 REVEALING HIDDEN RESONANCES THROUGH AN INNOVATIVE BONDING WIRE STRATEGY

Zhong-Wei Lin and Sheng-Shian Li
National Tsing Hua University, TAIWAN

W4P.095 STRIP-LOADED OVERLAY SH₀ WAVEGUIDE BASED DIRECTIONAL COUPLERS IN THIN FILM LITHIUM NIOBATE ON INSULATOR

Chuan Tian, Jack Guida, and Siddhartha Ghosh
Northeastern University, USA

W4P.096 THIN-FILM PIEZOELECTRIC SUSPENDED MEMS RESONATORS FOR REDUCING ANCHOR LOSS

Maliha Sultana, Hamed Atashbar, Tanvir Hasan, Hakhamanesh Mansoorzare, and Reza Abdolvand
University of Central Florida, USA

Monday - Wearable and In-Vivo Medical Devices and Microsystems

M4P.097 3D-PRINTED OPTOGENETIC DEVICE WITH A RECORDING-CHANNEL-EMBEDDED WAVEGUIDE

Keonghwan Oh¹ and Sohmyung Ha²
¹New York University, Abu Dhabi, UAE and ²New York University, USA

M4P.098 A SILK-BASED BIDIRECTIONAL FLEXIBLE EXTRAVASCULAR BIOINTERFACE

Xiner Wang¹, Weijian Fan², Yuxin Liu¹, Li Chen², Erda Zhou¹, Xiaoling Wei¹, Liuyang Sun¹, Bo Yu², Jinyun Tan², Tiger H. Tao¹, and Zhitao Zhou¹
¹Chinese Academy of Sciences, CHINA and ²Huashan Hospital of Fudan University, CHINA

M4P.099 AN INTRABODY ULTRASONIC FREQUENCY MODULATION COMMUNICATION MICROSYSTEM BASED ON PIEZOELECTRIC MICROMACHINED ULTRASONIC TRANSDUCERS

Chenyuan Zhang, Chong Yang, Yiwei Guo, Xinyue Zhang, Zhihong Li, and Bowen Sheng, Yipeng Lu
Peking University, CHINA

M4P.100 ELASTICITY-INDEPENDENT ANGLE DETECTION FOR DIRECTIONAL PALPATION USING A MICROFINGER BY INTEGRATED DESIGN OF FLEXIBLE STRAIN SENSORS

Yuto Hori and Satoshi Konishi
Ritsumeikan University, JAPAN

M4P.101 IMPLANTABLE ELECTRONIC DEVICES BASED ON OMNIDIRECTIONAL PRE-STRETCHED SILK FILMS

Siyuan Ni¹, Huiran Yang¹, Ziyi Zhu¹, Zhengyu Liang¹, Dujuan Zou¹, Jianbo Jiang¹, Wenyan Liu¹, Zhitao Zhou¹, Liuyang Sun¹, Tiger H. Tao^{2,3}, Xiaoling Wei¹, and Keyin Liu¹
¹Chinese Academy of Sciences, CHINA,
²Guangdong Institute of Intelligence Science and Technology, CHINA, and
³Tianqiao and Chrissy Chen Institute for Translational Research, CHINA

M4P.102 REAL-TIME MONITORING OF HAPTIC RESPONSE USING ULTRA-THIN SI/PZT STACKED SENSORS AND ACTUATORS IN SOFT FLEXIBLE PACKAGING FOR WEARABLE AND MEDICAL APPLICATIONS

Daniel Zymelka¹, Toshihiro Takeshita¹, Yusuke Takei¹, Takeshi Kobayashi¹, and Takashi Hanakawa²
¹National Institute of Advanced Industrial Science and Technology (AIST), JAPAN and
²Kyoto University, JAPAN

M4P.103 ROBOTIC ACTUATION MODULE TOWARD A SUBEPITHELIAL SEROTONIN SENSING INGESTIBLE CAPSULE

Sydney N. Overton, Michael A. Straker, and Reza Ghodssi
University of Maryland, College Park, USA

M4P.104 ULTRASONICALLY POWERED IMPLANTABLE MICRODEVICE PLATFORM FOR WIRELESS IN-SITU MULTIMODAL CANCER THERAPY

Sophia Selvarajan and Albert Kim
University of South Florida, USA

Tuesday - Wearable and In-Vivo Medical Devices and Microsystems

T3P.098 A BIOCOMPATIBLE AND HIGH-SENSITIVE EPIDERMAL GLUCOSE BIOSENSOR MODIFIED BY AN ENHANCED CATALYTIC ZWITTERIONIC HYDROGEL

Wenjun Li, Chengcheng Li, Yuxiao Ma, Wangwang Zhu, Xingguo Zhang, Hao Zheng, Dachao Li, and Zhihua Pu
Tianjin University, CHINA

T3P.099 A VARIABLE-STIFFNESS CATHETER WITH INTEGRATED FORCE SENSING FOR SURGICAL APPLICATIONS

Xiaotong Guo¹, Qindong Zheng¹, Jinshi Zhao¹, Burak Temelkuran¹, Bing Li², and Eric Yeatman¹
¹Imperial College, London, UK and ²University College, London, UK

T3P.100 BALLOON CATHETER WITH INTEGRATED AIRFLOW SENSOR FOR RESPIRATION MEASUREMENT INSIDE LUNG AIRWAY

Jun Yoshida¹, Muhammad Salman Al Farisi¹, Yoshihiro Hasegawa¹, Miyoko Matsushima², Tsutomu Kawabe², and Mitsuhiro Shikida¹
¹Hiroshima City University, JAPAN and ²Nagoya University, JAPAN

T3P.101 ELECTRODE SHAPE OPTIMIZATION FOR ROBUST INTERFACE BETWEEN ULTRA THIN FILM AND METAL ELECTRODE

Takashi Sato¹, Aoi Okonogi², Fujita Hajime², Tatsumi Horii², Junya Kurumida¹, Toshinori Fujie², and Eiji Iwase³
¹National Institute of Advanced Industrial Science and Technology (AIST), JAPAN,
²Institute of Science, Tokyo, JAPAN, and ³Waseda University, JAPAN

T3P.102 LAYER BY LAYER ASSEMBLY OF ALTERNATING SACRIFICIAL MICROFLUIDIC CHANNEL TEMPLATE WITH STRUCTURAL SILICONE FOR MULTILAYER MICROFLUIDIC BLOOD OXYGENATOR FABRICATION

Anand Sojan and Ponnambalam RAVI. Selvaganapathy
McMaster University, CANADA

T3P.103 RING-SHAPED MICROPARTICLE AUTONOMOUSLY ANCHORED IN MICROCHANNEL FOR INTRAVASCULAR IMPLANTABLE DEVICES

Masaaki Oshita, Tetsuo Kan, and Kazuto Masamoto
University of Electro-Communications, JAPAN

- T3P.104 SPECTRAL ANALYSIS OF CAROTID ARTERY VIBRATIONS USING A WEARABLE SEISMIC PATCH FOR DETECTION OF STENOSIS AND DISSECTION**
Houriyeh Majditehran¹, Nia Desai¹, Brian Sang¹, Jin-Woo Park², Haoran Wen², Greg Junek², Fadi Nahab³, and Farrokh Ayazi^{1,2}
¹Georgia Institute of Technology, USA, ²StethX, USA, and ³Emory School of Medicine, USA

Wednesday - Wearable and In-Vivo Medical Devices and Microsystems

- W4P.097 3D LIPID MICROROBOTS FOR SIMULTANEOUS DELIVERY OF LIPOPHILIC AND HYDROPHILIC DRUGS.**
Jongeon Park, Arnaud Bertsch, and Juergen Brugger
École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND
- W4P.098 A CMOS-MEMS NEURAL RECORDING SYSTEM BASED ON IN-SITU INTEGRATION OF CMOS CHIPS ON NEURAL PROBE**
Haoyuan Chen, Longchun Wang, Jiawei Cao, Ning Wei, Zixing Li, Jingjing An, Kaijie Yang, Fangtao Kuang, Zhiyue Yang, Zhiyuan Du, and Jing-quan Liu
Shanghai Jiao Tong University, CHINA
- W4P.099 ACCURATE SUBCUTANEOUS GLUCOSE PREDICTION BASED ON REVERSE IONTOPHORESIS WITH SKIN SURFACE PH CALIBRATION**
Wangwang Zhu, Haixia Yu, Xi Li, Wenjun Li, Chenxi Jin, Hao Zheng, Xingguo Zhang, Dachao Li, and Zhihua Pu
Tianjin University, CHINA
- W4P.100 DEVELOPMENT OF INFILTRATING MICRONEEDLE ARRAYS FOR DRUG DELIVERY SYSTEM OF BIOMACROMOLECULES**
Genta Furuhashi¹, Haruna Kozuki¹, Masato Fujioka², and Yuta Kurashina¹
¹Tokyo University of Agriculture and Technology, JAPAN and ²Kitasato University, JAPAN
- W4P.101 HOLLOW MICROCATETER ACTUATOR AND MEMS THERMAL FLOW SENSOR HYBRIDIZATION TOWARD RESPIRATION MEASUREMENT INSIDE 1 MM DIAMETER BRONCHIOLES IN LUNG AIRWAY**
Aoi Hirayama¹, Muhammad Salman Al Farisi¹, Yoshihiro Hasegawa¹, Miyoko Matsushima², Tsutomu Kawabe², and Mitsuhiro Shikida¹
¹Hiroshima City University, JAPAN and ²Nagoya University, JAPAN
- W4P.102 MICROPOCKET-INTEGRATED MICRONEEDLE WOUND DRESSING WITH PH-RESPONSIVE ACTUATION FOR ENHANCED DRUG DELIVERY**
Mahsa Rastegar Pour¹, Dongjoon Lee², Syed Hassan Mehdi², Rana Saha³, Jun Ying Tan¹, Donghoon Yoon², Albert Kim⁴, and Jungkwun 'JK' Kim¹
¹University of North Texas, USA, ²University of Arkansas for Medical Sciences, USA, ³University of South Florida, USA, and ⁴University of South Florida, USA
- W4P.103 SMART SKIN FOR FLAPPING-WING ROBOTICS WITH ENVIRONMENT SENSING AND ATTITUDE MONITORING CAPABILITIES**
Fangyu Zhao^{1,3}, Jiachuang Wang^{1,3}, Wenyuan Liu¹, Nan Qin^{1,3}, and Tiger H. Tao^{3,4}
¹Shanghai Institute of Microsystem and Information Technology, CHINA,
²Chinese Academy of Sciences, CHINA,
³Guangdong Institute of Intelligence Science and Technology, CHINA, and
⁴Tianqiao and Chrissy Chen Institute for Translational Research
- W4P.104 TRANSFLEX: A FLEXIBLE MULTI-SHANK IMPLANTABLE NEUROELECTRODE WITH VARIABLE STIFFNESS BASED ON PATTERNABLE SOLUBLE DEXTRAN-PULLULAN SUPPORT LAYER**
Zhitong Zhang, Lexuan Yang, Xiaoyong Tang, Yarui Li, Jiayan Zhang, Zhe Huang, Yu-Qing Zheng, and Zhihong Li
Peking University, CHINA

Monday – Late News

- M4P.107 A BIODEGRADABLE, WIRELESS, IMPLANTABLE MICROPUMP FOR PERIPHERAL NERVE REPAIR**
Elena Aprea, Francesco Stallone, Feyza Pirim, Leon Abelmann, Pasqualina M. Sarro, and Clementine Boutry
Delft University of Technology, NETHERLANDS
- M4P.108 A MICRO MRI SYSTEM INTEGRATING A PERFUSION MECHANISM AND A MICRO PRESSURE SENSOR FOR BIOMEDICAL MONITORING**
Tetsuji Dohi, Riku Niitsu, and Ryo Hayamizu,
Chuo University, JAPAN
- M4P.110 AN OPEN-SOURCE, MICROFABRICATED, SELF-CLOSING CUFF ELECTRODE WITH CONDUCTIVE POLYMER COATING FOR IMPROVED ELECTROCHEMICAL PERFORMANCE**
Quentin Rezard ,Max Li, Paritosh Rustogi, Mona A. Mohamed, Alberto Esteban-Linares, Brianna Thielen and Ellis Meng
University of Southern California, USA
- M4P.111 DAIRY 4.0: IMPLANTABLE 3D-PRINTED MICROSENSORS FOR ON-FARM HEALTH MONITORING IN LACTATING COWS**
Md Azahar Ali and Matin Ataei Kachouei
Virginia Tech, USA
- M4P.112 DEVELOPMENT OF PIEZOELECTRIC 1D SCANNING MICROMIRROR USING MAGNESIUM AS A STRUCTURAL LAYER**
Youngsun Yun and Chang-Hyeon Ji
Ewha Womans University, KOREA
- M4P.113 FABRICATION OF SOFT THERMAL BIMORPH MICROACTUATOR VIA FEMTOSECOND LASER SURFACE CARBONIZATION**
Yasuko Tanaka, Yoshihiro Taguchi, and Masaaki Hashimoto
Keio University, JAPAN
- M4P.114 GEAR TRAIN-ENABLED LOW-POWER THERMOMECHANICAL BIOPSY SYSTEM FOR INGESTIBLE CAPSULES**
Michael A. Straker, Joshua A. Levy, Patrick A. Sweeney, and Reza Ghodssi
University of Maryland, College Park, USA
- M4P.115 IMPEDANCE MODELING PROVIDING ENHANCED UNDERSTANDING OF MITOCHONDRIAL BIOENERGETICS UTILIZING A NOVEL 3D MICROELECTRODE ARRAY-BASED BIOSENSOR**
Yamilet Rocha¹, Randall K. James², Aakash Patel², James Hickman², Swaminathan Rajaraman², and Jorge Manrique Castro¹
¹*The University of Texas at El Paso, USA* and ²*University of Central Florida, USA*
- M4P.116 LASER PATTERNED SELF-ALIGNED ELECTRODES FOR DUAL-SHELL HEMISPHERICAL RESONATOR GYROSCOPE**
Austin R. Parrish, Lois Meira Lopez, Mohammad H. Asadian Ardakani, Esther Wong, and Andrei M. Shkel
University of California, Irvine, USA

- M4P.117 LOW-VOLTAGE MILLIMETER-SCALE LIQUID MICROPUMP USING A PZT THIN-FILM DIAPHRAGM ACTUATOR FOR A 3D-STACKED FLUID SENSOR SYSTEM**
 Yuki Okamoto¹, Ryo Oda^{1,2}, Kei Ohara^{1,2}, Rihachiro Nakashima^{1,2}, Sucheta Gorwadkar¹, Yasuyuki Yamamoto¹, Tomoya Muramoto¹, Takeshi Kobayashi¹, Yusuke Takei¹, and Hironao Okada¹
¹National Institute of Advanced Industrial Science and Technology (AIST), JAPAN and ²Keio University, JAPAN
- M4P.118 OPTIMIZED INTERFACIAL PROPERTIES OF IONIC LIQUID-BASED FLEXIBLE STRAIN SENSOR FOR PERFORMANCE STABILIZATION**
 Jong-Hyun Na¹, Jae-Sung Park², and Woo-Tae Park¹
¹Seoul National University of Science and Technology, KOREA, and ²The Catholic University of Korea, KOREA
- M4P.119 SIGNAL AMPLIFICATION STRATEGY BASED ON HEAT-RESISTANT APTAMERS FOR MERCURY ION DETECTION USING BIO-FET**
 Guan-Cheng Zeng and Yu-Lin Wang
 National Tsing Hua University, TAIWAN
- M4P.120 ULTRASONICALLY-ACTIVATED AND MAGNETICALLY-CONTROLLED MICRO BIDIRECTIONAL FLOW SYSTEM BASED ON MAGNETIC FLUID GENERATED TEMPERATURE GRADIENT**
 Nayeon Ko¹, Eunjeong Byun¹, Albert Kim², and Seung Hyun Song¹
¹Sookmyung Women's University, KOREA and ²University of South Florida, USA
- M4P.121 DESIGN OF STRUCTURAL COLOR METAMATERIAL TRANSDUCER FOR MULTI-GAS SENSING BY ITS INDEPENDENT SPECTRAL AND ANGULAR INTERROGATION**
 Radislav A. Potyrailo, Shiyao Shan, and Baokai Cheng
 GE Vernova Advanced Research Center, USA

Tuesday – Late News

- T3P.105 A HITCHHIKER'S GUIDE TO CO-RESONANT ENHANCEMENT IN MICROMECHANICAL SENSORS**
 Nynne B. Edeler, Ioannis Lampouras, and Julia Körner
 Leibniz University Hannover, GERMANY
- T3P.106 A NOVEL GAUSSIAN DOPING PROFILE MODEL FOR HIGH-EFFICIENCY TCS PREDICTION IN PIEZORESISTIVE SENSORS**
 Zhiheng Yu, Changyuan Mai, Fengyang Li, and Dacheng Zhang
 Peking University, CHINA
- T3P.107 AI-ASSISTED VIRTUAL TESTING METHOD FOR MECHANICAL PERFORMANCE OF STRETCHABLE SILICON ARRAYS**
 Bo Wen¹, Han Xu¹, Yikang Ding¹, and Wei Wang^{1,2,3}
¹Peking University, CHINA,
²National Key Laboratory of Advanced Micro and Nano Manufacture Technology, CHINA, and
³Beijing Advanced Innovation Center for Integrated Circuits, CHINA
- T3P.108 BATTERY-FREE WIRELESS PRESSURE SENSOR FOR INTRAVASCULAR IMPLANTATION UTILIZING CHANGES IN ELECTRICAL BOUNDARY CONDITIONS**
 Fumihito Kato¹, Takato Otake¹, Takeru Yoshida¹, Yuki Mitsuyama¹, and Hirotsugu Ogi²
¹Nippon Institute of Technology, JAPAN and ²Osaka University, JAPAN
- T3P.109 DEEP EUTECTIC SOLVENT-BASED ALL-IN-ONE DESIGN ELECTRICAL STIMULATION WOUND DRESSING**
 Jia-Yu Yang and Cheng-Hsin Chuang
 National Sun Yat-sen University, TAIWAN

- T3P.110 EFFECT OF PUMP FREQUENCY AND POWER ON 1:1 MECHANICAL FREQUENCY COMBS**
Seyyed Mojtaba Hassani Gangaraj, Yue Zheng, and Azadeh Ansari
Georgia Institute of Technology, USA
- T3P.111 FACILE LASER FABRICATION OF FLEXIBLE FREE-STANDING THERMAL SENSOR FOR WALL SHEAR STRESS DETECTION**
Ayaka Sueyoshi, Muhammad Salman Al Farisi, Yoshihiro Hasegawa, and Mitsuhiro Shikida
Hiroshima City University, JAPAN
- T3P.112 HIGHLY ACCURATE WIDE-RANGE MEMS HYBRID VACUUM SENSOR WITH HIGHLY ACCURATE GAS IDENTIFICATION**
Jingping Qiao^{1,2}, Binbin Jiao¹, Sibol Li³, Ruiwen Liu¹, Yanmei Kong¹, YuXin Ye¹, Xin Liu⁴, and Zilong Wang^{1,2}
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- T3P.113 IN-PLANE-STRESS-TYPE VAPOR SENSER WITH HIGHER Q FACTOR BASED ON INDEPENDENT VIBRATION OF SI RESONATOR**
Mao Horiguchi, Takahito Ono, and Masaya Toda
University of Tohoku, JAPAN
- T3P.114 LEGO-INSPIRED RECONFIGURABLE PHONONIC CRYSTAL SENSOR FOR VERSATILE LIQUID IDENTIFICATION**
Jeewon Shin, Ibrahim Syed Muhammad Anas, and Jungyul Park
Sogang University, KOREA
- T3P.115 MINIATURIZED PIEZORESISTIVE INTRACRANIAL PRESSURE SENSOR WITH "PENINSULA-ISLAND-BEAM" MEMBRANE**
Cheng Zhang¹, Xiangguang Han¹, Yong Xia¹, Chen Jia¹, Yi Gao¹, Zeyu Cui¹, Shuaiyi Li¹, Shengqi Wang¹, Ping Yang¹, Yang Lu², Lihong Fan³, and Libo Zhao¹
¹Xi'an Jiaotong University, CHINA, ² Zhuzhou CRRC Times Electric Co., LTD, CHINA, and ³The First Affiliated Hospital of Xi'an Jiaotong University, CHINA
- T3P.116 RELIABLE TEMPERATURE - CONTROLLED SWITCHING BETWEEN POSITIVE AND NEGATIVE THERMAL COEFFICIENT OF RESISTANCE IN CONTINUOUS CARBON FIBER - POLY (E-CAPROLACTONE) COMPOSITES**
Kerem Kaya, Fengyi Shen, Ulrica Edlund, and Wouter van der Wijngaart
KTH Royal Institute of Technology, SWEDEN
- T3P.117 SIMULTANEOUS WIRELESS POWER AND DATA TRANSFER TO BIOMEDICAL IMPLANTS VIA SERIES-RESONANT CAPACITIVE LINKS**
Mohammad Mobaraki, Hossein Yaghobi, Hossein Miri Lavasani, and Pedram Mohseni
Case Western Reserve University, USA

Wednesday – Late News

- W4P.105 VOLATILE AND NON-VOLATILE NANO-ELECTROMECHANICAL SWITCHES WITH RUTHENIUM-ENHANCED NANO CONTACTS**
Yingying Li¹, Simon J. Bleiker¹, Elliott Worsey², Mukesh K. Kulsreshath², Jens Bolten³, Lisa Ehlert³, Dinesh Pamunuwa², and Frank Niklaus¹
¹KTH Royal Institute of Technology, SWEDEN, ²University of Bristol, UK, and ³AMO GmbH, GERMANY

- W4P.106 A MEMS PIRANI VACUUM SENSOR WITH MESH SUPPORT BEAM FOR EXTENDING THE LOWER LIMIT OF VACUUM MEASUREMENT**
Zilong Wang^{1,2}, Ruiwen Liu¹, Jingping Qiao^{1,2}, Binbin Jiao¹, and Yanmei Kong¹
¹*Institute of Microelectronics of the Chinese Academy of Sciences, CHINA, and*
²*University of Chinese Academy of Sciences, CHINA*
- W4P.107 ADVANCED FLEXURE DESIGN FOR LARGE-STROKE MEMS COMB-DRIVE ACTUATION**
Ilgar Jafarsadeghipournaki, Aron Micheal, Eying Sim Wong, Jayden Moore, and Hemanshu R. Pota
University of New South Wales, AUSTRALIA
- W4P.108 ALN THIN-FILM PIEZOELECTRIC-ON-SILICON TRANSDUCERS FOR IN-SENSOR COMPUTING**
Hsiang-Chun Hsiao, Zong-Xian Guan, and Yi Chiu
National Yang Ming Chiao Tung University, TAIWAN
- W4P.109 BREAST TUMOR-ON-CHIP INCORPORATING 3D CANCER SPHEROIDS CULTURE FOR TARGETED DRUG COMBINATION TESTS AND DEVELOPMENTS**
Tsai-Yu Shih¹, Lee-Wei Yang¹, Chao-Ling Yao², and Cheng-Hsien Liu¹
¹*National Tsing Hua University, TAIWAN and* ²*National Cheng Kung University, TAIWAN*
- W4P.111 ELECTRON BEAM SPOT INTENSITY UNIFORMITY DETECTION SYSTEM BASED ON SUSPENDED NANO PHOTOGRAPHIC PLATES**
Shiyang Yuan, Fengjun Yu, Xuanqing Hua, Jiawei Zhou, Peng Liu, and Dacheng Zhang
Peking University, CHINA
- W4P.113 HIGHLY SENSITIVE BIOCHEMICAL ANALYSIS BASED ON A SINGLE MOLECULE SERS MEASUREMENT USING A GOLD NANOPARTICLE DIMER**
Takashi Doi, Tomoya Shinabe, Akio Uesugi, Koji Sugano, and Yoshitada Isono
Kobe University, JAPAN
- W4P.114 LASER MICROMACHINED 3D-SHAPED FREE-STANDING STRUCTURES ON FLEXIBLE SUBSTRATE FOR THERMAL FLOW SENSOR**
Mohammad Nizar Mohamed Zukri, Muhammad Salman Al Farisi, Yoshihiro Hasegawa, and Mitsuhiro Shikida
Hiroshima City University, JAPAN
- W4P.115 LONG-PERIOD GRATINGS IN PERFLUORINATED PLASTIC OPTICAL FIBERS IMPLEMENTED BY MICRO DRY-ETCHING TECHNIQUE**
Keito Ishida¹, Takuto Nakanishi¹, Ryo Nakashima¹, Shimbu Shirai², Ryuki Ohata², Haruyuki Kubota², Cheng-Yao Lo³, Heeyoung Lee⁴, Yosuke Mizuno², and Daisuke Yamane¹
¹*Ritsumeikan University, JAPAN,* ²*Yokohama National University, JAPAN,* ³*National Tsing Hua University, TAIWAN, and* ⁴*Shibaura Institute of Technology, JAPAN*
- W4P.116 NON-INVASIVE DETECTION OF VEGF SECRETION FROM SMALL MSC CLUSTERS USING VEGF-SSSA INTEGRATED INTO THE CELLSTUDIO PLATFORM**
Enrique Azuaje-Hualde, Naiara Lartitegui-Meneses, Fernando Benito-López, and Lourdes Basabe-Desmonts
¹*University of the Basque Country, SPAIN*
- W4P.117 ROTATIONAL MORPHING OF A LOW-POWER ELECTROTHERMAL KIRIGAMI MEMS ACTUATOR VIA LOW-COST PWM HEATING**
Masaaki Hashimoto, Yuki Matsuoka, Tomoya Tsutsui, and Yoshihiro Taguchi
Keio University, JAPAN
- W4P.118 TUNABLE RESONANT ACCELEROMETER VIA LOOP GAIN CONTROL AND NONLINEAR EFFECT**
Yu-Chi Chuang, Yuan-Chieh Lee, and Yi Chiu
National Yang Ming Chiao Tung University, TAIWAN