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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*

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- T2C.05 CONTINUOUS SEPARATION AND MECHANOPORATION OF WHITE BLOOD CELLS FROM A WHOLE BLOOD SAMPLE THROUGH MICROPILLAR ARRAYS 235**
Naotomo Tottori¹, Ryo Takahashi¹, Hiroki Fukunaga¹, Satoshi Yotsumoto²,
Yoshitaka Shirasaki³, Shigeo S. Sugano⁴, Shinya Sakuma¹, and Yoko Yamanishi¹
¹Kyushu University, JAPAN, ²Tokyo University of Pharmacy and Life Sciences, JAPAN,
³University of Tokyo, JAPAN, and
⁴National Institute of Advanced Industrial Science and Technology, JAPAN

Session T2D - Physical & Optical Sensors

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- T2D.01 FIBER-OPTIC SENSORS WITH WATER-IMMERSIVE MEMBRANES FOR ULTRA-SENSITIVE LOW-FREQUENCY HYDROACOUSTIC DETECTION 239**
Xingyu Wei, Shoulu Gong, Junfeng Zhou, Zhaoliang Peng, Lei Shao, and Wenming Zhang
Shanghai Jiao Tong University, CHINA

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- T2D.02 LOW THERMAL CONDUCTIVITY UNCOOLED INFRARED BRIDGE MICROBOLOMETER BASED ON BEAMS OF CONSTANT STRENGTH 243**
Yan Zhao, Wangnan Chen, Zirui Yang, Xiaoyu Qi,
Nan Zhang, Chengchen Gao, and Zhenchuan Yang
Peking University, CHINA

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- T2D.03 THERMALLY MATCHED TWIN FOR ACCURATE BANDWIDTH SCALING IN UNCOOLED NANO-ELECTROMECHANICAL IR SENSOR 247**
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Pietro Simeoni, Matteo Rinaldi, and Benyamin Davaji
Northeastern University, USA

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- T2D.04 MEMS ELECTRIC FIELD SENSOR WITH COMB-ACTUATED RESONANT TORSIONAL SHUTTER 251**
Yohan Jung¹, Eunhwan Jo², and Jongbaeg Kim¹
¹Yonsei University, KOREA and ²Kumoh National Institute of Technology, KOREA

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- T2D.05 LASER-FABRICATED PIEZORESISTIVE FORCE SENSOR WITH LIQUID IMMERSION LASER SIDEWALL-DOPING 255**
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 ³University of Electro-Communications, JAPAN

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- T2D.06 A MEMS-BASED ELECTROCHEMICAL VIBRATION SENSORS WITH OPTIMIZED FLOW-RESISTANCE AND HIGH-RELIABILITY SENSITIVE UNIT 259**
Nan Zhang, Xiaoyu Qi, Yan Zhao, Lihao Ma, Xu Ma, Zhenchuan Yang, and Chengchen Gao
Peking University, CHINA

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- T4A.01 ENHANCEMENT OF ENERGY EXCHANGE RATE IN MODE-COUPLED MEMS FOR SUPERCONTINUUM FREQUENCY COMBS AND INJECTION LOCKING 263**
Jiahao Wu, Penghui Song, Shuke Zang, Wenming Zhang, and Lei Shao
Shanghai Jiao Tong University, CHINA

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- T4A.02 ENABLING OPTOMECHANICAL FREQUENCY COMB THROUGH THERMAL AND OPTICAL FORCES IN NONLINEAR NANOMECHANICAL RESONATOR 267**
Xinchen Wan, Ji Xia, Haoyang Sun, and Guangya Zhou
National University of Singapore, SINGAPORE

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Shanghai Jiao Tong University, CHINA

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- T4A.04 MULTI-FREQUENCY PMUT ARRAYS FOR BLOOD PRESSURE MONITORING AND VASCULAR ASSESSMENT USING PHOTOACOUSTIC SENSING 275**
Yexing Fang, Mengyue Zhang, Aocheng Bao, Jinghan Gan, Jiao Xia, Bowen Sheng, Haixia Zhang, Changhui Li, and Yipeng Lu
Peking University, CHINA

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- T4A.05 TOWARDS A BIOMIMETIC MEMS MICROPHONE FEATURING TUNABLE PERFORMANCE 279**
Zhuoyue Zheng¹, Yuan Wang¹, Chen Wang², Huahuang Luo³, Qingqing Ke³, Pan Zhang⁴, Michael Kraft², Rui P. Martins¹, and Pui-in Mak¹
¹University of Macau, CHINA, ²University of Leuven, BELGIUM, ³Sun Yat-sen University, CHINA and ⁴Peking University, CHINA

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- T4A.06 A TO-PACKAGED PHOTONIC MEMS MICROPHONE WITH OUTSTANDING SENSITIVITY BASED ON SELF-MIXING INTERFEROMETRY 283**
Anyu Li, Junfeng Zhou, Xingyu Wei, Shoulu Gong, and Lei Shao
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- T4B.01 A HIGH SENSITIVITY MEMS OMNIDIRECTIONAL HYDROPHONE BASED ON A VORTEX-SLIT STRUCTURE 287**
Fangtao Kuang, Zhiyong Hu, Tao Ruan, Lixuan Li, Hanshuo Liu, Zhiyue Yang, and Jingquan Liu
Shanghai Jiao Tong University, CHINA

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- T4B.02 A NOVEL THERMAL ACOUSTIC PARTICLE VELOCITY SENSOR WITH HIGH SENSITIVITY AND LOW POWER CONSUMPTION 291**
Wangnan Chen¹, Yan Zhao¹, Zirui Yang¹, Xu Ma¹, Lihao Ma¹, Xiaoyu Qi¹, Nan Zhang¹, Chengchen Gao^{1,2}, and Zhenchuan Yang^{1,2}
¹Peking University, CHINA and ²Beijing Advanced Innovation Center for Integrated Circuits, CHINA

16:30 - 16:45

- T4B.03 TWO-DECADE-WIDE DENSE PHONONIC FREQUENCY COMBS IN A LINEAR MEMS RESONATOR USING ANALOG FEEDBACK 295**
Shuke Zang, Jiahao Wu, Wenming Zhang, and Lei Shao
Shanghai Jiao Tong University, CHINA

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- T4B.04 A DEMONSTRATION OF ANALOG/DIGITAL CONVERTER-FREE RESERVOIR COMPUTING USING A SERIES-CONNECTED RESONATING SWITCHED MEMS COUNTER 299**
Akihiko Yoshida, Ryosho Nakane, Shun Yasunaga, Akio Higo, and Yoshio Mita
University of Tokyo, JAPAN

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- T4B.05 SPECTRUM-CLEAN $\text{LiNbO}_3/\text{SiO}_2/\text{Si}$ SH-SAW RESONATORS UTILIZING COMBINED ELECTRODE APODIZATION AND PROPAGATION ANGLE TWISTING 303**
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Sung-Yuan Huang, and Ming-Huang Li
National Tsing Hua University, TAIWAN

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- T4B.06 SIGNAL-TO-NOISE RATIO ENHANCEMENT FOR MEMS RESONANT SENSORS WITH POTENTIAL BARRIER ADAPTIVE STOCHASTIC RESONANCE 307**
Junhui Wu and Guangya Zhou
National University of Singapore, SINGAPORE

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

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- T4C.02 A MINIATURE PHOTOACOUSTIC SYSTEM FOR SKIN MELANIN DETECTION 315**
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Yang, Ziyi Liang, Jiahao Kang, Bowen Sheng, and Yipeng Lu
Peking University, CHINA

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- T4C.03 INTRAVASCULAR-DELIVERED HOLLOW HYDROGEL MICROFIBER WITHOUT BLOOD FLOW INTERRUPTION 319**
Shota Sato¹, Teppei Komatsu², Hiroki Ohta², Hiroataka James Okano², and Hiroaki Onoe¹
¹Keio University, JAPAN and ²Jikei University, JAPAN

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- T4C.04 SMART STENT FOR REAL-TIME ENDOLEAK DETECTION 323**
Trisha Das Mou¹, Jun Ying Tan², Subhrodeep Ray³,
Haijun Liu³, Jungkwun 'JK' Kim², and Albert Kim¹
¹University of South Florida, USA, ²University of North Texas, USA, and ³Temple University, USA

17:00 - 17:15

- T4C.05 HIGHLY STRETCHABLE BUT STRAIN-INSENSITIVE PRESSURE SENSORS FOR CROSSTALK-FREE ARTERIAL PULSE MONITORING 327**
Shoulu Gong, Xingyu Wei, Guoran Zhang, Qi Zhou, Zhiran Yi, Wenming Zhang, and Lei Shao
Shanghai Jiao Tong University, CHINA

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- T4C.06 3D-FLOWER-LIKE BIMETALLIC MXENE INCORPORATED LASER-ENGRAVED GRAPHENE-BASED PHYSIO-CHEMICAL HYBRID PATCH FOR PERSPIRATION ANALYSIS AND CARDIAC HEALTH MONITORING 331**
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

16:00 - 16:15

- T4D.01 A HIGHLY STRETCHABLE AND ALL-DIRECTIONAL TRIBOELECTRIC STRAIN SENSOR FOR CHRONIC JOINT STRESS MONITORING 335**
Shital Sharma, Gagan Bahadur Pradhan, Trilochan Bhatta, and Jae Yeong Park
Kwangwoon University, KOREA

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- 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 339**
Long Cheng^{1,2}, Ying Chen^{1,2}, Tao Jiang^{1,2}, Jiachou Wang^{1,2}, Xinxin Li^{1,2}, and Pengcheng Xu^{1,2}
¹*Chinese Academy of Sciences, CHINA* and ²*University of 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 343**
Tingfeng Peng^{1,2}, Zihan Lu^{1,2}, Hongxin Xu^{1,2}, Chunlong Cheng^{1,2}, Zhiqing Zhang^{1,2}, Jingwen Yang^{1,2}, Yuan Wang³, Qingqing Ke^{1,2}, and Huahuang Luo^{1,2}
¹*Sun Yat-sen University, CHINA* and ²*Macau University of Science and Technology, CHINA* and ³*University of Macau, CHINA*

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- T4D.04 LIQUID METAL FLEXIBLE 3-AXIS FORCE SENSOR ON A BALLOON FOR SENSOR ATTITUDE CONTROL 347**
Tomohiro Nakatsuka and Satoshi Konishi
Ritsumeikan University, JAPAN

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- T4D.05 MEMS RESONANT SENSORS FOR CHARACTERIZING MOLYBDENUM DITELLURIDE DECOMPOSITION 351**
Jun Li^{1,2}, Hao Jia^{1,3}, Pengcheng Xu^{1,3}, and Xinxin Li^{1,3}
¹*Chinese Academy of Sciences, CHINA*, ²*ShanghaiTech University, CHINA*, and ³*University of Chinese Academy of Sciences, CHINA*

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- T4D.06 MICRO TRIAXIAL FORCE PLATE SUPPORTED BY TILTED UV-CURABLE PDMS PILLARS WITH ISOTROPIC SPRING CONSTANTS VIA LIQUID-IMMERSION INCLINED EXPOSURE 355**
Toshihiro Shiratori, Gakuto Kagawa, and Hidetoshi Takahashi
Keio University, JAPAN

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Wednesday, 2 July

Session W1A - Quantum Devices

08:30 - 09:00

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- W1A.01 QUANTUM SENSORS - THE JOURNEY FROM THE LAB TO A PRODUCT OF DAILY LIFE 359**
André 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 364**
Ali Darvishian¹, Lichung Ha¹, Peter Cash¹, Mark Trainoff¹, Mike Silvera¹, Luan Vo¹, Igor Kosvin¹, Jackie Ellett¹, Robert Conners¹, Richard Overstreet¹, and Mark Mescher²
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 368**
Zening Li^{1,2}, Lin Zhou¹, Rongtao Zhang³, Jianlong Zhao^{1,2}, and Hongju Mao^{1,2}
¹*Chinese Academy of Sciences, CHINA*, ²*University of Chinese Academy of Sciences, CHINA*, and ³*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 372**
Yaochen Zhu^{1,2}, Qihui Liu^{1,2}, Xiao Peng^{1,2}, Nan Wang^{1,2}, Yuqiang Hu^{3,4}, Xin Luo^{1,2}, Chunji Zhang⁵, Wei Liu⁵, Hao Chen^{1,2,3}, Jiangong Cheng^{1,2}, and Zhenyu Wu^{1,2,3,4}
¹*Chinese Academy of Sciences, CHINA*, ²*University of Chinese Academy of Sciences, CHINA*, ³*Shanghai University, CHINA*, ⁴*Shanghai Industrial μ Technology Research Institute, CHINA*, and ⁵*Xi'an XD High Voltage Apparatus Co., Ltd, CHINA*

Session W1B - Microfluidics II

08:30 - 09:00

INVITED PRESENTATION

- W1B.01 CIRS AND LUSTRA: RAMAN SPECTROMETERS FOR ROBOTIC AND HUMAN PLANETARY EXPLORATION 376**
James Lambert
Jet Propulsion Laboratory, USA

09:00 - 09:15

- W1B.02 HIGH-SPEED MULTI-SORTING SYSTEM OF LARGE PARTICLES BY UTILIZING TRAVELING VORTEX GENERATIONS 377**
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, JAPAN*

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- W1B.03 DIGITAL MICROFLUIDIC IONIZATION FOR REAL-TIME MINIATURE MASS SPECTROMETRY 381**
Menglei Zhao, Zongliang Guo, Yanbin Zhai, Haobing Liu, Boyu Li, Liyuan Guo, Rongxin Fu, Wei Xu, Huikai Xie, Shuailong Zhang, and Hang Li
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 385**
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 389**
Xinying Xie¹, Qining Wang², Yushen Hu¹, Runxiao Shi¹,
Tengteng Lei¹, Chang-Jin “CJ” 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

08:30 - 09:00

INVITED PRESENTATION

- W1C.01 PIEZOELECTRIC AND PIEZOELECTRET SENSORS, ACTUATORS AND MICROSYSTEMS 393**
Liwei Lin
University of California, Berkeley, USA

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- W1C.02 SCALABLE PIEZO-OPTOMECHANICAL TRANSDUCER MATCHED TO A SUPERCONDUCTING QUBIT FOR OPTICAL READ-OUT 399**
Kiki L. Schuurman¹, Thierry C. van Thiel¹, Matthew J. Weaver¹, Federico Berto¹,
Pim Duivestein¹, 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, ²Rigetti Computing Inc., USA, and ³Qblox Quantum, NETHERLANDS*

09:15 - 09:30

- W1C.03 PIEZO-MEMS TUNABLE ULTRA LOW-NOISE LASER 402**
Alaina Attanasio¹, Andrey Voloshin^{2,3}, Anat Siddharth², Simone Bianconi²,
Andrea Bancora^{2,3}, Vladimir Shadymov^{2,3}, Sebastien Leni³, Rui Ning Wang²,
Johann Riemensberger², Tobias J. Kippenberg², and Sunil A. Bhave¹
¹*Purdue University, USA, ²Swiss 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 406**
Hung-Yu Lin^{1,2}, Mingching Wu², Mei-Feng Lai¹, and Weileun Fang¹
¹*National Tsing Hua University, TAIWAN and ²Coretronic MEMS Corporation, TAIWAN*

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- W1C.05 BI-AXIAL PIEZOELECTRIC MEMS MICROMIRROR WITH ARCHED ACTUATOR UTILIZING D32 EFFECT FOR BOTH RASTER AND LISSAJOUS SCANNING 410**
Hui-Ming Yang¹, Chang-I Lin¹, Po-Chun Lin¹, Wei-Kai Sung¹, Jerwei Hsieh², and Weileun Fang¹
¹*National Tsing Hua University, TAIWAN and ²Asia Pacific Microsystems, Inc., TAIWAN*

Session W1D - Materials Characterization

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INVITED PRESENTATION

- W1D.01 CAPACITIVE SENSOR DESIGN FOR SOFT ROBOTS AND SMART GARMENTS 414**
Damla Leblebicioglu, Immanuel Ampomah Maensah, Joseph Allen,
Ahilesh Vadivel, Nathaniel Hanson, and Kristen L. Dorsey
Northeastern University, USA

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- W1D.02 ENHANCED CHARACTERIZATION OF PA6 CRYSTALLIZATION
USING MEMS DSC INTEGRATED WITH IN SITU FTIR SPECTROSCOPY 419**
Zechun Li^{1,2}, Shaokui Tan^{1,3}, Yuhang Yang^{1,2}, Ming Li^{1,2},
Xiaoyuan Xia^{1,4}, Yemin Dong^{1,4}, Pengcheng Xu^{1,2}, and Xinxin Li^{1,2}
¹*Chinese Academy of Sciences, CHINA*, ²*University of Chinese Academy of Sciences, CHINA*,
³*Shanghai Normal University, CHINA*, and
⁴*Shanghai Industrial μ Technology Research Institute (SITRI), CHINA*

09:15 - 09:30

- W1D.03 DOUBLE-AXIS TAPERED HS-AFM
NANOCANTILEVER FOR BIOMEDICAL APPLICATIONS 423**
Eying Sim Wong¹, Aron Michael¹, Jayden D.R. Moore¹, and Hemanshu Pota²
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 427**
Qiaoyuan Yang^{1,2}, Zijian Wu², Ruomeng Guo¹, Ming Li^{1,2}, Pengcheng Xu^{1,2}, and Xinxin Li^{1,2}
¹*Chinese Academy of Sciences, CHINA* and ²*University of Chinese Academy of Sciences, CHINA*

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- W1D.05 A METHOD FOR IN-SITU ON-WAFER COMPRESSION TEST OF MICROBEAMS 431**
Yi Chen and Dacheng Zhang
Peking University, CHINA

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Session W2A - Piezoelectric Devices

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- W2A.01 ALSCN BASED PIEZOELECTRICALLY DRIVEN
QUASI-STATIC MEMS SCANNERS WITH LARGE FIELD
OF VIEW AND SELECTABLE REGIONS OF INTEREST 435**
Paul Raschdorf¹, Christian V. Hofen^{1,2}, Nils Voß^{1,3}, Erdem Yazar¹,
Gunnar Wille¹, Fabian Lofink^{1,2,4}, and Shanshan Gu-Stoppel^{1,3}
¹*Fraunhofer Institute for Silicon Technology, GERMANY*, ²*Christian-Albrecht-University Kiel, GERMANY*,
³*West Coast University of Applied Sciences, GERMANY*, and ⁴*Kiel Nano, 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 439**
Po-Shen Chen¹, Chia-Hao Lin¹, Chin Tseng¹,
Zih-Song Hu¹, Sung-Cheng Lo², and Weileun Fang^{1,2}
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 443**
Fabrizio Cerini¹, Chiara Gazzola², Filippo P. Perli¹,
Michele Rosso¹, Silvia Adorno², and Alberto Corigliano¹
¹Politecnico di Milano, ITALY and ²STMicroelectronics, ITALY

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- W2A.04 PHYSICS-INFORMED NEURAL NETWORKS FOR MODAL ANALYSIS OF DIAPHRAGM-STRUCTURED MEMS WITH EXPERIMENTAL VALIDATION 447**
Jiapeng Xu^{1,2}, Gabriele Schrag², Zhou Da^{1,3}, 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 451**
Chia-Hao Lin¹, Chin Tseng¹, Sung-Cheng Lo², Mei-Feng Lai¹, and Weileun Fang¹
¹National Tsing Hua University, TAIWAN and ²Upbeat Technology, TAIWAN

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- W2A.06 MICROPATTERNED PDMS DAMPING LAYER INTEGRATION TO ENHANCE THE FIDELITY OF PIEZOELECTRIC MEMS SPEAKERS WITHOUT SPL PENALTY 455**
Xuchen Wang¹, Yukio Suzuki¹, Chung-Min Li², and Shuji Tanaka¹
¹Tohoku University, JAPAN and ²AAC Technologies PTE.LTD, SINGAPORE

Session W2B - Bio & Chemical Sensors

10:30 - 10:45

- W2B.01 ELECTROCHEMICAL BIOSENSOR FOR REAL-TIME IN-VIVO MONITORING OF TUMOR PH, OXYGEN, AND ELECTRICAL CONDUCTIVITY 459**
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, and ³Kansas State 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 463**
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
¹Chinese Academy of Sciences, CHINA, ²University of Chinese Academy of Sciences, CHINA, and
³Shanghai Ocean University, CHINA

11:00 - 11:15

- W2B.03 EFFECT OF DIFFUSION AT THE AU/N-SI SCHOTTKY INTERFACE IN CURRENT DETECTION SURFACE PLASMON RESONANCE SENSORS 467**
Masaya Ukaji¹, Eslam Abubakr^{1,2}, Yuki Imai¹, and Tetsuo Kan¹
University of Electro-Communications, JAPAN and ²Aswan University, EGYPT

11:15 - 11:30

- W2B.04 A WIRELESS PAPER HUMIDITY SENSOR BASED ON COPPER-GRAPHENE COMPOSITE FOR PLANT TRANSPIRATION MONITORING 471**
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 475**
Ayobami Elisha Oseyemi and Pouya Rezai
York University, CANADA

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- W2B.06 ACHIEVING SELECTIVE SENSING IN MICROBIAL FUEL CELL
BIOSENSORS BY DEEP-LEARNING-BASED NEURAL NETWORKS
FOR DETECTION OF TETRACYCLINE AND PENICILLIN IN WATER 479**
Fengxiang Tang, Yining Wang, Boya Liu, and Hao Ren
ShanghaiTech University, CHINA

Session W2C - Nanomaterials

10:30 - 10:45

- W2C.01 SUBMICROMETRIC HIERARCHICAL NANOPOROUS
PATTERNS FOR LUBRICANT-INFUSED SURFACES WITH
ENHANCED LUBRICANT RETENTION AND RECOVERY 483**
Joowon Lim, Geonho Lee, Beomsu Kim, Sunbin Yoon,
Sueng Yoon Lee, Byeongju Hong, Junho Oh, and Won Chul Lee
Hanyang University, KOREA

10:45 - 11:00

- W2C.02 HEMISPHERICAL SILVER NANOSHELL ARRAY ON SILICON
NANOSPHERES FOR SURFACE-ENHANCED RAMAN SPECTROSCOPY 485**
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 488**
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 490**
Jing Wen^{1,2}, Qiming Guo^{1,2,4}, Fei Zhan³, Lei Wang³, Na Zhou^{1,2}, and Haiyang Mao^{1,2,4}
¹Chinese Academy of Sciences, CHINA, ²University of Chinese Academy of Sciences, CHINA,
³Beijing Forestry University, CHINA, and
⁴Shandong Key Laboratory of Intelligent Sensing Chips and System, CHINA

11:30 - 11:45

- W2C.05 AN INVESTIGATION OF VO₂ NANOWIRE ARRAYS FOR INTEGRATED SENSING.
FROM NON-STOCHASTIC NANOWIRES TO STOCHASTIC NANOSTRUCTURES 494**
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 498**
Sangjun Sim¹, Seungin Jo¹, Kyubin Bae², and Jongbaeg Kim¹
¹Yonsei University, KOREA and ²University of Texas, Austin, USA

Session W2D - Neural Interfaces

10:30 - 10:45

- W2D.01 THREE-DIMENSIONAL MICROELECTRODE ARRAY WITH VERTICALLY-ALIGNED CARBON NANOTUBES FOR RETINAL NEURAL SIGNAL RECORDING 502**
Hyunjun Han¹, Sangjun Sim¹, Chaesung Kim^{2,3}, Maesoon Im^{2,4,5}, and Jongbaeg Kim¹
¹Yonsei University, KOREA, ²Korea Institute of Science and Technology, KOREA, ³Korea University, KOREA, ⁴University of Science and Technology, KOREA, and ⁵Kyung 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 506**
Zhiyuan Du¹, Qingda Xu¹, Ye Xi¹, Mengfei Xu¹, Quan Peng¹, Kunyu Zheng¹, Ning Wei¹, Haoyuan Chen¹, Xiuyan Li¹, Qingkun Liu¹, Xiaolin Wang¹, Bin Yang¹, Wen Li², and Jingquan Liu¹
¹Shanghai Jiao Tong University, CHINA and ²Michigan State University, USA

11:00 - 11:15

- W2D.03 STRETCHABLE MICRONEEDLE ARRAY ELECTRODE FOR MOVEMENT-RESISTANT ELECTROENCEPHALOGRAPH MONITORING 510**
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 514**
Om T. Kolhe¹, Alec C. Booth^{1,2}, Hammad F. Khan¹, and Krishna Jayant¹
¹Purdue University, USA and ²Indiana 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 518**
Ning Wei, Longchun Wang, Kejun Tu, Jiawei Cao, Qingda Xu, Zhiyuan Du, 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 522**
Kehui Qi^{1,2}, Changding Li^{1,2}, Nan Li¹, Qinggang Meng^{1,2}, Jian Chen^{1,2}, and Junbo Wang^{1,2}
¹Chinese Academy of Sciences, CHINA and ²University of Chinese Academy of Sciences, CHINA

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

Session W3A - Ultrasonic Devices

14:00 - 14:15

- W3A.01 GHz ULTRASOUND FOR QUANTITATIVE OOCYTE MECHANOBIOLOGY 526**
Yilmaz Arin Manav¹, Andrew Piasecki¹, Amit Lal^{2,3}, Dori Woods¹, and Benyamin Davaji¹
¹Northeastern University, USA and ²Geegah LLC, USA, ³Cornell University, USA

14:15 - 14:30

- W3A.02 PIEZOELECTRIC MICROMACHINED ULTRASONIC TRANSDUCER (PMUT) BASED ON BILAYER X-CUT LITHIUM NIOBATE 530**
Xiaoxi Zhao, Michiel Pertjjs, 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 534**
Zihan Lu^{1,2}, Hongxin Xu^{1,2}, Xuefei Yan^{1,2}, Tingfeng Peng^{1,2}, Chunlong Cheng^{1,2},
Jingwen Yang^{1,2}, Zhiqing Zhang^{1,2}, Yuan Wang³, Huahuang Luo^{1,2}, and Qingqing Ke^{1,2}
¹*Sun Yat-sen University, CHINA,*
²*Zhuhai Key Laboratory of Micro-Nano Sensing Technology and Intelligent Detection, CHINA and*
³*University of Macau, CHINA*

14:45 - 15:00

- W3A.04 A NOVEL VERTICAL DUAL-GAP CMOS-MEMS CMUT ENABLING LARGE FRACTIONAL BANDWIDTH 538**
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 542**
Akash Roy, Kianoush Sadeghian Esfahani, Anik Sengupta, Yicheng Zhang, and Eun S. Kim
University of Southern California, USA

Session W3B - Biomedical Devices

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 546**
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 550**
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 554**
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 558**
Mateo W. Lim, Justin M. Stine, Hammed 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 562**
Jincai Huang^{1,2}, Yuanshuai Dai¹, Jia Cheng¹, Zhe Zhao¹, and Xining Zang^{1,2}
Tsinghua University, CHINA and ²*Ministry of Education, CHINA*

15:15 - 15:30

- W3B.06 MILLIMETRIC IMPLANTABLE DEVICE FOR EXTENDED IN-VIVO FLUORESCENCE RECORDING 566**
Xu Tian¹, Argyris Spyrou¹, Martin Köhler², Per-Olof Berggren², Göran Stemme¹, and Niclas Roxhed¹
¹*KTH Royal Institute of Technology, SWEDEN, ²Karolinska Institute, SWEDEN*

Session W3C - Flow Sensors

14:00 - 14:15

- W3C.01 INSECT ANTENNAE-BASED SENSOR FOR ACCURATE ODOR CONCENTRATION DETERMINATION BY COMBINING AIRFLOW AND ODOR MEASUREMENT 570**
Ryusei Ando¹, Chihiro Fukui², Kei Ohara¹, Daigo Terutsuki³, Toshiyuki Nakata², and Hidetoshi Takahashi¹
¹*Keio University, JAPAN, ²Chiba University, JAPAN, and ³Shinshu 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 574**
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 578**
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 582**
Muhammad Salman Al Farisi¹, Tsuyoshi Tsukada¹, Yoshihiro Hasegawa¹, Miyoko Matsushima², Shin Hasegawa³, Tsutomu Kawabe², and Mitsuhiro Shikida¹
¹*Hiroshima City University, JAPAN, ²Nagoya University, JAPAN, and ³COSMOSWEB Co., Ltd., JAPAN*

15:00 - 15:15

- W3C.05 MICROFLUIDIC THERMAL FLOW SENSOR WITH EXTENDED LINEAR RANGE AND REDUCED HEAT DISSIPATION USING A SHUNT 586**
Maarten J S. Bonnema¹, Jarno Groenesteijn², Remco J. Wiegerink¹, and Joost C. Lötters¹
¹*University of Twente, NETHERLANDS and ²Bronkhorst 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 590**
Haoxin Hu, Wenlin Xiao, Ke Xiao, and Wei Xu
Shenzhen University, CHINA

Session W3D - Actuators

14:00 - 14:15

- W3D.01 BIOHYBRID MUSCLE ACTUATOR WITH EMBEDDED SPRING-SHAPED SKELETON FOR MULTIMODAL ELEPHANT TRUNK-LIKE MOTION 594**
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 596**
Wenyuan Liu^{1,2}, Jiachuang Wang^{1,2}, Fangyu Zhao^{1,2}, Nan Qin^{1,2} and Tiger H. Tao^{1,2,3,4,5}
Chinese Academy of Sciences, CHINA

14:30 - 14:45

- W3D.03 CANTILEVER FREE MULTISTABLE MAGNETIC LIFT ACTUATOR FOR LARGE OUT-OF-PLANE DISPLACEMENTS 600**
Pascal M. Weber and Ulrike Wallrabe
University of Freiburg, GERMANY

14:45 - 15:00

- W3D.04 HEXASTABLE MEMS STAGE 604**
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 608**
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 612**
Tomohiro Morita, Minghao Nie and Shoji Takeuchi
University of Tokyo, JAPAN

Poster Session W4P and Exhibit Inspection

15:35 - 17:30

15:30 – 16:00 **Break**

17:30 Adjourn for the Day

Transducers 2025 Conference Banquet

17:30 - 23:00

Thursday, 3 July

Session Th1A - Robotics & Tactile Sensing

08:30 - 09:00

INVITED PRESENTATION

- Th1A.01 EMERGING ROBOTIC TECHNOLOGIES EXPANDING CAPABILITIES IN THE MICROSCOPIC WORLD FOR BIOMEDICAL INNOVATIONS 614**
Fumihito Arai
University of Tokyo, JAPAN

09:00 - 09:15

- Th1A.02 MULTI-UNIT TERAHERTZ FREQUENCY SELECTIVE FINGERPRINT SENSOR: WIDEBAND IDENTIFICATION OF TRACE SUBSTANCES 618**
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 622**
Yi Sun¹, Fang Wang^{1,2}, Yue He^{1,4}, Yunhao Wang^{1,3}, Hao Yu^{1,2}, Ke Sun¹, Tiger H. Tao^{1,2}, Xiaoyuan Xia^{1,5}, Yemin Dong^{1,5}, Heng Yang^{1,2}, and Xinxin Li^{1,2}
¹Chinese Academy of Sciences, CHINA, ²University of Chinese Academy of Sciences, CHINA, ³ShanghaiTech University, CHINA, ⁴Jiangsu University, CHINA, and ⁵Shanghai Industrial μ Technology Research Institute, CHINA

09:30 - 09:45

- Th1A.04 ULTRA-FAST AND SCALABLE MICROFABRICATION OF FLEXIBLE TACTILE SENSORS VIA SEQUENTIAL DIGITAL LIGHT PROCESSING 626**
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 630**
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

08:30 - 09:00

INVITED PRESENTATION

- Th1B.01 ADVANCE IN AI SENSOR AND AIOT TECHNOLOGY 634**
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 640**
Takuya Igashira¹, Daisuke Nishitani¹, Hideyuki Nagai¹, Hirokazu Nakazawa¹, Noriyuki Matsushita², Kazuhiko Kano², Yumi Tanaka³, and Hiroyuki Wado¹
¹MIRISE Technologies Corporation, JAPAN, ²DENSO Corporation, JAPAN, and ³Tokyo University of Science, JAPAN

09:15 - 09:30

- Th1B.03 A PROBIOTIC-POWERED TRANSIENT BATTERY WITH PH-RESPONSIVE BIODEGRADATION 644**
Maryam Rezaie¹ and Seokheun Choi^{1,2}
¹State University of New York, Binghamton, USA and
²Center for Research in Advanced Sensing Technologies and Environmental Sustainability

09:30 - 09:45

- Th1B.04 A NOVEL MULTI-OBJECTIVE OPTIMIZATION METHOD BY MACHINE LEARNING AND ITS APPLICATION IN MEMS VIBRATION ENERGY HARVESTERS DESIGN 648**
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 652**
Rui Jiang¹, Ling Bu¹, Shihan Yang¹, and Xiaohong Wang²
¹China University of Geosciences, CHINA and ²Tsinghua University, CHINA

Session Th1C - Environmental Sensors

08:30 - 09:00

INVITED PRESENTATION

- Th1C.01 ECOSENSE – SMART SENSORS ALONE IN THE FOREST 656**
Ulrike Wallrabe¹, 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, and Christiane Werner¹
¹University 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 662**
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 666**
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 670**
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 674**
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

08:30 - 09:00

INVITED PRESENTATION

- Th1D.01 ENHANCING MEMS PERFORMANCE THROUGH CMOS INTEGRATION: THE CASE OF PMUTS 678**
Eyglis Ledesma, Ivan Zamora, Ahsan Shabeer, Mohammadamir Ghasemishabankareh,
Zeyuan Hui, Francesc Torres, Arantxa Uranga and Núria Barniol
Universitat Autònoma de Barcelona, SPAIN

09:00 - 09:15

- Th1D.02 CMOS-COMPATIBLE STRATEGY FOR TRANS-SCALE STRUCTURES VIA OPTICALLY PROGRAMMABLE SELF-ASSEMBLY 683**
Zhi-Qi Dong, Kai-Ming Hu, Rui-Jia Xiang, Tian-Yu Zhao,
Jun-Feng Zhou, Wen-Ming Zhang, and Guang Meng
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 687**
Feiyun Wang, Xuan Ouyang, Xiangyu Song, Linze Hong, and Wei Xu
Shenzhen University, CHINA

09:30 - 09:45

- Th1D.04 TOWARD A SELF-POWERED MM-SCALE MEMS SENSOR PLATFORM THROUGH HETEROGENEOUS INTEGRATION OF SC_μM AND HV SOI CMOS 691**
Yichen Liu, Daniel Lovell, Titan Yuan, and Kristopher S.J. Pister
University of California, Berkeley, USA

09:45 - 10:00

- Th1D.05 STACKED TEMPERATURE AND HUMIDITY SOC WITH ENHANCED SENSITIVITY AND LOW HYSTERESIS VIA CMOS-MEMS INTEGRATION 695**
Yubin Ma, Linze Hong, Ruining Xu, Mengliang Jia, and Wei Xu
Shenzhen University, CHINA

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

Session Th2A - Cellular Systems

10:30 - 10:45

- Th2A.01 VISUAL FEEDBACK SYSTEM FOR ROTATIONAL ANGLE CONTROL OF A SINGLE CELL BASED ON VIBRATION-INDUCED FLOW 699**
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 703**
Xukun Huang^{1,2}, Xiao Chen^{1,2}, Junbo Wang^{1,2}, Xuzhen Qin³, Xiaoye Huo^{1,2}, Nan Li^{1,2}, and Jian Chen^{1,2}
¹Chinese Academy of Sciences, CHINA, ²University of Chinese Academy of Sciences, CHINA, and
³Peking 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 707**
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 710**
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 712**
Xiao Chen^{1,2}, Yimin Li^{1,2}, Tingxuan Fang^{1,2}, Jie Zhang³, Yueying Li³, Xuzhen Qin⁴, Nan Li¹, Junbo Wang^{1,2}, Xiaoye Huo¹, and Jian Chen^{1,2}
¹Chinese Academy of Sciences, CHINA, ²University of Chinese Academy of Sciences, CHINA, ³China National Center for Bioinformatics, CHINA, and ⁴Peking Union Medical College Hospital, CHINA

11:45 - 12:00

- Th2A.06 QUANTITATIVE NANO-ARTIFACTS EXPOSURE TOWARD SINGLE CELLS UTILIZING A MICRODROPLET-BASED MICROFLUIDIC SYSTEM 716**
Ren Takeuchi¹, Makoto Saito¹, Rinko Kurogi¹, Nariaki Kiyama¹, Yoko Yamanishi¹, Kosuke Dodo², Takashi Kamatani³, Yoshitaka Shirasaki⁴, Chia-Hung Dylan Tsai⁵, Satoshi Yotsumoto⁶, Niko Kimura⁷, Shigeo S. Sugano⁸, and Shinya Sakuma¹
¹Kyushu University, JAPAN, ²RIKEN, JAPAN, ³Institute of Science Tokyo, JAPAN, ⁴University of Tokyo, JAPAN, ⁵National Yang Ming Chiao Tung University, TAIWAN, ⁶Tokyo University of Pharmacy and Life Sciences, JAPAN, ⁷Tokyo University of Agriculture and Technology, JAPAN, ⁸National Institute of Advanced Industrial Science and Technology (AIST), JAPAN

Session Th2B - Fabrication & Functional Materials

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 720**
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 724**
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 727**
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 731**
Linet Thomas C¹, Praveen Kumar¹, Sambuddha Khan², and Gayathri Pillai¹
¹Indian Institute of Science, INDIA and ²University College Cork, IRELAND

11:30 - 11:45

- Th2B.05 HIGH ASPECT RATIO 3D CARBON MICROSTRUCTURE FOR INFRARED EMITTER USING PARYLENE CARBONIZATION 735**
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 739**
Aocheng Bao, Chong Yang, Kai Yang, Xili Wang, Yufeng Gao, Haixia Zhang, and Yipeng Lu
Peking University, CHINA

Session Th2C - Accelerometers & Gyroscopes

10:30 - 10:45

- Th2C.01 FROM STRESS TO SUCCESS: DEMONSTRATING ULTRAHIGH QUALITY FACTOR DUAL-SHELL RESONATOR GYROSCOPES WITH LOW STRESS TOPOLOGY 743**
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 747**
Xiaoyu Qi¹, Nan Zhang¹, Yan Zhao¹, Wangnan Chen¹, Chengchen Gao^{1,2}, and Zhenchuan Yang^{1,2}
¹*Peking University, CHINA, and* ²*Beijing Advanced Innovation Center for Integrated Circuits*

11:00 - 11:15

- Th2C.03 HIGH SENSITIVITY AND WIDE BANDWIDTH IN MULTI-MASS MEMS ACCELEROMETERS 751**
Inês S. Garcia¹, Mubasher Saleem¹, Filipa C. Mota¹, Néilson Castro¹, Pablo Valentim¹, Rui Madeira², Alexandre Correia², Diogo E. Aguiam¹, Rosana A. Dias¹, and Filipe S. Alves¹
¹*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 755**
Xu Guo¹, Kunyang Zhang¹, Jintao Ni¹, Ye Jiang¹, Jiehe Wang¹, Bo Ma¹, Yajiang Yin², Wenshuai Lu², 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 759**
Yiwei Ge^{1,2}, Tiantian Huang¹, Hussein Hussein³, Yuan Wang⁴, Zhijuan Zhu¹, Michael Kraft², Zhuoyue Zheng⁴, and Chen Wang²
¹*Zhejiang University, CHINA,* ²*University of 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 763**
Mahtab Shakibmanesh, Lois Meira Lopez, Mark Jiang, Naji Tarabay, Andrei M. Shkel, and Camilo Velez
University of California, Irvine, USA

Session Th2D - Mixed

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- Th2D.01 EXPERIMENTAL EVIDENCE OF TWO COMPETING EFFECTS IN THE NONLINEAR RESPONSE OF CANTILEVER BEAMS 767**
Eliya Salman¹, Michael Feldman¹, Chun-Yu Chou², David Rosenstock¹, Danny A. 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 772**
Jie Yan¹, Jintark Kim¹, Rakibul Islam¹, Jiheng Jing¹, Karim Elmeligy¹,
Jiawei Yang², Thomas W. Kenny², Paven K. Hanumolu¹, and Gaurav Bahl¹
¹University of Illinois, Urbana-Champaign, USA and ²Stanford University, USA

11:00 - 11:15

**Th2D.03 SUSTAINED AC PLASMA GENERATION AT LOW VOLTAGE
USING AMINIATURIZED HIGH-Q ROSEN TRANSFORMER 775**
Justin Phelps and Reza Abdolvand
University of Central Florida, USA

11:15 - 11:30

Th2D.04 CHARACTERIZATION OF MICROREACTORS FOR NANOPARTICLE SYNTHESIS 779
Avery E. England, Scott D. Collins, Michael D. Mason, and Rosemary L. Smith
University of Maine, USA

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Th2D.06 STATIC HYSTERESIS MITIGATION FOR PZT MEMS VARIFOCAL LIQUID LENS 783
Andrea Vergara, Zhengnan Tang, Yukio Suzuki, and Shuji Tanaka
Tohoku University, JAPAN

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Award Ceremony and Closing Remarks

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12:45 **Conference Adjourns**

Optional Facility Tour

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Poster Presentations

All times are Eastern Standard Time (EST)

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Classification Chart
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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 787
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 791
Yunhao Wang^{1,2,3}, Ke Sun¹, Junxiang Cai², Yiwei Wang², Xiaoyuan Xia^{1,4},
Yemin Dong^{1,4}, Yi Sun¹, Tao Wu^{1,2,3}, and Xinxin Li^{1,2,3}
¹Chinese Academy of Sciences, CHINA, ²ShanghaiTech University, CHINA,
³University of Chinese Academy of Sciences, CHINA and
⁴Shanghai Industrial μ Technology Research Institute, CHINA

- M4P.003 AN ULTRA-SENSITIVE PMUT EXPLOITING HIGH ORDER MODE FOR LONG DISTANCE AIRBORNE RANGING 795**
 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}
¹ShanghaiTech University, CHINA, ²Chinese Academy of Sciences, CHINA, ³University of Chinese Academy of Sciences, CHINA, and ⁴Shanghai Engineering Research Center of Energy Efficient and Custom AI IC, CHINA
- M4P.004 DIRECT BANDWIDTH MEASUREMENTS OF DYNAMIC PRESSURE SENSORS 799**
 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 803**
 Haruna Kozuki¹, Koki Yoshida², Hiroki Yasuga³, and Yuta Kurashina¹
¹Tokyo University of Agriculture and Technology, JAPAN, ²Shibura Institute of Technology, JAPAN, and ³National Institute of Advanced Industrial Science and Technology (AIST), JAPAN
- M4P.006 A PLANAR SINGLE-ACTUATOR BI-STABLE SWITCH BASED ON A HOOKLESS NONUNIFORM ARC-SHAPED MECHANISM 806**
 Xudong Cai¹, Wankai Liu¹, Wing Tung Hui², Yuta Kawashima³, Zerui Xu¹, Man Wong², Toshiyuki Tsuchiya³, Renrong Liang¹, and Xiaohong Wang¹
¹Tsinghua University, CHINA, ²Hong Kong University of Science and Technology, HONG KONG, and ³Kyoto University, JAPAN
- M4P.007 PROPELLER OPTIMIZATION OF MICRO FLYING ROBOTS BY DEEP REINFORCEMENT LEARNING 810**
 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 814**
 Shingo Terashima and Eiji Iwase
 Waseda University, JAPAN
- M4P.009 TOWARDS UNVEILING THE HIDDEN DYNAMICS OF BACTERIORHODOPSIN WITH MEMS-BASED ATOMIC FORCE MICROSCOPY 817**
 Suyambulingam Subramanian¹, Nicolas Mauran¹, Guillaume Jourdan², Ignacio Casuso³, and Bernard Legrand¹
¹Université de Toulouse, FRANCE, ²Université Grenoble-Alps, FRANCE, and ³Université Aix-Marseille, FRANCE

Tuesday - Actuators and Microsystems

- T3P.001 A BISTABLE SHAPE MEMORY - THERMOMAGNETIC MICROACTUATOR 821**
 Joel Joseph¹, Ruikang Wang¹, Maxim Wischnewski¹, 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 825**
 Tingzhong Xu¹, Damiano Caponi¹, Rodrigo Tumolin Rocha¹, Zhou Da^{1,2}, and Chunlei Xu¹
¹Silicon Austria Labs, AUSTRIA and ²Roma Tre University, ITALY
- T3P.003 BISTABLE IN-PLANE SWITCHING BY A NI-TI-CU/SI MICROACTUATOR 829**
 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 833**
 Sean J.Z. 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 836**
 Chloe Halbach^{1,2}, Pieter Gijsenbergh¹, Veronique Rochus¹, Xavier Rottenberg¹, David Cheyons¹, 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 MICROSPEAKER 840**
 Tsung-Wen Tsai¹, Chia-Hao Lin¹, Chin Tseng¹, Po-Shen Chen¹, 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 844**
 Sai Saraswathi Yarajena¹ and Amit Lal^{1,2}
¹Cornell University, USA and ²Geegah Inc., USA
- T3P.008 THE MICROSCOPIC BIOPSY DEVICE FOR THE HIGHLY VISCOELASTIC TISSUE BY USING TRANSLATIONAL/ROTATIONAL PIEZO IMPACT DRIVE MECHANISM 848**
 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 850**
 Jingzhe Cao¹, Fade Hu¹, Lei Li², and Chuan Luo^{1,3}
¹Tsinghua University, CHINA, ²Beijing Information Science and Technology University, CHINA, and ³Zhejiang Nurotron Biotechnology Company, CHINA
- W4P.002 A SEMI-ANALYTICAL METHOD FOR COMPREHENSIVE MODELING OF LEVITATING MICRO-SYSTEM ACTUATORS 854**
 Kirill Poletkin
Hefei University of Technology, CHINA
- W4P.003 CMOS BEOL-COMPATIBLE SEE-SAW MICROELECTROMECHANICAL NON-VOLATILE MEMORY WITH LOW ON-RESISTANCE 858**
 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
¹Korea Advanced Institute of Science and Technology (KAIST), KOREA and ²Chonnam National University, KOREA
- W4P.004 HIGH-FREQUENCY AND BROADBAND PZT-BASED PMUT ARRAY WITH NEGATIVE POLING FOR ENHANCED COUPLING EFFICIENCY 862**
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Peking University, CHINA
- W4P.005 MECHANICALLY-TOUGH FIBRIN-BASED ACTOMYOSIN SOFT ACTUATOR DRIVEN BY ATP 866**
 Takuro Kawasumi¹, Koki Yoshida², Yuichi Hiratsuka³, and Hiroaki Onoe¹
¹Keio University, JAPAN, ²Shibaura Institute of Technology, JAPAN, and ³Japan Advanced Institute of Science and Technology, JAPAN

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

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¹Fraunhofer USA, ²Michigan State University, USA, and
³Institute for Quantitative Health Science and Engineering, USA

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Toyohashi University of Technology, JAPAN

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Zening Li^{1,2}, Lin Zhou¹, Rongtao Zhang³, Jianlong Zhao^{1,2}, and Hongju Mao^{1,2}
¹Chinese Academy of Sciences, CHINA, ²University of Chinese Academy of Sciences, CHINA, and
³Tianjin University, CHINA

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

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Chen Chen^{1,2}, Lin Zhou¹, Huiying Liu², and Hongju Mao¹
¹Chinese Academy of Sciences, CHINA and ²Dalian Medical University, CHINA

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¹Keio University, JAPAN and ²University of Tokyo, JAPAN

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¹Chinese Academy of Sciences, CHINA, ²Harbin Medical University, CHINA, ³University of Academy of Sciences, CHINA, ⁴Shanghai Frontier Innovation Research Institute, CHINA and
⁵Tianjin University, CHINA

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¹Delft University of Technology (TU Delft), NETHERLANDS,
²Shiv Nadar Institution of Eminence, INDIA, and
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¹Academia Sinica, TAIWAN and ²National Taiwan University, TAIWAN

- W4P.015 ON-SITE STERILIZATION OF SMALL MEDICAL DEVICES USING DBD-GENERATED REACTIVE SPECIES AND DISPOSABLE INDICATOR 980**
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¹National Sun Yat-sen University, TAIWAN and ²Metal Industries Research
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 Kobe University, JAPAN
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 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 991**
 Chinaza Ogonna, 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 995**
 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 998**
 Sujoy Halder, Prasadanie. Adhichetty, Michael H. Nantz, and Xiao-An Fu
 University of Louisville, USA
- M4P.021 AN INTEGRATED INTELLIGENT SENSING PLATFORM FOR SPECIFIC IDENTIFICATION OF BIOCHEMICAL SUBSTANCES 1002**
 Yusa Chen^{1,2}, Dingbang Liu^{1,2}, Yunhao Cao^{1,2}, Hongshun Sun^{1,2}, Dingyi Yang^{1,2}, and Wengang Wu^{1,2}
¹National Key Laboratory of Advanced Micro and Nano Manufacture Technology, CHINA, and ²Peking University, CHINA
- M4P.022 ELECTRO-THERMAL-DRIVEN GRAPHENE RESONANT SENSOR FOR HIGHLY SENSITIVE VIRUS DETECTION 1006**
 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 1010**
 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 1014**
 Wenxing Xu, Jiayue Han, Jiangong Cheng, and Yanyan Fu
 Chinese Academy of Sciences, CHINA

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¹Yonsei University, KOREA and ²Kumoh National Institute of Technology, KOREA
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¹Chinese Academy of Sciences, CHINA, ²University of Chinese Academy of Sciences, CHINA, and ³Shanghai Normal University, CHINA
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¹Chinese Academy of Sciences, CHINA, ²University of Chinese Academy of Sciences, and ³University of Shanghai for Science and Technology, CHINA
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¹Fraunhofer EMFT, GERMANY and ²Universität der Bundeswehr München, GERMANY

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 Long Zhang¹, Yunfei Gao¹, and Liang Lou^{1,2}
¹Shanghai University, CHINA and ²Shanghai Industrial μ Technology Research Institute, CHINA
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¹Chinese Academy of Sciences, CHINA and ²University of Chinese Academy of Sciences, CHINA
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 Zijian Cui¹, Wenshuo Chen², Yue Wang², and Xiaoguang Zhao¹
¹*Tsinghua University, CHINA* and ²*Xi'an University of Technology, CHINA*

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¹*Chinese Academy of Sciences, CHINA*, ²*University of Chinese Academy of Sciences, CHINA*, and ³*Shandong Key Laboratory of Intelligent Sensing Chips and System, CHINA*
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¹*Michigan State University, USA* and ²*Fraunhofer USA*
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¹*Chinese Academy of Sciences, CHINA*, ²*University of Chinese Academy of Sciences, CHINA*, ³*Neuroxess Co., Ltd., CHINA*, ⁴*Guangdong Institute of Intelligence Science and Technology, CHINA*, and ⁵*Tianqiao and Chrissy Chen Institute for Translational Research, CHINA*
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¹*Delft University of Technology (TU Delft), NETHERLANDS*, ²*VSPARTICLE, NETHERLANDS*, and ³*Graphenea, SPAIN*
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¹*Chinese Academy of Sciences, CHINA*, ²*Shanghai Ocean University, CHINA* and ³*Shanghai Institute of Technology, CHINA*
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¹Chinese Academy of Sciences, CHINA and ²ShanghaiTech University, CHINA
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¹Korea Institute of Industrial Technology, KOREA and ²Kyungpook National University, KOREA

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 Xinkai Xie¹, Jun Wu¹, Chengkuo Lee², and Qiongfeng Shi¹
¹Southeast University, CHINA and ²National University of Singapore, SINGAPORE
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¹Tsinghua University, CHINA and ²University of California, San Diego, USA
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¹Tohoku University, JAPAN, ²Mitsui Chemicals, Inc., JAPAN, and
³Vietnam National University of Ho Chi Minh City, VIETNAM
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¹University of Southern California, USA and ²National Institute of Standards and Technology, USA
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¹Hiroshima City University, JAPAN and ²Nagoya University, JAPAN
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¹National Sun Yat-sen University, TAIWAN and
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 Hao Zheng¹, Xueqin Wang², Youhao Liu¹, Chengcheng Li¹,
 Xingguo Zhang¹, Dachao Li¹, and Zhihua Pu¹
¹Tianjin University, CHINA, ²Tianjin Medical University, CHINA
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¹Tianjin University, CHINA and ²Tianjin Medical University, CHINA
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¹Gunma University, JAPAN, ²Shizuoka University, JAPAN, and ³University of Tokyo, JAPAN
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 Jinwen Zhang^{1,2,3}, 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

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 Yoshihiro Muneta², Hiroshi Sawada², Shozo Arai², and Toshihiro Itoh¹
¹*University of Tokyo, JAPAN and* ²*National Agriculture and Food Research Organization, JAPAN*
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¹*Tohoku University, JAPAN and* ²*City College of New York, USA*

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

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¹ *Vietnam National University (VNU), VIETNAM*, ² *University of California, Irvine, USA*, ³ *Vietnam Academy of Science and Technology, VIETNAM*, and ⁴ *Posts and Telecommunications Institute of Technology, VIETNAM*
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¹ *York University, CANADA* and ² *Dalhousie University, CANADA*
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Zizhen Wang^{1,2}, Meiyang Qin^{1,2}, Rui Jiang^{1,2}, Yang Zhao¹, Haiyang Mao¹, Lingqian Zhang¹, Chengjun Huang^{1,2}, and Mingxiao Li
¹ *Chinese Academy of Sciences, CHINA* and ² *University of Chinese Academy of Sciences, CHINA*

Tuesday - Microfluidics Platform Technologies

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¹ *Vietnam National University (VNU), VIETNAM*, ² *University of California, Irvine, USA*, and ³ *Vietnam Academy of Science and Technology, VIETNAM*
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 Selin Kasap¹, Guleda O. Engin⁴, Emine U. Saritas^{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*
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¹*Tecnol gico de Monterrey, MEXICO* and ²*Massachusetts Institute of Technology, USA*
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 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 1303**
 A. Muhaymin Chowdhury, Thaddaeus Stine, Kalp B. Upadhayay, 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 1307**
 Osama Alalul¹, Jintian Liu¹, Markus B l¹, Ala'aldeen Al-Halhoul², and Andreas Dietzel¹
¹*Technische Universit t Braunschweig, GERMANY* and ²*German Jordanian University, JORDAN*
- T3P.049 STUDY OF RECTANGULAR MEMBRANE PMUT-BASED ACOUSTIC STREAMING MICROPUMP 1311**
 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 1315**
 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 1319**
 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 1323**
 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 1327**
Toshihiro Tanihata, Ryutaro Toyoshima, and Takeshi Hayakawa
Chuo University, JAPAN
- W4P.045 HANDHELD VIBRATIONAL DROPLET GENERATOR: A SIMPLE, SCALABLE DEVICE FOR DIGITALIZING ASSAYS 1331**
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 1335**
Jia-Jun Yeh^{1,2}, Pratik 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 LNP SYNTHESIS CHIP WITH IN-SITU SIZE MONITORING 1339**
Ebrahim Taiedinejad^{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 Mikroelektronik und Mikrosysteme IMM, GERMANY*
- W4P.048 REACTIVE OXYGEN SPECIES GENERATION IN MICROFLUIDICS DEVICE BY PLASMA EXCITATION VIA THIN FILM 1343**
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 1347**
Daiki Tanaka¹, Masashi Kobayashi¹, Risa Fujita¹, Tetsushi Sekiguchi¹, Takashiro 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 1350**
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 1354**
Qirui Zhang^{1,2}, Huabin Yang^{1,2}, Meng Shi^{1,2}, Hanhui Li^{1,2}, Yu Liu^{1,2}, Na Zhou^{1,2}, and Haiyang Mao^{1,2,3}
¹*Chinese Academy of Sciences, CHINA*, ²*University of Chinese Academy of Sciences, CHINA*, and ³*Shandong Key Laboratory of Intelligent Sensing Chips and System*

Tuesday - Nanoscale Materials and Fabrication

- T3P.050 ECO-FRIENDLY AND LARGE-SCALE FABRICATION OF SILK-BASED ENZYMATIC BIOSENSORS THROUGH MICROELECTRONIC DEVICES 1358**
Pablo Rodríguez¹, Carla Blanes¹, Silvia Mena¹, Sebastián Gavira¹, Salvador Aznar-Cervantes², Carlos Domínguez¹, Gonzalo Guirado³, Sara Santiago⁴, and Xavier Muñoz¹
¹*Microelectrónica de Barcelona, SPAIN*, ²*Instituto Murciano de Investigación y Desarrollo Agrario y Alimentario y Medioambiental, SPAIN*, ³*Universitat Autònoma de Barcelona, SPAIN*, and ⁴*Universidad Complutense de 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 1362**
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Wangyang Zhang, Wanyu Xu, and Xiaojing Mu
Chongqing University, CHINA
- W4P.051 WRINKLE-ASSISTED NANOCANNEL ARRAYS
FOR DIFFERENTIAL RESISTIVE PULSE SENSING 1365**
Minsu Kwon, Dongwoo Seo, and Taesung Kim
Ulsan National Institute of Science and Technology, KOREA

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- M4P.052 2D PATTERN PROJECTION FOR MODE COUPLING ANALYSIS IN
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Adrien Piot¹, Sara R.P. Guerreiro^{1,2}, Rodrigo T. Rocha¹, Clément Fleury¹,
Takashi Sasaki¹, Anton Lagosh¹, Aleš Travnik¹, Dominik Holzmann¹, and Markus Bainschab¹
¹*Silicon Austria Labs GmbH, AUSTRIA*, ²*University of Tokyo, JAPAN*
- M4P.053 ANGLE TUNABLE KIRIGAMI-HINGED MIRROR ARRAY FOR
AUTOSTEREOSCOPIC DISPLAY USING DOUBLE REFLECTION 1373**
Taiki Sugihara, Satoshi Ikezawa, and Eiji Iwase
Waseda University, JAPAN
- M4P.054 HIGH-SENSITIVITY DETECTION FOR KIDNEY CANCER CELLS USING
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Yunhao Cao¹, Mingyao Gao¹, Hongshun Sun¹, Xubo Song², Zhihong Feng²,
Lijun Ma¹, Liye Li¹, and Wengang Wu¹
¹*Peking University, CHINA* and ²*Hebei Semiconductor Research Institute, CHINA*
- M4P.055 MULTI-LAYERED CHIRAL METAMATERIALS USING STANDARD
CMOS FOR POLARIZATION-DEPENDENT MID-INFRARED IMAGING 1381**
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*
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PERFLUOROCARBON-BASED PERITONEAL OXYGENATION 1385**
Bibek Ramdam¹, Hyun-Tae Kim¹, Behzad Kadkhodaeielyaderani¹, Yejin Moon¹,
Parham Rezaei¹, Melissa J. Culligan², Nosayaba Enofe¹, 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 1389**
Mikiya Oki, Masaki Shimofuri, Amit Banerjee, Jun Hirotsu, 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 1393**
Biyun Ling¹, Xiaoyue Wang¹, Minli Cai^{1,2}, Yuhu Xia^{1,2},
Biqing Zhou^{1,2}, Yuwei Han^{1,2}, and Yaming Wu^{1,2}
¹*Chinese Academy of Sciences, CHINA* and ²*University of 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 1397**
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 1401**
Wei-Kai Sung¹, Chang-I Lin¹, Po-Chun Lin¹,
Mingching Wu², Mei-Feng Lai¹, and Weileun Fang^{1,2}
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 1405**
Hao Huang^{1,2}, Lihao Wang^{1,5}, Yongquan Su¹, Yichen Liu^{1,2},
Xingwang Zhu⁴, Hao Chen^{1,2,3}, Yang Wang^{1,2}, and Zhenyu Wu^{1,2,3,4}
¹Chinese Academy of Sciences, CHINA, ²University of Chinese Academy of Sciences, CHINA,
³Shanghai University, CHINA, ⁴Shanghai Industrial Technology Research Institute (SITRI), CHINA, and
⁵MExpert Technologies Co., Ltd, CHINA
- T3P.056 SPLIT ACCELERATED DEGRADATION TEST PLATFORM WITHOUT ON-CHIP SENSOR FOR LONG-TERM RELIABILITY OF 2D MEMS MIRRORS 1409**
Ze-Yu Zhou, Kai-Ming Hu, Er-Qi Tu, Wen-Ming Zhang, and Guang Meng
Shanghai Jiaotong University, CHINA
- T3P.057 ULTRA-HIGH RESPONSIVITY BRIDGE UNCOOLED INFRARED MICROBOLOMETERS BASED ON THIN-FILM MN-CO-NI-O 1413**
Yan Zhao, Zirui Yang, Xiaoyu Qi, Chengchen Gao, and Zhenchuan Yang
Peking University, CHINA

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Peking University, CHINA
- W4P.053 ENHANCED PERFORMANCE OF FIBER-OPTIC LOCALIZED SURFACE PLASMON RESONANCE SENSOR VIA BUMPY BALL STRUCTURE BASED ON RAPID THERMAL ANNEALING 1421**
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- W4P.054 MINIATURIZED BEAM SCANNING DEVICE ENABLED BY CASCADED METASURFACES FOR LIDAR APPLICATIONS 1425**
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 1429**
Takashi Sasaki, Adrien Piot, Rodrigo T. Rocha, Anton Lagosh, Sara R.P. Guerreiro,
Clément Fleury, Dominik Holzmann, and Aleš Travník
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W4P.056 SYMMETRIC METAMATERIAL ANTENNA TO IMPROVE RESPONSIVITY OF CMOS-MEMS THERMOELECTRIC INFRARED SENSORS 1433
Yian Su¹, Cheng-En Yang¹, Yi Chiu², and Weileun Fang¹
¹National Tsing Hua University, TAIWAN and ²National Yang-Ming Chiao Tung University, TAIWAN

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

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Kaixuan He^{1,2}, Rui Feng², Yu Zheng², Lijian Guo², Qichao Liao², Yuan Xiang², Hongkun Zhang², Jiachou Wang³, and Xinxin Li^{1,3}
¹Fudan University, CHINA, ²East China Institute of Photo-Electron IC, CHINA, and ³Chinese Academy of Sciences, CHINA

M4P.060 DEFLECTION CHARACTERISTICS OF A CIRCULAR SLIT DIAPHRAGM MEMS DEVICE 1445
Tim J. Cheng^{1,3}, Robert D. White¹, and Kasia Oleske²
¹Tufts University, USA, ²The Charles Stark Draper Laboratory, USA, and ³Draper Scholar, USA

M4P.061 ELECTROHYDRODYNAMIC HIGH-PRECISION PRINTING: AN EMERGING APPROACH FOR FABRICATION OF WEARABLE MICROSENSORS 1449
Nadine Philippin^{1,2}, Ingo Kuehne¹, Alexander Frey³, and Gabriele Schrag²
¹Heilbronn University of Applied Sciences, GERMANY, ²Technical University of Munich, GERMANY and ³Technical University of Applied Sciences Augsburg, GERMANY

M4P.062 FABRICATON OF THROUGH-SILICON-VIA INDUCTORS FOR HIGH-FREQUENCY VERTICAL POWER DELIVERY 1453
Yixiao Ding, Xuan Wang, Dengyang Lu, and Mark G. Allen
University of Pennsylvania, USA

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Tohoku University, JAPAN

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Leman D. Balci^{1,2}, Ali C. Atik^{1,2}, Muhammed B. Yüksel¹, and Haluk Külah^{1,2}
¹Middle East Technical University, TURKEY and ²METU MEMS Center, TURKEY

M4P.065 NEEDLE-TYPE OXYGEN MICROSENSOR MADE BY 3D PRINTING AND LOCALIZED 3D ELECTROLESS PLATING 1465
Juntaro Nomaru, Taisuke Masuda, Satoshi Amaya, Kohki Tanabe, and Fumihito Arai
University of Tokyo, JAPAN

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Chao-Wei Dong and Woo-Tae Park
Seoul National University of Science and Technology, KOREA

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- T3P.058 A COST-EFFECTIVE UNIVERSAL WAFER LEVEL PACKAGING PLATFORM FOR BAW AND THIN-FILM SAW FILTERS 1472**
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 1476**
Shiyang Yuan, Peng Liu, Fengjun Yu, Xuanqing Hua, Xufeng Wang, Zhiheng Yu, and Dacheng Zhang
Peking University, CHINA
- T3P.060 DEVELOPMENT OF CRYSTALLIZED THICK, HIGHLY DOPED A-SI:H LAYERS FOR SURFACE MICROMACHINING OF MEMS 1480**
Yimei Zhang^{1,2}, Hans-Joachim Quenzer¹, Björn Jensen¹, Jens-Hendrik Zollondz¹, and Axel Müller-Groeling^{2,3}
¹Fraunhofer Institute for Silicon Technology, GERMANY, ²Kiel University, GERMANY, and ³Fraunhofer-Gesellschaft, GERMANY
- T3P.061 FABRICATION PROCESS FOR ULTRA-RELIABLE POLYIMIDE-BASED NEURAL-INTERFACE TECHNOLOGY 1484**
Kenneth A. Fluker, Jr. and Jack W. Judy
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- T3P.062 GLOBAL OPTIMIZATION OF THIN-FILM PROPERTIES IN PECVD SYSTEM HARNESSSED BY COMPLEX-SYSTEM-RESPONSE PLATFORM 1488**
Wen-Jun Chen^{1,2}, Ching-Chiun Wang², Shih-Chin Lin², Da-Jeng Yao^{1,2}, and Chih-Ming Ho¹
¹National Tsing Hua University, TAIWAN and ²Industrial Technology Research Institute, TAIWAN
- T3P.063 INFRA-RED CONCAVE LENS MOLD WITH MOTH EYE MICROSTRUCTURE REALIZED BY SUPER-CONTACT PATTERNING OF LATENT IMAGE 1492**
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Toyota Technological Institute, JAPAN
- T3P.064 MEMS INERTIAL SENSORS FOR EXTREME ENVIRONMENTS 1496**
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 1500**
Yubo Tian^{1,2}, Jiachou Wang^{1,2}, and Xinxin Li^{1,2}
¹Chinese Academy of Sciences, CHINA and ²University of Chinese Academy of Sciences, CHINA
- T3P.066 WAFER-LEVEL FABRICATION OF ON-CHIP SINGLE/DOUBLE LAYER RECTANGULAR SPIRAL INDUCTORS FOR IMPLANTABLE BIOSENSORS 1504**
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 1508**
Sanjana Afrin Raisa¹, Khandaker Reaz Mahmud¹, Steven M. Tran¹, Farhan Sadik Sium¹, Austin Johnson², Sam Larson², Seungbeom Noh¹, and Hanseup Kim¹
¹University of Utah, USA and ²Certus Critical Care, Inc, USA

- W4P.059 A PSPI/PSEP/PSPI NANOCOMPOSITE POLYMER INTERPOSER TECHNOLOGY FOR WIRELESS EDGE-AI MICROSYSTEM INTEGRATION 1512**
 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 Michael Wu², and Yu-Tao Yang³
¹National Yang Ming Chiao Tung University, TAIWAN, ²National Taiwan University, TAIWAN, and ³Mediatek Company, TAIWAN
- W4P.060 ELECTRODE DEPENDENT THERMAL STABILITY OF PZT THIN FILM FOR POST-PIEZOELECTRIC PROCESS 1516**
 Chong Yang, Aocheng Bao, Ping Yin, Jin You, Bowen Sheng, Dunshan Yu, and Yipeng Lu
 Peking University, CHINA
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 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 1524**
 Nishant Kumar Sharma, Ankit Priya, and Prosenjit Sen
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 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 1532**
 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 1536**
 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 1540**
 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 1544**
 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 1548**
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 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 1552**
 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 1556**
 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 1560**
 Pengxiang Ye^{1,2}, Zongze Yu^{1,2}, Zhaoyuan Tan^{1,2}, Bo Xie^{1,2},
 Yulan Lu¹, Nan Li¹, Deyong Chen^{1,2}, Junbo Wang^{1,2}, and Jian Chen^{1,2}
 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 1564**
 Lihao Ma,¹ Xu Ma¹, Beining Wang¹, Wangnan Chen¹, Nan Zhang¹,
 Xiaoyu Qi¹, Yan Zhao¹, Chengchen Gao^{1,2}, and Zhenchuan Yang^{1,2}
¹Peking University, CHINA and ²Beijing Advanced Innovation Center for Integrated Circuits, CHINA
- M4P.074 DUAL-MODE ELECTRIC POWER SENSING BASED ON MEMS RESONATORS 1568**
 Xuecui Zou^{1,2}, Nizar Jaber³, Dongxiang Luo⁴, Bin Liu⁵, Yuan Liu¹, and Khaled Salama²
¹Guangdong University of Technology, CHINA,
²King Abdullah University of Science and Technology, SAUDI ARABIA,
³Aramco, SAUDI ARABIA, ⁴Guangdong University, CHINA and ⁵Harbin Engineering University, CHINA
- M4P.075 FABRICATION OF WAFER-LEVEL VACUUM PACKAGED POLY-SI/SIC BEAM RESONATORS WITH STRAIN SENSITIVITY LARGER THAN 1 KHZ/ $\mu\epsilon$ 1572**
 Sergio Sapienza¹, Luca Belsito¹, Matteo Ferri¹,
 Ivan Elmi¹, Marcin Zielinski², and Alberto Roncaglia¹
¹ISMN Institute, ITALY and ²Soitec, FRANCE
- M4P.076 FREQUENCY-CODED FLEXIBLE MICROFLUIDIC RFID SENSOR FOR SIMULTANEOUS TEMPERATURE AND DEFORMATION MEASUREMENT 1576**
 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 1580**
 Samira Yasmin¹, Pooja Roy¹, Yunong Wang², Philip X.-L. Feng^{2,3}, and Jaesung Lee¹
¹University of Central Florida, USA, ²Herbert Wertheim College of Engineering, USA and
³University of Florida, Gainesville, USA
- M4P.078 MACHINE LEARNING-ASSISTED NONLINEARITY DECOUPLING FOR MEMS RESONATORS WITHIN CLOSED-LOOP CONFIGURATION 1584**
 Chengxin Li¹, Fan Wu¹, Mustafa Mert Torunbalci², Hemin Zhang³, Ruo Chen Ding¹,
 Helin Li¹, Milad Shojaeian¹, Chen Wang¹, Lieven De Strycker¹, and Michael Kraft¹
¹KU Leuven, BELGIUM, ²Quantum AI, Google, USA, and ³Northwestern Polytechnical University, CHINA
- M4P.079 MONOLITHIC CMOS-MEMS TACTILE FORCE/PROXIMITY SENSORS WITH FULL WHEATSTONE BRIDGE AND SHIELDING ELECTRODE 1588**
 Pei-Yun Li, Ruei-Cing Mai, Yi-Ming Lai, Mei-Feng Lai, and Weileun Fang
 National Tsing Hua University, TAIWAN

- M4P.080 NEUROMORPHIC ACOUSTIC SENSORS USING PIEZOELECTRIC MEMS RESONATORS WITH EPITAXIALLY GROWN BIFEO3 FILMS 1592**
 Sena Yamamoto¹, Mario Kiuchi¹, Sengsavang Aphayvong²,
 Meika Takagi², Yohane Fujibayashi², and Takeshi Yoshimura²
¹Sumitomo Precision Products Co., LTD., JAPAN and ²Osaka Metropolitan University, JAPAN
- M4P.081 NOVEL TACTILE-TEXTURE SENSING SYSTEM WITH SUPER-HUMAN SENSING PERFORMANCE VIA DEEP LEARNING 1596**
 Shuta Kanda¹, Yusaku Maeda^{1,2}, Kyohei Terao¹,
 Mayu Ikeda¹, Kazuhiro Kubo¹, and Hidekuni Takao¹
¹Kagawa University, JAPAN and ²Kagawa College, JAPAN
- M4P.082 PLANAR SINGLE-LAYER LITHIUM NIOBATE PIEZOELECTRIC TRANSDUCER WITH NO PASSIVE LAYER 1600**
 Vakhtang Chulukhadze, Ziqian Yao, Naveed Ahmed, Zihuan Liu,
 Xiaoyu Niu, Tzu-Hsuan Hsu, Neal Hall, and Ruo Chen Lu
 University of Texas, Austin, USA
- M4P.083 SIMULTANEOUS ACQUISITION OF VISCOUS AND ELASTIC PROPERTIES BY SINGLE MEASUREMENT SCAN OF FINGERTIP-TYPE TACTILE SENSOR 1604**
 Aoi Itou, Adila Safiah Binti 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 1608**
 Donghyun Lee¹, Seongbeom Heo¹, Gyeongwan Lee¹, Janghyeon Lee²,
 Dong Gu Kim², Deok Woo Yun², Yoonhyuk Kang², and Jungwook Choi¹
¹Chung-Ang University, KOREA and ²Hyundai Motor Company, KOREA
- M4P.085 TOWARDS ENCODER-LIKE TACTILE SENSING VIA CONDUCTIVEBEAM BUCKLING 1612**
 Lilly A. Rizvi, Ibrahim Abubakar, and Kristen L. Dorsey
 Northeastern University, USA
- M4P.086 ULTRA-HIGH FREQUENCY AND SMALL APERTURE SIZE CIRCULAR ARRAY BASED ON PIEZOELECTRIC POLYMER FOR INTRAVASCULAR ULTRASOUND IMAGING 1617**
 Zhiqing Zhang¹, Guoxiang Zhang¹, Weiting Liu¹, Kanjie Du¹, W.-N Lee²,
 Zihan Lu¹, Chunlong Cheng¹, Jingwen Yang¹, Tingfeng Peng¹, Huahuang Luo¹, and Qingqing Ke¹
¹Sun Yat-sen University, CHINA and ²University of Hong Kong, CHINA
- M4P.087 ACCURATE ACQUISITION OF PRESSURE SIGNALS WITH OPTIMAL AMPLITUDE USING FLEXIBLE TACTILE SENSOR ARRAY 1621**
 Tengting Lei, Boyi Zhu, Yushen Hu, and Man Wong
 Hong Kong University of Science and Technology, CHINA

Tuesday - Physical Sensors and Microsystems

- T3P.067 A COMPACT THREE-DIMENSIONAL ACOUSTIC VECTOR SENSOR WITH STEPPED DOUBLE SEMI-CONE TUBE HORN 1625**
 Lihao Ma¹, Xu Ma¹, Beining Wang¹, Wangnan Chen¹, Nan Zhang¹,
 Xiaoyu Qi¹, Yan Zhao¹, Chengchen Gao^{1,2}, and Zhenchuan Yang^{1,2}
¹Peking University, CHINA and ²Beijing Advanced Innovation Center for Integrated Circuits, CHINA
- T3P.068 A HIGH-FLATNESS PMUT-BASED HYDROPHONE SYSTEM FOR LARGE BANDWIDTH UNDERWATER ACOUSTIC DETECTION 1629**
 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 1633**
 Xu Ma¹, Lihao Ma¹, Wangnan Chen¹, Beining Wang¹, Xiaoyu Qi¹,
 Nan Zhang¹, Chengchen Gao^{1,2}, and Zhenchuan Yang^{1,2}
Peking University, CHINA
- T3P.070 A NOVEL HIGH-SENSITIVITY RESONANT ELECTRIC FIELD MICROSENSOR WITH NONLINEAR ENHANCED SENSITIVITY 1637**
 Junpeng Wang, Jiacheng Li, Wenjie Liu, Jiahao Luo, Zhengwei Wu, and Chunrong Peng
University of Chinese Academy of Sciences, CHINA
- T3P.071 A PRACTICAL RESONANT MEMS THERMOMETER FOR CRYOGENIC TEMPERATURE APPLICATIONS 1641**
 Yueyang Li², Benhao Huo², Yuan Wang², Yatao Peng²,
 Chen Wang³, Pan Zhang¹, Rui P. Martins², and Pui-In Mak²
³*Peking University, CHINA*, ²*University of Macau, CHINA*, and
³*ESAT Research Division Micro and Nano-Systems, BELGIUM*
- T3P.072 A STABILIZED-FLOW PACKAGING METHOD FOR ENHANCED INTERFERENCE RESISTANCE IN ELECTROCHEMICAL VELOCITY-TYPE VECTOR HYDROPHONES 1645**
 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 1649**
 Nan Zhao¹, Yusen Wang², Congchun Zhang¹, and Guifu Ding¹
¹*Shanghai Jiao Tong University, CHINA* and
²*Shanghai 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 1653**
 Jorge E. López¹, Masanori Muroyama², Takashiro Tsukamoto¹, and Shuji Tanaka¹
¹*Tohoku University, JAPAN* and ²*Tohoku Institute of Technology, CHINA*
- T3P.075 DEVELOPMENT OF A VACUUM SUCTION MICROCUP ARRAY FEATURING VISIONBASED TACTILE SENSING FOR ROBOTIC MANIPULATION - CHARACTERIZATION OF A TRI-AXIAL FORCE DISTRIBUTION SENSOR 1657**
 Yuma Kanazawa¹, Yukiya Matsumura¹, Kazuki Yokohata¹, Sho Ohira¹,
 Toshihiro Shiratori², Masato Suzuki¹, Tomokazu Takahashi¹, and Seiji Aoyagi¹
¹*Kansai University, JAPAN* and ²*Keio University, JAPAN*
- T3P.076 FIRST DEMONSTRATION OF SILICON CARBIDE MICROPHONE 1661**
 Siti Aisyah Zawawi¹, Azrul Azlan Hamzah², Burhanuddin Yeop Majlis², and Faisal Mohd-Yasin³
¹*Universiti Teknologi MARA, MALAYSIA*, ²*Universiti Kebangsaan Malaysia, MALAYSIA*, and
³*Griffith University, AUSTRALIA*
- T3P.077 HIGH-INTER-AXIAL-ORTHOGONALITY TRIAXIAL GYROSCOPE WITH BUILDING-BLOCK SENSORS AND COMPENSATION ALGORITHM 1664**
 Ippei Takahashi¹, Hirofumi Funabashi¹, Shota Harada², and Teruhisa Akashi¹
¹*Toyota Central R&D Labs., Inc., JAPAN* and ²*MIRISE Technologies Corporation, JAPAN*

- T3P.078 INNOVATIVE APPROACH TO CONTACT POSITION AND AREA ESTIMATION VIA RESPONSE MAPPING OF TACTILE SENSOR WITH MICROCANTILEVERS EMBEDDED IN ELASTOMER 1668**
 Ryusuke Mitobe, Harufumi Hosokawa, Takashi Abe, and Masayuki Sohgawa
Niigata University, JAPAN
- T3P.079 MAGNETORESISTIVE SENSORS FOR MICROROBOTICS USING AMORPHOUS OXIDE SEMICONDUCTORS 1672**
 Pin-Chun Huang, Guoduan Liu, Rohit Amba, Juan Sanchez, and Camilo Velez
University of California, Irvine, USA
- T3P.080 MULTI-AXIS LARGE-RANGE SILICON MICROMACHINED FORCE SENSING SYSTEM 1676**
 Lars Holm, Remco J. Wiegink, and Dennis Alveringh
University of Twente, NETHERLANDS
- T3P.081 NONLINEAR MEMS RESONATOR BASED PROGRAMMABLE PRESSURE SWITCH 1680**
 Xuecui Zou^{1,2}, Nizar Jaber³, Dongxiang Luo⁴, Bin Liu⁵, Yuan Liu¹, 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,* ⁴*Guangzhao University, CHINA,* and ⁵*Harbin Engineering University, CHINA*
- T3P.082 NUCLEAR MAGNETIC RESONANCE FORCE DETECTION USING A MICRO-GLASS-TUBE RESONATOR 1684**
 Ryosuke Shibaki, Zilong Zhang, Takahito Ono, and Masaya Toda
Tohoku University, JAPAN
- T3P.083 REDUCING DRIFTS OF MEMS PIEZORESISTIVE GYROSCOPES IN UNCONTROLLED ENVIRONMENT 1688**
 Gabriele Laita¹, Francesco Tubaro¹, Andrea Buffoli², Philippe Robert², and Giacomo Langfelder¹
¹*Politecnico di Milano, ITALY* and ²*CEA-Leti, Université Grenoble Alpes, FRANCE*
- T3P.084 STUDY ON THERMALLY TUNED ASYMMETRICAL COUPLED RESONATOR AND ITS GAS SENSING APPLICATION 1692**
 Zhengliang Fang^{1,4}, Bernardo Pereira Madeira², Chen Wang², Yuan Wang³, Chun Zhao⁴, Stephanos Theodossiades¹, and Amal Z. Hajjaj¹
¹*Loughborough University, UK,* ²*University of Leuven, BELGIUM,* ³*University of Macau, CHINA,* and ⁴*York University, UK*
- T3P.085 THREE-DEGREE-OF-FREEDOM MODE LOCALIZED SENSING WITHIN A SINGLE MEMS RESONATOR ENABLED BY TWO PARAMETRIC MODULATION SIGNALS 1696**
 Erion Uka¹, Jingqian Xi^{1,2}, and Chun Zhao¹
¹*University of York, UK* and ²*Huazhong 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 1700**
 Seongbeom Heo, Donghyun Lee, Seok-min 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 1704**
 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 1708**
Jarno Groenesteijn, Victor Winnen, and Wouter Sparreboom
¹Bronkhorst High-Tech B.V., NETHERLANDS
- W4P.067 A DUAL MOTOR TEETER-TOTTER INERTIAL SENSOR WITH HIGH SNR AND WIDE BANDWIDTH FOR BONE-CONDUCTED VOICE DETECTION 1712**
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 1716**
Xiaoyu Qi¹, Nan Zhang¹, Yan Zhao¹, Wangnan Chen¹, Beining Wang¹, Chengchen Gao^{1,2}, and Zhenchuan Yang^{1,2}
¹Peking University, CHINA and ²Beijing Advanced Innovation Center for Integrated Circuits, CHINA
- W4P.069 A MEMS ACCELEROMETER WITH IN-SENSOR NEUROMORPHIC COMPUTING CAPABILITY 1720**
Yunlong Bai^{1,2}, Wuhaio Yang¹, Bingchen Zhu^{1,2}, Zheng Wang², and Xudong Zou^{1,2}
¹Chinese Academy of Science, CHINA, ²QiLu Aerospace Information Research Institute, CHINA, and ³University of Chinese Academy of Science, CHINA
- W4P.070 A RESONANT MEMS ELECTRIC FIELD SENSOR BASED ON FEEDBACK CAPACITOR CLOSED-LOOP AND NEURAL NETWORK METHOD FOR TEMPERATURE COMPENSATION 1724**
Jiacheng Li^{1,2}, Junpeng Wang^{1,2}, Jiahao Luo^{1,2}, Wenjie Liu^{1,2}, Zhengwei Wu¹, Ren Ren¹, and Chunrong Peng¹
¹Chinese Academy of Sciences, CHINA and ²University of Chinese Academy of Sciences, CHINA
- W4P.071 A RESONANT PRESSURE SENSOR BASED ON WEDGE-SHAPED COMB EXCITATIONS 1728**
Wei Jiang^{1,2}, YuLan Lu, Bo Xie, DeYong Chen¹, JunBo Wang¹, Jian Chen¹, and Nan Li¹
¹Chinese Academy of Sciences, CHINA and ²University of Chinese Academy of Sciences, CHINA
- W4P.072 A STUDY ON THE PHOTOELECTRIC EFFECT OF A MEMS RESONATOR AT CRYOGENIC TEMPERATURE 1732**
Yueyang Li¹, Yancheng Lian¹, Yatao Peng¹, Chen Wang², Rui P. Martins¹, Pui-In Mak¹, and Yuan Wang¹
¹University of Macau, CHINA and ²ESAT Research Division Micro and Nano-Systems, BELGIUM
- W4P.073 CHARACTERIZATION AND MODELING METHOD OF ELECTRICAL AND MECHANICAL COUPLINGS FOR A MEMS CAPACITIVE GYROSCOPE 1736**
Chunhua He¹, Yingyu Xu¹, Jing Lin¹, Qinwen Huang², Qiancheng Zhao³, Guizhen Yan³, Yanchao Ren⁴, and Guodong Duan⁴
¹Guangdong University of Technology, CHINA, ²Science and Technology on Reliability Physics and Application Technology of Electronic Component Laboratory, 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 1740**
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
*¹NARLabs, TAIWAN and ²Institute of Microelectronics, A*STAR, SINGAPORE*

- W4P.075 EXTRACTION OF THERMAL PACKAGING STRESS VIA INTRINSIC SILICON ON GLASS STRESS MEASUREMENT 1744**
 Ahmet Arif Aslan and Erdinc Tatar
Bilkent University, TURKEY
- W4P.076 FREQUENCY DYNAMICS OF MICRO-PERFORATED THERMAL SENSORS: UNLOCKING POTENTIAL IN ACOUSTIC SENSING 1748**
 Akash Gupta¹, Achim Bittner¹, and Ing Alfons Dehe^{1,2}
¹*Hahn-Schickard-Gesellschaft für angewandte Forschung, GERMANY, and*
²*University of Freiburg, GERMANY*
- W4P.077 HIGH-PERFORMANCE OSCILLATION TRACKING AND FREQUENCY READOUT SYSTEM FOR ALL-QUARTZ MONOLITHIC MEMS RESONANT ACCELEROMETERS ENABLES ULTRA-HIGH STABILITY N/A**
 Kai Bu, Cun Li, Yulong Zhao, Hong Xue, Jiabin Ai, Shengxiang Zhou, and Zichao Zhang
Xi'an Jiaotong University, CHINA
- W4P.078 INTEGRATED DIAMOND MAGNETOMETER FOR VECTOR MAGNETIC MEASUREMENT 1756**
 Xiao Peng^{1,2}, Fei Xie^{1,2}, Yaochen Zhu^{1,2}, Xin Luo^{3,4}, Qihui Liu^{1,2}, Yuqiang Hu^{3,4},
 Jiachen Han^{3,4}, Lingyun Li^{1,2}, Hao Chen^{1,2}, Jiangong Cheng^{1,2}, and Zhenyu Wu^{1,2,3,4}
¹*Chinese Academy of Sciences, CHINA,* ²*University of Chinese Academy of Sciences,*
³*Shanghai University, CHINA, and* ⁴*Shanghai Industrial Technology Research Institute, CHINA*
- W4P.079 MEMS MICROPHONE-DRIVEN NEAR-SENSOR RESERVOIR COMPUTING FOR LIGHTWEIGHT TOOL WEAR CLASSIFICATION IN MILLING 1760**
 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 1764**
 Inês S. Garcia¹, Filipa C. Mota¹, Jorge M. Pereira¹, Fahimullah Khan¹,
 Carlos Ferreira², Jorge Cabral², José Fernandes¹, Rosana A. Dias¹, and Filipe S. Alves¹
¹*International Iberian Nanotechnology Laboratory, PORTUGAL and* ²*Ceiiia, PORTUGAL*
- W4P.081 NOVEL DIAMOND NANOWIRE FIELD EMISSION TRIODES AND THEIR APPLICATION AS BUFFER AMPLIFIERS AND VACUUM SWITCHES 1768**
 Yang Wang, Rui Tang and Jinwen Zhang
Peking University, CHINA
- W4P.082 PARAMETRICALLY ACTUATED RESONANT ELECTRIC FIELD MICROSENSOR IN THE DUFFING REGIME 1772**
 Guijie Wang¹, Shenglin Hou², Lifang Ran¹, Jianhua Li¹, Bo Zhang¹,
 Xiaolong Wen^{1,2}, Najib Kacem³, and Ashwin A. Seshia²
¹*University of Science and Technology, Beijing, CHINA,* ²*University of Cambridge, UK, and*
³*University of Marie et Louis Pasteur, FRANCE*
- W4P.083 SAMPLING-MOIRÉ-METHOD FORCE PLATE ARRAY VIA SINGLE-STEP 3D-PRINTING 1776**
 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 1780**
 Feiyun Wang, Xuan Ouyang, and Wei Xu
Shenzhen University, CHINA
- W4P.085 TOWARD ZERO-POWER FEATURE EXTRACTION FOR SPEECH WAKEUP USING HELMHOLTZ RESONATOR ARRAY 1784**
 Po-Han Chen¹, Ting-Yi Chen¹, Shang-Yu Lin¹, Pei-Zen Chang¹, Tay-Jyi Lin², and Wei-Chang Li¹
¹*National Taiwan University, TAIWAN and* ²*National Chung Cheng University, TAIWAN*

**W4P.086 TUNABLE PIEZOELECTRIC MEMS MICROPHONE
BASED ON INVERSE PIEZOELECTRIC EFFECT 1788**
 Zhuoyue Zheng¹, Xinyu Wu², Yuan Wang¹, Chen Wang², Pan Zhang⁴,
 Huahuang Luo³, Qingqing Ke³, Micheal Kraft², Rui P. Martins¹, and Pui-in Mak¹
¹University of Macau, CHINA, ²ESAT Research Division Micro and Nano-Systems, BELGIUM,
³Sun Yat-sen University, CHINA, and ⁴Peking University, CHINA

**W4P.087 ULTRASOUND-BASED BATTERY STATE-OF-CHARGE MONITORING AND
HEALTH EVALUATION USING HIGH DIRECTIVITY MEMS TRANSDUCER 1792**
 Jiao Xia, Junhao Wang, Chong Yang, Yinjun Wu, Peng Huang, and Yipeng Lu
 Peking University, CHINA

Monday - RF MEMS, Resonators and Oscillators

**M4P.088 EXCEPTIONAL POINTS IN HYBRID COUPLED
RESONATORS THROUGH DIGITAL NEGATIVE COUPLING SPRING 1796**
 Bernardo P. Madeira¹, Yuan Wang², Chun Zhao³, Xinyu Wu¹, Michael Kraft¹, and Chen Wang¹
¹KU Leuven, BELGIUM, ²University of Macau, CHINA, and ³York University, UK

**M4P.089 EXPERIMENTAL OBSERVATION OF THE ACOUSTOELECTRIC EFFECT
IN MONOLITHICALLY INTEGRATED ALSCN/SIC HETEROSTRUCTURES 1799**
 Xingyu Du¹, Chin-Yu Chang¹, Yunfei He¹, Chloe Leblanc¹,
 Matthew Eichenfield^{2,3}, Deep Jariwala¹, and Roy Olsson III¹
¹University of Pennsylvania, USA, ²University of Arizona, USA, and ³Sandia National Labs, USA

**M4P.090 GIGAHERTZ FOCUSING ACOUSTIC DELAY
LINES FOR PHONONIC INTEGRATED CIRCUITS 1803**
 Jiawei Li^{1,2}, Yang Li^{1,2}, Daozheng Luo^{1,2}, and Tao Wu^{1,2}
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 1807**
 Raul Ruiz, Daniyal Khosh Maram, Xavier Cartoixa and Gabriel Abadal
 Universitat Autònoma de Barcelona, SPAIN

**M4P.093 NEW METHOD FOR EVALUATING INTRINSIC MECHANICAL Q FACTOR OF
SCALN, GAN, METAL FILMS BY GHZ ULTRASONIC PULSE-ECHO TECHNIQUE 1811**
 Cocono Mita^{1,2}, Yohkoh Shimano^{1,2}, and Takahiko Yanagitani^{1,2}
¹Waseda University, JAPAN and ²ZAIKEN, JAPAN

**M4P.094 SAW EXCITATION BY SOLID FLAT ELECTRODE ON PERIODICALLY
POLARIZATION INVERTED STRUCTURE FOR NOVEL RF FILTER 1815**
 Yuichiro Hidaka^{1,2}, Satoshi Matumura^{1,2}, Naoki Ono^{1,2},
 Yohkoh Shimano^{1,2}, and Takahiko Yanagitani^{1,2}
¹Waseda University, JAPAN and ²ZAIKEN, JAPAN

**M4P.095 SURFACE ACOUSTIC WAVE/SPIN WAVE COUPLING BEHAVIOUR
OF SCALN/SI BASED SAW DEVICES AT CRYOGENIC TEMPERATURES 1819**
 Ioana Zdru¹, Claudia Nastase¹, Andrei Florescu^{1,2}, George Boldeiu¹, Daniele Narducci³,
 Monica Nedelcu^{1,2}, Dan Vasilache¹, Alexandra Nicoloiu¹, Christoph Adelman³,
 Adrian Dinescu¹, Mathias Weiler⁴, Florin Ciubotaru³, Phillipp Pirro⁴, and Alexandru Müller¹
¹IMT Bucharest, ROMANIA ²National University of Science and Technology Politehnica, ROMANIA,
³IMEC, BELGIUM, and ⁴Universität 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 1823**
 Sinwoo Cho¹, Yinan Wang¹, Eugene Kwon², Lezli Matto², Omar Barrera¹, Michael Liao²,
 Jack Kramer¹, Tzu-Hsuan Hsu¹, Vakhtang Chulukhadze¹, Ian Anderson¹, Mark Goorsky² and Ruochen Lu¹
¹University of Texas, Austin, USA and ²University 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 1827**
 Ryohei Takahashi, Shun Yasunaga, Tetsuya Iizuka, Akio Higo,
 Ryocho Nakane, Motohiko Ezawa, and Yoshio Mita
University of Tokyo, JAPAN
- T3P.089 BAW TRANSFORMER FOR RECTENNA USING 12-LAYER POLARIZATION INVERTED STRUCTURE 1831**
 Yuichiro Hidaka^{1,2}, Sarina Kinoshita^{1,2}, Yohkoh Shimano^{1,2}, and Takahiko Yanagitani^{1,2}
¹Waseda University, JAPAN and ²ZAIKEN, JAPAN
- T3P.090 GEOMETRICAL MODE-MATCHING IN A (100) SINGLE-CRYSTALLINE SILICON, SMOOTH-QUATREFOIL DISK RESONATOR 1835**
 Danny A. Kassie¹, Gabrielle D. Haddon-Vukasin²,
 Michael Feldman¹, Thomas W. Kenny², and David Elata¹
¹Technion - Israel Institute of Technology, ISRAEL and ²Stanford University, USA
- T3P.091 HIGH SENSITIVITY OF FILM BULK ACOUSTIC RESONATOR SENSORS BASED ON NONLINEAR PT SYMMETRIC SYSTEM 1839**
 Zhenyu Wei, Jianqiu Huang, and Qing-an Huang
Southeast University, CHINA
- T3P.092 LITHIUM NIOBATE ACOUSTIC RESONATORS OPERATING BEYOND 900°C 1843**
 Walter Gubinelli¹, Hasan Karaca², Ryan Tetro¹, Sariha N. Azad²,
 Philip X.-L. Feng², Luca Colombo¹, and Matteo Rinaldi¹
¹Northeastern University, USA and ²University of Florida, Gainesville, USA
- T3P.093 MoS₂ NANO-RESONANT SENSOR BASED ON INTERNAL RESONANCE STATE EXCITATION FREQUENCY COMB 1847**
 Zhujie Zhao, Lijia Zhang, Jijia 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 1851**
 Tanvir Hasan, Hakhamanesh Mansoorzare, and Reza Abdolvand
University of Central Florida, Orlando, USA
- T3P.095 SCALABLE 3D MICROPILLAR FREQUENCY SELECTIVE DEVICES FOR LOW-LOSS TERAHERTZ BANDPASS APPLICATIONS 1855**
 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 1859**
 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 1863**
 Yang Li¹, Jiawei Li¹, and Tao Wu^{1,2}
¹ShanghaiTech University, CHINA, and
²Shanghai 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 1867**
Xianzheng Lu¹, Liang Lou^{2,3}, and Hao Ren¹
¹ShanghaiTech University, CHINA, ²Shanghai University, CHINA, and
³Shanghai Industrial μ Technology Research Institute, CHINA
- W4P.089 ENHANCED FREQUENCY STABILITY IN A BLUE-SIDEBAND EXCITED MEMS RESONATOR WITH PHONONIC-FREQUENCY-COMBS-LIKE BEHAVIOUR 1871**
Jingqian Xi^{1,2}, Erion Uka², Yuan Wang³, and Chun Zhao¹
¹University of York, UK and ²Huazhong University of Science and Technology, CHINA, and
³University of Macau, CHINA
- W4P.090 GIGAHERTZ BENDING ACOUSTIC WAVEGUIDES IN ALUMINUM SCANDIUM NITRIDE FILM 1874**
Yang Li^{1,2}, Lihui Jin^{1,2}, Jiawei Li^{1,2}, Daozheng Luo^{1,2}, and Tao Wu^{1,2}
¹ShanghaiTech University, CHINA, and
²ShanghaiTech Engineering Research Center of Energy Efficient and Custom AI IC, CHINA
- W4P.091 HIGH-PERFORMANCE SOLIDLY MOUNTED BIDIMENSIONAL MODE RESONATORS (S2MRs) OPERATING AROUND 16 GHz 1878**
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 1882**
Ziqian Yao¹, Clarissa Daniel², Eric Stolt²,
Vakhtang Chulukhadze¹, Juan Rivas Davila², and Ruochen 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 1886**
Wenzhen Li¹, Yushuai Liu¹, Jiawei Li¹, Peng Dong¹, Jun Li¹, and Tao Wu^{1,2}
¹ShanghaiTech University, CHINA and
²Shanghai Engineering Research Center of Energy Efficient and Custom AI IC, CHINA
- W4P.094 REVEALING HIDDEN RESONANCES THROUGH AN INNOVATIVE BONDING WIRE STRATEGY 1890**
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 1894**
Chuan Tian, Jack Guida, and Siddhartha Ghosh
Northeastern University, USA
- W4P.096 THIN-FILM PIEZOELECTRIC SUSPENDED MEMS RESONATORS FOR REDUCING ANCHOR LOSS 1898**
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 1902**
Keonghwan Oh¹ and Sohmyung Ha^{1,2}
¹New York University, Abu Dhabi, UAE and ²New York University, USA

- M4P.098 A SILK-BASED BIDIRECTIONAL FLEXIBLE EXTRAVASCULAR BIOINTERFACE 1906**
 Xiner Wang^{1,2}, Weijian Fan³, Yuxin Liu^{1,2}, Li Chen³, Erda Zhou^{1,2},
 Xiaoling Wei^{1,2}, Liuyang Sun^{1,2}, Bo Yu³, Jinyun Tan³, Tiger H. Tao^{4,5,6}, and Zhitao Zhou^{1,2}
¹Chinese Academy of Sciences, CHINA, ²University of Chinese Academy of Sciences, CHINA
³Fudan University, CHINA, ⁴Neuroxess Co., Ltd., CHINA,
⁵Guangdong Institute of Intelligence Science and Technology, CHINA
⁶Tianqiao and Chrissy Chen Institute for Translational Research, CHINA
- M4P.099 AN INTRABODY ULTRASONIC FREQUENCY MODULATION COMMUNICATION MICROSYSTEM BASED ON PIEZOELECTRIC MICROMACHINED ULTRASONIC TRANSDUCERS 1910**
 Chenyuan Zhang, Chong Yang, Yiwei Guo,
 Xinyue Zhang, Zhihong Li, Bowen Sheng, and Yipeng Lu
 Peking University, CHINA
- M4P.100 ELASTICITY-INDEPENDENT ANGLE DETECTION FOR DIRECTIONAL PALPATION USING A MICROFINGER BY INTEGRATED DESIGN OF FLEXIBLE STRAIN SENSORS 1914**
 Yuto Hori and Satoshi Konishi
 Ritsumeikan University, JAPAN
- M4P.101 IMPLANTABLE ELECTRONIC DEVICES BASED ON OMNIDIRECTIONAL PRE-STRETCHED SILK FILMS 1918**
 Siyuan Ni^{1,2}, Huiran Yang¹, Ziyi Zhu^{1,2}, Zhengyu Liang^{1,2}, Dujuan Zou^{1,2}, Jianbo Jiang^{1,2},
 Wenyuan Liu^{1,2}, Zhitao Zhou^{1,2}, Liuyang Sun², Tiger H. Tao^{3,4}, Xiaoling Wei^{1,2}, and Keyin Liu¹
¹Chinese Academy of Sciences, CHINA, ²University of Chinese Academy of Sciences, CHINA,
³Guangdong Institute of Intelligence Science and Technology, CHINA, and
⁴Tianqiao 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 1921**
 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 1925**
 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 1929**
 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 1933**
 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 1937**
 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 1941**
 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 1945**
 Takashi Sato¹, Aoi Okonogi², Hajime Fujita², Tatsuhiko Horii², 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 MULTILAYERMICROFLUIDIC BLOOD OXYGENATOR FABRICATION 1949**
 Anand Sojan and Ponnambalam Ravi Selvaganapathy
 McMaster University, CANADA
- T3P.103 RING-SHAPED MICROPARTICLE AUTONOMOUSLY ANCHORED IN MICROCHANNEL FOR INTRAVASCULAR IMPLANTABLE DEVICES 1953**
 Masaaki Oshita^{1,2}, Tetsuo Kan¹, and Kazuto Masamoto¹
¹University of Electro-Communications, JAPAN and ²National Institute of Advanced Industrial Science and Technology (AIST), JAPAN
- T3P.104 SPECTRAL ANALYSIS OF CAROTID ARTERY VIBRATIONS USING A WEARABLE SEISMIC PATCH FOR DETECTION OF STENOSIS AND DISSECTION 1957**
 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 1961**
 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 1965**
 Haoyuan Chen, Jiawei Cao, Longchun Wang, Ning Wei, Zixing Li, Jingjing An, Kaijie Yang, Zhiyuan Du, Zhiyue Yang, Fangtao Kuang, Bin Yang, and Jingquan Liu
 Shanghai Jiao Tong University, CHINA
- W4P.099 ACCURATE SUBCUTANEOUS GLUCOSE PREDICTION BASED ON REVERSE IONTOPHORESIS WITH SKIN SURFACE PH CALIBRATION 1969**
 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 1973**
 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 1976**
 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 1980**
 Mahsa Rastegar Pour¹, Dongjoon Lee², Syed Hassan Mehdi², Rana Saha³,
 Jun Ying Tan¹, Donghoon Yoon², Albert Kim³, and Jungkwun 'JK' Kim¹
¹University of North Texas, USA, ²University of Arkansas for Medical Sciences, USA, and
³University of South Florida, USA
- W4P.103 SMART SKIN FOR FLAPPING-WING ROBOTICS WITH ENVIRONMENT SENSING AND ATTITUDE MONITORING CAPABILITIES 1984**
 Fangyu Zhao^{1,2}, Jiachuang Wang^{1,2}, Wenyuan Liu^{1,2}, Nan Qin^{1,2}, and Tiger H. Tao^{1,2,3,4,5}
¹Chinese Academy of Sciences, CHINA, ²University of Chinese Academy of Sciences, CHINA,
³Neuroxess Co., Ltd, CHINA, ⁴Guangdong Institute of Intelligence Science and Technology, CHINA, and
⁵Tianqiao 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 1988**
 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 1992**
 Elena Aprea, Francesco Stallone, Feyza Pirim-Aslan,
 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 1996**
 Ryo Hayamizu, Riku Niitsu, and Tetsuji Dohi
 Chuo University, JAPAN
- M4P.110 AN OPEN SOURCE, MICROFABRICATED, SELF CLOSING CUFF ELECTRODE WITH CONDUCTIVE POLYMER COATING FOR IMPROVED ELECTROCHEMICAL PERFORMANCE 2000**
 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 2004**
 Md Azahar Ali and Matin Ataei Kachouei
 Virginia Tech, USA
- M4P.112 DEVELOPMENT OF PIEZOELECTRIC 1D SCANNING MICROMIRROR USING MAGNESIUM AS A STRUCTURAL LAYER 2008**
 Youngsun Yun and Chang-Hyeon Ji
 Ewha Womans University, KOREA
- M4P.113 FABRICATION OF SOFT THERMAL BIMORPH MICROACTUATOR VIA FEMTOSECOND LASER SURFACE CARBONIZATION 2012**
 Yasuko Tanaka, Yoshihiro Taguchi, and Masaaki Hashimoto
 Keio University, JAPAN

- M4P.114 GEAR TRAIN-ENABLED LOW-POWER THERMOMECHANICAL BIOPSY SYSTEM FOR INGESTIBLE CAPSULES 2016**
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 2020**
Yamilet Rocha¹, Randall K. James², Aakash Patel², James Hickman², Swaminathan Rajaraman², and Jorge Manrique Castro¹
¹*University of Texas El Paso, USA* and ²*University of Central Florida, USA*
- M4P.116 LASER PATTERNED SELF-ALIGNED ELECTRODES FOR DUAL-SHELL HEMISPHERICAL RESONATOR GYROSCOPE 2024**
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 2028**
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
¹*National Institute of Advanced Industrial Science and Technology (AIST), JAPAN* and ²*Keio University, JAPAN*
- M4P.118 OPTIMIZED INTERFACIAL PROPERTIES OF IONIC LIQUID-BASED FLEXIBLE STRAIN SENSOR FOR PERFORMANCE STABILIZATION 2032**
Jong-Hyun Na¹, Jae-Sung Park², and Woo-Tae Park¹
¹*Seoul National University of Science and Technology, KOREA*, and ²*The Catholic University of Korea, KOREA*
- M4P.119 DEVELOPMENT AND VALIDATION OF A THERMALLY STABLE APTAMER-BASED BIOFET SENSOR FOR SENSITIVITY MERCURY ION DETECTION 2036**
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 2040**
Nayeon Ko¹, Eunjeong Byun¹, Albert Kim², and Seung Hyun Song¹
¹*Sookmyung Women's University, KOREA* and ²*University of South Florida, USA*
- M4P.121 DESIGN OF STRUCTURAL COLOR METAMATERIAL TRANSDUCER FOR MULTI-GAS SENSING BY ITS INDEPENDENT SPECTRAL AND ANGULAR INTERROGATION 2044**
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 2048**
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 2052**
 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 2056**
 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 2060**
 Fumihito Kato¹, Takato Otake¹, Takeru Yoshida¹, Yuki Mitsuyama¹, and Hirotsugu Ogi²
¹*Nippon Institute of Technology, JAPAN* and ²*University of Osaka, JAPAN*
- T3P.109 DEEP EUTECTIC SOLVENT-BASED ALL-IN-ONE DESIGN ELECTRICAL STIMULATION WOUND DRESSING 2064**
 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 2067**
 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 2071**
 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 2075**
 Jingping Qiao^{1,2}, Binbin Jiao¹, Sibao Li³, Ruiwen Liu¹, Yanmei Kong¹, YuXin Ye¹, Xin Liu⁴, and Zilong Wang^{1,2}
¹*Institute of Microelectronics of the Chinese Academy of Sciences, CHINA,*
²*University of Chinese Academy of Sciences, CHINA,* ³*Xi'an Shiyong University, CHINA,* and
⁴*Zhengzhou Zhongke Integrated Circuit and System Application Research Institute, CHINA*
- T3P.113 IN-PLANE-STRESS-TYPE VAPOR SENSER WITH HIGHER Q FACTOR BASED ON INDEPENDENT VIBRATION OF SI RESONATOR 2079**
 Mao Horiguchi, Takahito Ono, and Masaya Toda
Tohoku University, JAPAN
- T3P.114 LEGO-INSPIRED RECONFIGURABLE PHONONIC CRYSTAL SENSOR FOR VERSATILE LIQUID IDENTIFICATION 2083**
 Jeewon Shin, Ibrahim Syed Muhammad Anas, and Jungyul Park
Sogang University, KOREA
- T3P.115 MINIATURIZED PIEZORESISTIVE INTRACRANIAL PRESSURE SENSOR WITH PENINSULA-ISLAND-BEAM MEMBRANE 2087**
 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
¹*Xi'an Jiaotong University, CHINA,* ²*Zhuzhou CRRC Times Electric Co., LTD, CHINA,* and
³*The 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 (ϵ -CAPROLACTONE) COMPOSITES 2091**
 Kerem Kaya, Fengyi Shen, Ulrica Edlund, and Wouter M. 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 2094**
 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 2098**
 Yingying Li¹, Simon J. Bleiker¹, Elliott Worsey², Mukesh Kumar Kulsreshath², Jens Bolten³, Lisa Ehlert³, Dinesh Pamunuwa², and Frank Niklaus¹
¹*KTH Royal Institute of Technology, SWEDEN*, ²*University of Bristol, UK*, and ³*AMO GmbH, GERMANY*
- W4P.106 A MEMS PIRANI VACUUM SENSOR WITH MESH SUPPORT BEAM FOR EXTENDING THE LOWER LIMIT OF VACUUM MEASUREMENT N/A**
 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 2106**
 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 2110**
 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 2114**
 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 2118**
 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 2122**
 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 2125**
 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 2129**
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 2132**
Enrique Azuaje-Hualde¹, Naiara Lartitegui-Meneses¹, Fernando Benito-López¹, and Lourdes Basabe-Desmots^{1,2}
¹*University of the Basque Country, SPAIN* and ²*Basque Foundation of Science*
- W4P.117 ROTATIONAL MORPHING OF A LOW-POWER ELECTROTHERMAL KIRIGAMI MEMS ACTUATOR VIA LOW-COST PWM HEATING 2136**
Masaaki Hashimoto, Yuki Matsuoka, Tomoya Tsutsui, and Yoshihiro Taguchi
Keio University, JAPAN
- W4P.118 TUNABLE RESONANT ACCELEROMETER VIA LOOP GAIN CONTROL AND NONLINEAR EFFECT 2140**
Yu-Chi Chuang, Yuan-Chieh Lee, and Yi Chiu
National Yang Ming Chiao Tung University, TAIWAN