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All times are Japan Standard Time (JST)

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*[1]Agency for Science, Technology and Research (A*STAR), SINGAPORE, [2]STMicroelectronics, ITALY and [3]STMicroelectronics, SINGAPORE*

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*[1]Delft University of Technology, NETHERLANDS and [2]Fraunhofer Institute for Integrated System and Devices Technology IISB, GERMANY*

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*[1]National University of Singapore, SINGAPORE and [2]National University of Singapore, Suzhou, CHINA*

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*[1]California Institute of Technology, USA and*
*[2]Arthur Riggs Diabetes & Metabolism Research Institute at City of Hope, USA*

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*[1]National Taiwan University of Science and Technology, TAIWAN,*
*[2]National Taiwan University, TAIWAN, and [3]National Taiwan Normal University, TAIWAN*

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Karen Cheung
*University of British Columbia, CANADA*

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*[1]TU Delft, NETHERLANDS, [2]Leiden University Medical Center, NETHERLANDS, and*
*[3]University of Twente, NETHERLANDS*

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*[1]University of Central Florida, USA and [2]Louisiana State University, USA*

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*[1]Keio University, JAPAN and [2]Tokyo University of Agriculture and Technology, JAPAN*

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*[1]University of Michigan – Shanghai Jiao Tong University Joint Institute, Shanghai Jiao Tong University, CHINA and [2]Shanghai Jiao Tong University (SJTU), CHINA*

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*[1]NaMLab gGmbH, GERMANY and [2]TU Dresden, GERMANY*

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*[2]China Astronaut Research and Training Center, CHINA, and [3]Sun Yat-sen University, CHINA*

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*[1]National Tsing Hua University, TAIWAN, [2]National Sun Yat-sen University, TAIWAN, and*
*[3]National Cheng Kung University, TAIWAN*

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*[1]Northwestern Polytechnical University, CHINA, [2]Hangzhou Dianzi University, CHINA, and [3]Shanghai Jiao Tong University, CHINA*

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*[1]Chinese Academy of Sciences (CAS), CHINA, [2]University of Chinese Academy of Sciences, CHINA, [3]Shanghai University of Electric Power, CHINA, [4]Nanjing Tech University, CHINA, [5]Shanghai Normal University, CHINA, [6]Neuroxess Co., Ltd. (Jiangxi), CHINA, [7]Guangdong Institute of Intelligence Science and Technology, CHINA, and [8]Tianqiao and Chrissy Chen Institute for Translational Research, CHINA*

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*[1]Chinese Academy of Sciences (CAS), CHINA, [2]University of Chinese Academy of Sciences, CHINA [3]Neuroxess Co., Ltd. (Jiangxi), 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]Shanghai Institute of Microsystem and Information Technology, CHINA, [2]Shanghai Industrial μtechnology Research Institute, CHINA, [3]Shanghai University, CHINA, [4]University of Chinese Academy of Sciences, CHINA, and [5]Chinese Academy of Sciences (CAS), CHINA*

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*[1]MIRISE Technologies Corporation, JAPAN and [2]Nisshinbo Micro Devices Inc., JAPAN*

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*[2]Fraunhofer Institute for Physical Measurement Techniques IPM, GERMANY*

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*[1]Technical University of Munich, GERMANY and [2]Infineon Technologies AG, GERMANY*

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*[1]Silicon Austria Labs GmbH (SAL), AUSTRIA and [2]University of South-Eastern Norway, NORWAY*

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**17:40 - 19:10**

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*[1]Ritsumeikan University, JAPAN, [2]Ritsumeikan Advanced Research Academy, JAPAN, and [3]Ritsumeikan Global Innovation Research Organization, JAPAN*

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*[1]Technion, Israel Institute of Technology, ISRAEL and [2]University of British Columbia, CANADA*

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*[1]Kyushu University, JAPAN, [2]National Institute of Advanced Industrial Science and Technology (AIST), JAPAN, and [3]University of Tokyo, JAPAN*

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*[1]National University of Singapore, SINGAPORE and*
*[2]Agency for Science, Technology and Research (A*STAR), SINGAPORE*

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*[1]Tokyo University of Agriculture and Technology, JAPAN and*
*[2]National Institute of Information and Communication Technology, JAPAN*

**10:00 - 10:15**

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*[1]Peking University, CHINA, [2]University of Science and Technology Beijing, CHINA, and*
*[3]University of Chinese Academy of Sciences, CHINA*

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*[1]KTH Royal Institute of Technology, SWEDEN, [2]École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND, [3]IMEC, BELGIUM, [4]Ghent University, BELGIUM, and*
*[5]Tyndall National Institute, IRELAND*

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*[1]National University of Singapore, SINGAPORE and*
*[2]National University of Singapore (Suzhou) Research Institute, CHINA*

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*[1]KTH Royal Institute of Technology, SWEDEN and [2]Universität der Bundeswehr Munich, GERMANY*

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

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*University of Tokyo, JAPAN*

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*[1]Osaka Metropolitan University, JAPAN, [2]University of Hyogo, JAPAN, and [3]Kobe University, JAPAN*

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*[1]KU Leuven, BELGIUM, [2]Northwestern Polytechnical University, CHINA, [3]Broadcom, USA, and [4]University of Macau, CHINA*

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*University of the Basque Country, SPAIN*

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*[1]Kwangwoon University, KOREA, [2]Seoul National University of Science and Technology, KOREA, and [3]Korea University, KOREA*

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*[1]Keio University, JAPAN and [2]Tokyo University of Agriculture and Technology, JAPAN*

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*[1]Chinese Academy of Sciences (CAS), CHINA, [2]Shanghai Institute of Technology, CHINA, and [3]University of Chinese Academy of Sciences, CHINA*

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

**11:45 - 12:00**

**W3B.03 FAST AND SIMULTANEOUS GAS SENSING METHOD IN MIXED GASES USING MULTIPLE MICROMACHINED THERMAL CONDUCTIVITY DETECTORS FOR FUTURE CARBON-NEUTRAL SOCIETY ..... 498**
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*[1]National Tsing Hua University, TAIWAN, [2]National Cheng Kung University, TAIWAN, and [3]National Sun Yat-sen University, TAIWAN*

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*[1]Toyohashi University of Technology, JAPAN and [2]University of Yamanashi, JAPAN*

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*[1]University of the Balearic Islands, SPAIN and [2]Health Research Institute of the Balearic Islands, SPAIN*

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*[1]Politecnico di Milano, ITALY and [2]STMicroelectronics, ITALY*

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*[1]University of Macau, CHINA, [2]University of York, UK, [3]KU Leuven, BELGIUM, and [4]Huazhong University of Science and Technology, CHINA*

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*[1]KU Leuven, BELGIUM and [2]University of Macau, CHINA*

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*[1]University of Bristol, UK and [2]Royal Institute of Technology (KTH), SWEDEN*

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*[1]Agency of Science Technology and Research (A*STAR), SINGAPORE and [2]Cornell University, USA*

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*[1]Université de Toulouse, FRANCE and [2]Université Grenoble Alpes, FRANCE*

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*California Institute of Technology, USA*

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*[1]Chinese Academy of Sciences, CHINA and [2]University of Chinese Academy of Sciences, CHINA*

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

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

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*Toshiba Corporation, JAPAN*

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*Toyohashi University of Technology, JAPAN*

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*National Tsing Hua University, TAIWAN*

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*[1]University of Florida, USA, [2]Air Force Research Laboratory, USA, and [3]Case Western Reserve University, USA*

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*[1]Beijing Institute of Technology, CHINA, [2]University of California, Davis, USA, and [3]Texas Instruments, USA*

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*Northeastern University, USA*

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*Agency of Science Technology and Research (A*STAR), SINGAPORE*

## Session W5D - Intelligent Bio-Chemical Sensors

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*Toyohashi University of Technology, JAPAN*

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*[1]Keio University, JAPAN and [2]University of Electro-Communications, JAPAN*

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

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[1]*Hong Kong University of Science and Technology, CHINA and*
[2]*Southern University of Science and Technology, CHINA*

## Session W5E - Functional Materials & Fabrication II

**16:15 - 16:45**

**INVITED PRESENTATION**

**W5E.01 To Be Announced**

Annalisa De-Pastina
*Silicon Austria Labs GmbH, AUSTRIA*

**16:45 - 17:00**

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Jan-Willem Burssens[1], Chen Wang[1], Xinyu Wu[1], Jesus Gandaro-Loe[1],
Appo Van der Wiel[2], and Michael Kraft[1]
[1]*KU Leuven, BELGIUM and* [2]*Melexis, BELGIUM*

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Seungbae Ahn, Ju Ying Shang, and Oscar Vazquez Mena
*University of California, San Diego, USA*

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Tatsuya Yano[1], Gaku Furusawa[1], Hiroaki Onoe[2], and Tetsuo Kan[1]
[1]*University of Electro-Communications, JAPAN and* [2]*Keio University, JAPAN*

**17:30 - 17:45**

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Hinako Sato[1], Yoshiyuki Yokoyama[2], and Takeshi Hayakawa[1]
[1]*Chuo University, JAPAN and*
[2]*Toyama Industrial Technology Research and Development Center, JAPAN*

17:45 End of Day

## Banquet

**18:00 - 21:00**

# Thursday, 29 June

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**08:30 - 09:15**

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Chunhai Fan
*Shanghai Jiao Tong University (SJTU), CHINA*

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*[1]Université Paris-Saclay, FRANCE, [2]Université Paris-Saclay, FRANCE, [3]Hôpital Paul Brousse, FRANCE, and [4]Université Paris-Saclay, FRANCE*

**09:45 - 10:00**

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*[1]Keio University, JAPAN and [2]Tokyo University of Agriculture and Technology, JAPAN*

**10:00 - 10:15**

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*[1]University of Freiburg, GERMANY, [2]University of Furtwangen, GERMANY, and [3]Hahn-Schickard, GERMANY*

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*Mayo Clinic, USA*

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*[1]Kyoto University, JAPAN, [2]Institute of Physical and Chemical Research (RIKEN), JAPAN, and [3]Osaka University, JAPAN*

## Session Th2D - Soft Actuators

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*Ritsumeikan University, JAPAN*

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Xiayu Wang[1], Fade Hu[1], Zheng You[1], and Chuan Luo[1,2]
*[1]Tsinghua University, CHINA and [2]Beijing Innovation Center for Future Chips, CHINA*

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*University of Tokyo, JAPAN*

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*Peking University, CHINA*

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Wei Yue[1], Xinyu Zhou[2], Fanping Sui[1], Mingzheng Duan[1], and Liwei Lin[1]
*[1]University of California, Berkeley, USA and [2]Peking University, CHINA*

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*Bilkent University, TURKEY*

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*[1]Université Grenoble Alpes, FRANCE, [2]Massachusetts Institute of Technology, USA, and [3]TRAVERA, USA*

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**Th2E.03 DROPLET AS A MECHANICAL COUPLING FOR A VIBRATIONAL SYSTEM AND ITS APPLICATION IN FLUID PROPERTY SENSING ..... 690**
Saravanakumar Dharmaraj and Prosenjit Sen
*Indian Institute of Science, INDIA*

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*[1]Shenzhen University, CHINA and [2]University of California, Berkeley, USA*

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Kenta Kuroda[4], Katsufumi Sato[4], and Hidetoshi Takahashi[1]
*[1]Keio University, JAPAN, [2]Tokyo Institute of Technology, JAPAN,*
*[3]Japan Aerospace Exploration (JAXA), JAPAN, and [4]University of Tokyo, JAPAN*

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

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*[1]Chinese Academy of Sciences (CAS), CHINA, [2]University of Chinese Academy of Sciences, CHINA,*
*[3]Shanghai Ninth People's Hospital, Shanghai JiaoTong University School of Medicine, CHINA,*
*[4]Shanghai Normal University, CHINA, [5]Neuroxess Co., Ltd. (Jiangxi), CHINA,*
*[6]Guangdong Institute of Intelligence Science and Technology, CHINA, and*
*[7]Tianqiao and Chrissy Chen Institute for Translational Research, CHINA*

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Shuo Tian and Rong Zhu
*Tsinghua University, CHINA*

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Toshihiro Itoh[2], Dzung Viet Dao[1], Jayishni Maharaj[1], and Van Thanh Dau[1]
*[1]Griffith University, AUSTRALIA and [2]University of Tokyo, JAPAN*

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**Th2F.05 CONTINUOUS CUFFLESS MONITORING OF ARTERIAL BLOOD PRESSURE BASED ON HIGH-DENSITY FLEXIBLE SENSOR ARRAY ..... 718**
Fang Wang[1,2], Heng Yang[1,2], Ke Sun[1], Yi Sun[1], and Xinxin Li[1,2]
*[1]Chinese Academy of Sciences (CAS), CHINA and [2]University of Chinese Academy of Sciences, CHINA*

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Hirotaka Hida
*Kobe University, JAPAN*

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*Toyohashi University of Technology, JAPAN*

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*Toyohashi University of Technology, JAPAN*

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Chao Liang[1], Wei Zhou[1], Ziqi Mei[2], Wenqiang Zhang[1], and Xiaoguang Zhao[2]
*[1]China Agricultural University, CHINA and [2]Tsinghua University, CHINA*

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**Th3C.06 HIGH-SPEED ON-CHIP IN-LIQUID DISPENSING BY UTILIZING ON-DEMAND VORTX GENERAIONS ..... 737**
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*Kyushu University, JAPAN*

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

**11:45 - 12:00**

**Th3D.03 DESIGN OF BI-DIRECTIONAL $VO_2$-KIRIGAMI ELECTROTHERMAL MICROACTUATOR WITH MILLIMETER LARGE STROKE ..... 741**
Masaaki Hashimoto, Tomoya Tsutsui, and Yoshihiro Taguchi
*Keio University, JAPAN*

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*[1]National Tsing Hua University, TAIWAN, [2]Upbeat Technology Co., Ltd., TAIWAN, [3]Asia Pacific Microsystem Inc., TAIWAN, and [4]National Sun Yat-sen University, TAIWAN*

**12:15 - 12:30**

**Th3D.05 A MECHANICALLY-OPEN AND ACOUSTICALLY-CLOSED PIEZO-MEMS SPEAKER FOR IN-EAR APPLICATIONS ..... 749**
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*[1]Politecnico di Milano, ITALY and [2]STMicroelectronics, ITALY*

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Akash Roy, Matin Barekatain, Jaehoon Lee, Baptiste Neff, and Eun Sok Kim
*University of Southern California, USA*

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*[1]Kyoto University, JAPAN and [2]University of Fukui, JAPAN*

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**Th3E.02 A METAL ORGANIC FRAMEWORK DERIVED NANO POROUS CARBON (NPC)-MWCNT HETEROSTRUCTURED NANOCOMPOSITE-BASED ELECTROCHEMICAL SENSING PATCH FOR SWEAT Ca ION AND pH MONITORING ..... 761**
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*Kwangwoon University, KOREA*

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**Th3E.03 HIGHLY CONDUCTIVE AND ENVIROMENTALLY STABLE MXENE-$Ti_3C_2T_X$ NANOSHEETS FOR MULTIPLEXED DISEASE INFLAMMATORY BIOMARKER DETECTION ..... 765**
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Hye Su Song, and Jae Yeong Park
*Kwangwoon University, KOREA*

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Curt Scharfe[3], Peter Griffin[4], Lars Steinmetz[4], Vicent Pelechano[2], and Mehdi Javanmard[1]
*[1]Rutgers, State University of New Jersey, USA, [2]Karolinska Institute, SWEDEN,*
*[3]Yale University, USA, and [4]Stanford University, USA*

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*[1]IMEC, BELGIUM, [2]Roswell ME, USA, and [3]University of California, San Diego, USA*

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*Tokyo Institute of Technology, JAPAN*

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**Th3F.01** **HIGHLY SENSITIVE AND STRETCHABLE STRAIN SENSOR BASED ON SILVER NANOWIRE/GRAPHENE HYBRID WITH A NEAR-ZERO THERMAL CROSSTALK** ..... **780**
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*Chung-Ang University, KOREA*

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*[1]Indian Institute of Technology Delhi, INDIA, [2]Defense Institute of Advanced Technology (DIAT), INDIA, and [3]Centre for Applied Research in Electronics (CARE), INDIA*

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**Th3F.03** **STRETCHABLE PEDOT: PSS-PRINTED FABRIC STRAIN SENSOR FOR HUMAN MOVEMENT MONITORING AND RECOGNITION** ..... **788**
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*Tsinghua University, CHINA*

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Jeonheyong Park, Hyeoncheol Lim, Chaehyun Ryu, Soon In Jung, Il Ryu Jang, and Hoe Joon Kim
*Daegu Gyeongbuk Institute of Science and Technology (DGIST), KOREA*

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**Th3F.05** **MULTIFUNCTIONAL STRETCHABLE SENSOR FOR MONITORING HUMAN MOTION** ..... **796**
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*Tsinghua University, CHINA*

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**Th3F.06** **IN-TUBE-CENTER PACKAGING OF FLEXIBLE MEMS AIRFLOW-RATE SENSOR AND ITS SENSITIVITY ENHANCEMENT** ..... **800**
Muhammad Salman Al Farisi[1], Yang Wang[1], Yoshihiro Hasegawa[1], Miyoko Matsushima[2], Tsutomu Kawabe[2], and Mitsuhiro Shikida[1]
*[1]Hiroshima City University, JAPAN and [2]Nagoya University, JAPAN*

12:45 - 13:00 Transition

## Best Paper Award Ceremony and Closing Remarks

**13:00 - 13:30**

13:30 Conference Adjourns

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All times are Japan Standard Time (JST)

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- 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


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Bart P. Weekers[1,2], Liesbet Lagae[1,2], Xavier Rottenberg[2], and Veronique Rochus[2]
*[1]KU Leuven, BELGIUM and [2]imec, BELGIUM*

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*[1]University of California, Berkeley, USA and [2]Tsinghua University, CHINA*

**M4P.003 DEVELOPMENT, REALIZATION AND VALIDATION OF A PIEZOELECTRIC FLEXIBLE HAPTIC INTERFACE ..... 812**
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*[1]Université Grenoble Alpes, FRANCE and [2]Université de Lille, France*

**M4P.004 FABRICATION AND PERFORMANCE EVALUATION OF 61-ELECTRODE PIEZOELECTRIC MEMS DEFORMABLE MIRROR BASED ON PZT FILM ..... 816**
Junhua Wang, Cao Xia, Yuanlin Xia, Liang He, and Zhuqing Wang
*Sichuan University, CHINA*

**M4P.005 HIGH OUTPUT TACTILE DISPLAY USING SMA THICK FILM ACTUATOR ARRAY WITH IMPROVED THERMAL AND FREQUENCY RESPONSE ..... 820**
Ryo Saito, Haruto Amano, and Takashi Mineta
Yamagata University, JAPAN

**M4P.006 DESIGN AND FABRICATION OF A 4-TERMINAL IN-PLANE NANOELECTROMECHANICAL RELAY ..... 824**
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*[1]KTH Royal Institute of Technology, SWEDEN, [2]University of Bristol, UK, [3]École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND, [4]IMEC, BELGIUM, and [5]University of Ghent, BELGIUM*

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*[1]National Tsing Hua University, TAIWAN and [2]CoretronicMEMS Co., Ltd., TAIWAN*

**M4P.008 ORIGAMI-INSPIRED FLEXURE-BASED ROBOT FOR ENDOMICROSCOPY PROBE MANIPULATION ..... 831**
Xu Chen, Jinshi Zhao, Khushi Vyas, Michail E. Kiziroglou, and Eric M. Yeatman
*Imperial College London, UK*

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Zhengnan Tang[1], Leo Soda[1,2], Taiyu Okatani[1], Andrea Vergara[1], Yukio Suzuki[1], and Shuji Tanaka[1]
*[1]Tohoku University, JAPAN and [2]École des Mines de Saint-Étienne, FRANCE*

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*[1]Griffith University, AUSTRALIA, [2]Australian National University, AUSTRALIA, [3]University of Queensland School of Dentistry, AUSTRALIA, [4]University of Sydney School of Dentistry, AUSTRALIA, [5]Dentroid (Emudent Technologies Pty Ltd), AUSTRALIA, and [6]Platypus Technical Consultants Pty Ltd, AUSTRALIA*

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*[1]Yokohama National University, JAPAN, [2]University of Tokyo, JAPAN, [3]Kyoto University, JAPAN, and [4]Kanagawa Institute of Industrial Science and Technology (KISTEC), JAPAN*

**T4P.003 A 3D SELF-ROLL INDUCTOR BASED ON AL-$SiO_2$ BIMORPHS ..... 845**
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*[1]Beijing Institute of Technology, CHINA and*
*[2]BIT Chongqing Institute of Microelectronics and Microsystems, CHINA*

**T4P.004 BENDABLE POLYMER-BASED HIGH-FREQUENCY PMUTS ON TRANSPARENT SU8 AND POLYIMIDE SUBSTRATES ..... 849**
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*KU Leuven, BELGIUM*

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*[1]Politecnico di Milano, ITALY and [2]STMicroelectronics, ITALY*

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*[1]Tohoku University, JAPAN, [2]Shibaura Institute of Technology, JAPAN, and*
*[3]Silicon Austria Labs, AUSTRIA*

**T4P.007 ELECTRO-FORCE DISPLAY FOR NANO ROBOTICS ..... 861**
Kain Ichinohe, Ken Sasaki, and Takayuki Hoshino
*Hirosaki University, JAPAN*

**T4P.008 HIGHLY MINIATURIZED IN-EAR MEMS LOUDSPEAKER FEATURING HIGH SPL ..... 865**
Fabian Stoppel, Johannes Fankhänel, Thorsten Giese, Christian Eisermann, Isa Pieper, Dirk Kaden, Lenny Castellanos, and Sven Gruenzig
*Fraunhofer Institute for Silicon Technology, GERMANY*

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Jiacheng Liu[1], Yuma Ohara[2], Zerui Xu[2], Ruizi Liu[1], Zhangshanhao Li[2], Xiaohong Wang[3], Toshiyuki Tsuchiya[2], and Man Wong[1]
*[1]Hong Kong University of Science and Technology, Hong Kong, CHINA, [2]Kyoto University, JAPAN, and*
*[3]Tsinghua University, CHINA*

**T4P.010 ON THE USE OF 3D-PRINTED ULTRASONIC HORNS TO TUNE THE FREQUENCY RESPONSE OF AIRBORNE MEMS TRANSDUCERS ..... 873**
Gabriele Bosetti, Stefan Hofstetter-Spona, and Gabriele Schrag
*Technical University of Munich, GERMANY*

## Wednesday - Actuators and Microsystems

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Minghao Nie, Ai Shima, and Shoji Takeuchi
*University of Tokyo, JAPAN*

**W4P.003 DEVELOPMENT OF HAPTIC BIO-FEEDBACK RING USING ULTRA-THIN HAPTIC MEMS FILM ..... 879**
Toshihiro Takeshita, Zymelka Daniel, Yusuke Takei, and Takeshi Kobayashi
*National Institute of Advanced Industrial Science and Technology (AIST), JAPAN*

**W4P.004 FABRICATION PROCESS OF CONVENTIONAL AND UNCONVENTIONAL 3D MICROCOILS BASED ON 2D ARRAY OF SU-8 MICROPOSTS STRUCTURE ..... 883**
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*[1]Karlsruhe Institute of Technology (KIT), GERMANY and [2]Hefei University of Technology, CHINA*

**W4P.005 HAPTIC INTERFACE BASED ON AN INNOVATIVE "PIEZO-IN-FLEX" PIEZOELECTRIC PATCH TECHNOLOGY ..... 887**
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*University Grenoble Alpes, FRANCE*

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*[1]University of Freiburg, GERMANY and [2]Hahn-Schickard, GERMANY*

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*[1]Universität Hamburg, GERMANY and [2]Hamburg Centre for Ultrafast Imaging, GERMANY*

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*[1]Tohoku University, JAPAN and [2]Sony Semiconductor Manufacturing Corporation, JAPAN*

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

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*[1]Technical University of Munich, GERMANY, [2]Infineon Technologies AG, GERMANY, and [3]Infineon Technologies Dresden GmbH, GERMANY*

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Yuqiang Hu[1,2,3], Fei Xie[2,4], Qihui Liu[2,4], Nan Wang[2,4], Jin Zhang[2], Yichen Liu[2], Yongquan Su[1,2,3], Lihao Wang[2,4], Hao Chen[2,4], and Zhenyu Wu[1,2,3,4]
*[1]Shanghai University, CHINA, [2]Chinese Academy of Sciences (CAS), CHINA, [3]Shanghai Industrial μTechnology Research Institute, CHINA, and [4]University of Chinese Academy of Sciences, CHINA*

**T4P.084 PIEZOELECTRIC MEMS ACOUSTIC EMISSION SENSOR MODULE WITH A BUILT-IN PREAMPLIFIER ..... 1691**
Yongfang Li, Yuki Ueda, Takashi Usui, and Kazuo Watabe
*Toshiba Corporation, JAPAN*

**T4P.085 SAW PRESSURE SENSOR ON LITHIUM NIOBATE USING A TRANFER OF SEPERATELY FABRICATED CAVITIES ..... 1695**
Sagun Shekhar, Ebinesh Abraham, and Prosenjit Sen
*Indian Institute of Science, INDIA*

**T4P.086 STIFFNESS IMBALANCE ERRORS TRIMMING FOR SILICON MEMS TUNING-FORK GYROSCOPES WITH LOW COST PICOSECOND LASERS ..... 1699**
Yuxian Liu, Qiancheng Zhao, Dacheng Zhang, and Jian Cui
*Peking University, CHINA*

**T4P.087 ULTRA-SENSITIVE PIEZORESISTIVE STRAIN SENSOR UTILISING LATERAL PHOTOVOLTAIC EFFECT IN 3C-SIC/SI HETEROJUNCTION ..... 1703**
Tuan-Hung Nguyen[1], Cong Thanh Nguyen[1], Dang D.H. Tran[1], Trung-Hieu Vu[1], Dinh Gia Ninh[1], Toan Dinh[2], Van T. Dau[1], Dzung V. Dao[1]
*[1]Griffith University, AUSTRALIA and [2]University of Southern Queensland, AUSTRALIA*

## Wednesday - Physical Sensors and Microsystems

**W4P.066 3D ANISOTROPIC TACTILE SENSORS FOR NORMAL AND SHEAR FORCE DISCRIMINATION ..... 1707**
Kai-Ming Hu, Yi-Hang Xin, Xin-Lu Deng, Zhi-Qi Dong, Jing-Lin Ye, and Wen-Ming Zhang
*Shanghai Jiao Tong University (SJTU), CHINA*

**W4P.067 A FLEXIBLE, EMBROIDERED STRAIN SENSOR FOR USE WITH TEXTILES ..... 1711**
Yoshiki Kondo, Satoko Honda, and Kuniharu Takei
*Osaka Metropolitan University, JAPAN*

**W4P.068 A HIGHLY SENSITIVE ELECTROMECHANICAL SMALL CURRENT AMMETER ..... 1715**
Xuecui Zou, Usman Yaqoob, Khaled Salama, and Hossein Fariborzi
*King Abdullah University of Science and Technology (KAUST), SAUDI ARABIA*

**W4P.069 A NOVEL WALL-SHEAR STRESS SENSOR WITH A COVERING FLOATING ELEMENT FOR HARSH ENVIRONMENTS ..... 1719**
Yunzhe Liu, Guanghui Ding, Tao Zhang, Peng Pang,
Keli Zhao, Guangyao Pei, Jian Luo, and Binghe Ma
*Northwestern Polytechnical University, CHINA*

**W4P.070 A SINGLE-INPUT SINGLE-OUTPUT SENSING SCHEME FOR MULTIPLE TRACES VIA HIGH-ORDER NONLINEAR MODE LOCALIZATION ..... 1723**
Wei Zhang, Jiajia Xiang, Na Ling, Jiayang Chen,
Lijia Zhang, Cao Xia, Yuanlin Xia, and Zhuqing Wang
*Sichuan University, CHINA*

**W4P.071 A SELF-POWERED TACTILE SENSING INTERFACE FOR HUMAN-MACHINE INTERACTION ..... 1727**
Yuyang Sun, Hanyang Li, Kaiyao Wang, Xiaowei Feng, Cheng Hou, Tao Chen, and Huicong Liu
Soochow University, CHINA

**W4P.072 AN ULTRA-SENSITIVE HYDROGEL TACTILE SENSOR WITH MICRO-CONE STRUCTURES FOR HUMAN–MACHINE INTERFACE ..... 1731**
Aocheng Bao[1], Jiahao Yu[1], Jiyuan Zhang[1], Jin Wu[2], Bowen Ji[1], Honglong Chang[1],
Weizheng Yuan[1], and Kai Tao[1]
*[1]Northwestern Polytechnical University, CHINA and [2]Sun Yat-sen University, CHINA*

**W4P.073 BY VARYING THE DISTANCE OF NI FLUX-GUIDE FOR OUT-OF-PLANE MAGNETIC FIELD SENSITIVITY ENHANCEMENT OF AMR SENSOR ..... 1735**
Shihwei Lin, Meifeng Lai, and Weileun Fang
*National Tsing Hua University, TAIWAN*

**W4P.074 DESIGN AND VALIDATION OF THE FIRST Z-AXIS MEMS ACCELEROMETER WITH IN-PLANE READOUT ..... 1739**
Gabriele Gattere[1], Valentina Zega[2], Manuel Riani[1], Francesco Rizzini[1], and Federico Maspero[2]
*[1]STMicroelectronics, ITALY and [2]Politecnico di Milano, ITALY*

**W4P.075 DEVELOPMENT OF THE NASA MINI/MEMS TRI-AXIS SENSOR SYSTEM ..... 1743**
Kenneth G. Toro[1] and Jonathon D. Ponder[2]
*[1]NASA Langley Research Center, USA and [2]NASA Glenn Research Center, USA*

**W4P.076 ENHANCING LOW-FREQUENCY ACCELERATION RESOLUTION OF RESONANT ACCELEROMETERS BY MANIPULATING THE BIAS VOLTAGE NOISE ..... 1747**
Kunfeng Wang[1,2], Zheng Wang[1], Liangbo Ma[1,2], Zhaoyang Zhai[1,2], and Xudong Zou[1,2]
*[1]Chinese Academy of Sciences (CAS), CHINA and [2]University of Chinese Academy of Sciences, CHINA*

**W4P.077 LARGE VERTICAL PIEZO-OPTOELECTRONIC EFFECT IN SIC/SI HETEROSTRUCTURE ..... 1751**
Cong Thanh Nguyen, Gia-Ninh Dinh, Tuan-Hung Nguyen, Trung-Hieu Vu, Dang D.H. Tran,
Emily Lakis, Braiden Tong, Nam-Trung Nguyen, Van Thanh Dau, and Dzung Viet Dao
*Griffith University, AUSTRALIA*

**W4P.078 MICROSTRUCTURE-ENHANCED VISION-BASED TACTILE SENSOR ..... 1755**
Mayue Shi, Yongqi Zhang, Xiaotong Guo, and Eric M. Yeatman
*Imperial College London, UK*

**W4P.079 ONE STEP FABRICATION OF TRIAXIAL FORCE PLATE USING A FDM 3D PRINTER ..... 1759**
Yukitake Nakahara and Hidetoshi Takahashi
*Keio University, JAPAN*

**W4P.080 QUALITY FACTOR MODULATION IN MEMS RESONATORS BY ELASTIC WAVE INTERFERENCE IN THE ANCHOR REGION ..... 1762**
Daniel Platz, Marco Stixenberger, Andre Gesing, Ioan Igant, Hendrik Kähler, and Ulrich Schmid
*TU Wien, AUSTRIA*

**W4P.081 SELF-HEALING METAL INTERCONNECT USING SILICONE OIL DISPERSED WITH COPPER NANOPARTICLES ..... 1766**
Akane Umeda, Naoki Suetsugu, Wakana Akema, and Eiji Iwase
*Waseda University, JAPAN*

**W4P.082 SELF-OSCILLATING CALORIMETER BASED ON THERMAL-PIEZORESISTIVE RESONATOR ..... 1770**
Aojie Quan[1], Hemin Zhang[2], Chengxin Li[1], Chen Wang[1], Xinyu Wu[1], and Michael Kraft[1]
*[1]KU Leuven, BELGIUM and [2]Northwestern Polytechnical University, CHINA*

**W4P.083 TENSION-INDUCED MOEMS GRAPHENE RESONANT PRESSURE SENSOR ..... 1774**
Yujian Liu[1], Cheng Li[1,2], Zhengwei Wu[3], Shangchun Fan[2], Zhen Wan[1], and Song Han[4]
*[1]Beihang University, CHINA, [2]Shenzhen Institute of Beihang University, CHINA,*
*[3]Chinese Academy of Sciences (CAS), CHINA, and*
*[4]Southern University of Science and Technology, CHINA*

**W4P.084 UNCERTAINTY QUANTIFICATION OF MEMS DEVICES WITH HIGH-DIMENSIONAL CORRELATED PROCESS VARIATIONS ..... 1778**
Lin-Feng Zhao, Zai-Fa Zhou, and Qing-An Huang
*Southeast University, CHINA*

**W4P.085 UNCLOSED HEXAGONAL PIEZOELECTRIC MEMS HYDROPHONE BASED ON RIGID-FLEXIBLE COMPOSITE MEMBRANE ..... 1782**
Zhiyong Hu, Qi Wang, Qingda Xu, Tao Ruan, Bin Yang, and Jingquan Liu
*Shanghai Jiao Tong University (SJTU), CHINA*

## Monday - RF MEMS, Resonators and Oscillators

**M4P.088 FULLY IMPEDANCE-MATCHED HIGH-OVERTONE BULK ACOUSTIC WAVE RESONATORS USING 2DEG ELECTRODES ..... 1786**
Jingjie Cheng, Jiahao Wu, Yan Qiao, Penghui Song, Wenming Zhang, and Lei Shao
Shanghai Jiao Tong University (SJTU), CHINA

**M4P.089 HIGH QUALITY FACTOR ALSCN LAMB WAVE RESONATORS USING NBN/AL TOP ELECTRODES AT CRYOGENIC TEMPERATURE ..... 1790**
Zhifang Luo[1,2,3,5], Shuai Shao[1,2,3], Peng Dong[1], Haowen Guo[1,4],
Xinbo Zou[1,4], Jun Li[1], Chengkuo Lee[5], and Tao Wu[1,2,3,4]
*[1]ShanghaiTech University, CHINA, [2]Chinese Academy of Sciences (CAS), CHINA,*
*[3]University of Chinese Academy of Sciences, CHINA, [4]Shanghai Engineering Research Center of Energy Efficient and Custom AI IC, CHINA, and [5]National University of Singapore, SINGAPORE*

**M4P.090 INVESTIGATION OF QUALITY FACTOR VARIATION BASED ON TAILORED MODE SHAPE ENGINEERING FOR PIEZOELECTRIC CONTOUR MODE RESONATORS ..... 1794**
Wei Lin and Sheng-Shian Li
National Tsing Hua University, TAIWAN

**M4P.091 STRESS INDUCED GAP CLOSING ELECTRODES FOR SILICON RESONATORS ENABLING LOW BIAS VOLTAGE AND EQUIVALENT RESISTANCE ..... 1798**
Hao Yu[1,2], Ke Sun[1], Chaoyue Zheng[1,2], Fang Wang[1,2], Heng Yang[1,2], and Xinxin Li[1,2]
*[1]Chinese Academy of Sciences (CAS), CHINA and [2]University of Chinese Academy of Sciences, CHINA*

## Tuesday - RF MEMS, Resonators and Oscillators


**T4P.088 ALUMINUM SCANDIUM NITRIDE LAMB WAVE ACOUSTIC DELAY LINES WITH OVER 6% FRACTIOINAL BANDWIDTH ..... 1801**
Zhifang Luo[1,2,3,5], Shuai Shao[1,2,3], Chengkuo Lee[5], and Tao Wu[1,2,3,4]
*[1]ShanghaiTech University, CHINA, [2]Chinese Academy of Sciences (CAS), CHINA, [3]University of Chinese Academy of Sciences, CHINA, [4]Shanghai Engineering Research Center of Energy Efficient and Custom AI IC, CHINA, and [5]National University of Singapore, SINGAPORE*

**T4P.089 AN 18GZ ALSCN FILM BULK ACOUSTIC WAVE RESONATOR WITH EPITAXIAL METAL ELECTRODES ..... 1805**
Mingyo Park, Jialin Wang, and Azadeh Ansari
*Georgia Institute of Technology, USA*

**T4P.090 PARAMETRIC IMPEDANCE MODULATION IN DEPLETION LAYER TRANSDUCED MICROMECHANICAL RESONATOR ..... 1809**
Satish K. Verma and Bhaskar Mitra
*Indian Institute of Technology Delhi, INDIA*

**T4P.091 SHEAR BULK MODE RESONATOR WITH HIGH ELECTROMECHANICAL COUPLING USING X-CUT LITHIUM NIOBATE THIN FILM FOR WIDE BAND RF APPLICATIONS ..... 1813**
Seniz E. Kucuk Eroglu, Soumya Yandrapalli, Victor Plessky, and Luis Guillermo Villanueva
*École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND*

**T4P.092 TEMPERATURE-COMPENSATED PURE SILICON CANTILEVER RESONATOR WITH COUPLED TORSIONAL STRUCTURE AT ANCHOR ..... 1817**
Shunsuke Yamada and Shuji Tanaka
Tohoku University, JAPAN


## Wednesday - RF MEMS, Resonators and Oscillators


**W4P.086 A MECHANICALLY COUPLED PIEZOELECTRIC MEMS FILTER BASED ON SUPPORT TRANSDUCER TOPOLOGY ..... 1821**
Ken-Wei Tang[1], Anurag Zope[1], Zhong-Wei Lin[1], Gayathri Pillai[2], and Sheng-Shian Li[1]
*[1]National Tsing Hua University, TAIWAN and [2]Indian Institute of Science, INDIA*

**W4P.087 A PIEZOELECTRIC WIDTH-FLEXURAL MODE MEMS RESONATOR WITH HIGH QUALITY FACTOR AND LOW MOTIONAL RESISTANCE ..... 1825**
Yuhao Xiao[1], Wen Chen[1], Jinzhao Han[1], Kewen Zhu[1], and Guoqiang Wu[1,2]
*[1]Wuhan University, CHINA and [2]Hubei Yangtze Memory Laboratories, CHINA*

**W4P.088 A THERMO-PIEZORESISTIVE RESONATOR WITH F-Q PRODUCTS OVER 4.5E14 ..... 1829**
Chaowei Si[1], Yongmei Zhao[1,2], Guowei Han[1], Jin Ning[1,2], Xiaodong Wang[1,2], and Fuhua Yang[1,2]
*[1]Chinese Academy of Sciences (CAS), CHINA and [2]University of Chinese Academy of Sciences, CHINA*

**W4P.089 GRAPHENE OXIDE INTEGRATED SURFACE ACOUSTIC WAVE HUMIDITY SENSOR WITH SIMULTANEOUS MULTI-FREQUENCY OPERATION ..... 1833**
Il Ryu Jang[1], Soon In Jung[1], Chaehyun Ryu[1], Jaeonhyung Park[1], Aneeta Padhan[1], Jaesok Yu[1], Hohyun Keum[2], and Hoe Joon Kim[1]
*[1]Daegu Gyeongbuk Institute of Science and Technology (DGIST), KOREA and [2]Korea Institute of Industrial Technology (KITECH), KOREA*

**W4P.090 NON-LINEARITY CORRECTIONS OF TAPERED BAW TRANSDUCERS FOR ACCURATE FFT COMPUTATION USING ULTRASONIC WAVEFRONT COMPUTING ..... 1837**
Zaifeng Yang[1], Xing Haw Marvin Tan[1], Daniel Ssu-Han Chen[1], Bui Viet Phuong[1], Kevin Tshun Chuan Chai[1], Ching Eng Png[1], and Amit Lal[2]
*[1]Agency of Science Technology and Research (A*STAR), SINGAPORE and [2]Cornell University, USA*

## Monday - Wearable and In-Vivo Medical Devices and Microsystems


**M4P.092 A FLEXIBLE LC-TYPE PASSIVE WIRELESS PRESSURE SENSOR FOR ATMOSPHERIC PRESSURE DETECTION ..... 1840**
Yifei Pan[1], Xilin Qian[1], Bowen Tian[1], Boshuai Sheng[1], Haonan Yang[1], Zhe Wu[1], Zefang Chen[1], Jiacheng Tu[1], Chengxi Guo[1], Huiyang Yu[1], and Jianqiu Huang[2]
*[1]Nanjing Tech University, CHINA and [2]Southeast University, CHINA*

**M4P.093 A UNIVERSAL CAVITY-BASED FORCE SENSOR WITH RECONFIGURABLE PERFORMANCE FOR INTEGRATION WITH THIN FILM DEVICES ..... 1844**
Zehua Xiang, Haobin Wang, Ji Wan, Chen Xu, Pengcheng Zhao, Mengdi Han, and Haixia Zhang
*Peking University, CHINA*

**M4P.094 A WIRELESS BACKSCATTER, BLUETOOTH LOW ENERGY (BLE)-COMPATIBLE BIOSIGNAL ACQUISITION SYSTEM FOR INTEGRATED BIOELECTRONICS ..... 1848**
Yashwanth Vyza, James D. Rosenthal, Alix Trouillet, Ivan Furfaro, and Stéphanie P. Lacour
*École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND*

**M4P.095 A WIRELESS HEADSET BIOSENSOR MEASURING VOLATILE CHEMICALS EMITTED FROM THE AURIS EXTERNA FOR MONITORING METABOLISMS ..... 1852**
Kenta Iitani[1], Huang Di[1], Geng Zhang[1], Koji Toma[2], Takahiro Arakawa[3], and Kohji Mitsubayashi[1]
*[1]Tokyo Medical and Dental University, JAPAN, [2]Shibaura Institute of Technology, JAPAN, and [3]Tokyo University of Technology, JAPAN*

**M4P.096 AN IMPLANTABLE PASSIVE WIRELESS TEMPERATURE SENSOR FOR MULTI-NODE MONITORING OF ARTIFICIAL KNEE JOINTS ..... 1856**
Zi-Ang Qi, Lei Dong, Qing-An Huang, Lei Han, and Meng Nie
*Southeast University, CHINA*

**M4P.097 IMPLANTABLE BIOSENSOR FOR CONTINUOUS SEROTONIN DETECTION IN FREELY MOVING CRAYFISH ..... 1860**
Jinjing Han, Tawen Ho, Justin M. Stine, Michael A. Straker, Jens Herberholz, and Reza Ghodssi
*University of Maryland, USA*


## Tuesday - Wearable and In-Vivo Medical Devices and Microsystems


**T4P.093 A TETRAPOLAR BIOIMPEDANCE SENSOR-INTEGRATED CAPSULE TOWARD TARGETED REAL-TIME MONITORING OF INTESTINAL TISSUES ..... 1864**
Brian M. Holt, Justin M. Stine, Luke A. Beardslee, and Reza Ghodssi
University of Maryland, USA

**T4P.094 A WEARABLE TRIPLE-SPIRAL SENSOR FOR IN-SITU REAL TIME SWEAT ANALYSIS BASED ON LASER INDUCED GRAPHENE ..... 1868**
Yaozheng Wang, Haobin Wang, Zehua Xiang, Pengchen Zhao, Yexing Fang, Ji Wan, Chen Xu, and Haixia Zhang
*Peking University, CHINA*

**T4P.095 CALIBRATION METHOD FOR WEARABLE SENSOR USING AIRFLOW AT MOUTH FOR QUANTITATIVE MONITORING OF RESPIRATION AND HEARTBEAT ..... 1872**
Kenta Horie[1], Muhammad Salman Al Farisi[1], Yoshihiro Hasegawa[1], Miyoko Matsushima[2], Tsutomu Kawabe[2], and Mitsuhiro Shikida[1]
*[1]Hiroshima City University, JAPAN and [2]Nagoya University, JAPAN*

**T4P.096 CANTILEVER ACTUATOR MODULE FOR ON-COMMAND DRUG DEPLOYMENT FROM INGESTIBLE CAPSULES ..... 1876**
Joshua A. Levy, Michael A. Straker, Luke A. Beardslee, and Reza Ghodssi
*University of Maryland, USA*

**T4P.097 DEVELOPMENT OF FLEX-TO-RIGID CAPACITIVE MICROMACHINED ULTRASOUND TRANSDUCER (CMUT) WITH BENDING MODULATION ..... 1880**
Sang-Mok Lee, Taemin Lee, Chaerin Oh, and Hyunjoo J. Lee
Korea Advanced Institute of Science and Technology (KAIST), KOREA

**T4P.098 SEROPILL: NOVEL MINIMALLY INVASIVE INGESTIBLE CAPSULE FOR SEROTONIN SENSING IN THE GI TRACT ..... 1884**
Michael A. Straker, Joshua A. Levy, Justin M. Stine, Jinjing Han, Luke A. Beardslee, and Reza Ghodssi
*University of Maryland, USA*

**T4P.099 SIMULTANEOUS AIRFLOW AND PRESSURE MEASUREMENTS BASED ON PITOT TUBE FOR EVALUATION OF EXPIRED AIR INSIDE LUNG AIRWAY ..... 1888**
Aoi Miyawaki[1], Muhammad Salman Al Farisi[1], Yoshihiro Hasegawa[1], Miyoko Matsushima[2], Tsutomu Kawabe[2], and Mitsuhiro Shikida[1]
*[1]Hiroshima City University, JAPAN and [2]Nagoya University, JAPAN*

## Wednesday - Wearable and In-Vivo Medical Devices and Microsystems

**W4P.091 HIGH-DENSITY ULTRA-FLEXIBLE NEURAL PROBE FOR MONITORING ELECTROPHYSIOLOGICAL SIGNALS OF FREE-MOVING MICE WITH EPILEPSY ..... 1892**
Han Wang[1,2], Qian Cheng[1,2], Cunkai Zhou[1,3], Ye Tian[1,2], Chengjian Xu[1,8], Xiaoling Wei[1,2], Zhitao Zhou[1,2], Tiger H. Tao[1,2,4,5,6,7], and Liuyang Sun[1,2]
*[1]Chinese Academy of Sciences (CAS), CHINA, [2]University of Chinese Academy of Sciences, CHINA, [3]Shanghai University of Electric Power, CHINA, [4]ShanghaiTech University, CHINA [5]Neuroxess Co., Ltd. (Jiangxi), CHINA, [6]Guangdong Institute of Intelligence Science and Technology, CHINA, [7]Tianqiao and Chrissy Chen Institute for Translational Research, CHINA, and [8]University of Science and Technology of China, CHINA*

**W4P.092 IMPLANTABLE IN-VIVO PH IMAGE SENSOR WITH INTEGRATED REFERENCE ELECTRODE FOR BIOLOGICAL EXPERIMENTS ON AWAKE MOUSE ..... 1896**
Mai Madokoro[1], Yuto Nakamura[1], Hiroshi Horiuchi[2], Tomoko Kobayashi[2], Junko Ishida[2], Tomoko Horio[1], Yasuyuki Kimura[1], Takeshi Hizawa[1], Daisuke Akai[1], Hideo Doi[1], Yong-Joon Choi[1], Kazuhiro Takahashi[1], Toshihiko Noda[1], Junichi Nabekura[2], and Kazuaki Sawada[1]
*[1]Toyohashi University of Technology, JAPAN and [2]National Institute for Physiological Sciences, JAPAN*

**W4P.093 MAGNETOELECTRIC NANOPARTICLE BASED WEARABLE ENERGY HARVESTER FOR POWERING BIO-MEDICAL DEVICES ..... 1900**
Nandan Murali[1], Dibyajyoti Mukherjee[1], G Vijay Malhaar[2], Dhiman Mallick[1], and Soutik Betal[1]
*[1]Indian Institute of Technology Delhi, INDIA and*
*[2]Birla Institute of Technology and Science-Pilani (BITS–Pilani), INDIA*

**W4P.094 MULTIFUNCTIONAL NEURAL PROBE FOR SYNCHRONIZED STIMULATION AND MONITORING MULTIPLE SIGNALS ..... 1904**
Jiawei Cao, Longchun Wang, Zhejun Guo, Zhuo Wang, Kejun Tu, Qingda Xu, Mengfei Xu, Junyu Xiao, Bin Yang, and Jingquan Liu
*Shanghai Jiao Tong University (SJTU), CHINA*

**W4P.095 STRETCHABLE HYBRID ELECTRONICS BASED ON AUXETIC STRUCTURES ..... 1908**
Daniel Zymelka, Toshihiro Takeshita, Yusuke Takei, and Takeshi Kobayashi
*National Institute of Advanced Industrial Science and Technology (AIST), JAPAN*

**W4P.096 UTILIZING ORIGAMI INTEGRATED PIEZOELECTRIC FOIL ACOUSTIC EMISSION AND ACCELERATION SENSOR FUSED WITH OMNIDIRECTIONAL MOTION DETECTOR FOR KNEE JOINT HEALTH MONITORING ..... 1911**
Cheng-Da Lin and Guo-Hua Feng
*National Tsing Hua University, TAIWAN*

**W4P.097 WIRELESS URINE MONITORING FOR DIAPERS WITH PASSIVE ANNTENA USING SPLIT RING METAMATERIAL ..... 1915**
Ashitaka Kurita[1], Gaku Furusawa[1], Hiroaki Onoe[2], and Tetsuo Kan[1]
*[1]University of Electro-Communications, JAPAN and [2]Keio University, JAPAN*

## Monday - Late News

**M4P.098 A 0.6 METER LONG LARGE-AREA FLEXIBLE PRESSURE SENSORS WITH OUTSTANDING UNIFORMITY AND THERMOSTABILITY ..... 1919**
Shoulu Gong, Ding Zhe Gan, Xinlu Deng, Wenming Zhang, and Lei Shao
*Shanghai Jiao Tong University, CHINA*

**M4P.099 A MICROFLUIDIC PLATFORM FOR ENHANCED LABELLING AND DETECTION OF EXTRACELLULAR VESICLES ..... 1923**
Shi Hu, Rui Hao, Zitong Yu, Huitao Zhang, Qisang Zuo, and Hui Yang
*Chinese Academy of Sciences (CAS), CHINA*

**M4P.100 A PLASMONIC-PHOTONIC HYBRID FIBER-OPTIC SENSOR FOR TUMOR MARKER DETECTION AND HETEROGENEITY CHARACTERIZING ..... 1927**
Nanxi Wang[1,2], Xin Li[1,2], Yimin Shi[1,2], Fei Wang[1,2], Lina Zhang[3], Mingxiao Li[1], Hongyao Liu[1], Yang Zhao[1], Lingqian Zhang[1], and Chengjun Huang[1,2]
*[1]Chinese Academy of Sciences, CHINA, [2]University of Chinese Academy of Sciences, CHINA, and [3]Beijing Chest Hospital, Capital Medical University, CHINA*

**M4P.101 A STUDY OF FERROELECTRIC POLARIZATION SWITCHING AND NEGATIVE CAPACITANCE EFFECT FOR ENHANCED ENERGY STORAGE IN ON-CHIP ELECTROSTATIC SUPERCAPACITORS ..... 1931**
Sadegh Kamaei, Michele Ghini, Ali Gilani, Carlotta Gastaldi, and Adrian M. Ionescu
*École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND*

**M4P.102 ACTIVE CONTROL OF VIBRATION-INDUCED FLOW USING A PNEUMATICALLY DRIVEN MICROBALLOON DEVICE ..... 1935**
Taku Sato, Kanji Kaneko, Takeshi Hayakawa, and Hiroaki Suzuki
*Chuo University, JAPAN*

**M4P.103 BEOL COMPATIBLE (< 400 ˚C) NOVEL CROSS-POINT RRAM BASED RESISTIVE HYDROGEN SENSOR FOR DOWNSTREAM HYDROGEN USE ..... 1939**
Subhranu Samanta, Zhixian Chen, Doris K.T. Ng, Weiguo Chen, Linfang Xu, Fuu Ming Kai, and Yao Zhu
*Agency for Science, Technology and Research (A*STAR), SINGAPORE*

**M4P.104 CRYSTALLIZATION OF DNA-FUNCTIONALIZED NANOPARTICLE IN GIANT UNILAMELLAR VESICLES ..... 1942**
Ryuta Tetsuya[1], Naotomo Tottori[1], Azusa Takao[1], Maasa Yokomori[1], Miho Tagawa[2], Shigeo S. Sugano[3], Shinya Sakuma[1], and Yoko Yamanishi[1]
*[1]Kyushu University, JAPAN, [2]Nagoya University, JAPAN, and [3]National Institute of Advanced Industrial Science and Technology (AIST), JAPAN*

**M4P.105 EFFECT OF VAN DER WAALS FORCES ON DYNAMIC PROPERTIES OF GRAPHENE-BASED NEMS RESONATORS ..... 1946**
Zhi-Qi Dong, Kai-Ming Hu, Xin-Lu Deng, Yi-Hang Xin, You-Lang He, and Jing-Lin Ye
*Shanghai Jiao Tong University, CHINA*

**M4P.106 EVALUATION METHOD OF OUT-OF-PLANE DEFORMATION ON KIRIGAMI STRUCTURE WITH REPETITIVE SLIT PATTERNS ON CONCENTRIC CIRCLES ..... 1950**
Miyako Mizuna and Eiji Iwase
*Waseda University, JAPAN*

**M4P.107 FABRICATION OF A MOVING-COIL-TYPE PDMS-BASED MEMBRANE ELECTROMAGNETIC MICRO-ACTUATOR BY DOUBLE-SIDED SCREEN PRINTING TECHNOLOGY ..... 1954**
Chao Qi, Naohiro Sugita, and Tadahiko Shinshi
*Tokyo Institute of Technology, JAPAN*

**M4P.108 FLEXIBLE THERMOPILE-TYPE WARMTH SENSOR ..... 1958**
Minoru Sasaki[1], Yoshiyuki Hata[2], and Yae Ito[1]
*[1]Toyota Technological Institute, JAPAN and [2]Meijo University, JAPAN*

**M4P.109 HIGH CRYSTALLINE QUALITY A-AXIS ORIENTED $AL_{0.56}SC_{0.44}N$ FILMS FOR HIGH COUPLING SAW APPLICATIONS ..... 1962**
Weipeng Xuan[1], Weilun Xie[1], Xiwei Huang[1], Xingli He[2], Zhen Cao[3], Hao Jin[3], Shurong Dong[3], and Jikui Luo[3]
*[1]Hangzhou Dianzi Univerisity, CHINA, [2]Soochow University, CHINA and [3]Zhejiang University, CHINA*

**M4P.110 HIGH-THROUGHPUT SPERM SORTING MICROFLUIDIC DEVICE FOR LIVESTOCK'S SPERM MOTILITY ENHENCEMENT ..... 1966**
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