



THE 21st INTERNATIONAL CONFERENCE ON
SOLID-STATE SENSORS, ACTUATORS AND MICROSYSTEMS

TRANSDUCERS 2021
ONLINE)))) **VIRTUAL CONFERENCE**

FINAL PROGRAM

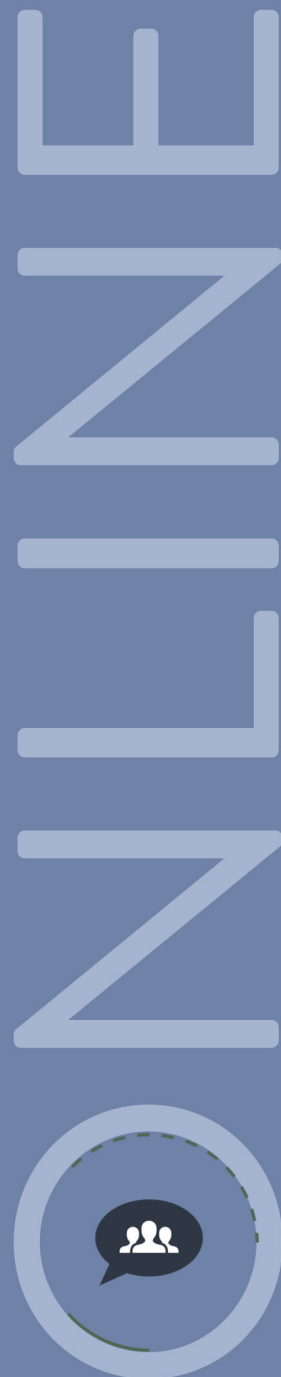
CONFERENCE CHAIRS

■ Jürgen Brugger
EPFL, SWITZERLAND

■ Amy Duwel
Draper Laboratory, USA

■ Yoshio Mita
University of Tokyo, JAPAN

All indicated times in the program are
Greenwich Mean Time (GMT)/Universal Time Coordinated (UTC)



SPONSORED BY

TRF TRANSDUCER
RESEARCH FOUNDATION
connecting big ideas and small tech

 **semi**

 **MEMS & Sensors
Industry Group®**

**TECHNICAL
SPONSORS**

 **IEEE**

MEMS
IEEE MEMS TECHNICAL COMMUNITY

BENEFACTORS

We gratefully acknowledge the financial support of this Conference from the following:

Conference Sponsor



Transducer Research Foundation

info@transducer-research-foundation.org

www.transducer-research-foundation.org

The Transducer Research Foundation (TRF) is a nonprofit organization whose mission is to stimulate research within the Americas in science and engineering, with emphasis on technologies related to transducers, microsystems, and nanosystems, and to foster the exchange of ideas and information between academic, industrial, and government researchers.

Conference Co-Sponsor



MEMS & Sensors Industry Group - SEMI

<https://www.semi.org/en/communities/msig>

The MEMS and Sensors Industry Group® (MSIG), a SEMI technology community, connects the MEMS and sensors supply network in established and emerging markets enabling members to grow and prosper. MEMS and sensors play an integral role in billions of electronic devices. From your smartphone to your smart home, MEMS and sensors are the essential enabling components that allow us to experience the world around us in fundamentally new ways.

Technical Sponsors



IEEE

www.ieee.org

IEEE is the world's largest professional association dedicated to advancing technological innovation and excellence for the benefit of humanity. IEEE and its members inspire a global community through IEEE's highly cited publications, conferences, technology standards, and professional and educational activities.



IEEE MEMS Technical Community

ieeememstc.wpengine.com

IEEE Micro Electro Mechanical Systems (MEMS) Technical Community will keep you abreast of the latest in MEMS ideas, designs, and manufacturing methodologies, many of which could very well spark new thinking and enable new capabilities in a myriad of IEEE fields. MEMS is an enabling technology harnessing the benefits of miniaturization in physical domains beyond the electrical and found in billions of devices today. The field of MEMS encompasses tiny (generally chip-scale) devices or systems capable of realizing functions not easily achievable via macroscopic ones. Many IEEE organizational units already benefit from MEMS, as the utility of its fundamental concepts and technology touches nearly all IEEE field of interest areas.

PLATINUM BENEFACTORS

Bosch Sensortec GmbH

Gerhard-Kindler-Strasse 9
Reutlingen, 72770 GERMANY
phone: +49-7121-3535-924
christian.hoenicke@bosch-sensortec.com
www.bosch-sensortec.com

Bosch specializes in designing microelectronics for the automotive and consumer world. The Bosch MEMS sensing solutions are typically function-rich and highly integrated, embedding the vast experience of Bosch as a system supplier. The portfolio for automotive includes inertial and pressure MEMS sensors. The portfolio for consumer electronics includes 3-axis accelerometers, gyroscopes and magnetometers, integrated 6- and 9-axis sensors, smart sensors, barometric pressure sensors, humidity sensors, gas sensors, optical microsystems and comprehensive software. For more information about automotive products, please visit www.bosch-semiconductors.com. For more information about consumer electronics products, please visit www.bosch-sensortec.com.

NXP Semiconductors

1300 N. Alma School Road
Chandler, AZ 85224 USA
phone: 1-602-509-4897
maryann.busha@nxp.com
www.nxp.com

NXP Semiconductors enables secure connections for a smarter world, advancing solutions that make lives easier, better, and safer. As the world leader in secure connectivity solutions for embedded applications, NXP is driving innovation in the automotive, industrial & IoT, mobile, and communication infrastructure markets. Together, we accelerate breakthroughs that anticipate, automate and advance the world. Visit nxp.com

TRF CORPORATE STEWARDSHIP SPONSORS

InvenSense, a TDK Group Company

1745 Technology Drive
San Jose, CA 95110 USA
phone: 1-408-988-7339
fax: 1-408-988-8104
sales@invensense.com
www.invensense.com

InvenSense, Inc., a TDK Group Company, is a world leading provider of MEMS sensor platforms. InvenSense's vision of Sensing Everything® targets the consumer electronics and industrial areas with integrated Motion and Sound solutions. InvenSense's solutions combine MEMS (micro electrical mechanical systems) sensors, such as accelerometers, gyroscopes, compasses, and microphones with proprietary algorithms and firmware that intelligently process, synthesize, and calibrate the output of sensors, maximizing performance and accuracy. InvenSense's motion tracking, audio and location platforms, and services can be found in Mobile, Wearables, Smart Home, Industrial, Automotive, and IoT products. In May of 2017, InvenSense became part of the MEMS Sensors Business Group within the newly formed Sensor Systems Business Company of TDK Corporation. InvenSense is headquartered in San Jose, California and has offices worldwide.

Knowles Corporation

1151 Maplewood Drive
Itasca, IL 60143 USA
phone: 1-630-250-5100
www.knowles.com

Knowles Corporation (NYSE: KN) is a market leader and global supplier of advanced micro-acoustic, audio processing, and specialty component solutions, for mobile consumer electronics, communications, medical, military, aerospace, and industrial markets.

TRF CORPORATE STEWARDSHIP SPONSORS (continued)

NXP Semiconductors

1300 N. Alma School Road

Chandler, AZ 85224 USA

phone: 1-602-509-4897

maryann.busha@nxp.com

www.nxp.com

NXP Semiconductors enables secure connections for a smarter world, advancing solutions that make lives easier, better, and safer. As the world leader in secure connectivity solutions for embedded applications, NXP is driving innovation in the automotive, industrial & IoT, mobile, and communication infrastructure markets. Together, we accelerate breakthroughs that anticipate, automate and advance the world. Visit nxp.com

GOLD BENEFACTOR

CSEM SA

Jaquet Droz 1

Neuchatel, 2002 SWITZERLAND

phone: +41-32-720-5411

info@csem.ch

www.csem.ch

Your partner for MEMS & Microsystems development from the lab to the fab. We strive to bring your MEMS and microsystems innovations to life in our industry-grade environment. We embody more than 30 years of expertise in a diverse range of demanding fields, such as watchmaking, space, life sciences, and harsh environments. Our seasoned and permanent team supports our partners with a flexible mindset empowered with a state-of-the-art 150 mm wafer cleanroom. At CSEM, our expertise covers the full development cycle, from MEMS design to process development and production. Whether you need a complete development, some design inputs, or just a few thin-film depositions, we are here for you.

SILVER BENEFACTORS

Heidelberg Instruments, Inc.

2539 W. 237th Street, Suite A

Torrance, CA 90505 USA

phone: 1-310-212-5071

info@himt.de

www.himt.de

Heidelberg Instruments is a world leader in the development and production of high precision photolithography systems, maskless aligners and nanofabrication tools. Our systems are installed in industrial and academic facilities all over the world. These are used for direct writing and photomask production in various areas of MEMS/NEMS - for Semiconductors, Quantum Computing, Flat Panel Displays, Photonics, 2D Materials, IOT and many other related applications. With over 35 years of experience and more than 1,000 systems installed worldwide, we can provide lithography solutions specifically tailored to meet all your micro- and nanofabrication requirements no matter how challenging.

Microsystems & Nanoengineering/Springer Nature

No.19 North Fourth Ring Road West, Haidian District

Beijing, 100190 CHINA

phone: +86-10-5888-7066

mine@aircas.ac.cn

<https://www.nature.com/micronano/>

Microsystems & Nanoengineering is the first engineering journal with emphases on fundamental research in MEMS and NEMS launched by the Nature Publishing Group. It is an open access and fully peer-reviewed journal which publishes original articles and reviews on cutting-edge and emerging topics related to MEMS/NEMS and nanotechnology. The journal is now indexed by SCIE and the impact factor in 2017 is 5.071.

SILVER BENEFACTORS (continued)

OQmented GmbH

Fraunhoferstrasse 3
Itzehoe, 25524 GERMANY
phone: +49-4821-778-276
info@oqmented.com
oqmented.com

OQmented is a deep tech startup, whose founders have been major drivers in MEMS mirror technology for 20+ years. Our very dedicated team enables AR glasses for everyday use and powerful 3D camera systems. Achieving highest performance and compactness, OQmented offers breakthrough laser beam scanning. Combined with in-house developed electronics and software, the high frequency scanning 2D MEMS mirrors enter new dimensions in wide field of view, high resolution projections and sensing with low energy consumption. Our established MEMS production process includes our patented Bubble MEMS® technology, a unique optical 3D shaped hemisphere with vacuum at wafer-level package.

Silterra Malaysia Sdn. Bhd.

Lot 8, Phase II, Kulim Hi-Tech Park
Kulim, Kedah 09090 MALAYSIA
phone: +604-401-5111
DIST-MEMS-BD@silterra.com
www.silterra.com

SilTerra Malaysia is a semiconductor wafer foundry offering a full range of process technologies covering our core business in CMOS technologies (advanced logic, RFCMOS, mixed signal and high voltage) to leading edge technologies in MEMS, silicon photonics, bio-photonics and power. SilTerra's wafer fab has a capacity of 40,000 eight-inch wafers per month. SilTerra also offers MEMS foundry services and a unique MEMS-on-CMOS technology. Under the MEMS foundry services, we help customers realize working prototypes from their proof of concept, support the transfer or set-up of customer owned process and ramp-up to high volume manufacturing (all in one fab). With our MEMS-on-CMOS technology, we have the capability to build the MEMS devices on pre-processed CMOS wafers thus offering a "truly monolithic MEMS integrated solution".

SPTS Technologies Ltd.

Ringland Way
Newport, NP18 2TA UK
phone: +44-1633-414-000
enquiries@spts.com
www.spts.com

SPTS Technologies, a KLA company, designs, manufactures, sells, and supports advanced etch, PVD, CVD and MVD® wafer processing equipment and solutions for the global semiconductor and micro-device industries, with focus on the Advanced Packaging, MEMS, high speed RF device, power management and manufacturing. SPTS has manufacturing facilities in Newport, Wales and Allentown, Pennsylvania, and operates across 19 countries in Europe, North America and Asia-Pacific.

BRONZE BENEFACTORS

Asia Pacific Microsystems, Inc.

No. 2, R&D Road 6, Science-Based Industrial Park
Hsinchu, 300 TAIWAN
phone: +886-3-666-1188
sales@apmsinc.com
www.apmsinc.com/eng/

Asia Pacific Microsystems, Inc. has been dedicated to providing Micro Electro Mechanical Systems (MEMS) foundry service for over 15 years. Differentiating from IC foundries, MEMS foundry focuses on developing 3-dimensional microstructures and/or integrated optical, mechanical and electrical microchips. These include devices such as pressure and environmental sensors, silicon oscillators, optical actuators, silicon optical bench and micro fluidic structures. From the accumulated experience acquired in development and mass production of various MEMS devices, we are enabled to serve the numerous customers from different industries including consumer electronics, automotive, industrial, telecommunication, and biomedical sectors. In the future, APM plans to continue serving as a solution provider for customers in need of professional development and production of micromachined devices.

BRONZE BENEFACTORS (continued)

Coventor, A Lam Research Company

4650 Cushing Parkway
Fremont, CA 94538
phone: 1-617-648-8388
sales@coventor.com
www.coventor.com

Coventor offers MEMS design automation and process modeling solutions for MEMS and semiconductor devices. For over two decades, Coventor has supplied world-leading MEMS companies and R&D organizations with simulation tools that accurately predict the complex, multi-physics behavior of MEMS devices. Coventor's MEMS design platform, CoventorMP, solves MEMS design problems such as multi-physics interactions, process variability, MEMS+IC integration, and MEMS+package interactions. CoventorMP is being used to develop MEMS and IoT products for automotive, aerospace, industrial, defense and consumer electronics applications. Our software and expertise help customers predict the structures and behavior of their designs before committing to time-consuming and costly fabrication.

Hitachi High Tech Corporation

Toranomon Hills Business Tower
1-17-1 Toranomon, Minato-ku
Tokyo, 105-6409 JAPAN
phone: +81-3-3504-7111
www.hitachi-hightech.com/us/

In Nano-Technology Solutions, we will contribute to customers' cutting-edge R&D and mass production and create new value through "Processing" in addition to "Observation", "Measurement", and "Analysis". In the semiconductor field, we will provide integrated solutions to respond to customers' diverse needs as the sole equipment manufacturer with processing, measurement and analysis. In materials and biotechnology fields, we will provide solutions by collaboration with partners in growth fields such as batteries and pharmaceutical application.

i-ROM GmbH

Hauptstraße 130
Neukirchen, 09221 GERMANY
phone: +49 152 5212 5971
jan.mehner@i-rom.de
<https://www.i-rom.de>

The i-ROM MODELBUILDER is a quantum leap in the design of sensors and actuators. Easy to use for experienced engineers and students in training. It supports the design and optimization of MEMS through its graphical user interface, which can be used in parallel with entering commands. Even complex MEMS models with several mass bodies, suspension springs and various comb cells can be easily created and professionally analyzed. Manufacturing tolerances and corner fillets are also taken into account. Interfaces to MATLAB Simulink and ANSYS complete the MODELBUILDER and make it the design tool of the future.

JEOL Ltd.

3-1-2 MusashinoTokyo, 196-8558 JAPAN
phone: +81-42-542-2383
salesinfo@jeol.com
www.jeol.co.jp/en/

Since 1949, the JEOL legacy has been one of outstanding innovation in developing instruments used to advance scientific research and technology. JEOL has 70 years of expertise in the field of electron microscopy, more than 60 years in mass spectrometry and NMR spectrometry, and more than 50 years of e-beam lithography leadership. With over 3,000 employees worldwide, JEOL has become a global supplier of electron-optical analytical instrumentation used for research and development in the fields of materials sciences, nanotechnology, medicine, life sciences and biotechnology.

BRONZE BENEFACTORS (continued)

Lam Research

4650 Cushing Parkway
Fremont, CA 94538 USA
phone: 1-510-572-0200
www.lamresearch.com

As a trusted, collaborative partner to the world's leading semiconductor companies, Lam Research is a fundamental enabler of the semiconductor roadmap. In fact, today, nearly every advanced chip is built with Lam technology. Our innovative wafer fabrication equipment and services allow chipmakers to build smaller, faster, and better performing electronic devices. We combine superior systems engineering, technology leadership, a strong values-based culture, and unwavering commitment to customer success to accelerate innovation, enabling our customers to shape the future.

Lyncée Tec

Innovation Park, Building A
Lausanne, 1015 SWITZERLAND
phone: +41-24-552-0420
info@lynceetec.com
www.lynceetec.com

Lyncée Tec - Digital Holographic Microscope (DHM®) Lyncée Tec offers matured holographic microscopes based on the revolutionary patented Digital Holographic Microscope (DHM®) technology as MEMS vibration analyzer and 4D profilometry. Additionally of having a standard product portfolio, Lyncée Tec has expert competences for customizing system to specific needs, and supplies OEM solutions. Lyncée Tec is making the invisible visible enabling you to characterize your samples like you couldn't before!

MDPI - Sensors Journal

St. Alban-Anlage 66
Basel, 4052 SWITZERLAND
phone: +41-61-683-7734
sensors@mdpi.com
www.mdpi.com/journal/sensors

Sensors (ISSN 1424-8220; CODEN: SENSC9) is the leading international, peer-reviewed, open access journal on the science and technology of sensors. *Sensors* is published semimonthly online by MDPI. The Polish Society of Applied Electromagnetics (PTZE), Japan Society of Photogrammetry and Remote Sensing (JSPRS) and Spanish Society of Biomedical Engineering (SEIB) are affiliated with *Sensors* and their members receive a discount on the article processing charges.

Tousimis

2211 Lewis Avenue
Rockville, MD 20851 USA
phone: 1-301-881-2450
trc@tousimis.com
www.tousimis.com

Tousimis designs and manufactures advanced CPD systems for MEMS and other applications. We are based in the USA and provide global sales and service support. Our CPD process enables you to reproducibly eliminate surface tensions forces and preserve delicate Micro-Structures during the drying process.

EXHIBITORS

EUROPRACTICE (imec)

Kapeldreef 75
Leuven, 3001 BELGIUM
phone: +32-16-281-272
mpc@imec.be
europactice-ic.com

A true one-stop shop, EUROPRACTICE provides all services that you need to design and fabricate electronic circuits and smart integrated systems. We offer affordable access to a wide range of CAD tools, training courses and state-of-the-art fabrication technologies. Our portfolio includes world-leading MEMS, Photonics and Microfluidics technologies that can be used as key building blocks for sensors, actuators and related microsystems. Our team supports customers in all critical steps on the way from prototype design to volume production. Current services are provided by five EUROPRACTICE consortium members: CMP (FR), Fraunhofer IIS (D), imec (B), STFC-UKRI (UK) and Tyndall (IRL).

EXHIBITORS (continued)

Heidelberg Instruments, Inc.

2539 W. 237th Street, Suite A

Torrance, CA 90505 USA

phone: 1-310-212-5071

info@himt.de

www.himt.de

Heidelberg Instruments is a world leader in the development and production of high precision photolithography systems, maskless aligners and nanofabrication tools. Our systems are installed in industrial and academic facilities all over the world. These are used for direct writing and photomask production in various areas of MEMS/NEMS - for Semiconductors, Quantum Computing, Flat Panel Displays, Photonics, 2D Materials, IOT and many other related applications. With over 35 years of experience and more than 1,000 systems installed worldwide, we can provide lithography solutions specifically tailored to meet all your micro- and nanofabrication requirements no matter how challenging.

Microsystems & Nanoengineering/Springer Nature

No.19 North Fourth Ring Road West, Haidian District

Beijing, 100190 CHINA

phone: +86-10-5888-7066

mine@aircas.ac.cn

<https://www.nature.com/micronano/>

Microsystems & Nanoengineering is the first engineering journal with emphases on fundamental research in MEMS and NEMS launched by the Nature Publishing Group. It is an open access and fully peer-reviewed journal which publishes original articles and reviews on cutting-edge and emerging topics related to MEMS/NEMS and nanotechnology. The journal is now indexed by SCIE and the impact factor in 2017 is 5.071.

Okmetic

Piitie 2

Vantaa, 01510 FINLAND

communications@okmetic.com

www.okmetic.com

Okmetic, founded in 1985, is the 7th largest silicon wafer manufacturer in the world the leading supplier of advanced, high value-added, silicon wafers for the manufacture of MEMS and Sensors as well as RF and Power applications. Okmetic has the most extensive 150 to 200mm wafer portfolio in the market comprising of comprehensive lines of SOI and High Resistivity RFSi® wafers as well as SSP and DSP wafers, and all our wafers are customized for our customers' needs. Okmetic has worldwide sales organization and strong presence in the US as a result of establishment of US sales office in 1999.

EARLY CAREER AWARD BENEFACTOR

CSEM SA

Jaquet Droz 1

Neuchatel, 2002 SWITZERLAND

phone: +41-32-720-5411

info@csem.ch

www.csem.ch

Your partner for MEMS & Microsystems development from the lab to the fab. We strive to bring your MEMS and microsystems innovations to life in our industry-grade environment. We embody more than 30 years of expertise in a diverse range of demanding fields, such as watchmaking, space, life sciences, and harsh environments. Our seasoned and permanent team supports our partners with a flexible mindset empowered with a state-of-the-art 150 mm wafer cleanroom. At CSEM, our expertise covers the full development cycle, from MEMS design to process development and production. Whether you need a complete development, some design inputs, or just a few thin-film depositions, we are here for you.

STUDENT EVENT BENEFACTORS

Hitachi High Tech Corporation

Toranomon Hills Business Tower

1-17-1 Toranomon, Minato-ku

Tokyo, 105-6409 JAPAN

phone: +81-3-3504-7111

www.hitachi-hightech.com/us/

In Nano-Technology Solutions, we will contribute to customers' cutting-edge R&D and mass production and create new value through "Processing" in addition to "Observation", "Measurement", and "Analysis". In the semiconductor field, we will provide integrated solutions to respond to customers' diverse needs as the sole equipment manufacturer with processing, measurement and analysis. In materials and biotechnology fields, we will provide solutions by collaboration with partners in growth fields such as batteries and pharmaceutical application.

JEOL Ltd.

3-1-2 Musashino

Tokyo, 196-8558 JAPAN

phone: +81-42-542-2383

salesinfo@jeol.com

www.jeol.co.jp/en/

Since 1949, the JEOL legacy has been one of outstanding innovation in developing instruments used to advance scientific research and technology. JEOL has 70 years of expertise in the field of electron microscopy, more than 60 years in mass spectrometry and NMR spectrometry, and more than 50 years of e-beam lithography leadership. With over 3,000 employees worldwide, JEOL has become a global supplier of electron-optical analytical instrumentation used for research and development in the fields of materials sciences, nanotechnology, medicine, life sciences and biotechnology.

MEDIA BENEFACTORS

MDPI - Actuators Journal

St. Alban-Anlage 66

Basel, 4052 SWITZERLAND

phone: +41-61-683-7734

actuators@mdpi.com

www.mdpi.com/journal/actuators

Actuators (ISSN 2076-0825; CODEN: ACTUC3) is an international open access journal on the science and technology of actuators and control systems published by MDPI, Basel, Switzerland. It is published under the scientific leadership of a well-recognized Editorial Board and has been indexed by many important databases, including Science Citation Index Expanded - Web of Science (Clarivate Analytics), Scopus (Elsevier), Inspec (IET), etc. The IF 2020 is 1.957. The journal also provide a rapid peer review and publication process. Manuscripts are peer-reviewed and a first decision provided to authors approximately 13.4 days after submission; acceptance to publication is undertaken in 2.6 days.

MEMS and Nanotechnology Exchange

1895 Preston White Drive

Reston, VA 20191 USA

phone: 1-703-262-5368

engineering@mems-exchange.org

www.mems-exchange.org

The MEMS and Nanotechnology Exchange (MNX) has been providing design and fabrication services to the United States research and business communities since 1999. Our engineers offer a complete range of technical assistance to help researchers and developers at any phase of your important project, including product design, prototype fabrication and low-volume manufacturing. MNX has completed nearly 3,000 customized process sequences for over 1,000 organizations around the country including multinational corporations, small start-ups, leading academic institutions, and government agencies. Many people do not know that MNX has its own fabrication facilities. Our capabilities include thousands of different solutions, ranging from standard microfabrication processes to unique, highly specialized, and hard to find MEMS and Nanotechnology processes.

MEDIA BENEFACTORS (continued)

Microtech Ventures, Inc.

550 Merrill Street, Suite 240

Birmingham, MI 48009 USA

info@microtechventures.com

microtechventures.com

Microtech Ventures is focused on strategic venture capital, angel investing, and M&A advisory services. Our mission is to accelerate the development of sensors, MEMS, and microtechnologies for the advancement of civilization and creation of market value. Our deep industry knowledge and extensive network, combined with practical hands-on strategy experience, enables us to quickly identify the connections that result in multiple opportunities to maximize ownership value, and ensure successful outcomes.



20-25 JUNE 2021

ONLINE

VIRTUAL CONFERENCE

TRANSDUCERS 2021

Early Career AWARD

The **TRANSDUCERS Early Career Award** was established by the Transducers International Steering Committee in order to celebrate the 20th edition of the Transducers Conference in 2019. The Award will acknowledge and honor advances in the design, fabrication and/or commercialization of solid-state sensors, actuators and microsystems, which are achieved by individuals or teams. The awardees show either high potential for a successful academic or industrial career or demonstrate entrepreneurship as founders of a start-up or early-stage company. **The award will be presented on Wednesday, 23 June at 13:00.**

•••••

Ming-Huang Li has overcome several key technical challenges in power-efficient temperature compensated MEMS resonators and oscillators for low noise timing and signal processing applications, and his long-term involvement in the Transducers Community has shown his potential for making contributions in this field in the years ahead.

Ming-Huang Li's research focuses on the design, analysis, and fabrication of high frequency MEMS resonators as well as the development of low noise interface electronics for signal processing, environmental sensing, and power-efficient timing applications based on composite material structures. He developed several unique fabrication processes together with novel mechanical structure designs to enable high stability MEMS oscillators with low temperature coefficients, ultralow power integrated micro-oven with built-in self-test functions, and phase noise optimization through nonlinearities. Currently, his group at National Tsing Hua University (NTHU) focuses on developing acoustic RF micro devices based on subwavelength-thick solidly-mounted piezoelectric thin films to improve the mechanical robustness and power handling capability, while offering a preferable temperature compensation scheme through stacked layers. Furthermore, his research also outreached to general micromachined ultrasonic transducers and interface electronics for imaging, detection, and communication applications.

Ming-Huang Li is an Assistant Professor in Power Mechanical Engineering at National Tsing Hua University, Taiwan. He is a recipient of Young Scholar Fellowship from the Ministry of Science and Technology (MOST) of Taiwan.

SPONSORED BY



csem



TISSOT



Short Course 1
KEY TECHNOLOGIES AVAILABLE IN NANOFABRICATION
CENTERS WORLDWIDE

DISCUSSION I - Saturday, 19 June - 12:00 - 14:20

Times are Greenwich Mean Time (GMT)/Universal Time Coordinated (UTC)

AGENDA

NANOTECH PLATFORM

Yoshio Mita

University of Tokyo Nanofab Center, Nanotechnology Platform, JAPAN

EURONANOLAB

Michel de Labachellerie

EuroNanoLab, Renatech, FRANCE

NEP/NFFA

Luis Fonseca

IMB-CNM (CSIC), SPAIN

PRESENTATIONS

4D THERMOELASTIC MICRO-ACTUATOR BASED ON METAMATERIAL STRUCTURE

Johnny Moughames

FEMTO-ST, FRANCE

EXPERIMENTAL COMPARISON OF RAPID LARGE-AREA DIRECT ELECTRON BEAM EXPOSURE METHODS WITH PLASMONIC DEVICES

Akio Higo

University of Tokyo, JAPAN

SILICON NITRIDE PLATFORM FOR PHOTONIC INTEGRATED CIRCUITS, TRANSDUCERS, AND ACTUATORS: AN OPEN ACCESS FOUNDRY

Jad Sabek

IMB-CNM (CSIC), SPAIN

OVERVIEW ON INTEGRATED OPTICAL PLATFORMS FOR EVANESCENT FIELD SENSING

Georg Pucker

Fondazione Bruno Kessler, ITALY

LITHOGRAPHY ON NON-FLAT 3-D SURFACE

Minoru Sasaki

Toyota Institute of Technology, JAPAN

NANOSTRUCTURING PROCESS TO MINIMIZE REFLECTIVE LOSSES IN OPTOELECTRONIC DEVICES

Päivikki Repo

Aalto University, FINLAND

AN INVESTIGATION INTO THE ETCH BEHAVIOR OF PMMA TREATED VIA SEQUENTIAL INFILTRATION SYNTHESIS FOR HIGH-ASPECT-RATIO NANOMETER-SCALE FEATURE ETCHING

Jorge Barreda

Lurie Nanofabrication Facility, University of Michigan, USA

Short Course 1
KEY TECHNOLOGIES AVAILABLE IN NANOFABRICATION
CENTERS WORLDWIDE

DISCUSSION II - Monday, 21 June - 07:00 - 09:20

Times are Greenwich Mean Time (GMT)/Universal Time Coordinated (UTC)

AGENDA

NANOTECH PLATFORM

Yoshio Mita

University of Tokyo Nanofab Center, Nanotechnology Platform, JAPAN

EURONANOLAB

Michel de Labachellerie

EuroNanoLab, Renatech, FRANCE

NEP/NFFA

Luis Fonseca

IMB-CNM (CSIC), SPAIN

PRESENTATIONS

FABRICATION OF CYCLO-OLEFIN POLYMER-BASED MICROFLUIDIC DEVICE USING WATER VAPOR PLASMA ACTIVATED BONDING

Toshiyuki Tsuchiya

Kyoto University, JAPAN

MAGNETORESISTIVE-BASED LAB-ON-CHIP: STATIC AND DYNAMIC CONFIGURATIONS

Verónica C. Martins

INESC, PORTUGAL

UPSCALABLE CLEANROOM FABRICATION PROCESSES FOR GRAPHENE FIELD-EFFECT TRANSISTORS

Jérôme Borme

INTERNATIONAL IBERIAN NANOTECHNOLOGY LABORATORY (INL), PORTUGAL

3-D LITHOGRAPHY USING RAPID LASER WRITER

Kentaro Totsu

Tohoku University, JAPAN

PRE-INDUSTRIAL GAN DEVICES DEVELOPED AT THE NANOFABRICATION CENTER OF IEMN

Farid Medjdoub

IEMN, FRANCE

MEMS PROCESS WITH DEPOSITION STRESS CONTROL

Yukio Suzuki

Tohoku University, JAPAN

OPTICAL MEMS-BASED SPECTRALLY ADAPTIVE REMOTE SENSING AND IMAGING AT THE WESTERN AUSTRALIAN NODE OF THE AUSTRALIAN NATIONAL FABRICATION FACILITY

Mariusz Martyniuk

University of Western Australia, AUSTRALIA

Short Course 2
TOWARDS SYSTEM-LEVEL MODELING AND HIGH-FIDELITY
SIMULATIONS OF MEMS:
CHALLENGES, STATE-OF-THE-ART, PERSPECTIVES

DISCUSSION I - Sunday, 20 June - 12:00 - 14:00

Times are Greenwich Mean Time (GMT)/Universal Time Coordinated (UTC)

DISCUSSION II - Sunday, 20 June - 19:00 - 21:00

Times are Greenwich Mean Time (GMT)/Universal Time Coordinated (UTC)

PRESENTATIONS

HIGH-FIDELITY MODELING FOR HIGH-PERFORMANCE MEMS

Sam Zhang

Analog Devices, USA

VIRTUAL PROTOTYPING OF MEMS BY SYSTEM-LEVEL MODELING:
CONCEPTS, APPROACHES AND TOOLS

Gabriele Schrag

Technical University of Munich, GERMANY

MATHEMATICAL MODEL ORDER REDUCTION FOR MEMS:
BACKGROUND, TECHNICAL REALIZATION AND APPLICATION TO SPECIFIC DEMONSTRATOR
SYSTEMS

Tamara Bechtold

Jade University of Applied Sciences, GERMANY

Block 1 - Monday, 21 June

All times are Greenwich Mean Time (GMT)/Universal Time Coordinated (UTC)

Welcome Address and Technical Program Information

13:00 - 13:30

TRANSDUCERS 2021 CONFERENCE CHAIRS

Jürgen Brugger, *École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND*

Amy Duwel, *Draper Laboratory, USA*

Yoshio Mita, *University of Tokyo, JAPAN*

Online Quiz Hosted by the Student Engagement Committee

13:30 - 14:00

The Transducers 2021 Online Quiz is your chance to put your knowledge to use about past Transducers conference as well as random science facts. Top ranked participants will win special prizes. Be ready to be challenged and we look forward to "seeing" you! You will need to download Kahoot! (<https://kahoot.com/>) before the event to participate.

14:00 - 14:05 Transition Break

Industry Session 1

Startup Stories

Moderator:

Paul Carey, MEMS & Sensors Industry Group (MSIG), USA

14:05 - 14:35

Three startup stories to inspire and educate.

Bassam Saadany¹, Luca Verre², and Sunghoon Kwon³

¹*Si-Ware, EGYPT*, ²*Prophesee, FRANCE*, and ³*QuantaMatrix, KOREA*

14:35 - 14:40 Transition Break

Invited Speaker I Q&A

Session Chair:

Amar Basu, Wayne State University, USA

14:40 - 14:50

B1-IS1 TRANSFORMATION OF 2D PLANES INTO 3D SOFT STRUCTURES WITH ELECTRICAL FUNCTIONS

Hyunmin Moon, Byungwook Park, and [Sohee Kim](#)

Daegu Gyeongbuk Institute of Science and Technology (DGIST), KOREA

Invited Speaker II Q&A

Session Chair:

Karen Cheung, University of British Columbia, CANADA

14:40 - 14:50

B1-IS2 DEMOCRATIZING DIGITAL MICROFLUIDICS

Chang-Jin "CJ" Kim

University of California, Los Angeles, USA

Invited Speaker III Q&A

Session Chair:

Caglar Ataman, University of Freiburg, GERMANY

14:40 - 14:50

B1-IS3 UBIQUITOUS SENSING WITH MEMS-FTIR SPECTROSCOPY - APPLICATIONS IN AGRICULTURE AND ENVIRONMENTAL MONITORING

Tarik Bourouina

Université Gustave Eiffel and CNRS, FRANCE

Invited Speaker IV Q&A

Session Chair:

Lukas Buergi, Sensirion AG, SWITZERLAND

14:40 - 14:50

B1-IS4 PUTTING ELECTRONICS TO WORK: HIGH-FREQUENCY DETECTION WITH CMOS NANOCAPACITOR ARRAYS

Serge J.G. Lemay

University of Twente, NETHERLANDS

14:50 - 14:55 Transition Break

Session 1A Q&A - Soft Actuators

Session Chair:

Anpan Han, Technical University of Denmark, DENMARK

14:55 - 15:00

B1-1A1 FABRICATION AND CHARACTERIZATION OF 3D PRINTED OUT-OF-PLANE TORSIONAL COMB-DRIVE ACTUATORS FOR MICROROBOTICS

Sukjun Kim and Sarah Bergbreiter

Carnegie Mellon University, USA

15:00 - 15:05

B1-1A2 BIOINSPIRED LIGHT-DRIVEN SOFT ROBOTS BY A FACILE TWO-MODE LASER ENGRAVING AND CUTTING PROCESS

Yande Peng, Peisheng He, Ruiqi Guo, and Liwei Lin

University of California, Berkeley, USA

15:05 - 15:10

B1-1A3 A POLYMERIC SU-8 MICRO-TWEZER WITH IN-PLANE DOUBLE ACTION BASED ON CHEVRON ACTUATORS

Rodica-Cristina Voicu¹, Catalin Tibeica¹, Marius Pustan², Corina Birleanu², and Raluca Muller¹

¹National Institute for Research and Development in Microtechnologies, ROMANIA and

²Technical University of Cluj-Napoca, ROMANIA

15:10 - 15:15

- B1-1A4 SELF-DEFORMABLE FLEXIBLE MEMS TWEEZER MADE OF POLY (VINYLIDENE FLUORIDE) / IONIC LIQUID GEL WITH ELECTRICAL MEASUREMENT CAPABILITY**
Takafumi Yamaguchi¹, Naoto Usami¹, Kei Misumi¹, Atsushi Toyokura¹, Akio Higo¹, Shimpei Ono², Gilgueng Hwang^{1,3}, Guilhem Larrieu^{1,4}, Yoshiho Ikeuchi¹, Agnès Tixier-Mita¹, Ken Saito⁵, Timothée Lévi^{1,6}, and Yoshio Mita¹
¹University of Tokyo, JAPAN, ²Central Research Institute of Electric Power Industry, JAPAN, ³C2N-CNRS, FRANCE, ⁴LAAS-CNRS, FRANCE, ⁵Nihon University, JAPAN, and ⁶University of Bordeaux, FRANCE

15:15 - 15:20

- B1-1A5 SELF-ACTUATED POLYMER-BASED CANTILEVERS WITH SHARP SILICON TIPS FOR HIGH-SPEED ATOMIC FORCE MICROSCOPY**
Matthias Neuenschwander, Santiago H. Andany, Mustafa Kangül, Nahid Hosseini, and Georg E. Fantner
École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND

Session 1B Q&A - MEMS Ultrasound Transducers (MUTs)

Session Chair:

Amit Lal, Cornell University, USA

14:55 - 15:00

- B1-1B1 PISTON-SHAPED CMOS-MEMS CMUT FRONT-END FEATURING FORCE-DISPLACEMENT TRANSDUCTION ENHANCEMENT**
Chun-Yu Chou, Po-Chun Chen, Hong-Teng Wu, Tzu-Hsuan Hsu, and Ming-Huang Li
National Tsing Hua University, TAIWAN

15:00 - 15:05

- B1-1B2 A MULTI-FREQUENCY PMUT ARRAY BASED ON CERAMIC PZT FOR ENDOSCOPIC PHOTOACOUSTIC IMAGING**
Haoran Wang¹, Hao Yang², Huabei Jiang², Zhenfang Chen³, Philip X.-L. Feng¹, and Huikai Xie⁴
¹University of Florida, USA, ²University of South Florida, USA, ³MEMS Engineering and Materials Inc., USA, and ⁴BIT Chongqing Center for Microelectronics and Microsystems, CHINA

15:05 - 15:10

- B1-1B3 A 128x1 PHASED ARRAY PIEZOELECTRIC MICROMACHINED ULTRASOUND TRANSDUCER (PMUT) FOR MEDICAL IMAGING**
Sina Sadeghpour, Marcus Ingram, Chen Wang, Jan D'Hooge, and Michael Kraft
University of Leuven (KU Leuven), BELGIUM

15:10 - 15:15

- B1-1B4 ALSCN PROGRAMMABLE FERROELECTRIC MICROMACHINED ULTASONIC TRANSDUCER (FMUT)**
Bernard Herrera, Michele Pirro, Gabriel Giribaldi, Luca Colombo, and Matteo Rinaldi
Northeastern University, USA

15:15 - 15:20

- B1-1B5 SOUND PRESSURE AND BANDWIDTH ENHANCED PMUT WITH VOLUME CONTROLLABLE HELMHOLTZ RESONATOR FOR RESPIRATORY MONITORING**
Guo-Hua Feng¹ and Wen-Sheng Chen²
¹National Tsing Hua University, TAIWAN and ²National Chung Cheng University, TAIWAN

15:20 - 15:25

- B1-1B6 AN ALUMINUM-NITRIDE PMUT WITH PRE-CONCAVED MEMBRANE FOR LARGE DEFORMATION AND HIGH QUALITY-FACTOR PERFORMANCE**
Sheng Wu^{1,2,3}, Wei Li^{1,3}, Ding Jiao^{1,3}, Heng Yang^{1,3}, Tao Wu², and Xinxin Li^{1,2,3}
¹Chinese Academy of Sciences (CAS), CHINA, ²ShanghaiTech University, CHINA, and ³University of Chinese Academy of Sciences (UCAS), CHINA

Session 1C Q&A - Aerial Sensing and Actuation MEMS

Session Chair:

Sunil Bhawe, Purdue University, USA

14:55 - 15:00

B1-1C1 A COMPACT ACOUSTIC PARTICLE VELOCITY GRADIENT SENSOR BASED ON MEMS HOT-WIRE SENSOR CHIPS

Lingmeng Yang, Zhezheng Zhu, Wenhan Chang, Fanrui Meng, Chengchen Gao, Yilong Hao, and Zhenchuan Yang
Peking University, CHINA

15:00 - 15:05

B1-1C2 HIGH FORCE DENSITY MULTI-STAGE ELECTROHYDRODYNAMIC JETS USING FOLDED LASER MICROFABRICATED ELECTRODES

Daniel S. Drew and Sean Follmer
Stanford University, USA

15:05 - 15:10

B1-1C3 MEMS PRECONCENTRATOR AND GAS CHROMATOGRAPH CHIPS FOR THE SPACECRAFT ATMOSPHERE MONITOR

Byunghoon Bae, Anton Belousov, Charles P. Malone, Margie L. Homer, Marianne Gonzalez, Jurij Simcic, Richard D. Kidd, Stojan Madzunkov, and Murray R. Darrach
NASA Jet Propulsion Laboratory, USA

15:10 - 15:15

B1-1C4 ULTRASOUND IMAGING IN MID-AIR USING PHASED POLYMER PMUT ARRAY

Pieter Gijzenbergh, Margo Billen, Dominika Wysocka, David Cheyins, and Veronique Rochus
IMEC, BELGIUM

15:15 - 15:20

B1-1C5 CAPACITIVE CMOS HUMIDITY SENSOR WITH NOVEL FRINGE ELECTRODES AND POLYIMIDE-PILLARS FOR PERFORMANCE ENHANCEMENT

Chia-Hung Yang, Cheng-Chun Chang, Ya-Chu Lee, Yen-Lin Chen, and Weileun Fang
National Tsing Hua University, TAIWAN

Session 1D Q&A - Pressure Sensors

Session Chair:

Gianluca Piazza, Carnegie Mellon University, USA

14:55 - 15:00

B1-1D1 2000-ATMOSPHERE CHIP-SCALE PACKAGED BULK-TYPE PRESSURE SENSOR WITH DUAL-CAVITY INDUCED STRESS AMPLIFICATION

Dequan Lin¹, Man Wong¹, and Kevin Chau²
¹*Hong Kong University of Science and Technology, CHINA and*
²*Chinese Academy of Sciences (CAS), CHINA*

15:00 - 15:05

B1-1D2 A CMOS-MEMS THERMAL-PIEZORESISTIVE OSCILLATOR IMPLEMENTED FOR WIDE-RANGE PRESSURE SENSING APPLICATIONS

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

15:05 - 15:10

B1-1D3 A RESONANT HIGH-PRESSURE SENSOR WITH HIGH STRENGTH DESIGN

Jie Yu^{1,2}, Yulan Lu^{1,2}, Deyong Chen^{1,2}, Junbo Wang^{1,2}, Jian Chen¹, and Bo Xie¹
¹*Chinese Academy of Sciences (CAS), CHINA and*
²*University of Chinese Academy of Sciences (UCAS), CHINA*

15:10 - 15:15

B1-1D4 A FAST AND PRECISE TIME-BASED CHARACTERIZATION METHOD FOR SENSORS

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

¹University of Leuven (KU Leuven), BELGIUM and ²Melexis, BELGIUM

15:15 - 15:20

B1-1D5 A RESONANT MICRO-PRESSURE SENSOR WITH GLASS-ON-SILICON WAFER PACKAGING

Sen Zhang^{1,2}, Yu Zheng^{1,2}, Yulan Lu^{1,2}, Bo Xie^{1,2}, Junbo Wang^{1,2}, Deyong Chen^{1,2}, and Jian Chen^{1,2}

¹Chinese Academy of Sciences (CAS), CHINA and

²University of Chinese Academy of Sciences (UCAS), CHINA

15:20 - 15:25

B1-1D6 A CMOS-MEMS CAPACITIVE PRESSURE SENSOR WITH DIFFERENTIAL SENSING ELECTRODES AND ON-CHIP FREQUENCY OUTPUT CIRCUITS

Po-Wei Liao^{1,2}, Hao-Chiao Hong^{1,2}, and Yi Chiu^{1,2}

¹National Chiao Tung University, TAIWAN and ²National Yang Ming Chiao Tung University, TAIWAN

15:25 - 15:35 Transition Break

**Plenary Speaker I Panel Presentation
Opportunities for Transducers in Healthcare**

Moderator:

Ellis Meng, *University of Southern California, USA*

15:35 - 16:05

B1-PS1 A BAYESIAN FRAMEWORK FOR HEALTH MEASUREMENT ACROSS THE LIFESPAN

Dan Wattendorf

Bill & Melinda Gates Foundation, USA

Panelists:

John A. Rogers, *Northwestern University, USA*

Axel Scherer, *California Institute of Technology, USA*

16:05 Conclusion of Block 1

Block 2 - Tuesday, 22 June

All times are Greenwich Mean Time (GMT)/Universal Time Coordinated (UTC)

Industry Session 2

Panel Discussion - Sensors for Smart Cities

Moderator:

Tim Brosnihan, MEMS & Sensors Industry Group (MSIG), USA

07:00 - 07:30

The panel will explore the rapidly growing Smart Cities Sector and the sensors that will enable safe, comfortable, energy efficient living for billions of urban dwellers.

Sreenivasa “Sreeni” Rao¹, Felix Hoehne², and Kush Mishra³

¹InvenSense, a TDK Group Company, USA, ²Sensirion, SWITZERLAND, and ³SenRa, INDIA

Invited Speaker V Q&A

Session Chair:

Takahito Ono, Tohoku University, JAPAN

07:30 - 07:40

B2-IS5 AUTOMOTIVE SEMICONDUCTORS IN THE CASE ERA

Nobuaki Kawahara

MIRISE Technologies Corporation, JAPAN

Invited Speaker VI Q&A

Session Chair:

Xia Liu, École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND

07:30 - 07:40

B2-IS6 NANOGENERATORS AND SELF-POWERED MICRODEVICES APPLIED TO WIRELESS ELECTRICAL STIMULATION AT CELL LEVEL

Gonzalo Murillo

Spanish National Research Council (CSIC), SPAIN

Invited Speaker VII Q&A

Session Chair:

Hyunjoo “Jenny” Lee, Korea Advanced Institute of Science and Technology (KAIST), KOREA

07:30 - 07:40

B2-IS7 SMART CARBON SCAFFOLDS FOR ELECTROCHEMICAL MONITORING OF CELL CULTURES

Stephan Sylvest Keller

Technical University of Denmark (DTU), DENMARK

Invited Speaker VIII Q&A

Session Chair:

Ellis Meng, University of Southern California, USA

07:30 - 07:40

B2-IS8 MICROELECTROMECHANICAL ORGANS-ON-CHIP

Massimo Mastrangeli, Hande Aydogmus, Milica Dostanic, Paul Motreuil-Ragot, Nele Revyn, Bjorn de Wagonaar, Ronald Dekker, and Pasqualina M. Sarro
Delft University of Technology (TU Delft), NETHERLANDS

07:40 - 07:45 Transition Break

Session 2A Q&A - Accelerometer, Shock Sensor, and Switch

Session Chair:

Emerson Cheng, TSMC, TAIWAN

07:45 - 07:50

B2-2A1 A MODE-LOCALIZED MEMS ACCELEROMETER IN THE MODAL OVERLAP REGIME EMPLOYING PARAMETRIC PUMP

Hemin Zhang¹, Madan Parajuli¹, Milind Pandti², Guillermo Sobreviola², Dongyang Chen¹, Jiangkun Sun¹, Chun Zhao³, and Ashwin A. Seshia¹

¹University of Cambridge, UK, ²Silicon Microgravity Ltd., UK, and

³Huazhong University of Science and Technology, UK

07:50 - 07:55

B2-2A2 A MEMS ACCELEROMETER WITH A SINGLE AXIS TWO PROOF MASSES FOR A WIDE DETECTION RANGE

Akihiro Uchiyama¹, Takashi Ichikawa¹, Kohei Shibata¹, Shin-ichi Iida², Sangyeop Lee¹, Noboru Ishihara¹, Katsuyuki Machida¹, Kazuya Masu¹, and Hiroyuki Ito¹

¹Tokyo Institute of Technology, JAPAN and ²NTT Advanced Technology Corporation, JAPAN

07:55 - 08:00

B2-2A3 A 3 PPM/°C TEMPERATURE COEFFICIENT OF SCALE FACTOR FOR A SILICON RESONANT ACCELEROMETER BASED ON CRYSTALLOGRAPHIC ORIENTATION OPTIMIZATION

Mengxia Liu, Jian Cui, Dong Li, and Qiancheng Zhao

Peking University, CHINA

08:00 - 08:05

B2-2A4 MULTI-THRESHOLD MEMS SHOCK SENSOR FOR QUANTITATIVE ACCELERATION MEASUREMENTS

Qiu Xu, Lvjun Wang, Alhammam Niyazi, and Mohammad I. Younis

King Abdullah University of Science and Technology (KAUST), SAUDI ARABIA

08:05 - 08:10

B2-2A5 A NOVEL FABRICATION PLATFORM FOR ACCELERATION SENSOR SWITCH WITH TOP CONTACTS

Srinivas Merugu¹, Jaibir Sharma¹, Sagnik Ghosh¹, Yul Koh¹, Amit Lal^{1,2}, and Eldwin J. Ng¹

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

08:10 - 08:15

B2-2A6 A PLANAR SINGLE-ACTUATOR BI-STABLE SWITCH BASED ON HOOKLESS MECHANISM

Zehua Lan¹, Qi Tao², Zili Tang³, Toshiyuki Tsuchiya⁴, Man Wong³, and Xiaohong Wang¹

¹Tsinghua University, CHINA, ²China Academy of Engineering Physics, CHINA,

³Hong Kong University of Science and Technology, CHINA, and ⁴Kyoto University, JAPAN

Session 2B Q&A -
PowerMEMS 1 - Vibrational and Energy Transduction Systems
Session Chair:
Michael Kraft, University of Leuven (KU Leuven), BELGIUM

07:45 - 07:50

B2-2B1 A SHORT-STROKE ELECTROSTATIC VIBRATIONAL ENERGY HARVESTER WITH EXTENDED BANDWIDTH AND SENSITIVITY

Hiroaki Honma, Yukiya Tohyama, and Hiroshi Toshiyoshi
University of Tokyo, JAPAN

07:50 - 07:55

B2-2B2 FREQUENCY COMBS: A NEW MECHANISM FOR MEMS VIBRATION ENERGY HARVESTERS

Ling Bu^{1,2}, Emmanuelle Arroyo², and Ashwin A. Seshia²
¹*China University of Geosciences, CHINA* and ²*University of Cambridge, UK*

07:55 - 08:00

B2-2B3 A BISTABLE ENERGY HARVESTER FOR SELF-POWERED SENSING IN RAIL TRANSPORT CONDITION MONITORING

Hailing Fu¹, Yuan Zhang², Mengzhou Liu³, Yong Qin³, and Eric M. Yeatman⁴
¹*Loughborough University, UK*, ²*Beijing Institute of Graphic Communication, CHINA*,
³*Beijing Jiaotong University, CHINA*, and ⁴*Imperial College London, UK*

08:00 - 08:05

B2-2B4 DIRECT TRANSDUCTION FROM RADIOFREQUENCY RADIATED POWER TO STATIC AND DYNAMIC FLEXURAL MECHANICAL MODES

Raul Ruiz and Gabriel Abadal
Universitat Autònoma de Barcelona, SPAIN

08:05 - 08:10

B2-2B5 INTELLIGENT THRUST BEARING BASED ON ELECTRET ROTARY POWER GENERATOR WITH SELF-POWERING AND SELF-SENSING CAPABILITIES

Zhe Zhao¹, Yaozheng Wang¹, Tengfei Sun¹, Hao Huang¹, Jin Wu², Kai Tao¹, Honglong Chang¹,
and Weizheng Yuan¹
¹*Northwestern Polytechnical University, CHINA* and ²*Sun Yat-sen University, CHINA*

08:10 - 08:15

B2-2B6 A NOVEL HYBRID GENERATOR WITH AN EFFICIENT MODIFIED VOLTAGE-MULTIPLYING RECTIFIER CIRCUIT FOR LOW FREQUENCY MOTION ENERGY HARVESTING

Zibo Wu, Zeyuan Cao, Shiwen Wang, Rong Ding, and Xiongying Ye
Tsinghua University, CHINA

Session 2C Q&A - Gas Sensors

Session Chair:
Isabelle Dufour, University of Bordeaux, FRANCE

07:45 - 07:50

B2-2C1 STRETCHABLE OXYGEN SENSOR BASED ON SELF-HEALING AND SELF-ADHESIVE ORGANOHYDROGELS

Yuning Liang¹, Zixuan Wu¹, Yaoming Wei¹, Zijing Zhou¹, Wenxi Huang¹, Bizhang Zhong¹, Jindong Ye¹,
Yuanqing Lin¹, Zhenyi Li¹, Haojun Ding¹, Xing Yang¹, Kai Tao², and Jin Wu¹
¹*Sun Yat-sen University, CHINA* and ²*Northwestern Polytechnical University, CHINA*

07:50 - 07:55

B2-2C2 A LOW POWER 4-CHANNEL SINGLE-CANTILEVER METAL-OXIDE GAS SENSOR CELL WITH GAS IDENTIFICATION CAPABILITY

Dongcheng Xie¹, Ruichen Liu¹, George Adedokun¹, Feng Wu¹, Qian Rong², and Lei Xu¹

¹University of Science and Technology of China, CHINA and ²Sun Yat-sen University, CHINA

07:55 - 08:00

B2-2C3 HIGH SENSITIVE NITROGEN DIOXIDE SENSOR BASED ON POLYVINYL ALCOHOL-CELLULOSE NANOFIBRIL ORGANOHYDROGEL WITH REPAIRABILITY, ANTI-FREEZING, STRETCHABILITY, LONG-LASTING MOISTURE, AND HIGH STRENGTH

Zijing Zhou¹, Yuning Liang¹, Wenxi Huang¹, Bizhang Zhong¹, Jindong Ye¹, Kai Tao², and Jin Wu¹

¹Sun Yat-sen University, CHINA and ²Northwestern Polytechnical University, CHINA

08:00 - 08:05

B2-2C4 A THERMAL-PIEZORESISTIVE SELF-SUSTAINED RESONANT MASS SENSOR WITH HIGH-Q (>95k) IN AIR

Aojie Quan, Chen Wang, Hemin Zhang, Michel De Cooman, Chenxi Wang, Linlin Wang, Sina Sadeghpour, and Michael Kraft

University of Leuven (KU Leuven), BELGIUM

08:05 - 08:10

B2-2C5 A PMUT INTEGRATED MICROFLUIDIC SYSTEM FOR VOLUMETRIC FLOW RATE SENSING

Kaustav Roy, Kritank Kalyan, Anuj Ashok, Vijayendra Shastri, and Rudra Pratap

Indian Institute of Science, INDIA

Session 2D Q&A - Cells and Organs on a Chip

Session Chair:

Ryo Miyake, University of Tokyo, JAPAN

07:45 - 07:50

B2-2D1 MULTILAYERED MICROFLUIDIC DEVICE FOR CONTROLLABLE FLOW PERFUSION OF GUT-LIVER ON A CHIP

Jiandong Yang¹, Satoshi Imamura¹, Yoshikazu Hirai¹, Ken-ichiro Kamei¹, Toshiyuki Tsuchiya¹, and Osamu Tabata^{1,2}

¹Kyoto University, JAPAN and ²Kyoto University of Advanced Science, JAPAN

07:50 - 07:55

B2-2D2 DUAL-GATE FET-BASED CHARGE SENSOR ENHANCED BY IN-SITU ELECTRODE DECORATION IN A MEMS ORGANS-ON-CHIP PLATFORM

Hande Aydogmus¹, H. Joost van Ginkel¹, Anna-Danai Galiti¹, Michel Hu², Jean-Philippe Frimat², Arn van den Maagdenberg², GuoQi Zhang¹, Massimo Mastrangeli¹, and Pasqualina M. Sarro¹

¹Delft University of Technology (TU Delft), NETHERLANDS and

²Leiden University Medical Centre, NETHERLANDS

07:55 - 08:00

B2-2D3 REALIZATION OF ON-CHIP MICROFLUIDIC SYSTEM WITH FILTER-FREE FLUORESCENCE SENSOR FOR LENS-LESS FLOWCYTOMETRY

Tomoya Ide, Yong-Joon Choi, Yasuyuki Kimura, Takeshi Hizawa, Kazuhiro Takahashi, Hiromu Ishii, Toshihiko Noda, and Kazuaki Sawada

Toyohashi University of Technology, JAPAN

08:00 - 08:05

B2-2D4 MINIATURIZED ELECTROCHEMICAL DEVICE FOR IN-SITU MONITORING OF GLUCOSE, LACTATE, DISSOLVED OXYGEN, PH, AND TEMPERATURE IN YEAST CULTURE

Nurul Izni Rusli^{1,2}, Pablo Lopez Espinar¹, Frederik Ceyssens¹, Irene Taurino¹, and Michael Kraft¹

¹University of Leuven (KU Leuven), BELGIUM and ²Universiti Malaysia Perlis (UniMAP), MALAYSIA

08:05 - 08:10

B2-2D5 MICROCHIP FOR SURFACE-ENHANCED RAMAN SCATTERING DETECTION OF LIVE SINGLE CELL

Shengsen Zhang and Rong Zhu
Tsinghua University, CHINA

08:10 - 08:15

B2-2D6 A MICROFLUIDIC DEVICE TO STATISTICALLY DETERMINE THE DISTRIBUTION OF SICKLE RED CELL SUBPOPULATIONS USING BIOIMPEDANCE

Tieying Xu¹, Maria A. Lizarralde-Iragorri², Jean Roman¹, Emile Martincic³, Valentine Brousse²,
Olivier Français⁴, Wassim El Nemer², and Bruno Le Pioufle¹
¹*Université Paris-Saclay, FRANCE*, ²*Université de Paris, FRANCE*, ³*C2N, CNRS, FRANCE*, and
⁴*ESIEE Paris, FRANCE*

Poster Session I and Exhibit Inspection

08:15 – 10:15 Presentations are listed by topic category with their assigned number starting on page 50.

10:15 Conclusion of Block 2

Block 3 - Wednesday, 23 June

All times are Greenwich Mean Time (GMT)/Universal Time Coordinated (UTC)

Industry Session 3 MEMS & Sensors Industry Group Emerging Leaders and Student Committee Joint Event

Moderators:

Andrea Vergara, Tohoku University, JAPAN and
Gerardo Gonzalez, University of Freiburg, GERMANY

00:00 - 00:30

For the first time ever, an international student committee teamed with the Industry Events committee to create a special event where an Emerging Leaders panel offers insights and answers questions from students and early-career professionals. The discussion will include emerging new technologies for the future, dealing with global challenges, and advice and tips for MEMS students.

Eugene Hwang¹, Robert Hennessy², and Igino Padovani³

¹SpaceX, USA, ²InvenSense, a TDK Group Company, USA, and ³Robert Bosch, USA

00:30 - 00:35 Transition Break

Invited Speaker IX Q&A

Session Chair:

Jae Yoong Cho, Enertia Microsystems Inc., USA

00:35 - 00:45

B3-IS9 ULTRA-HIGH-Q NANOMECHANICS THROUGH DISSIPATION DILUTION: TRENDS AND PERSPECTIVES

Nils J. Engelsen¹, Aman R. Agrawal², and Dalziel J. Wilson²

¹École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND and ²University of Arizona, USA

Invited Speaker X Q&A

Session Chair:

Shoji Takeuchi, University of Tokyo, JAPAN

00:35 - 00:45

B3-IS10 HIGH THROUGHPUT SIZE CONTROLLED MICRODROPLET GENERATION

Shuichi Shoji, Dong Hyun Yoon, Daiki Tanaka, and Tetsushi Sekiguchi

Waseda University, JAPAN

Invited Speaker XI Q&A

Session Chair:

Yoko Yamanishi, Kyushu University, JAPAN

00:35 - 00:45

B3-IS11 SPECTROCHIP FOR COVID-19 PANDEMIC

Cheng-Hao Ko

National Taiwan University of Science and Technology, TAIWAN

Invited Speaker XII Q&A

Session Chair:

Jack Judy, University of Florida, USA

00:35 - 00:45

B3-IS12 NEURAL STIMULATION: NEW DESIGNS FOR ENHANCED CONTROL

Shelley I. Fried

Harvard Medical School, USA

00:45 - 00:50 Transition Break

Session 3A Q&A - Force/Tactile Sensors

Session Chair:

Xinxin Li, Chinese Academy of Sciences (CAS), CHINA

00:50 - 00:55

B3-3A1 A NOVEL CMOS-MEMS TRI-AXIAL TACTILE FORCE SENSOR USING CAPACITIVE AND PIEZORESISTIVE SENSING MECHANISMS

Yen-Lin Chen, Yu-Cheng Huang, Meng-Lin Hsieh, Sheng-Kai Yeh, and Weileun Fang

National Tsing Hua University, TAIWAN

00:55 - 01:00

B3-3A2 WIDE RANGE BRIDGE TYPE 3D TACTILE SENSOR WITH VARIABLE SENSITIVITY THROUGH REPLACEABLE ELASTIC LAYER ATTACHING ON PDMS CAP

Cheng Hou¹, Kaiyao Wang¹, Liang Lou², Songsong Zhang², Huicong Liu¹, and Lining Sun¹

¹Soochow University, CHINA and ²Shanghai Industrial μ Technology Research Institute (SITRI), CHINA

01:00 - 01:05

B3-3A3 FLEXIBLE TACTILE SENSING ARRAY FOR ROBUST OBJECT RECOGNITION

Mengwei Liu^{1,2}, Yujia Zhang^{1,2}, Jiachuang Wang^{1,2}, Heng Yang^{1,2}, Nan Qin^{1,2}, and Tiger H. Tao^{1,2,3,4}

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

³ShanghaiTech University, CHINA, and

⁴Shanghai Research Center for Brain Science and Brain-Inspired Intelligence, CHINA

01:05 - 01:10

B3-3A4 SURFACE COVERING STRUCTURE AND ACTIVE SENSING WITH MEMS-CMOS INTEGRATED 3-AXIS TACTILE SENSORS FOR OBJECT SLIP DETECTION AND TEXTURE RECOGNITION

Sumeyya Javaid¹, Hideki Hirano¹, Shuji Tanaka¹, and Masanori Muroyama^{1,2}

¹Tohoku University, JAPAN and ²Tohoku Institute of Technology, JAPAN

01:10 - 01:15

B3-3A5 A HIGH-SENSITIVITY MEMS GRAVIMETER WITHOUT A VACUUM CHAMBER

XiaoChao Xu¹, Qian Wang¹, Ji'ao Tian¹, YanYan Fang¹, LuJia Yang¹, Chun Zhao¹, Fangjing Hu¹, and Liangcheng Tu^{1,2}

¹Huazhong University of Science and Technology, CHINA and ²Sun Yat-sen University, CHINA

Session 3B Q&A - MEMS Acoustic Sensors, Imaging, and Speakers

Session Chair:

Chengkuo "Vincent" Lee, National University of Singapore, SINGAPORE

00:50 - 00:55

B3-3B1 TWO-WAY PIEZOELECTRIC MEMS MICROSPEAKER WITH NOVEL STRUCTURE AND ELECTRODE DESIGN FOR BANDWIDTH ENHANCEMENT

Yu-Tzu Lin, Sung-Cheng Lo, and Weileun Fang

National Tsing Hua University, TAIWAN

00:55 - 01:00

B3-3B2 A MULTI-DIRECTIONAL SINGLE-PROOF-MASS ACCELEROMETER CONTACT MICROPHONE (ACCELOPHONE) WITH 10KHZ OPEN-LOOP BANDWIDTH

Pranav Gupta, Anosh Daruwalla, Haoran Wen, and Farrokh Ayazi

Georgia Institute of Technology, USA

01:00 - 01:05

B3-3B3 IMPROVED PIEZOELECTRIC MEMS ACOUSTIC EMISSION SENSORS

Yongfang Li¹, Takahiro Omori¹, Kazuo Watabe¹, and Hiroshi Toshiyoshi²

¹Toshiba Corporation, JAPAN and ²University of Tokyo, JAPAN

01:05 - 01:10

B3-3B4 MEMS MICROPHONE WITH 73dBA SNR IN A 4mm X 3mm X 1.2mm PACKAGE

Vahid Naderyan, Sung Lee, Ankur Sharma, Nicholas Wakefield, Michael Kuntzman, Yunfei Ma, Mark Da Silva, and Michael Pedersen

Knowles Electronics, USA

01:10 - 01:15

B3-3B5 ATTENUATION OF CURVED STRUCTURAL SURFACES IN PMUT MEASUREMENTS

Sedat Pala¹, Yande Peng¹, Hong Ding², Jin Xie³, and Liwei Lin¹

¹University of California, Berkeley, USA, ²University of California, San Diego, USA, and

³Zhejiang University, CHINA

Session 3C Q&A - MEMS for Environmental Sensing

Session Chair:

Tie Li, Chinese Academy of Sciences (CAS), CHINA

00:50 - 00:55

B3-3C1 DEVELOPMENT OF A GAS SENSOR FOR GREEN LEAF VOLATILE DETECTION

Shakir-ul Haque Khan¹, Sayali Tope¹, Rana Dalpati¹, Kyeong Heon Kim¹, Seungbeom Noh¹, Ashrafuzzaman Bulbul¹, Ravi V. Mural², Aishwaryadev Banerjee¹, James C. Schnable², Mingyue Ji¹, Carlos Mastrangelo¹, Ling Zang¹, and Hanseup Kim¹

¹University of Utah, USA and ²University of Nebraska, Lincoln, USA

00:55 - 01:00

B3-3C2 GRAPHENE OXIDE-CHITOSAN COMPOSITE-BASED FLEXIBLE ELECTROCHEMICAL SENSORS FOR LEAD ION DETECTION

Pawan Pathak and Hyoung J. Cho

University of Central Florida, USA

01:00 - 01:05

B3-3C3 REAL-TIME IN VIVO IMAGING OF INTRA-STEM ION DISTRIBUTION USING INSERTABLE CMOS SENSOR FOR PLANTS

Kenta Sembo, Taichi Yoshida, Seitaro Toda, Tomoko Horio, Yasuyuki Kimura, Yong-Joon Choi, Kazuhiro Takahashi, Kotaro Takayama, Kazuaki Sawada, and Toshihiko Noda

Toyohashi University of Technology, JAPAN

01:05 - 01:10

B3-3C4 ZERO-POWER FLAME DETECTOR WITH WIDE FIELD-OF-VIEW BASED ON PLASMONICALLY-ENHANCED MICROMECHANICAL PHOTOSWITCH

Sila Deniz Caliskan, Vageeswar Rajaram, Sungho Kang, Antea Risso, Zhenyun Qian, and Matteo Rinaldi
Northeastern University, USA

01:10 - 01:15

B3-3C5 SMOLDERING FIRE DETECTION USING LOW-POWER CAPACITIVE MEMS HYDROGEN SENSOR FOR FUTURE FIRE ALARM

Yumi Hayashi, Yosuke Akimoto, Naoki Hiramatsu, Kei Masunishi, Tomohiro Saito, Hiroaki Yamazaki, Naofumi Nakamura, and Akihiro Kojima
Toshiba Corporation, JAPAN

Session 3D Q&A - Brains, Drugs Test and Screening

Session Chair:

Boris Stoeber, University of British Columbia, CANADA

00:50 - 00:55

B3-3D1 NEEDLE-TYPE 5- μ M PIXEL PITCH Ph-IMAGE SENSOR AND IMAGING OF PROTON EMISSIONS IN THE CEREBRAL CORTEX

Kotaro Sakamoto¹, Mai Madokoro¹, Hiroshi Horiuchi², Junko Ishida², Tomoko Horio¹, Yasuyuki Kimura¹, Takeshi Hizawa¹, Yong-Joon Choi¹, Kazuhiro Takahashi¹, Toshihiko Noda¹, Junichi Nabekura², and Kazuaki Sawada¹

¹*Toyohashi University of Technology, JAPAN* and ²*National Institute for Physiological Sciences, JAPAN*

00:55 - 01:00

B3-3D2 A MULTI-CHEMICAL IMAGE SENSOR FOR SIMULTANEOUS VISUALIZATION OF LACTATE AND Ph DISTRIBUTION AND ITS APPLICATION FOR EXTRACELLULAR MEASUREMENT OF A HIPPOCAMPAL SLICE

Hayato Muraguchi¹, Hideo Doi¹, Tomoko Horio¹, Bijay Parajuli², Eiji Shigetomi², Youichi Shinozaki², Yong-Joon Choi¹, Kazuhiro Takahashi¹, Toshiaki Hattori¹, Toshihiko Noda¹, Schuichi Koizumi², and Kazuaki Sawada¹

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

01:00 - 01:05

B3-3D3 FABRICATION OF ULTRA-THIN MICRO-POROUS PDMS MEMBRANE FOR CELL CO-CULTURE IN BLOOD BRAIN BARRIER MODEL ON CHIP

Fengyi Zheng^{1,2}, Qiushi Li¹, Panhui Yang^{1,2}, Shihui Qiu^{1,2}, Hongju Mao^{1,2}, and Jianlong Zhao^{1,2}

¹*Chinese Academy of Sciences (CAS), CHINA* and

²*University of Chinese Academy of Sciences (UCAS), CHINA,*

01:05 - 01:10

B3-3D4 ENDOTHELIAL CHEMICAL REACTION AND DRUG TEST REPRODUCED ON MOLDED FLEXIBLE COLLAGEN HYDROGEL TUBE

Shun Itai and Hiroaki Onoe
Keio University, JAPAN

01:10 - 01:15

B3-3D5 A TUBING-FREE SAMPLE-TO-DROPLET INTERFACE ENABLES FACILE SAMPLE LOADING OF DROPLET MICROFLUIDICS DEVICES TOWARD HIGH-THROUGHPUT SCREENING

Fangchi Shao, Kuangwen Hsieh, Pengfei Zhang, Aniruddha M. Kaushik, and Tza-Huei Wang
Johns Hopkins University, USA

01:15 - 01:20

B3-3D6 A SILK-BASED OPTO-ELECTRONIC INTEGRATED NEURAL PROBE FOR ANIMAL MOTION CONTROL

Chi Gu^{1,2}, Huiran Yang¹, Bohan Zhang³, Haoyuan Li⁴, Xueying Wang^{1,2}, Zhitao Zhou¹, Zhifeng Shi⁴, Ying Mao⁴, Xiaoling Wei^{1,2}, and Tiger H. Tao^{1,2,3,5}

¹*Chinese Academy of Sciences, Shanghai, CHINA*, ²*University of Chinese Academy of Sciences (UCAS), CHINA*, ³*Shanghai Tech University, CHINA*, ⁴*Huashan Hospital of Fudan University, CHINA*, and

⁵*Shanghai Research Center for Brain Science and Brain-Inspired Intelligence, CHINA*

Poster Session II and Exhibit Inspection

01:20 – 03:20 Presentations are listed by topic category with their assigned number starting on page 50.

03:20 Conclusion of Block 3

Block 4 - Wednesday, 23 June

All times are Greenwich Mean Time (GMT)/Universal Time Coordinated (UTC)

TRANSDUCERS Early Career Award Presentation

13:00 - 13:15

2021 Award Recipient

Ming-Huang Li

National Tsing Hua University, TAIWAN

Transducers 2023 Conference Announcement

13:15 - 13:27

Transducers 2023 Conference Chairs

Satoshi Konishi, *Ritsumeikan University, JAPAN*

Shuji Tanaka, *Tohoku University, JAPAN*

Hilton Head 2022 Workshop Announcement

13:27 - 13:30

Hilton Head 2022 Workshop Chair

Reza Ghodssi, *University of Maryland, USA*

13:30 - 13:35 Transition Break

Invited Speaker XIII Q&A

Session Chair:

Roozbeh Tabrizian, *University of Florida, USA*

13:35 - 13:45

B4-IS13 QUANTUM CONTROL OF SPIN AND ORBITAL STATES WITH A DIAMOND MEMS RESONATOR

Gregory D. Fuchs

Cornell University, USA

Invited Speaker XIV Q&A

Session Chair:

Olivier Guenat, *University of Bern, SWITZERLAND*

13:35 - 13:45

B4-IS14 ORGAN CHIP MODELS OF HUMAN PHYSIOLOGY

Anna Herland

KTH Royal Institute of Technology, SWEDEN

Invited Speaker XV Q&A

Session Chair:

Silvan Schmid, Vienna University of Technology (TU Wien), AUSTRIA

13:35 - 13:45

B4-IS15 INTERROGATION AND CHARGING OF EMBEDDED SENSORS BY AUTONOMOUS VEHICLES

Juan M. Arteaga, James O’Keeffe, David E. Boyle, Paul D. Mitcheson, and [Eric M. Yeatman](#)

Imperial College London, UK

Invited Speaker XVI Q&A

Session Chair:

Satoshi Konishi, Ritsumeikan University, JAPAN

13:35 - 13:45

B4-IS16 DRAWING FEATURE MAPS OF MOLECULAR COMPUTATION

[Teruo Fujii](#)

University of Tokyo, JAPAN

13:45 - 13:50 Transition Break

Session 4A Q&A - Resonators and RF MEMS

Session Chair:

Troy Olsson, University of Pennsylvania, USA

13:50 - 13:55

B4-4A1 DESIGN OF ELECTROMAGNETIC RING RESONATOR WITH ZERO ANCHORLOSS

Muhammad Jehanzeb Khan, Takashiro Tsukamoto, and Shuji Tanaka

Tohoku University, JAPAN

13:55 - 14:00

B4-4A2 A SILICON MEMS DISK RESONATOR OSCILLATOR DEMONSTRATING 36 PPT FREQUENCY STABILITY

Madan Parajuli, Guillermo Sobreviela, Hemin Zhang, and Ashwin A. Seshia

University of Cambridge, UK

14:00 - 14:05

B4-4A3 SINGLE-CHIP DUAL-BAND FILTERS BASED ON SPURIOUS-FREE DUAL-RESONANCE $\text{SC}_{0.15}\text{AL}_{0.85}\text{N}$ LATERALLY COUPLED ALTERNATING THICKNESS (LCAT) MODE RESONATORS

Chen Liu, Yao Zhu, Nan Wang, and Bangtao Chen

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

14:05 - 14:10

B4-4A4 IN-PLANE BULK ACOUSTIC RESONATORS USING 50NM-THICK NANO-LAMINATED FERROELECTRIC $\text{HF}_{0.5}\text{ZR}_{0.5}\text{O}_2$

Troy Tharpe, Faysal Hakim, and Roozbeh Tabrizian

University of Florida, USA

14:10 - 14:15

B4-4A5 INTRINSICALLY SWITCHABLE FERROELECTRIC SCANDIUM ALUMINUM NITRIDE BULK ACOUSTIC WAVE RESONATORS

Dicheng Mo, Sushant Rassay, and Roozbeh Tabrizian

University of Florida, USA

14:15 - 14:20

B4-4A6 SELF-HEATING AND QUALITY FACTOR: THERMAL CHALLENGES IN ALUMINUM SCANDIUM NITRIDE BULK ACOUSTIC WAVE RESONATORS

Yue Zheng, Chao Yuan, Mingo Park, Samuel Graham, and Azadeh Ansari
Georgia Institute of Technology, USA

Session 4B Q&A - MEMS for Human Sensing and Machine Interfacing

Session Chair:

Thierry Leïchl , Georgia Institute of Technology - CNRS, USA

13:50 - 13:55

B4-4B1 ELECTRONIC SKIN FOR DETECTIONS OF HUMAN-ROBOT COLLISION FORCE AND CONTACT POSITION

Qian Mao, Guozhen Li, and Rong Zhu
Tsinghua University, CHINA

13:55 - 14:00

B4-4B2 A TRIBOELECTRIC TACTILE PERCEPTION RING FOR CONTINUUM ROBOT COLLISION-AWARE

Yuyang Sun¹, Hanyang Li¹, Cheng Hou¹, Wenjie Shen¹, Huicong Liu¹, Tao Chen¹, Hongliang Ren², Xiuli Zuo³, and Yanqing Li⁴

¹*Soochow University, CHINA*, ²*National University of Singapore, CHINA*,

³*Qilu Hospital of Shandong University, CHINA*, and ⁴*Shandong University, CHINA*

14:00 - 14:05

B4-4B3 HAPTIC-FEEDBACK RING ENABLED HUMAN-MACHINE INTERFACE (HMI) AIMING AT IMMERSIVE VIRTUAL REALITY EXPERIENCE

Zhongda Sun, Minglu Zhu, Zhaocong Chen, Xuechuan Shan, and Chengkuo Lee
National University of Singapore, SINGAPORE

14:05 - 14:10

B4-4B4 A GLOVE-BASED HUMAN-MACHINE INTERFACE ASSISTED BY ULTRA-STRETCHABLE STRAIN SENSORS AND THREE-AXIS FORCE SENSORS

Xingyou Meng, Hanyang Li, Kui Zhang, Yuyang Sun, and Huicong Liu
Soochow University, CHINA

14:10 - 14:15

B4-4B5 AN MXENE-EDOT NANOCOMPOSITE BASED STRAIN SENSOR PATCH FOR WIRELESS HUMAN MOTION MONITORING

Shipeng Zhang, Ashok Chhetry, Sudeep Sharma, Chani Park, and Jae Yeong Park
Kwangwoon University, KOREA

14:15 - 14:20

B4-4B6 MEMS-ENABLED WIRELESS URETERAL STENT WITH INTEGRATED ANTENNA FOR LOCAL PRESSURE MONITORING

Mohammad Reza Yousefi Darestani, Nabil Shalabi, Dirk Lange, Ben H. Chew, and Kenichi Takahata
University of British Columbia, Vancouver, CANADA

Session 4C Q&A - Microrobots and Microswimmers

Session Chair:

Michel Despont, CSEM, SWITZERLAND

13:50 - 13:55

B4-4C1 FIRST JUMPS OF A SILICON MICROROBOT WITH AN ENERGY STORING SUBSTRATE SPRING

Craig B. Schindler, Hani C. Gomez, and Kristofer S.J. Pister
University of California, Berkeley, USA

13:55 - 14:00

B4-4C2 AN UNTETHERED CRAWLING AND JUMPING MICRO-ROBOT

Dongkai Wang^{1,2}, Fanping Sui², Wenying Qiu^{1,2}, Yandeng Peng², Min Zhang¹, Xiaohao Wang¹, and Liwei Lin^{1,2}
¹*Tsinghua University, CHINA* and ²*University of California, Berkeley, USA*

14:00 - 14:05

B4-4C3 MICRO SWIMMING ROBOTS POWERED BY A SINGLE-AXIS ALTERNATING MAGNETIC FIELD WITH CONTROLLABLE MANIPULATION

Fanping Sui¹, Yuanyuan Huang², Ruiqi Guo¹, and Liwei Lin¹
¹*University of California, Berkeley, USA* and ²*Southwest University, CHINA*

14:05 - 14:10

B4-4C4 UNTETHERED SOFT CRAWLING ROBOTS DRIVEN BY MAGNETIC ANISOTROPY

Fanping Sui¹, Dongkai Wang^{1,2}, Ruiqi Guo¹, Renxiao Xu¹, and Liwei Lin^{1,2}
¹*University of California, Berkeley, USA* and ²*Tsinghua University, CHINA*

14:10 - 14:15

B4-4C5 RECONFIGURABLE ACOUSTOFLUIDIC MANIPULATION OF PARTICLES IN RING-LIKE RICH PATTERNS ENABLED ON A BULK MICROMACHINED SILICON CHIP

Jingui Qian¹, Renhua Yang¹, Habiba Begum¹, and Joshua E.-Y. Lee^{1,2}
¹*City University of Hong Kong, HONG KONG* and
²*Agency for Science, Technology and Research (A*STAR), SINGAPORE*

14:15 - 14:20

B4-4C6 FABRICATION OF BIOINSPIRED ARTIFICIAL BACTERIAL FLAGELLA VIA TWO PHOTON LITHOGRAPHY AND WET METALLIZATION

Roberto Bernasconi¹, Gea Prioglio¹, Carlos C.J. Alcantara², Salvador Panè², and Luca Magagnin¹
¹*Politecnico di Milano, ITALY* and ²*ETH Zurich, SWITZERLAND*

Session 4D Q&A - MEMS with Beyond AI and Novel Computing Methods

Session Chair:

Philip Feng, University of Florida, USA

13:50 - 13:55

B4-4D1 AN EXPERIMENTAL STUDY OF THE PHOTORESPONSE OF 1T-1R OSCILLATORS BASED ON VANADIUM DIOXIDE: TOWARDS SPIKING SENSING SYSTEMS

Teodor Rosca, Fatemeh Qaderi, Marco Riccardi, Olivier J.F. Martin, and Adrian M. Ionescu
École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND

13:55 - 14:00

B4-4D2 TOPOMEMS CIRCUIT: STEP-VARIABLE-RESETTABLE MEMS CAPACITOR FOR TOPOLOGICAL ELECTRICAL CIRCUIT

Yoshio Mita¹, Eric Lebrasseur¹, Motohiko Ezawa¹, Keigo Tsuji¹, Minoru Kawamura², and Akio Higo¹
¹*University of Tokyo, JAPAN* and ²*RIKEN, JAPAN*

14:00 - 14:05

B4-4D3 DOUBLE-COFFEE RING NANOPLASMONIC EFFECTS WITH CONVOLUTIONAL NEURAL LEARNING FOR SARS-COV-2 DETECTION

Kamyar Behrouzi and Liwei Lin

University of California, Berkeley, USA

14:05 - 14:10

B4-4D4 AI ON A CHIP FOR IDENTIFYING MICROALGAL CELLS WITH HIGH HEAVY METAL REMOVAL EFFICIENCY

Muzhen Xu¹, Jeffrey Harmon¹, Tomohisa Hasunuma², Akihiro Isozaki^{1,3}, and Keisuke Goda^{1,4,5}

¹University of Tokyo, JAPAN, ²Kobe University, JAPAN, ³Kanagawa Institute of Industrial Science and Technology, JAPAN, ⁴Wuhan University, CHINA, and ⁵University of California, Los Angeles, USA

14:10 - 14:15

B4-4D5 MACHINE LEARNING AUGMENTED VOC IDENTIFICATION BY MID-INFRARED NANOANTENNAS WITH MICROFLUIDICS CHAMBERS

Zhihao Ren, Zixuan Zhang, Jingxuan Wei, Haibo Wang, Bowei Dong, and Chengkuo Lee

National University of Singapore, SINGAPORE

Poster Session III and Exhibit Inspection

14:20 – 16:20 Presentations are listed by topic category with their assigned number starting on page 50.

16:20 Conclusion of Block 4

Block 5 - Thursday, 24 June

All times are Greenwich Mean Time (GMT)/Universal Time Coordinated (UTC)

Plenary Speaker II & III Panel Presentation Opportunities for Transducers in Global Good

Moderator:

Hiroyuki Fujita, *Canon Medical Systems Corporation, JAPAN*

07:00 - 07:30

B5-PS2 DIGITAL TECHNOLOGY MEETS ETHICS: HOW TO THINK ABOUT THE GLOBAL GOOD WHEN YOU ARE CHANGING THE WORLD

[Andrea Renda](#)

Centre for European Policy Studies (CEPS), BELGIUM

B5-PS3 DIGITAL SOCIAL INNOVATION: TAIWAN CAN HELP

[Audrey Tang](#)

Digital Minister, TAIWAN

07:30 - 07:35 Transition Break

Invited Speaker XVII Q&A

Session Chair:

Gabriele Schrag, *Technical University of Munich, GERMANY*

07:35 - 07:45

B5-IS17 MEMS TOOLS FOR ACCELERATING MATERIALS SCIENCE

[Alfred Ludwig](#)

Ruhr Universität, Bochum (RUB), GERMANY

Invited Speaker XVIII Q&A

Session Chair:

Guillermo Villanueva, *École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND*

07:35 - 07:45

B5-IS18 SILICON NANOMECHANICAL RESONATORS AND LARGE SCALE OPTOMECHANICS FOR SENSING

[Sébastien Hentz](#)

CEA, FRANCE

Invited Speaker XIX Q&A

Session Chair:

Massimo Mastrangeli, *Delft University of Technology, NETHERLANDS*

07:35 - 07:45

B5-IS19 SMART 3D VOLUMETRIC PRINTING

Paul Delrot², Damien Loterie² and [Christophe Moser](#)¹

¹*École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND* and ²*Readily3D, SWITZERLAND*

Invited Speaker XX Q&A

Session Chair:

Levent Yobas, Hong Kong University of Science and Technology, HONG KONG

07:35 - 07:45

B5-IS20 EMERGING FUNCTIONS OF ELECTRICALLY-INDUCED BUBBLES AND ITS BIOMEDICAL APPLICATIONS

Yoko Yamanishi

Kyushu University, JAPAN

07:45 - 07:50 Transition Break

Session 5A Q&A - Gyroscope, Magneto/Electrical Field, and Gravimeter

Session Chair:

Silvan Schmid, Vienna University of Technology (TU Wien), AUSTRIA

07:50 - 07:55

B5-5A1 A 0.1 DEG/H MODULE-LEVEL SILICON MEMS RATE INTEGRATING GYROSCOPE USING VIRTUALLY ROTATED DONUT-MASS STRUCTURE AND DEMONSTRATION OF THE EARTH'S ROTATION DETECTION

Fumito Miyazaki¹, Ryunosuke Gando¹, Daiki Ono^{1,2}, Shiori Kaji¹, Hiroshi Ota², Hiroki Hiraga¹, Kei Masunishi¹, Etsuji Ogawa¹, Tetsuro Itakura¹, and Yasushi Tomizawa^{1,2}

¹Toshiba Corporation, JAPAN and ²Device & System Platform Development Center Co. Ltd., JAPAN

07:55 - 08:00

B5-5A2 THEORETICAL AND EXPERIMENTAL INVESTIGATIONS OF THE PWM FREQUENCY EFFECT ON THE SENSITIVITY OF THERMAL EXPANSION-BASED ANGULAR MOTION SENSOR

Huahuang Luo, Jose Cabot, Xiaoyi Wang, Mingzheng Duan, and Yi-Kuen Lee

Hong Kong University of Science and Technology, HONG KONG

08:00 - 08:05

B5-5A3 A RESONANT LORENTZ-FORCE MAGNETOMETER BASED ON CAVITY SLOTTED DOUBLE-ENDED TUNING FORK TO ENHANCE Q-FACTOR AND SENSITIVITY

Xiaoxiao Song¹, Chen Wang², Chengxin Li¹, Fangzheng Li¹, Jingqian Xi¹, Yuan Wang¹, Huafeng Liu¹, Chun Zhao¹, Liang-Cheng Tu^{1,3}, and Michael Kraft²

¹Huazhong University of Science and Technology, CHINA, ²University of Leuven, BELGIUM, and

³Sun Yat-sen University, CHINA

08:05 - 08:10

B5-5A4 DESIGN AND CHARACTERIZATION OF AN ALN PIEZOELECTRIC MEMS MAGNETOMETER

Ken-Wei Tang, Po-Chih Cheng, Shyam Trivedi, and Sheng-Shian Li

National Tsing Hua University, TAIWAN

08:10 - 08:15

B5-5A5 INTEGRATION OF MAGNETOSTRICTIVE MICROSENSOR WITH HALL ELEMENT FOR MICROSTRUCTURE RESONANCE DETECTION

Taiga Ezura, Naoki Inomata, and Takahito Ono

Tohoku University, JAPAN

08:15 - 08:20

B5-5A6 A NOVEL HIGH SENSITIVE MODE-LOCALIZATION MEMS ELECTRIC FIELD SENSOR BASED ON CLOSED-LOOP FEEDBACK

Zilong Wang^{1,2}, Zhengwei Wu¹, Xiangming Liu^{1,2}, Yahao Gao^{1,2}, Simin Peng^{1,2}, Ren Ren¹, Fengjie Zheng¹, Yao Lv¹, and Chunrong Peng^{1,2}

¹Chinese Academy of Sciences (CAS), CHINA and

²University of Chinese Academy of Sciences (UCAS), CHINA,

Session 5B Q&A - Optical MEMS

Session Chair:

Frank Niklaus, KTH Royal Institute of Technology, SWEDEN

07:50 - 07:55

B5-5B1 A ONE-INCH APERTURE PIEZOELECTRIC TUNABLE LENS WITH SMALL FOOTPRINT

Hitesh G.B. Gowda, Tobias Gräf, and Ulrike Wallrabe

University of Freiburg, GERMANY

07:55 - 08:00

B5-5B2 BI-AXIAL MAGNETICALLY ACTUATED TUNABLE PRISM

Pascal M. Weber, Matthias C. Wapler, Florian Lemke, and Ulrike Wallrabe

University of Freiburg, GERMANY

08:00 - 08:05

B5-5B3 CLOSED-LOOP CONTROL OF QUASI-STATIC SCANNING PZT MICROMIRRORS WITH EMBEDDED PIEZORESISTIVE SENSING AND SPURIOUS MODE REJECTION

Paolo Frigerio¹, Luca Molinari², Andrea Barbieri², Roberto Carminati², Nicolò Boni², and Giacomo Langfelder¹

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

08:05 - 08:10

B5-5B4 ACOUSTICALLY LEVITATED SPINNING OPTICAL SCANNER

Takashi Sasaki and Kazuhiro Hane

Tohoku University, JAPAN

08:10 - 08:15

B5-5B5 MODELLING AND EXPERIMENTAL VALIDATION OF PIEZOELECTRICALLY DRIVEN MICRO-LENS ACTUATOR

Syed Mamun R Rasid¹, Aron Michael², Hemanshu Roy Pota¹, Ssu-Han Chen², and Chee Yee Kwok²

¹*University of New South Wales, Canberra, AUSTRALIA* and

²*University of New South Wales, Sydney, AUSTRALIA*

08:15 - 08:20

B5-5B6 CONTINUOUSLY TUNABLE SILICON PHOTONIC MEMS 2 × 2 POWER COUPLER

Alain Y. Takabayashi¹, Hamed Sattari¹, Pierre Edinger², Peter Verheyen³, Kristinn B. Gylfason², Wim Bogaerts^{3,4}, and Niels Quack¹

¹*École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND*, ²*KTH Royal Institute of Technology, SWEDEN*, ³*Interuniversity Microelectronics Centre (IMEC), BELGIUM*, and

⁴*Ghent University-IMEC, BELGIUM*

Session 5C Q&A - PowerMEMS 2 - Thermo - Tribo - Electro - Magnetic

Session Chair:

Fei Wang, Southern University of Science and Technology, CHINA

07:50 - 07:55

B5-5C1 A STRATEGY TO REDUCE AIR BREAKDOWN EFFECT AND BOOST OUTPUT ENERGY FOR CONTACT-SEPARATION MODE TRIBOELECTRIC NANOGENERATOR

Zeyuan Cao, Yao Chu, Shiwen Wang, Zibo Wu, Rong Ding, and Xiongying Ye

Tsinghua University, CHINA

07:55 - 08:00

B5-5C2 MAGNETICALLY EXCITED PIEZOELECTRIC ENERGY HARVESTER FOR MICROPOWER SUPPLY AND WAKEUP APPLICATIONS

Björn Gojdka¹, Torben Dankwort¹, Marc A. Nowak¹, Mani T. Bodduluri¹, Minhaz Ahmed^{1,2}, Sven Grünzig¹, and Fabian Lofink¹

¹*Fraunhofer Institute for Silicon Technology ISIT, GERMANY* and ²*Furtwangen University, GERMANY*

08:00 - 08:05

- B5-5C3 AN ENERGY HARVESTING SCHEME WITH TEMPERATURE THRESHOLD TRIGGERED GENERATION FOR HEAT EVENT AUTONOMOUS MONITORING**
Ruofeng Han, Nianying Wang, Qisheng He, Jiachou Wang, and Xinxin Li
Chinese Academy of Sciences (CAS), CHINA

08:05 - 08:10

- B5-5C4 COUPLING EFFECTS IN PARALLEL THERMOMAGNETIC GENERATORS BASED ON RESONANT SELF-ACTUATION**
Joel Joseph¹, Mira Wehr¹, Hiroyuki Miki², Makoto Ohtsuka², and Manfred Kohl¹
¹Karlsruhe Institute of Technology (KIT), GERMANY and ²Tohoku University, JAPAN

08:10 - 08:15

- B5-5C5 FLEXIBLE THERMOELECTRIC GENERATOR USING KIRIGAMI-FOLDING STRUCTURE**
Shingo Terashima and Eiji Iwase
Waseda University, JAPAN

08:15 - 08:20

- B5-5C6 FABRICATION OF μ TEGs BASED ON NANO-SCALE THERMOELECTRIC MATERIAL DISPERSIONS**
Swathi Krishna Subhash, Timo Gerach, Negin Sherkat, Harald Hillebrecht, Peter Woias, and Uwe Pelz
University of Freiburg, GERMANY

Session 5D Q&A - MEMS for Clinical Applications

Session Chair:

Yuksel Temiz, IBM Research - Europe, SWITZERLAND

07:50 - 07:55

- B5-5D1 A NEGATIVE DEPLETION-ENHANCED FILTRATION SYSTEM FOR HIGH-PURITY CIRCULATING TUMOR CELL ENRICHMENT FROM WHOLE BLOOD**
Qingmei Xu^{1,2}, Tingyu Li¹, Tingting Hun¹, Jianyu Du^{1,3}, Zheng Liu¹, Kunzhe Song¹, Xiao Ma⁴, and Wei Wang¹
¹Peking University, CHINA, ²Taiyuan Institute of Technology, CHINA, ³China University of Geosciences, CHINA, and ⁴Hangzhou Branemagic Medical Technology Co. Ltd., CHINA

07:55 - 08:00

- B5-5D2 A MICROFLUIDIC DEVICE PLATFORM RECONSTRUCTING LUNG PATTERN FOR CANCER IMMUNOTHERAPY APPLICATIONS**
Yu-Chen Chen¹, Han-Jung Liao¹, Jean-An Chieh¹, Pin-Tzu Lai¹, Yi-Ying Liang¹, Kang-Yun Lee², Wei-lun Sun², Shu-Chuan Ho², Yu-Shiuan Wang², Wan-Chen Huang³, Wei-Chiao Chang², Sung-Yang Wei¹, and Cheng-Hsien Liu¹
¹National Tsing Hua University, TAIWAN, ²Taipei Medical University, TAIWAN, and ³Academia Sinica, TAIWAN

08:00 - 08:05

- B5-5D3 GRAVITY AND FILM STRESS ANALYSIS FOR MEMS DEFORMABLE MIRROR WITH ELECTROSTATIC PISTON ARRAY**
Toshiyuki Tsuchiya¹, Toshiki Ema¹, Yoshikazu Hirai¹, Christopher Welham², and Hideyuki Maekoba²
¹Kyoto University, JAPAN and ²Coventor, Inc., FRANCE

08:05 - 08:10

- B5-5D4 QUANTITATIVE FORCE MEASUREMENT OF THE EYE SURGICAL SIMULATOR FOR ILM PEELING BY USING QCR FORCE SENSOR**
Yuta Taniguchi¹, Hirotaka Sugiura¹, Toshiro Yamanaka¹, Shiro Watanabe², Seiji Omata³, Kanako Harada¹, Mamoru Mitsuishi¹, Takashi Ueta¹, Tomoyasu Shiraya¹, Koichiro Sugimoto¹, Kiyohito Totsuka¹, Fumiyouki Araki¹, Muneyuki Takao¹, Makoto Aihara¹, and Fumihito Arai¹
¹University of Tokyo, JAPAN, ²Nagoya University, JAPAN, and ³Kumamoto University, JAPAN

08:10 - 08:15

B5-5D5 BIOFUNCTIONAL AND SELF-CONTRACTABLE SILK-BASED SENSING THREADS

Yating Xie^{1,2}, Keyin Liu², and Tiger H. Tao^{1,2,3,4}

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

³*University of Chinese Academy of Sciences (UCAS), CHINA, and*

⁴*Shanghai Research Center for Brain Science and Brain-Inspired Intelligence, CHINA*

Poster Session IV and Exhibit Inspection

08:20 – 10:20 Presentations are listed by topic category with their assigned number starting on page 50.

10:20 Conclusion of Block 5

Block 6 - Friday, 25 June

All times are Greenwich Mean Time (GMT)/Universal Time Coordinated (UTC)

Invited Speaker XXI Q&A

Session Chair:

Wei Wang, Peking University, CHINA

00:35 - 00:45

B6-IS21 SILK-DRIVE: PROTEIN-BASED HARD DRIVE USING NEAR-FIELD NANO-OPTICS

Zhitao Zhou¹, Jianjuan Jiang¹, and **Tiger H. Tao**^{1,2,3,4}

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

³ShanghaiTech University, CHINA, and

⁴Shanghai Research Center for Brain Science and Brain-Inspired Intelligence, CHINA

Invited Speaker XXII Q&A

Session Chair:

Megan Yi-Ping Ho, Chinese University of Hong Kong, HONG KONG

00:35 - 00:45

B6-IS22 NANOSTRUCTURED BIOSENSORS AND INTEGRATED SYSTEMS FOR HEALTH MONITORING

Yuanjing Lin

Southern University of Science and Technology, CHINA

Invited Speaker XXIII Q&A

Session Chair:

Takashiro Tsukamoto, Tohoku University, JAPAN

00:35 - 00:45

B6-IS23 NATURE-INSPIRED SURFACES FOR WATER-ENERGY NEXUS

Wanghuai Xu and **Zuankai Wang**

City University of Hong Kong, CHINA

Invited Speaker XXIV Q&A

Session Chair:

Honglong Chang, Northwestern Polytechnical University, CHINA

00:35 - 00:45

B6-IS24 RESEARCH AND DEVELOPMENT ON MEMS BASED ELECTRIC FIELD SENSOR

Shanhong Xia^{1,2,3}, Hucheng Lei^{1,4}, Jun Liu^{1,4}, Simin Peng^{1,4}, Chunrong Peng^{1,2}, Pengfei Yang⁵, Xiaolong Wen⁶ and Zhaozhi Chu¹

¹Chinese Academy of Sciences (CAS), CHINA, ²Beijing TFLying Transducer Technology Co., Ltd. CHINA,

³Beijing Institute of Collaborative Innovation, CHINA, ⁴University of Chinese Academy of Sciences (UCAS)

CHINA, ⁵Beijing Information Science and Technology University, CHINA,

⁶University of Science and Technology Beijing, CHINA

00:45 - 00:50 Transition Break

Session 6A Q&A - Novel Lithography Techniques

Session Chair:

Eiji Iwase, Waseda University, JAPAN

00:50 - 00:55

B6-6A1 SOFT LITHOGRAPHY-BASED FABRICATION METHOD FOR FLEXIBLE SUPEROMNIPHOBIC SURFACE

Thanh-Vinh Nguyen, Yuki Okamoto, Hironao Okada, Atsushi Takei, Yusuke Takei, and Masaaki Ichiki
National Institute of Advanced Industrial Science and Technology (AIST), JAPAN

00:55 - 01:00

B6-6A2 A "SOFT CASTING" PDMS PROCESS USING MULTI-FUNCTIONAL COVER FOR FABRICATION OF PRECISE MICROFLUIDIC CHIPS

Shiyuan Gao^{1,2}, Lei Wu¹, Tiegang Xu¹, Xiaoyue Zhu³, Xuefeng Wang¹, Jianzhong Chen¹, Wei Zhou¹, and Xinxin Li¹

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

³Fujian Agriculture and Forestry University, CHINA

01:00 - 01:05

B6-6A3 TILTABLE UV-LED LITHOGRAPHY FOR 3D MICROFABRICATION

Sabera Fahmida Shiba, Ke Wang, and Jungkwun "JK" Kim
Kansas State University, USA

01:05 - 01:10

B6-6A4 FINE PATTERNING ON 3D SAMPLE WITH CURVATURE AND DEPTH USING RESIST SHEET WITH LATENT IMAGE

Takayuki Kuroyanagi¹, Shigenori Saito², and Minoru Sasaki¹

¹Toyota Technological Institute, JAPAN and ²Aicello Corporation, JAPAN

01:10 - 01:15

B6-6A5 DIRECT INK WRITING OF PURE PDMS FOR SOFT 3D MICROSTRUCTURES AND TACTILE SENSORS

Huyue Chen, Wen-Ming Zhang, Xiuyuan Li, Qifan Ding, and Lei Shao
Shanghai Jiao Tong University, CHINA

01:15 - 01:20

B6-6A6 ELECTRICAL PATTERNING SYSTEM UTILIZING ON-DEMAND MICRO-PLASMA-BUBBLES

Yu Yamashita, Natsumi Basaki, Shinya Sakuma, and Yoko Yamanishi
Kyushu University, JAPAN

Session 6B Q&A - Novel Nano Materials and Devices

Session Chair:

Debbie Senesky, Stanford University, USA

00:50 - 00:55

B6-6B1 SIMULTANEOUS ELECTROCHEMICAL DETECTION OF DOPAMINE AND URIC ACID WITH GRAPHENE QUANTUM DOTS DECORATED COBALT PHTHALOCYANINE NANOCOMPOSITE

Bo Wu, Minzhang Li, Zongxiang Xu, Rajendran Ramachandran, and Fei Wang
Southern University of Science and Technology, CHINA

00:55 - 01:00

B6-6B2 FORMALDEHYDE SENSOR WITH PENTAGRAM-SHAPED CORE-SHELL NANOSTRUCTURE AS CATALYST

Xuefeng Wang¹, Yarong Cheng², Li Su², Pengcheng Xu¹, and Xinxin Li¹

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

01:00 - 01:05

**B6-6B3 NANOMECHANICAL AND OPTOMECHANICAL COUPLING IN SILICON CARBIDE /
HEXAGONAL BORON NITRIDE HYBRID RESONATOR**

Yuncong Liu¹, Yanan Wang¹, Xu-Qian Zheng¹, Qiang Lin², and Philip X.-L. Feng¹

¹University of Florida, USA and ²University of Rochester, USA

01:05 - 01:10

**B6-6B4 ACOUSTOELECTRIC SURFACE ACOUSTIC WAVE SWITCH IN AN EPITAXIAL INGAAS
ON LITHIUM NIOBATE HETEROSTRUCTURE**

Matthew J. Storey¹, Lisa Hackett², Sara DiGregorio², Michael Miller², Greg Peake², Matt Eichenfield²,
and Dana Weinstein¹

¹Purdue University, USA and ²Sandia National Laboratories, USA

01:10 - 01:15

**B6-6B5 EXTENSION OF FRACTURE LIFETIME OF SILICON SCANNING MICROMIRROR BY
COATING WITH ATOMIC LAYER DEPOSITED ALUMINA THIN FILM**

Yuuki Fujita, Takashi Sasaki, Koichi Fukuda, Nguyen Thanh Tung, Fumio Ogawa, Toshiyuki Hashida,
and Kazuhiro Hane

Tohoku University, JAPAN

01:15 - 01:20

**B6-6B6 TRANSFER-PRINTED NEMS TUNABLE FABRY PÉROT FILTER FOR MID-INFRARED
COMPUTATIONAL SPECTROSCOPY**

Yuhua Chang, Siyu Xu, Bowei Dong, Jingxuan Wei, Xianhao Le, Yiming Ma, Guangya Zhou,
and Chengkuo Lee

National University of Singapore, SINGAPORE

Session 6C Q&A - PowerMEMS 3 - Zero-Power MEMS

Session Chair:

Sheng-Shian Li, National Tsing Hua University, TAIWAN

00:50 - 00:55

B6-6C1 ZERO-POWER OPTO-ELECTRO-MECHANICAL ACTUATORS

Mikhail A. Kanygin and Behraad Bahreyni

Simon Fraser University, CANADA

00:55 - 01:00

**B6-6C2 A MILLIMETER SCALE PIEZOELECTRIC RECEIVER WITH SUB-MILLIWATT OUTPUT FOR
ULTRASONIC WIRELESS POWER TRANSFER IN WATER**

Md. Shihab Uddin¹ and Joshua E.-Y. Lee^{1,2}

¹City University of Hong Kong, HONG KONG and ²Agency for Science, Technology and Research (A*STAR)

01:00 - 01:05

**B6-6C3 ZERO POWER CROP WATER-STRESS DETECTOR BASED ON A MICROMECHANICAL
PHOTOSWITCH MONITORING LEAF TRANSMITTANCE CHANGE**

Antea Risso, Vageeswar Rajaram, Sungho Kang, Sila Deniz Caliskan, Zhenyun Qian, and Matteo Rinaldi

Northeastern University, USA

01:05 - 01:10

**B6-6C4 A POLY-DADMAC FUNCTIONALIZED NANOFIBROUS MAT-BASED SELF-POWERED
HUMAN MOTION SENSOR FOR IOT APPLICATIONS**

S M Sohel Rana, Md Salauddin, M. Toyabur Rahman, Sanghyuk Yoon, Hyunok Cho,
and Jae Y. Park

Kwangwoon University, KOREA

01:10 - 01:15

B6-6C5 SUB- μ W WIRELESS INFRARED SENSOR WITH ABOVE-THRESHOLD MEASUREMENT FUNCTION BASED ON A BISTABLE MICROMECHANICAL SWITCH

Vageeswar Rajaram, Sila Deniz Caliskan, Sungho Kang, Antea Risso, Zhenyun Qian, and Matteo Rinaldi
Northeastern University, USA

01:15 - 01:20

B6-6C6 ACOUSTO-ELECTRIC WIRELESS PRESSURE SENSING SYSTEM

Jeonga Han, Eungyoul Oh, Chaerin Jun, Jiseon Lee, and Seunghyun Song
Sookmyung Women's University, KOREA

Session 6D Q&A - IR Sensors and Modulators

Session Chair:

Guangya Zhou, National University of Singapore, SINGAPORE

00:50 - 00:55

B6-6D1 SINGLE (111)-WAFER FABRICATION OF 100- μ M SCALE THERMOPILE/ABSORBER DOUBLE-DECK STRUCTURE FOR HIGH-DETECTIVITY IR-DETECTION

Dan Xue^{1,2}, Wenhan Zhou^{1,2}, Haozhi Zhang^{1,2}, Zao Ni¹, Wei Li¹, Jiachou Wang^{1,2}, and Xinxin Li^{1,2}

¹*Chinese Academy of Sciences (CAS), CHINA and*

²*University of Chinese Academy of Sciences (UCAS), CHINA*

00:55 - 01:00

B6-6D2 HETEROGENEOUS LiNbO₃/SI DIRECT BONDING FOR WAVELENGTH-DEPENDENT MID-INFRARED IMAGING

Jikai Xu^{1,2}, Zhihao Ren¹, Xinmiao Liu¹, Cheng Xu¹, Chenxi Wang², Yanhong Tian², and Chengkuo Lee¹

¹*National University of Singapore, SINGAPORE and* ²*Harbin Institute of Technology, CHINA*

01:00 - 01:05

B6-6D3 ULTRA-SMALL PIXEL IR SENSING ARRAY FABRICATED WITH A POST-CMOS COMPATIBLE PROCESS

Wenhan Zhou^{1,2}, Haozhi Zhang^{1,2}, Dan Xue^{1,2}, Wei Li¹, Zao Ni¹, and Xinxin Li^{1,2}

¹*Chinese Academy of Sciences (CAS), CHINA, and*

²*University of Chinese Academy of Sciences (UCAS), CHINA*

01:05 - 01:10

B6-6D4 ELECTRICAL MODULATION TRANSMITTED IR LIGHT THROUGH VO₂ THIN FILM ON GAN MEMBRANES

Ferhat Bayram¹, Durga Gajula², Balaadithya Uppalapati¹, Digangana Khan¹, and Goutam Koley¹

¹*Clemson University, USA and* ²*Georgia Institute of Technology, USA*

01:10 - 01:15

B6-6D5 ZERO-BIAS LONG-WAVE INFRARED WAVEGUIDE PHOTODETECTOR VIA GRAPHENE/SILICON/HALIDE HETEROGENEOUS INTEGRATION

Yiming Ma, Yuhua Chang, Bowei Dong, Jingxuan Wei, and Chengkuo Lee

National University of Singapore, SINGAPORE

01:15 - 01:20

B6-6D6 A PHOTOTHERMAL TRANSDUCER BASED ON 3D THERMAL MANAGEMENT

Jinying Zhang, Defang Li, Zhuo Li, Xin Wang, and Suhui Yang

Beijing Institute of Technology, CHINA

01:20 - 01:30 Transition Break

Invited Speaker XXV Q&A

Session Chair:

Tiger H. Tao, Shanghai Institute of Microsystem and Information Technology, CHINA

01:30 - 01:40

**B6-IS25 DEVELOPMENT OF ADVANCED DYNAMIC ANGIO MODEL (ADAM) SIMULATOR:
ENABLING A REALISTIC SIMULATION OF ENDOVASCULAR INTERVENTION**

Joonwon Kim

Pohang University of Science and Technology (POSTECH), KOREA

Invited Speaker XXVI Q&A

Session Chair:

Jin Xie, Zhejiang University, CHINA

01:30 - 01:40

B6-IS26 SENSING WITH SERIAL OR PARALLEL MICROMECHANICAL RESONATORS

Honglong Chang

Northwestern Polytechnical University, CHINA

Invited Speaker XXVII Q&A

Session Chair:

Nan Wang, Agency for Science, Technology and Research (A*STAR), SINGAPORE

01:30 - 01:40

B6-IS27 MICROMECHANICAL VIBRO-IMPACT RESONATOR-ENABLED SENSING APPLICATIONS

Wei-Chang Li

National Taiwan University, TAIWAN

Invited Speaker XXVIII Q&A

Session Chair:

Norihisa Miki, Keio University, JAPAN

01:30 - 01:40

B6-IS28 SOFT MICROFLUIDIC WEARABLE SENSORS FOR BIOMEDICAL APPLICATIONS

Chwee Teck "CT" Lim

National University of Singapore, SINGAPORE

01:40 Conclusion of Block 6

Block 7 - Friday, 25 June

All times are Greenwich Mean Time (GMT)/Universal Time Coordinated (UTC)

Just-In Press Session 1A Q&A

Actuators and Resonators

Session Chair:

Leon Abelmann, University of Twente, NETHERLANDS

12:00 - 12:05

B6-JI1A1 MICROFABRICATED ALKALI METAL VAPOR CELLS FILLED WITH AN ON-CHIP DISPENSING COMPONENT

Shun Kiyose¹, Yoshikazu Hirai¹, Osamu Tabata², and Toshiyuki Tsuchiya¹

¹Kyoto University, JAPAN and ²Kyoto University of Advanced Science, JAPAN

12:05 - 12:10

B6-JI1A2 MODELING THE DAMPING MECHANISM OF MEMS OSCILLATORS IN THE TRANSITIONAL FLOW REGIME WITH THERMAL WAVES

Tobias Zengerle¹, Julian Joppich¹, Patrick Schwarz¹, Abdallah Ababneh², and Helmut Seidel¹

¹Saarland University, GERMANY and ²Yarmouk University, JORDAN

12:10 - 12:15

B6-JI1A3 CHAOTIC ULTRASOUND GENERATION USING A NONLINEAR PIEZOELECTRIC MICROTRANSDUCER

Martial Defoort, Libor Rufer, and Skandar Basrour

University Grenoble Alpes, FRANCE

12:15 - 12:20

B6-JI1A4 FERROELECTRIC-ON-SI SUPER-HIGH-FREQUENCY FIN BULK ACOUSTIC RESONATORS WITH HF0.5ZR0.5O2 NANO-LAMINATED TRANSDUCERS

Faysal Hakim, Troy Tharpe, and Roozbeh Tabrizian

University of Florida, USA

12:20 - 12:25

B6-JI1A5 FREQUENCY STABILIZATION OF NANOMECHANICAL RESONATORS USING THERMALLY INVARIANT STRAIN ENGINEERING

Mingkang Wang^{1,2}, Rui Zhang³, Robert Ilic², Vladimir Aksyuk², and Yuxiang Liu³

¹University of Maryland, USA, ²National Institute of Standards and Technology (NIST), USA, and

³Worcester Polytechnic Institute, USA

12:25 - 12:30

B6-JI1A6 A DOUBLE-SIDED COMB-DRIVE ACTUATOR WITH A FLOATING ROTOR: ACHIEVING A STRONG RESPONSE WHILE ELIMINATING THE DC BIAS

Danny A. Kassie, Sivan Levi, and David Elata

Technion - Israel Institute of Technology, ISRAEL

12:30 - 12:35

B6-JI1A7 THE EFFECT OF LASER BEAM INTENSITY AND MICROSCOPE ILLUMINATION INTENSITY, ON THE RESPONSE OF ELECTROSTATIC RESONATORS

Danny A. Kassie and David Elata

Technion - Israel Institute of Technology, ISRAEL

12:35 - 12:40

B6-JI1A8 PARAMETRIC RESONATORS WITH A FLOATING ROTOR: SENSING STRATEGY FOR DEVICES WITH AN INCREASED STIFFNESS AND COMPACT DESIGN

Danny A. Kassie and David Elata

Technion - Israel Institute of Technology, ISRAEL

12:40 - 12:45

B6-JI1A9 DEVELOPMENT OF BROADBAND HIGH-FREQUENCY PIEZOELECTRIC MICROMACHINED ULTRASONIC TRANSDUCER ARRAY

Xu-Bo Wang¹, Le-Ming He¹, You-Cao Ma¹, Wen-Juan Liu¹, Wei-Jiang Xu², Jun-Yan Ren¹, Antoine Riaud¹, and Jia Zhou¹

¹Fudan University, CHINA and ²University Polytechnic Hauts-de-France, FRANCE

**Just-In Press Session 1B Q&A
Bio-Sensors and Microsystems**

Session Chair:

Sivashankar Krishnamoorthy, Luxembourg Institute of Science and Technology, LUXEMBOURG

12:00 - 12:05

B6-JI1B1 3D CONE-BEAM BREAST ULTRASONIC TOMOGRAPHY IMAGING FOR CAPACITIVE MICROMACHINED ULTRASONIC TRANSDUCER CYLINDRICAL ARRAY

Yu Pei¹, Guojun Zhang¹, Sai Zhang², Yu Zhang¹, Tian Zhang¹, Zhihao Wang¹, and Wendong Zhang¹

¹North University of China, CHINA and ²Jiangsu University, CHINA

12:05 - 12:10

B6-JI1B2 HIGH-THROUGHPUT DIELECTROPHORETIC CELL SORTING ASSISTED BY CELL SLIDING ON SCALABLE ELECTRODE TRACKS MADE OF CONDUCTING-PDMS

Xiaofeng Nie¹, Yuan Luo², Penghui Shen¹, Chengwu Han³, Duli Yu¹, and Xiaoxing Xing¹

¹Beijing University of Chemical Technology, CHINA,

²Southern University of Science and Technology, CHINA, and ³China-Japan Friendship Hospital, CHINA

12:10 - 12:15

B6-JI1B3 NEXT GENERATION CELL CULTURE TOOLS FEATURING MICRO- AND NANOTOPOGRAPHIES FOR BIOLOGICAL SCREENING

James Carthew¹, Hazem Abdelmaksoud¹, Karla Cowley², Margeaux Hodgson-Garms¹, Roey Elnathan¹, Joachim Spatz³, Juergen Brugger⁴, Helmut Thissen⁵, Kaylene Simpson⁶, Nicolas Voelcker¹, Jessica Frith¹, and Victor J Cadarso¹

¹Monash University, AUSTRALIA, ²Peter MacCallum Cancer Centre, AUSTRALIA,

³Heidelberg University, GERMANY, ⁴École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND,

⁵Commonwealth Scientific and Industrial Research Organisation (CSIRO) Manufacturing, AUSTRALIA, and

⁶University of Melbourne, AUSTRALIA

12:15 - 12:20

B6-JI1B4 SHAPE MEMORY ALLOY CAPSULE MICROPUMP FOR DRUG DELIVERY APPLICATIONS

Youssef Kotb, Islam Elgamel, and Mohamed Serry

American University, Cairo, EGYPT

12:20 - 12:25

B6-JI1B5 REAL-TIME RESPIRATION CHANGES AS A VIABILITY INDICATOR FOR RAPID ANTIBIOTIC SUSCEPTIBILITY TESTING IN A MICROFLUIDIC CHAMBER ARRAY

Petra Juskova¹, Steven Schmitt¹, André Kling¹, Darius G. Rackus¹, Martin Held¹, Adrian Egli², and Petra S. Dittrich¹

¹ETH Zurich, SWITZERLAND and ²University Hospital Basel, SWITZERLAND

12:25 - 12:30

B6-JI1B6 DIGITAL CRISPR/CAS-ASSISTED ASSAY FOR RAPID AND SENSITIVE DETECTION OF SARS-COV-2

Joon Soo Park, Kuangwen Hsieh, Liben Chen, Aniruddha Kaushik, Alexander Y. Trick, and Tza-Huei Wang
Johns Hopkins University, USA

12:30 - 12:35

B6-JI1B7 REAL-TIME ODOR CONCENTRATION AND DIRECTION RECOGNITION FOR EFFICIENT ODOR SOURCE LOCALIZATION USING A SMALL BIO-HYBRID DRONE

Daigo Terutsuki¹, Tomoya Uchida¹, Chihiro Fukui², Yuji Sukekawa¹, Yuki Okamoto³, and Ryohei Kanzaki¹

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

³National Institute of Advanced Industrial Science and Technology (AIST), JAPAN

12:35 - 12:40

B6-JI1B8 DROPLET-BASED SINGLE-CELL MEASUREMENTS OF 16S RRNA ENABLE INTEGRATED BACTERIA IDENTIFICATION AND PHENO-MOLECULAR ANTIMICROBIAL SUSCEPTIBILITY TESTING FROM CLINICAL SAMPLES IN 30 MIN

Kuangwen Hsieh¹, Aniruddha M. Kaushik¹, Kathleen E. Mach², Shawna Lewis³, Christopher M. Puleo⁴, Karen C. Carroll³, Joseph C. Liao², and Tza-Huei Wang¹

¹Johns Hopkins University, USA, ²Stanford University School of Medicine, USA,

³Johns Hopkins University School of Medicine, USA, and ⁴GE Global Research Center, USA

12:40 - 12:45

B6-JI1B9 INTEGRATED TEMPERATURE CONTROLLING PLATFORM TO SYNTHESIZE ZNO NANOPARTICLES AND ITS DEPOSITION ON AL-FOIL FOR BIOSENSING

Madhusudan B. Kulkarni¹ and Sanket Goel²

¹Birla Institute of Technology and Science, Pilani Hyderabad, INDIA and

²Birla Institute of Technology and Science, Pilani, INDIA

Just-In Press Session 1C Q&A

Opto-Electro-Mechanical-Chemical Systems

Session Chair:

Guus Rijnders, University of Twente, NETHERLANDS

12:00 - 12:05

B6-JI1C1 MOVING ELECTRODE IMPEDANCE SPECTROSCOPY FOR ACCURATE CONDUCTIVITY MEASUREMENTS OF CORROSIVE IONIC MEDIA

Nikolaus Doppelhammer¹, Nick Pellens², Johan Martens², Christine E.A. Kirschhock², Bernhard Jakoby¹, and Erwin K. Reichel¹

¹Johannes Kepler University, Linz, AUSTRIA and ²University of Leuven (KU Leuven), BELGIUM

12:05 - 12:10

B6-JI1C2 SELF-POWERED POTENTIOMETRIC ION SENSORS FOR ELECTRICAL READOUT

Sunil Kumar Sailapu¹, Neus Sabaté¹, and Eric Bakker²

¹Instituto de Microelectronica de Barcelona, SPAIN and ²University of Geneva, SWITZERLAND

12:10 - 12:15

B6-JI1C3 AN INVESTIGATION ON DESIGN AND CHARACTERIZATION OF A HIGHLY SELECTIVE LED OPTICAL BIOSENSOR FOR COPPER IONS IN AQUEOUS SOLUTIONS

Sheng Chun Hung, Chih-Cheng Lu, and Yu-Ting Wu

National Taipei University of Technology, TAIWAN

12:15 - 12:20

B6-JI1C4 PIEZO-ACTUATED ADAPTIVE PRISMS FOR CONTINUOUSLY ADJUSTABLE BI-AXIAL SCANNING

Florian Lemke¹, Pascal M. Weber¹, Katrin Philipp², Juergen W. Czarske², Nektarios Koukourakis², Ulrike Wallrabe¹, and Matthias C. Wapler¹

¹University of Freiburg, GERMANY and ²Dresden University of Technology (TU Dresden), GERMANY

12:20 - 12:25

B6-JI1C5 BROADBAND THERMOMECHANICALLY LIMITED SENSING WITH AN OPTOMECHANICAL ACCELEROMETER

Feng Zhou, Yiliang Bao, Ramgopal Madugani, David A. Long, Jason J. Gorman, and Thomas W. LeBrun

National Institute of Standards and Technology (NIST), USA

12:25 - 12:30

B6-JI1C6 CIRCULARLY POLARIZED VACUUM ULTRAVIOLET COHERENT LIGHT GENERATION USING A SQUARE LATTICE PHOTONIC CRYSTAL NANOMEMBRANE

Kuniaki Konishi¹, Daisuke Akai², Yoshio Mita¹, Makoto Ishida², Junji Yumoto¹, and Makoto Kuwata-Gonokami¹

¹University of Tokyo, JAPAN and ²Toyohashi University of Technology, JAPAN

12:35 - 12:40

B6-JI1C7 DESIGN AND FABRICATION OF NEGATIVE-REFRACTIVE-INDEX METAMATERIAL UNIT CELLS FOR NEAR-MEGAHERTZ ENHANCED ACOUSTIC TRANSMISSION IN BIOMEDICAL ULTRASOUND APPLICATIONS

Oscar Vazquez Mena, Jiaying Wang, Florian Allein, Nicholas Boechler, and James Friend

University of California, San Diego, USA

12:30 - 12:35

B6-JI1C8 MEMS-ACTUATED METASURFACE ALVAREZ LENS

Zheyi Han, Shane Colburn, Arka Majumdar, and Karl F. Böhringer

University of Washington, USA

Just-In Press Session 1D Q&A

Sensors, Power Transducers, and Feedthrough

Session Chair:

Andreas Friedrich, Allegro MicroSystems, FRANCE

12:00 - 12:05

B6-JI1D1 METHOD TO REDUCE THE CONTACT RESISTIVITY BETWEEN GALINSTAN AND A COPPER ELECTRODE FOR ELECTRICAL CONNECTION IN FLEXIBLE DEVICES

Takashi Sato¹, Kento Yamagishi², Michinao Hashimoto², and Eiji Iwase¹

¹Waseda University, JAPAN and ²Singapore University of Technology and Design, SINGAPORE

12:05 - 12:10

B6-JI1D2 VECTOR HIGH-RESOLUTION MARINE TURBULENCE SENSOR BASED ON A MEMS BIONIC CILIUM-SHAPED STRUCTURE

Wenjun Zhang

North University of China, CHINA

12:10 - 12:15

B6-JI1D3 DESIGN AND IMPLEMENTATION OF JELLYFISH OTOLITH-INSPIRED MEMS VECTOR HYDROPHONE FOR LOW-FREQUENCY DETECTION

Renxin Wang, Wei Shen, Wenjun Zhang, Guojun Zhang, Chenyang Xue, and Wendong Zhang

North University of China, CHINA

12:15 - 12:20

B6-JI1D4 A LOW-NOISE HIGH-ORDER MODE-LOCALIZED MEMS ACCELEROMETER

Hemin Zhang¹, Guillermo Sobreviela², Milind Pandit², Dongyang Chen¹, Jiangkun Sun¹, Madan Parajuli¹, Chun Zhao³, and Ashwin A. Seshia¹

¹University of Cambridge, UK, ²Silicon Microgravity Ltd., UK, and

³Huazhong University of Science and Technology, CHINA

12:20 - 12:25

B6-JI1D5 SELF-ACTIVATED MICROBATTERIES FOR ELECTRICAL STIMULATION OF CELLS

Sunil Kumar Sailapu, Jaume Esteve, and Neus Sabate

Instituto de Microelectronica de Barcelona, SPAIN

12:25 - 12:30

B6-JI1D6 CHARACTERIZATION AND MINIATURIZATION OF SILVER-NANOPARTICLE MICROCOIL VIA AEROSOL JET PRINTING TECHNIQUES FOR MICROMAGNETIC COCHLEAR STIMULATION

Ressa R. Sarreal and Pamela T. Bhatti
Georgia Institute of Technology, USA

12:30 - 12:35

B6-JI1D7 COMPUTER-FREE AUTONOMOUS NAVIGATION AND POWER GENERATION USING ELECTRO-CHEMOTAXIS

Min Wang¹, Yue Gao², and James Pikul¹
¹University of Pennsylvania, USA and ²Fudan University, CHINA

12:45 - 12: 50 Transition Break

Award Ceremony and Closing Remarks

12:50 - 13:50

TRANSDUCERS 2021 CONFERENCE CHAIRS

Jürgen Brugger, *École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND*
Amy Duwel, *Draper Laboratory, USA*
Yoshio Mita, *University of Tokyo, JAPAN*

13:50 **Conclusion of 2021 Transducers Virtual Conference**

Poster Presentations

All times are Greenwich Mean Time (GMT)/Universal Time Coordinated (UTC)

B2	– Tuesday, 22 June	08:15 - 10:15
B3	– Wednesday, 23 June	01:20 - 03:20
B4	– Wednesday, 23 June	14:20 - 16:20
B5	– Thursday, 24, June	08:20 - 10:20

Classification Chart

(last character of poster number)

a	Actuators and Microsystems
b	Bio-Sensors and Microsystems Including In-Vitro Medical Applications
c	Chemical Sensors and Microsystems
d	Composite Materials, Polymers, and Fabrication Processes
e	Energy, Power and Thermal Management
f	Microfluidics Platform Technologies
g	Nanoscale Materials and Fabrication
h	Optical and Atomic Transducers
i	Packaging & Solid-State Materials and Fabrication Processes
j	Physical Sensors and Microsystems
k	RF MEMS, Resonators and Oscillators
l	Wearable and In-Vivo Medical Devices and Microsystems
m	Just-In Time

a - Actuators and Microsystems

- B2-201a ACOUSTIC STRUCTURAL COUPLING IN A SILICON BASED VIBRATING MESH NEBULIZER**
 Ruth Houlihan¹, Michael Timothy², Conor Duffy², Ronan MacLoughlin², and Oskar Olszewski¹
¹Tyndall National Institute, IRELAND and ²Aerogen Ltd., IRELAND
- B2-202a ELECTROSTATIC COMB DRIVE ACTUATOR ARRAY WITH INTEGRATED CANTILEVER FOR SCANNING PROBE APPLICATIONS**
 Kristen L. Genter^{1,2}, Pavel Kabos², and Victor M. Bright¹
¹University of Colorado, Boulder, USA and ²National Institute of Standards and Technology (NIST), USA
- B2-203a METALIZED SOFT POLYMERS FOR ELECTROMECHANICAL TRANSDUCERS ON GLASS SUBSTRATES**
 Boshen Liang^{1,2}, Grim Keulemans¹, Dominika Wysocka¹, Lei Zhang¹, Veronique Rochus¹, Tim Stakenborg¹, Paul Heremans^{1,2}, and David Cheyns¹
¹Imec, BELGIUM and ²University of Leuven (KU Leuven), BELGIUM

- B2-204a MONITORING MICROMECHANICAL BUCKLING AT HIGH-SPEED FOR SENSING AND TRANSDUCER APPLICATIONS**
Berke Demiralp, Hadi S. Pisheh, Berk Kucukoglu, Utku Hatipoglu, and M. Selim Hanay
Bilkent University, TURKEY
- B2-205a TORSIONAL MEMS SCANNER BASED ON LiNbO₃ THIN FILM**
Yushuai Liu^{1,2,3}, Zhiyuan Gao¹, Kangfu Liu^{1,2,3}, and Tao Wu¹
¹*ShanghaiTech University, CHINA*, ²*Chinese Academy of Sciences (CAS), CHINA*, and
³*University of Chinese Academy of Sciences, CHINA*
- B2-261a BRIEF INTRODUCTION OF MICROSYSTEMS & NANOENGINEERING**
Na Li
Microsystems & Nanoengineering/Springer Nature, CHINA
- B3-301a ROBUST ELECTROSTATIC INCHWORM MOTORS FOR MACROSCOPIC MANIPULATION AND MOVEMENT**
Daniel Teal, Hani C. Gomez, Craig B. Schindler, and Kristofer S.J. Pister
University of California, Berkeley, USA
- B4-401a LARGE-AREA THIN FILM HEATER FOR THERMAL TREATMENTS IN LAB-ON-CHIP**
Nicola Lovecchio¹, Giampiero de Cesare¹, Augusto Nascetti¹, Francesca Costantini^{1,2}, and Domenico Caputo¹
¹*University of Rome, ITALY* and ²*Research Centre for Plant Protection and Certification, ITALY*
- B4-402a PROSPECT OF NEW AFM PROBE DESIGN ENABLED BY STRESS GRADIENT**
Omar Alshehri¹, Majed Al-Ghamdi², Mohamed Arabi³, Mahmoud Khater⁴, Maher Bakri-Kassem³, and David Yevick³
¹*King Saud University, SAUDI ARABIA*, ²*King Abdulaziz City for Science and Technology, SAUDI ARABIA*,
³*University of Waterloo, CANADA*, and ⁴*King Fahad University for Petroleum and Minerals, SAUDI ARABIA*
- B4-403a SINGLE-LAYER THIN-FILM LITHIUM NIOBATE OUT-OF-PLANE ACTUATORS**
Justin Phelps, Kevin Chan, and Reza Abdolvand
University of Central Florida, USA
- B4-455a CSEM - YOUR PARTNER FOR MEMS & MICROSYSTEMS DEVELOPMENT FROM THE LAB TO THE FAB**
Frederic Loizeau
CSEM SA, SWITZERLAND
- B4-457a MOLECULAR VAPOR DEPOSITION (MVD[®]): A VERSATILE, MULTIFUNCTIONAL TECHNOLOGY FOR IMPROVING PERFORMANCE AND RELIABILITY OF MEMS BASED PRODUCTS**
David Springer
SPTS Technologies Ltd., UK
- B5-501a ANALYSIS ON INTERNAL BIOMOLCULAR STRUCTURE OF ATP-DRIVE ACTOMYOSIN-COLLAGEN HYBRID ACTUATOR**
Kenjiro Kohno¹, Yuichi Hiratsuka², and Hiroaki Onoe¹
¹*Keio University, JAPAN* and ²*Japan Advanced Institute of Science and Technology (JST), JAPAN*
- B5-502a BIO-INSPIRED MICROSCALE THREE DIMENSIONAL DIRECTIONAL SENSING MICROPHONE ARRAY**
Ashiqur Rahaman and Byungki Kim
Korea University of Technology and Education, KOREA
- B5-503a DEVELOPMENT OF LINEAR PMUT ARRAY WITH LOW MECHANICAL CROSSTALK TOWARD ULTRASONOGRAPHY APPLICATIONS**
Pham Ngoc Thao
Vietnam National University, VIETNAM

- B5-504a FABRICATION AND EVALUATION OF A NOVEL ACTUATOR FOR REACTION FORCE VARIABLE PASSIVE-TYPE TACTILE DISPLAYS**
Masanori Murase, Keita Nambara, Takahiro Yamazaki, Chiemi Oka, Seiichi Hata, and Junpei Sakurai
Nagoya University, JAPAN
- B5-505a FABRICATION OF MULTI-AXIS MOVING COIL TYPE ELECTROMAGNETIC MICRO-ACTUATOR USING PARYLENE BEAMS FOR PURE IN-PLANE MOTION**
Huayu Wang, Shunsuke Yamada, and Shuji Tanaka
Tohoku University, JAPAN
- B5-506a FLEXIBLE FILM LOUDSPEAKER BASED ON PIEZOELECTRIC PZT/SI ULTRA-THIN MEMS CHIPS**
Takahiro Yamashita, Toshihiro Takeshita, Atsushi Oouchi, and Takeshi Kobayashi
National Institute of Advanced Industrial Science and Technology (AIST), JAPAN
- B5-507a HIGH DURABILITY LATCH-LOCK BI-STABLE SWITCH ON Y-SHAPED CANTILEVER**
Zili Tang¹, Qi Tao², Zehua Lan³, Zong Liu¹, Toshiyuki Tsuchiya⁴, Xiaohong Wang³, and Man Wong¹
¹*Hong Kong University of Science and Technology, HONG KONG*, ²*Chinese Academy of Engineering Physics, CHINA*, ³*Tsinghua University, CHINA*, and ⁴*Kyoto University, JAPAN*

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

- B2-206b A HIGH-DENSITY DRIVABLE MICROELECTRODES ARRAY FOR MULTI-BRAIN RECORDING**
Longchun Wang¹, Zhejun Guo¹, Bowen Ji², Ye Xi¹, Bin Yang¹, and Jingquan Liu¹
¹*Shanghai Jiao Tong University, CHINA* and ²*Northwestern Polytechnical University, CHINA*
- B2-207b A MICROFLUIDIC FLOW CYTOMETER COMPOSED OF DOUBLE T-TYPE CONSTRICTION CHANNEL WITH PREDEFINED FLUORESCENCE DETECTION WINDOW, ENABLING HIGH-THROUGHPUT CHARACTERIZATION OF INTRINSIC SINGLE-CELL STRUCTURAL AND ELECTRICAL PARAMETERS**
Hongyan Liang^{1,2}, Yi Zhang^{1,2}, Minruihong Wang^{1,2}, Yueying Li¹, Deyong Chen^{1,2}, Junbo Wang^{1,2}, and Jian Chen^{1,2}
¹*Chinese Academy of Sciences (CAS), CHINA* and ²*University of Chinese Academy of Sciences (UCAS), CHINA*
- B2-208b MACHINE VISION BASED METHOD FOR MEASUREMENT SINGLE-CELL BIOPHYSICAL PROPERTIES USING DIELECTROPHORESIS MOBILITY**
Shengjie Chen, Zhizhong Zhang, and Rong Zhu
Tsinghua University, CHINA
- B2-209b MEMS FLOW SENSOR CAPABLE OF MEASURING MULTI-VITAL SIGNS OF RESPIRATION, HEART RATE, AND BODY TEMPERATURE**
Yoshihiro Hasegawa¹, Seunghyeon Lee¹, Miyoko Matsushima², Shin Hasegawa³, Tsutomu Kawabe², and Mitsuhiro Shikida¹
¹*Hiroshima City University, JAPAN*, ²*Nagoya University, JAPAN*, and ³*COSMOSWEB Co. Ltd., JAPAN*
- B2-210b MULTIFUNCTIONAL 3D VIADUCT MICROELECTRODES FOR CONTINUOUS-FLOW DIELECTROPHORETIC RAILING AND ELECTROPORATION OF CELLS UNDER MODULATED ACTIVATION**
Zili Tang, Stanley D. Kushigbor, Junwu Bai, Yang Bu, Sheng Ni, and Levent Yobas
Hong Kong University of Science and Technology, HONG KONG
- B2-211b MULTIMODAL NEUROTRANSMITTER IMAGE SENSOR WITH LATERAL ION DIFFUSION SUPPRESSOR**
Chinatsu Kawakami, Shirlyn Eng Shu Ying, Tomoko Horio, Hideo Doi, Yong-Joon Choi, Kazuhiro Takahashi, Toshihiko Noda, and Kazuaki Sawada
Toyohashi University of Technology, JAPAN

- B2-212b OXYGEN AND LACTATE MONITORING IN 3D BREAST CANCER ORGANOID CULTURE WITH SENSOR-INTEGRATED MICROFLUIDIC PLATFORM**
Johannes Dornhof¹, Jochen Kieninger¹, Harshini Muralidharan², Jochen Maurer², Gerald A. Urban¹, and Andreas Weltin¹
¹University of Freiburg, GERMANY and ²University Hospital RWTH Aachen, GERMANY
- B2-213b RECONSTITUTING ORGAN-LEVEL PERIODONTAL SOFT TISSUE ON A CHIP**
Laidi Jin¹, Tian Tian², Danyang Liu¹, Hongji Mao², and Huiying Liu¹
¹Dalian Medical University, CHINA and ²Chinese Academy of Sciences (CAS), CHINA
- B2-214b REDOX-TYPE LABEL-FREE ATP IMAGE SENSOR FOR HIGHLY SENSITIVE IN VITRO IMAGING OF EXTRACELLULAR ATP**
Hideo Doi, Tomoko Horio, Young-Joon Choi, Kazuhiro Takahashi, Toshihiko Noda, and Kazuaki Sawada
Toyohashi University of Technology, JAPAN
- B3-302b A 3D BIO-PRINTED SPHEROIDS BASED PERFUSION IN VITRO LIVER ON CHIP FOR DRUG SCREENING**
Tian Tian¹, Chen Chen², and Hongji Mao¹
¹Chinese Academy of Sciences (CAS), CHINA and ²Dalian Medical University, CHINA
- B3-303b A COST-EFFECTIVE PAPER-BASED SERS DEVICE FOR THE DETECTION OF CORTISOL IN SALIVA**
Dilip Kumar Agarwal, Junfei Xia, Ayedin Sadeqi, Rachel Owyung, Hojatollah R. Nejad, and Sameer Sonkusale
Tufts University, USA
- B3-304b A MICROWELL-BASED IMPEDANCE SENSOR IN MICRONEEDLE SHAPE FOR MULTIPLEXING CYTOKINE DETECTION**
Naixin Song¹, Pengfei Xie², Mehdi Javanmard², and Mark Allen¹
¹University of Pennsylvania, USA and ²Rutgers University, USA
- B3-305b FPGA-ASSISTED NONPARALLEL IMPEDANCE CYTOMETRY AS LOCATION SENSOR OF SINGLE PARTICLE**
Tao Tang¹, Xun Liu¹, Yigang Shen², Yapeng Yuan², Yo Tanaka², Yoichiro Hosokawa¹, and Yaxiaer Yalikun^{1,2}
¹Nara Institute of Science and Technology, JAPAN and ²RIKEN, JAPAN
- B3-306b HIGHLY SENSITIVE SENSOR BASED ON GRAPHENE AND GOLD NANOPARTICLES FOR DOPAMINE SELECTIVE DETECTION**
Wenzheng He¹, Xiongying Ye¹, and Tianhong Cui²
¹Tsinghua University, CHINA and ²University of Minnesota, USA
- B3-307b IN-PLANE MODE ENCASED CANTILEVERS FOR CANCER CELL DETECTION IN LIQUID**
Hao Jia, Ying Chen, Xuefeng Wang, Tiegang Xu, and Xinxin Li
¹Chinese Academy of Sciences (CAS), CHINA
- B3-308b USING ADVANCED 2D MATERIALS TO CLOSELY MIMIC VESTIBULAR HAIR CELL SENSORS**
Sajad A. Moshizi¹, Shohreh Azadi¹, Andrew Belford¹, Shuying Wu¹, Zhao J. Han², and Mohsen Asadnia¹
¹Macquarie University, AUSTRALIA and ²CSIRO Manufacturing, AUSTRALIA
- B4-404b A HIGHLY SENSITIVE POINT-OF-CARE COVID-19 SEROLOGICAL TEST USING IMMUNO-PCR IN 35 MINS**
Pengfei Zhang, Liben Chen, Jiumei Hu, Alexander Y. Trick, Fan-En Chen, Kuangwen Hsieh, Yang Zhao, and Tza-Huei Wang
Johns Hopkins University, USA
- B4-405b DUAL MODE NEURAL PROBE WITH ENHANCED MICROSTRUCTURE FOR NEURAL STIMULATION AND RECORDING**
Longchun Wang, Fang Wang, Zhejun Guo, Ye Xi, Bin Yang, and Jingquan Liu
Shanghai Jiao Tong University, CHINA

- B4-406b ENRICHMENT AND ANALYSIS OF BREAST CANCER CELL-DERIVED EXTRACELLULAR VESICLES BY LASER-ASSISTED PROTEIN ADSORPTION IN THERMOPLASTIC MICROCHANNELS**
André Kling, Jonas Nikoloff, Mario A. Saucedo-Espinosa, and Petra S. Dittrich
ETH Zurich, SWITZERLAND
- B4-407b SMART TOOTH SYSTEM FOR IN-SITU WIRELESS PH MONITORING**
Sayemul Islam¹, Geelsu Hwang², Seung Hyun Song³, and Albert Kim¹
¹Temple University, USA, ²University of Pennsylvania, USA, and ³Sookmyung Women's University, KOREA
- B5-508b A NOVEL MICRO SPR SENSOR WITH MULTIPLE SENSING AREAS FOR JOINT DETECTION OF EARLY LIVER CANCER MARKERS**
Jiaming Ma, Xingguo Zhang, Xiao Su, Hailong Chen, Haixia Yu, Ridong Wang, and Dachao Li
Tianjin University, CHINA
- B5-509b EFFICIENT GAS-TO-LIQUID PARTITION USING GAS-FLOW CHANNELS FOR CELL-BASED GASEOUS ODORANT DETECTION**
Takuma Nakane¹, Toshihisa Osaki², Hisatoshi Mimura², Norihisa Miki¹, and Shoji Takeuchi^{2,3}
¹Keio University, JAPAN, ²Kanagawa Institute of Industrial Science and Technology (KISTEC), JAPAN, and ³University of Tokyo, JAPAN
- B5-510b FABRICATION AND CHARACTERIZATION OF 3D MICROELECTRODE ARRAYS (3D MEAS) WITH TRI-MODAL (ELECTRICAL, OPTICAL, AND MICROFLUIDIC) INTERROGATION OF ELECTROGENIC CELL CONSTRUCTS**
Julia Freitas Orrico¹, Avra Kundu¹, Charles M. Didier¹, Alexander Bosak², Michael J. Moore², and Swaminathan Rajaraman¹
¹University of Central Florida, USA and ²Tulane University, USA
- B5-511b LABEL-FREE MEASUREMENT OF T-CELL ACTIVATION BY MICROFLUIDIC ACOUSTOPHORESIS**
Jayanth M. Dabbi, Yunhua Shi, Alket Mërtiri, Rebecca J. Christianson, and Jason Fiering
Draper, USA
- B5-512b MONOLITHIC FABRICATION OF A LIPID BILAYER DEVICE USING STEREOLITHOGRAPHY**
Kazuto Ogishi¹, Toshihisa Osaki², Yuya Morimoto¹, and Shoji Takeuchi^{1,2}
¹University of Tokyo, JAPAN and ²Kanagawa Institute of Industrial Science and Technology, JAPAN
- B5-513b REAL TIME CYTOKINE QUANTIFICATION IN WOUND FLUID SAMPLES USING NANOWELL IMPEDANCE SENSING**
Pengfei Xie¹, Muhammad Tayyab¹, Ali Ashraf¹, Suneel Kumar¹, Aaron Mazzeo¹, Kaushik Sengupta², François Berthiaume¹, and Mehdi Javanmard¹
¹Rutgers University, USA and ²Princeton University, USA

c - Chemical Sensors and Microsystems

- B2-215c A CMOS-MEMS FLUORESCENCE QUENCHING GAS SENSOR ENCAPSULATED WITH SILICON-BASED LED REFLECTOR**
Ya-Chu Lee¹, Shih-Wei Lin¹, Cheng-Shiun Liou², Chingfu Tsou², and Weileun Fang¹
¹National Tsing Hua University, TAIWAN and ²Feng Chia University, TAIWAN
- B2-216c DEFORMABLE HUMIDITY SENSOR AND ITS PERFORMANCE BASED ON DOUBLE-NETWORK AND IONIC CONDUCTIVE HYDROGEL MEMBRANE**
Zhenyi Li¹, Zixuan Wu¹, Haojun Ding¹, Yaoming Wei¹, Xing Yang¹, Kai Tao², and Jin Wu¹
¹Sun Yat-sen University, CHINA and ²Northwestern Polytechnical University, CHINA
- B2-217c ELECTROCHEMICAL SENSOR SYSTEM FOR GLYPHOSATE DETECTION**
Besnik Uka, Jochen Kieninger, Gerald A. Urban, and Andreas Weltin
University of Freiburg, GERMANY

- B2-218c HIGH DATA DIMENSIONALITY OF VIRTUAL SENSOR ARRAY BASED ON QCM AND MXENE FOR SELECTIVE VOC DETECTION**
Dongsheng Li, Jintao Pang, Mengjiao Qu, Qian Zhang, and Jin Xie
Zhejiang University, CHINA
- B2-219c HIGHLY DEFORMABLE AND STABLE GAS SENSOR BASED ON ANTI-DRYING IONIC ORGANOHYDROGEL FOR O₂ GAS DETECTION**
Yuanqing Lin¹, Zixuan Wu¹, Yaoming Wei¹, Yuning Liang¹, Kankan Zhai¹, Kai Tao², Chunwei Li¹, Xi Xie¹, and Jin Wu¹
¹*Sun Yat-sen University, CHINA and* ²*Northwestern Polytechnical University, CHINA*
- B2-220c INKJET TiO₂-BASED SENSORS FOR ENVIRONMENTAL MONITORING**
Bianca di Diodoro, Carmen Bax, Giacomo Langfelder, Roberto Bernasconi, Luca Magagnin, Stefano Prudenza, and Laura Capelli
Politecnico di Milano, ITALY
- B2-221c POROUS TITANIA NANOSHEETS AS MICRO-GRAVIMETRIC SENSING MATERIAL FOR TRACE NO₂ DETECTION**
Jialin Yang^{1,3}, Ming Li^{1,2}, Haitao Yu¹, Pengcheng Xu^{1,2}, and Xinxin Li^{1,2}
¹Chinese Academy of Sciences (CAS), CHINA, ²University of Chinese Academy of Sciences (UCAS), CHINA, and ³University of Shanghai for Science and Technology, CHINA
- B2-222c ZINC OXIDE GAS SENSOR ENHANCED WITH NANO BETA ZEOLITE CATALYST FOR HIGH-SENSITIVE FREON DETECTION**
Xueqing Wang^{1,2}, Pengcheng Xu¹, Ying Chen¹, and Xinxin Li¹
¹Chinese Academy of Sciences (CAS), CHINA and ²University of Chinese Academy of Sciences (UCAS), CHINA
- B3-309c A FLEXIBLE RUTHENIUM OXIDE ELECTRODEPOSITED SPCE SENSOR FOR STABLE DETECTION OF WIDE-RANGE Ph ENHANCED BY ANNEALING**
Yujie He¹, Yinong Chen¹, Jing Zhang², Yinfei Zheng^{1,2}, and Xishan Guo^{1,2}
¹*Zhejiang University, CHINA and* ²*Zhejiang Lab, CHINA*
- B3-310c A SINGLE MICROCANTILEVER-TYPE GAS SENSOR WITH ENHANCED SENSITIVITY TO ETHANOL BY SPUTTERING ZNO WITH AU EMBEDDED IN O₂ ATMOSPHERE**
Ruichen Liu, Dongcheng Xie, George Adedokun, Feng Xue, Lei Xu, and Feng Wu
University of Science and Technology of China, CHINA
- B3-311c A WARPED-CANTILEVER MEMS MOS GAS SENSOR ARRAY**
Feng Xue, Dongcheng Xie, Ruichen Liu, George Adedokun, Lei Xu, and Feng Wu
University of Science and Technology of China, CHINA
- B3-312c CO₂ GAS SENSING BY CMOS-MEMS SCALN-BASED PYROELECTRIC DETECTOR BASED ON MID-IR ABSORPTION**
Doris K.T. Ng, Chong-Pei Ho, Linfang Xu, Weiguo Chen, Yuan Hsing Fu, Tantan Zhang, Li-Yan Siow, Norhanani Jaafar, Eldwin J. Ng, Yuan Gao, Hong Cai, Qingxin Zhang, and Lennon Y.T. Lee
*Agency for Science, Technology and Research (A*STAR), SINGAPORE*
- B3-313c ENHANCED FORMALDEHYDE SENSING PERFORMANCE BASED ON SNO₂ NANOSHEETS/TITANIUM CARBIDE (MXENE) COMPOSITES**
Gaoqiang Niu, Rajendran Ramachandran, Changhui Zhao, and Fei Wang
Southern University of Science and Technology, CHINA
- B3-314c STIMULI-RESPONSIVE STRUCTURAL-COLOR HYDROGEL CHEMICAL SENSOR MICROARRAY WITH SEPARATED FUNCTIONAL STRUCTURES**
Ryohei Ueno, Shota Yamawaki, and Hiroaki Onoe
Keio University, JAPAN
- B4-408c CHARACTERIZATION OF SMART HYDROGEL-BASED ULTRASOUND RESONATORS FOR IMPLANTABLE SENSING APPLICATIONS**
Navid Farhoudi, Prattay D. Kairi, Jules J. Magda, Florian Solzbacher, and Christopher F. Reiche
University of Utah, USA

- B4-409c HYDROGEL-BASED SENSITIVE AND HUMIDITY-RESISTANT OXYGEN GAS SENSORS ENABLED BY POROUS ECOFLEX MEMBRANES**
Jindong Ye¹, Zixuan Wu¹, Yuning Liang¹, Bizhang Zhong¹, Zijing Zhou¹, Zhenyi Li¹, Yaoming Wei¹, Kai Tao², and Jin Wu¹
¹*Sun Yat-san University, CHINA and* ²*Northwestern Polytechnical University, CHINA*
- B4-410c INFLUENCE OF THE CARBON NANOTUBE DENSITY ON BUILDING SENSITIVE AND NOISE-FREE VOLATILE ORGANIC COMPOUND SENSORS**
Daniel Sim^{1,2}, Tiffaney Huang¹, Rajesh R. Naik¹, and Steve S. Kim¹
¹*Air Force Research Laboratory (AFRL), USA and* ²*UES Inc., USA*
- B5-514c CHEMOCAPACITIVE DETECTION OF ETHYLENE USING POTASSIUM PERMANGANATE/POLYIMIDE COMPOSITE THIN-FILMS**
Aishwaryadev Banerjee, Chayanjit Ghosh, Shakir-ul Haque Khan, Adwait Deshpande, Erfan Pourshaban, Mohit U. Karkhanis, Seungbeom Noh, Hanseup Kim, and Carlos H. Mastrangelo
University of Utah, USA
- B5-515c FERROGEL-BASED WIRELESS ACOUSTO-BIOCHEMICAL SENSING**
Jiseon Lee¹, Chaerin Jun¹, Eungyoul Oh¹, Jeonga Han¹, Albert Kim², and Seunghyun Song¹
¹*Sookmyung Women's University, KOREA and* ²*Temple University, USA*
- B5-516c MID-IR METAMATERIAL ABSORBER WITH POLYVINYLAMINE AS A SENSITIVE LAYER FOR ON-CHIP SENSING OF CARBON DIOXIDE**
Hong Zhou¹, Dongxiao Li¹, Xindan Hui¹, Xianming He¹, He Huang^{1,2}, and Xiaoqing Mu¹
¹*Chongqing University, CHINA and* ²*Chinese Academy of Sciences (CAS), CHINA*
- B5-517c SPLIT-RING-SHAPED BIODEGRADABLE pH SENSOR FOR WIRELESS AND BATTERY-FREE MONITORING OF AGRICULTURAL FIELDS**
Katsutoshi Hori¹, Ayaka Inami¹, Tetsuo Kan², and Hiroaki Onoe¹
¹*Keio University, JAPAN and* ²*University of Electro-Communications, JAPAN*
- B5-518c SURFACE-ENHANCED RAMAN SCATTERING OF AU COATED HEMISPHERIC DIAMOND NANO-THORN**
Chen Lin, Guanzhou Lin, Jinwen Zhang, and Wengang Wu
Peking University, CHINA

d - Composite Materials, Polymers, and Fabrication Processes

- B2-223d A GLASS-LIKE CARBON MEMS STRAIN SENSOR**
Jongmoon Jang^{1,2}, Giulia Panusa¹, Giovanni Boero¹, and Juergen Brugger¹
¹*École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND and* ²*Korea Institute of Materials Science (KIMS), KOREA*
- B2-224d OPTIMIZATION OF ZnO/Su-8 BASED PHOTOPATTERNABLE, PIEZOELECTRIC NANO-COMPOSITES FOR MECHANICAL ENERGY HARVESTING APPLICATIONS**
Nadeem Tariq Beigh and Dhiman Mallick
Indian Institute of Technology Delhi, INDIA
- B3-315d CARBON BLACK-GELATIN COMPOSITE THIN-FILM CHEMIRESISTOR WITH LARGE RESPONSE TO CHEMICAL VAPORS**
Chun Huang¹, Zhuqing Wang^{1,2}, Yi-Te Huang¹, Noriko Tsuruoka¹, and Takahito Ono¹
¹*Tohoku University, JAPAN and* ²*Sichuan University, CHINA*
- B3-316d THE EFFECT OF ANNEALING THIN FILM PARYLENE C-PLATINUM INTERFACES CHARACTERIZED BY BROADBAND DIELECTRIC SPECTROSCOPY**
Eugene J. Yoon¹, Angela C. Stelson², Nathan D. Orloff², Christian J. Long², James C. Booth², and Ellis F. Meng¹
¹*University of Southern California, USA and* ²*National Institute of Standards and Technology (NIST), USA*

- B4-411d 3D PRINTED GRAPHENE-COATED FLEXIBLE LATTICE AS PIEZORESISTIVE PRESSURE SENSOR**
Amar M. Kamat¹ and Ajay Giri Prakash Kottapalli^{1,2}
¹University of Groningen, NETHERLANDS and ²Massachusetts Institute of Technology, USA
- B4-412d ABSORBENT AND FLEXIBLE CONDUCTIVE NANOCOMPOSITES FOR BIOELECTRONIC APPLICATIONS**
Dhruv R. Seshadri^{1,2}, Nicholas D. Bianco^{1,2}, Christian A. Zorman^{1,2}, and Kath M. Bogie^{1,2}
¹Case Western Reserve University, USA and ²Louis Stokes Cleveland VA Medical Center, USA
- B4-413d FLEXIBLE PIEZOELECTRIC AND PIEZORESISTIVE MECHANISMS COUPLED SENSOR FOR HIGHLY DYNAMIC AND STATIC COLLABORATIVE DETECTION**
Lijun Lu, Guosheng Hu, Yang Huang, Jingquan Liu, and Bin Yang
Shanghai Jiao Tong University, CHINA
- B4-414d HYBRID FABRICATION METHOD FOR MICROFLUIDIC CHANNELS WITHIN A POLYMER NANOCOMPOSITE FOR NEURAL INTERFACING APPLICATIONS**
Youjoung Kim^{1,2}, Natalie Mueller^{1,2}, William Schwartzman^{1,2}, Varoon Aluri^{1,2}, Amanda Herried^{1,2}, Jeffrey R. Capadona^{1,2}, and Allison Hess-Dunning^{1,2}
¹Case Western Reserve University, USA and ²Louis Stokes Cleveland Veterans Affairs Medical Center, USA
- B4-415d LASER-CARBONIZED MXENE-REINFORCED HIERARCHICAL NANOFIBERS FOR BREATHABLE AND REUSABLE ELECTROPHYSIOLOGICAL E-TATTOOS**
Md Sharifuzzaman, Md Abu Zahed, Sudeep Sharma, Sanghyuk Yoon, Chani Park, and Jae Y. Park
Kwangwoon University, KOREA
- B4-416d MULTIDIRECTIONAL LITHOGRAPHY OF CELL-LADEN HYDROGELS**
Pegah Pezeshkpour, Wouter van der Wijngaart, and Anna Herland
KTH Royal Institute of Technology, SWEDEN
- B4-417d POINTWISE FABRICATION AND FLUIDIC SHAPING OF CARBON NANOTUBE FIELD EMITTERS**
Crystal E. Owens¹, Jon Ludwick^{2,3}, Joy Y. Ma¹, Robert J. Headrick⁴, Steven M. Williams³, Megan Creighton^{1,2}, Tyson C. Back², Benji Maruyama², Matteo Pasquali⁴, Gareth H. McKinley¹, and A. John Hart¹
¹Massachusetts Institute of Technology, USA, ²Air Force Research Laboratory, USA, ³University of Cincinnati, USA, and ⁴Rice University, USA
- B5-519d MANUFACTURING HIGH NUMERICAL APERTURE MICROLENS ARRAY BY MICROFLUIDICS AND OIL-INDUCED EXPANDABLE PDMS MEMBRANE**
Pin-Chuan Chen, Liang-Ta Chen, and Cing-Sung Yeh
National Taiwan University of Science and Technology, TAIWAN

e - Energy, Power and Thermal Management

- B2-225e ALL-POLYMER SOFT-X-RAY-CHARGED PIEZOELECTRET FOR PUSH-BUTTON ENERGY HARVESTER**
Jia Lu and Yuji Suzuki
University of Tokyo, JAPAN
- B2-226e HEAT STORAGE THERMOELECTRIC GENERATOR FOR WIRELESS IOT SENSING SYSTEMS**
Truong Thi Kim Tuoi, Nguyen Van Toan, and Takahito Ono
Tohoku University, JAPAN
- B2-228e PYROELECTRICALLY RECHARGEABLE ELECTRET FOR CONTINUOUS VIBRATION ENERGY HARVESTER**
Pedro Gonzalez Losada, Filipe Alves, Marco Martins, Stephen Mundy, Rosana Dias, and KB Vinayakumar
International Iberian Nanotechnology Laboratory, PORTUGAL

- B3-317e AN INVISIBLE BIONIC DRAGONFLY BASED ON FULLY-TRANSPARENT CONDUCTIVE HYDROGEL AND DIELECTRIC ELASTOMER**
Ronggang He, Kai Tao, Zhensheng Chen, Bowen Ji, Qiang Shen, Dayong Qiao, Weizheng Yuan, and Honglong Chang
Northwestern Polytechnical University, CHINA
- B3-318e INTERSECTING BOOK INSPIRED HIGH-POWER-DENSITY ELECTRET/TRIBOELECTRIC MULTILAYERED POWER GENERATOR WITH FLEXIBLE INTERDIGITAL ELECTRODES**
Hao Huang¹, Zhe Zhao¹, Kai Tao¹, Jin Wu², Bowen Ji¹, Weizheng Yuan¹, and Honglong Chang¹
¹*Northwestern Polytechnical University, CHINA and* ²*Sun Yat-sen University, CHINA*
- B3-319e MICRO-PATTERNED ELECTRET POWER GENERATOR FOR SIMULTANEOUS OSCILLATION AND ROTATORY DETECTION IN RAILWAYS**
Jiaqian Ding¹, Zhe Zhao¹, Yaozheng Wang¹, Kai Tao¹, Jin Wu², Weizheng Yuan¹, and Honglong Chang¹
¹*Northwestern Polytechnical University, CHINA and* ²*Sun Yat-sen University, CHINA*
- B3-320e MULTI-ARCHED ASYNCHRONOUS TRIBOELECTRIC SENSOR BASED ON ULTRA-STRETCHABLE HYDROGEL FOR A NOVEL DISPLACEMENT MEASURING MECHANISM**
Zhensheng Chen¹, Jiahao Yu¹, Haozhe Zeng¹, Kai Tao¹, Zixuan Wu², Jin Wu², Weizheng Yuan¹, and Honglong Chang¹
¹*Northwestern Polytechnical University, CHINA and* ²*Sun Yat-sen University, CHINA*
- B3-321e THERMOELECTRIC GENERATOR WITH SERIES/PARALLEL SWITCHING FUNCTION FOR IMPROVEMENT OF EXTRACTED POWER**
Ryuji Sorimachi and Eiji Iwase
Waseda University, JAPAN
- B4-418e A ROTARY ENERGY HARVESTER WITH LIQUID METAL COILS EMBEDDED IN PDMS MEMBRANE**
Zih-Jyun Wei, Yi-Cheng Zhang, and Shih-Jui Chen
National Central University, TAIWAN
- B4-419e AN ULTRA-LOW FREQUENCY MAGNET-TETHERED VIBRATION ENERGY HARVESTER FOR SELF-POWERED SENSING**
Sayed Nahiyen Masabi, Hailing Fu, and Stephanos Theodossiades
Loughborough University, UK
- B4-420e MAGNETICALLY-COUPLED MICROMACHINED ELECTROSTATIC ENERGY HARVESTER DRIVEN BY EYELID BLINK MOTION**
Erfan Pourshaban, Mohit U. Karkhanis, Adwait Deshpande, Aishwaryadev Banerjee, Chayanjit Ghosh, Hanseup Kim, and Carlos H. Mastrangelo
University of Utah, USA
- B4-421e NONLINEAR WIND ENERGY HARVESTING BASED ON MECHANICAL SYNCHRONOUS SWITCH HARVESTING ON INDUCTOR**
Mayue Shi, Andrew S. Holmes, and Eric M. Yeatman
Imperial College London, UK
- B4-422e PCB INTEGRATED LiNbO₃ PYROELECTRIC HIGH VOLTAGE SUPPLY WITH ELECTROSTATIC SWITCH REGULATOR**
Di Ni, Ved Gund, and Amit Lal
Cornell University, USA
- B5-520e A UNIFIED DESIGN OF BROADBAND TWO-DEGREE-OF-FREEDOM VIBRATION ENERGY HARVESTING SYSTEM FOR HIGH-QUALITY FACTOR GENERATORS**
Tomoya Miyoshi¹, Hiroyuki Mitsuya², Hiroshi Toshiyoshi¹, and Yuji Suzuki¹
¹*University of Tokyo, JAPAN and* ²*Saginomiya Seisakusho, JAPAN*

f - Microfluidics Platform Technologies

- B2-229f CENTRIFUGAL STEP EMULSIFICATION MICROFLUIDICS SUPPORTING DROPLET DIGITAL LOOP-MEDIATED ISOTHERMAL AMPLIFICATION (LAMP) OF SARS-COV-2 N GENE**
Zhi Shi, Nan Dong, Xiaochen Lai, Haixia Yu, and Dachao Li
Tianjin University, CHINA
- B2-230f INTEGRATED ON-CHIP CELLULAR EXOSOME ISOLATION AND RNA ANALYSIS MICROSYSTEM**
Yunxing Lu^{1,2}, Xiaoyu Jian¹, Zhaoduo Tong^{1,2}, Zhenhua Wu¹, Shihui Qiu^{1,2}, Chuanjie Shen^{1,2}, Hao Yin^{1,2}, and Hongju Mao^{1,2}
¹*Chinese Academy of Sciences (CAS), CHINA and*
²*University of Chinese Academy of Sciences (UCAS), CHINA,*
- B2-231f MULTI-STAGE MICROFLUIDIC CAPTURE ARRAYS FOR DETECTING VARIOUS ALZHEIMER'S DISEASE BIOMARKERS IN SALIVA**
Pengcheng Zhao^{1,2}, Jianan Hui^{1,3}, Hongju Mao^{1,3}, Guowu Ma², and Huiying Liu²
¹*Chinese Academy of Sciences (CAS), CHINA, ²Dalian Medical University, Dalian, CHINA, and*
³*University of Chinese Academy of Sciences (UCAS) CHINA*
- B2-232f OPEN DROPLET MICROFLUIDICS FOR TESTING MULTI-DRUG RESISTANCE AND ANTIBIOTIC RESILIENCE IN BACTERIA**
Santosh Pandey, Taejoon Kong, Nicholas Backes, and Gregory J. Phillips
Iowa State University, USA
- B3-322f A SERPENTINE MICROCHANNEL WITH ADDED CAVITIES PLATFORM FOR MAGNETIC SEPARATION OF LUNG ADENOCARCINOMA CELLS UTILIZING APTAMER-CONJUGATED MAGNETIC BEAD APPROACH**
Hang Tran Thanh¹, Loc Do Quang¹, Bao-Anh Hoang¹, Tung Thanh Bui¹, Trinh Chu Duc¹, and Chun-Ping Jen²
¹*Vietnam National University, VIETNAM and ²National Chung Cheng University, TAIWAN*
- B3-323f MICROFLUIDIC CELL SEPARATION AND GENETIC ANALYSIS OF KURUMA SHRIMP**
Tomoki Murakami¹, Hiroaki Suzuki¹, and Keiichiro Koiwai²
¹*Chuo University, JAPAN and ²Tokyo University of Agriculture and Technology, JAPAN*
- B3-324f NEAR INFRARED LIGHT-TRIGGERD ON-DEMAND DRUG DELIVERY FROM NON-TOXIC HYDROGEL MICROBEADS WITH HEAT TRANSDUCER**
Shuhei Takatsuka¹, Takeshi Kubota¹, Yuta Kurashina^{1,2}, and Hiroaki Onoe¹
¹*Keio University, JAPAN and ²Tokyo Institute of Technology, JAPAN*
- B4-423f A VACUUM-DRIVEN MICROFLUIDIC ARRAY FOR MULTI-STEP SAMPLE DIGITALIZATION**
Jiumei Hu, Liben Chen, Pengfei Zhang, Kuangwen Hsieh, Hui Li, and Tza-Huei Wang
Johns Hopkins University, USA
- B4-424f EFFICIENT DRIVING OF ACOUSTIC MICROFLUIDIC DEVICES USING A RESONANT PLATE**
Rebecca J. Christianson, Charles Lissandrello, Jason Durant, Ryan Dubay, and Jason Fiering
Draper, USA
- B4-425f FEMTOSECOND LASER MULTI-PULSE IRRADIATION FOR HIGH THROUGH-PUT MULT-SELECTABLE PARTICLE SORTING**
Ryota Kiya¹, Yo Tanaka², Yaxiaer Yalikun^{1,2}, and Yoichiro Hosokawa¹
¹*Nara Institute of Science and Technology, JAPAN and ²RIKEN, JAPAN*
- B4-426f PLASMONIC-ENHANCED FLOATING ELECTRODE OPTOELECTRONIC TWEEZERS (FEOET) FOR EFFECTIVE OPTICAL DROPLET MANIPULATION**
Si Kuan Thio¹, Sungwoo Bae¹, Yee Kan Koh¹, and Sung-Yong Park²
¹*National University of Singapore, SINGAPORE and ²San Diego State University, USA*

- B5-521f A LOW-FIELD PORTABLE NUCLEAR MAGNETIC RESONANCE (NMR) MICROFLUIDIC FLOWMETER**
Eren Aydin and Kofi A.A. Makinwa
Delft University of Technology (TU Delft), NETHERLANDS
- B5-522f AN INTEGRATED MICROFLUIDIC PLATFORM FOR DETECTING *BRCA1/BRCA2* GENE MUTATION AND RISK ASSESSMENT OF OVARIAN CANCER**
Yu-Hung Cheng¹, Chih-Hung Wang¹, Keng-Fu Hsu², and Gwo-Bin Lee¹
¹National Tsing Hua University, TAIWAN and ²National Cheng Kung University, TAIWAN
- B5-523f CLASSIFICATION OF WHITE BLOOD CELLS BASED ON CELL DIAMETER, SPECIFIC MEMBRANE CAPACITANCE AND CYTOPLASMIC CONDUCTIVITY LEVERAGING MICROFLUIDIC CONSTRICTION CHANNEL**
Huiwen Tan^{1,2}, Minruihong Wang^{1,2}, Yi Zhang^{1,2}, Xukun Huang², Deyong Chen^{1,2}, Min-Hsien Wu³, Junbo Wang^{1,2}, and Jian Chen^{1,2}
¹Chinese Academy of Sciences (CAS), CHINA, ²University of Chinese Academy of Sciences (UCAS), CHINA, and ³Chang Gung University, CHINA
- B5-524f LUNG CANCER ON CHIP FOR TESTING IMMUNOTHERAPY**
Han-Jung Liao¹, Jean-An Chieh¹, Yu-Chen Chen¹, Kang-Yun Lee², Yao-Fei Chan³, Shu-Chuan Ho², Wei-lun Sun², Yu-Shiuan Wang², Wan-Chen Huang⁴, Wei-Chiao Chang², and Cheng-Hsien Liu¹
¹National Tsing Hua University, TAIWAN, ²Taipei Medical University, TAIWAN, ³Linkuo Chang Gung Hospital, TAIWAN, and ⁴Academia Sinica, TAIWAN
- B5-525f PARTICLE SIZE DETERMINATION IN IMPEDANCE FLOW CYTOMETRY USING MEASURED OPACITY**
Douwe S. de Bruijn, Koen F.A. Jorissen, Wouter Olthuis, and Albert van den Berg
University of Twente, NETHERLANDS

g - Nanoscale Materials and Fabrication

- B2-233g BACTERIAL FORCE ON NANOPILLARS: INTERACTION AT SINGLE CELL**
Jagriti Singh, Vaibhav Sharma, Saurabh Chandorkar, and Prosenjit Sen
Indian Institute of Science, INDIA
- B3-325g HIERARCHICAL ZNO NANOSPIKES ON ROUGH NANOPILLARS FOR GAS SENSING WITH SELF-CLEANING PROPERTIES**
Yang Liu^{1,2}, Jie Cheng^{1,2}, Aiyao Tang^{1,2}, Mingxiao Li^{1,2}, Haiyang Mao^{1,2}, Na Zhou^{1,2}, and Chengjun Huang^{1,2}
¹Chinese Academy of Sciences (CAS), CHINA and ²University of Chinese Academy of Sciences (UCAS), CHINA
- B3-326g HIGH THROUGHPUT 16 NM NANOGAP BY VARIABLE SHAPED BEAM METHOD USING F7000S-VD02 EB LITHOGRAPHY**
Akio Higo, Yukinori Ochiai, and Yoshio Mita
University of Tokyo, JAPAN
- B3-327g MACHINE LEARNING-BASED DAMAGE PREDICION METHOD FOR THE MICRO/NANO STRUCTURES FABRICATED BY HELIUM FOCUSED ION BEAM**
Qianhuang Chen, Tianyang Shao, Yan Xing, and Zaifa Zhou
Southeast University, CHINA
- B4-427g A NEW APPROACH TO CALCULATE THE PIEZOELECTRIC COEFFICIENT OF PIEZO-SEMICONDUCTOR NANOWIRES INTEGRATED IN NANOCOMPOSITES: EXPERIMENT AND SIMULATION**
Andrés Jenaro Lopez Garcia¹, Ran Tao², Mireille Mouis¹, and Gustavo Ardila¹
¹University Grenoble Alpes, Univ. Savoie Mont Blanc, CNRS, FRANCE and ²Shenzhen University, CHINA

B4-428g IN-SITU SYNTHESIS OF MULTILAYER GRAPHENE ON TIN FILM VIA LOCALIZED HEATING OF AMORPHOUS CARBON USING AN ELECTROTHERMAL CANTILEVER NANOPROBE

Ingrid Torres¹, Sadeh Mehdi Aghaei², Nezih Pala¹, and Angelo Gaitas³

¹Florida International University, USA, ²Worcester Polytechnic Institute, USA, and

³Icahn School of Medicine at Mount Sinai, USA

B4-429g TOWARDS REALIZING THE LOW-COERCIVE FIELD OPERATION OF SPUTTERED FERROELECTRIC $\text{Sc}_x\text{Al}_{1-x}\text{N}$

Ved Gund, Benyamin Davaji, Hyunjea Lee, Joseph Casamento, Huili Grace Xing, Debdeep Jena, and Amit Lal

Cornell University, USA

B5-526g A METHOD FOR BIAXIAL FRACTURE STRESS TEST OF NANOSCALE FILM

Fengyang Li, Leijian Cheng, and Dacheng Zhang

Peking University, CHINA

h - Optical and Atomic Transducers

B2-234h PLASMONIC SILVER GRATING FOR MID-INFRARED SENSING

Gerald Stocker¹, Jasmin Spettel^{1,2}, Thang Duy Dao², Andreas Tortschanoff², Reyhaneh Jannesari³, Gerald Pühringer³, Parviz Saeidi³, Florian Dubois², Clement Fleury², Cristina Consani², Thomas Grille¹, Elmar Aschauer¹, and Bernhard Jakoby³

¹Infineon Technologies Austria AG, AUSTRIA, ²Silicon Austria Labs GmbH, AUSTRIA, and

³Johannes Kepler University, AUSTRIA

B3-328h NARROW TRENCH PLASMONIC MID-INFRARED DETECTOR WITH DISTINCT RESPONSIVITY FOR RECONSTRUCTIVE SPECTROSCOPY

Shun Yasunaga^{1,2} and Tetsuo Kan²

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

B3-329h SINGLE-MICRON SCALE TWO-LAYER MICRO AU CHIRAL STRUCTURE WITH CIRCULARLY POLARIZED LIGHT ABSORPTION IN FIR REGION

Gaku Furusawa¹, Takashi Sekiya², Hiroaki Nakamura², and Tetsuo Kan¹

¹University of Electro-Communications, JAPAN and ²Idemitsu Kosan Co., Ltd., JAPAN

B4-430h AN INTEGRATED BIFUNCTIONAL METASURFACE MULTIPLEXED POLARIZATION, WAVELENGTH, AND ANGLE

Yun Huang¹, Liye Li¹, Yusa Chen¹, Tian Kang¹, Guanzhou Lin¹, Shengxiao Jin¹, Kenan Zhang², Peimin Lu², and Wengang Wu¹

¹Peking University, CHINA and ²Fuzhou University, CHINA

B4-431h ASPHERICAL HIGH-SPEED VARIFOCAL PIEZOELECTRIC MEMS MIRROR

Jaka Pribošek, Markus Bainschab, Adrien Piot, and Mohssen Moridi

Silicon Austria Labs, AUSTRIA

B4-432h DEFECT DETECTIONS OF POLYMERS MATERIALS BASED ON BI-MATERIAL MICRO-CANTILEVER FPA AT 3.1THZ

Jiahao Miao, Jia Xu, Yi Liu, Yuan Tian, and Xiaomei Yu

Peking University, CHINA

B4-433h DEMONSTRATION OF RESONANT ADAPTIVE MIRRORS

Amr Kamel¹, Samed Kocer¹, Taylan Das², Lyazzat Mukhangaliyeva¹, Resul Saritas¹, Parsin Hajjireza¹, Mustafa Yavuz¹, and Eihab Abdel-Rahman¹

¹University of Waterloo, CANADA and ²Kirikkale University, TURKEY

- B4-434h MITIGATING HYSTERESIS EFFECTS IN OPEN-LOOP-DRIVEN PZT MEMS MICROMIRRORS WITH PIEZORESISTIVE SENSING**
 Paolo Frigerio¹, Matteo Gianollo¹, Giovanni Pezzi¹, Luca Molinari², Andrea Barbieri², Marco Zamprognò², Roberto Carminati², Nicolò Boni², and Giacomo Langfelder¹
¹Politecnico di Milano, ITALY and ²STMicroelectronics, ITALY
- B4-435h PICOMETER LEVEL DIMENSIONAL SENSING USING MICROSPHERICAL GLASS SHELL WHISPERING GALLERY MODE RESONATORS**
 Vedant Sumaria and Srinivas Tadigadapa
 Northeastern University, USA
- B5-527h ATOMIC VAPOR ACTUATORS**
 Amber J. Sucich, Danny M. Kim, and Christopher S. Roper
 HRL Laboratories, LLC, USA
- B5-528h CONSISTENCY EVALUATION ON PREPARATION METHODS OF OPTICAL FIBER PHOTOACOUSTIC PROBE**
 Shanshan Lu¹, Cheng Li^{1,2}, Shangchun Fan¹, and Xuefeng Song³
¹Beihang University, Beijing, CHINA, ²Beihang University, Shenzhen, CHINA, and ³Southern University of Science and Technology, CHINA
- B5-529h MID-INFRARED WAVEGUIDE-INTEGRATED DIELECTRIC METALENS BY BIGRADIANT SLOTS ON SILICON**
 Zhihao Ren, Jinyuan Liu, Qifeng Qiao, Xinmiao Liu, Bowei Dong, Yuhua Chang, Guangya Zhou, and Chengkuo Lee
 National University of Singapore, SINGAPORE
- B5-530h RECONSTRUCTIVE SPECTROMETER BASED ON PLASMONIC SCHOTTKY PHOTODETECTOR WITH MEMS ANGULAR MODULATOR**
 Masaaki Oshita¹, Yosuke Yamamoto¹, Shiro Saito², and Tetsuo Kan¹
¹University of Electro-Communications, JAPAN and ²IMRA Japan Co., Ltd., JAPAN

i - Packaging & Solid-State Materials and Fabrication Processes

- B2-235i A COMBINED SPIN COATING AND LIFT-OFF PROCESS (CSLOP) TO REALIZE THICK SILVER MICROSTRUCTURES WITH A HIGH ASPECT RATIO FOR IOT APPLICATIONS**
 Chi-Fu Huang¹, Ray Tung Chiang², and Yu-Ting Cheng¹
¹National Yang Ming Chiao Tung University, TAIWAN and ²LIWEI Nano Tech Co., Ltd., TAIWAN
- B2-236i CONTACTLESS ENDPOINT DETECTION OF GOLD ETCHING USING QUARTZ-BASED CAPACITIVE DETECTOR**
 Takuro Okuwaki, Takaaki Haino, Masayuki Sohgewa, and Takashi Abe
 Niigata University, JAPAN
- B3-330i DEVELOPMENT OF A WIRELESS CO₂ SENSOR MODULE WITH A PACKAGE ON PACKAGE STRUCTURE**
 Yuji Furuta, Tatsuaki Denda, Tomoharu Fujii, and Yoshihiro Ihara
 Shinko Electric Industries Co., Ltd., JAPAN
- B3-331i FABRICATION AND CHARACTERIZATION OF EVAPORATED ZINC ANODES FOR SMALL-SCALE ZINC-AIR BATTERIES**
 Vishal Venkatesh, Qi Yang, Jingwen Zhang, James Pikul, and Mark G. Allen
 University of Pennsylvania, USA
- B3-332i FULLY CMOS-COMPATIBLE WAFER BONDING BASED ON PRESS MARKING USING THICK ELECTROPLATED ALUMINUM**
 Muhammad Salman Al Farisi^{1,2}, Takashiro Tsukamoto¹, and Shuji Tanaka¹
¹Tohoku University, JAPAN and ²Hiroshima City University, JAPAN

- B3-333i NOVEL PRESSURE SENSOR CAPSULE PRODUCED IN SILICONE-OIL MODIFIED PDMS INTEGRATED WITH A MICROFLOW METER FOR URINARY TRACT OBSTRUCTION DETECTION IN CLINICAL UROLOGY**
Yong-Jun Lin¹, Kai-Hao Liu¹, Yung-Shun Juan², and Che-Hsin Lin¹
¹National Sun Yat-sen University, TAIWAN and
²Kaohsiung Medical University Chung-Ho Memorial Hospital, TAIWAN
- B3-334i THE INFLUENCES OF NON-VOLATILE SURFACE COMPOUND LAYER ON THE PLASMA ETCHING OF BOROSILICATE GLASS**
Seungmok Lee, Masashi Hasegawa, and Kazuhiro Nishizono
Kyocera Corporation, JAPAN
- B4-436i FABRICATION AND CHARACTERIZATION OF HOLLOW MICRONEEDLE ARRAY USING DIFFRACTION UV LITHOGRAPHY**
Jun Ying Tan¹, Albert Kim², and Jungkwun “JK” Kim¹
¹Kansas State University, USA and ²Temple University, USA
- B4-437i PLANAR CMOS-COMPATIBLE FUSION-BONDED SILICA VACUUM PACKAGES**
Lin Du, Xuan Wang, and Mark G. Allen
University of Pennsylvania, USA
- B4-456i DIRECT WRITE OPTICAL LITHOGRAPHY SYSTEMS AND MASKLESS ALIGNERS FOR CREATING MICRO- AND NANO-PATTERNED DEVICES**
Niels Wijnaendts van Resandt and Rick Trevino
Heidelberg Instruments, Inc., USA
- B5-531i EVALUATION OF NEW SOLID RUBIDIUM SOURCE USING ATOMIC CLOCK STABILIZATION LOOP**
Motoaki Hara¹, Yuichiro Yano¹, Masaya Toda², Takahito Ono², and Tetsuya Ido¹
¹National Institute of Information and Communications Technology, JAPAN and ²Tohoku University, JAPAN
- B5-532i HIGH LIGHT POWER DENSITY DUV-LED PACKAGING USING HIGH DENSITY TSV IN SILICON CAVITY AND LASER-GLASS-FRIT-BONDED GLASS CAP**
Hirofumi Chiba¹, Yukio Suzuki², Yoshiaki Yasuda¹, Tianjiao Gong², and Shuji Tanaka²
¹Stanley Electric Co., LTD., JAPAN and ²Tohoku University, JAPAN
- B5-533i NOVEL MICROCHANNEL PROFILE CONROL OF MICROPOWDER BLASTING USING DYNAMIC VISCOELASTISITY OF MASK**
Mikinari Takada, Mao Hamamoto, and Hiromasa Yagyu
Kanto Gakuin University, JAPAN

j - Physical Sensors and Microsystems

- B2-237j AN ABSOLUTE CAPACITIVE PRESSURE SENSOR BASED ON A SIMIT-FABRICATED VACUUM CAVITY**
Yushen Hu^{1,2}, Fei Wang², and Man Wong¹
¹Hong Kong University of Science and Technology, HONG KONG and
²Southern University of Science and Technology, CHINA
- B2-238j AN EAR-INSPIRED SOUND PRESSURE AMPLIFICATION STRUCTURE FOR FABRY-PEROT ACOUSTIC SENSOR**
Xi Xiao¹, Cheng Li¹, Shangchun Fan¹, and Xuefeng Song²
¹Beihang University, Beijing, CHINA and ²Southern University of Science and Technology, CHINA
- B2-239j AN UNDERWATER FLOW SENSOR INSPIRED BY AIR-RETAINING HAIRS OF NOTONECTA**
Keli Wang, Yan Wang, Zhiqiang Ma, Deyuan Zhang, Huawei Chen, and Yonggang Jiang
Beihang University, Beijing, CHINA

- B2-240j CORROSION MONITORING OF SACRIFICIAL ANODES BASED ON CONTOUR PLOT ANALYSIS OF ELECTRO-MECHANICAL IMPEDANCE SPECTRA**
Jeslin Thalapil, Durgesh Tamhane, Sauvik Banerjee, and Siddharth Tallur
Indian Institute of Technology Bombay, INDIA
- B2-241j FORCE SENSOR USING IONIC LIQUID CAPILLARY BRIDGE**
Thanh-Vinh Nguyen, Shinya Kano, Atsushi Takei, and Masaaki Ichiki
National Institute of Advanced Industrial Science and Technology (AIST), JAPAN
- B2-242j FULL SILICON CAPACITIVE FORCE SENSORS WITH LOW TEMPERATURE DRIFT AND HIGH TEMPERATURE RANGE**
Muhannad Ghanam, Thomas Bilger, Frank Goldschmidtboeing, and Peter Woias
Freiburg University, GERMANY
- B2-243j HIGH TEMPERATURE SURFACE ACOUSTIC WAVE SENSOR WITH STRAIN ISOLATION STRUCTURE**
Guangyao Pei, Binghe Ma, Jian Luo, and Jinjun Deng
Northwestern Polytechnical University, CHINA
- B2-244j IN-SITU MODE-MATCHING CONTROL FOR A SINGLE-CHIP HORIZONTAL DUAL-AXIS MEMS GYROSCOPE BASED ON MODULATING QUADRATURE COUPLING WITH SILICON GRATINGS**
Jian Cui and Qiancheng Zhao
Peking University, CHINA
- B2-245j INDUCTIVE TRANSDUCERS WITH 2D MICROCOILS IN REFLECTION DIFFERENTIAL TRANSMITTER-RECEIVER MODE FOR THE MICRO NON-DESTRUCTIVE TESTING OF GRINDING BURN**
Isman Khazi^{1,2}, Andras Kovacs¹, and Ulrich Mescheder^{1,2}
¹Furtwangen University, GERMANY and ²University of Freiburg, GERMANY
- B2-246j MEMS GAS JET FLOW GYROMETER - A NUMERICAL APPROACH**
Alexandre Kechaf¹, Alain Giani¹, Philippe Combette¹, Marwan Tedjini¹, Caroline Gauthier-Blum², and Markus Schneider²
¹Université de Montpellier, FRANCE and ²ISL - French-German Research Institute of Saint-Louis, FRANCE
- B2-247j P(VDF-TRFE)/BTO NANOFIBER BASED ARTIFICIAL LATERAL LINE SENSOR FOR FLOW DETECTION**
Xiaohe Hu¹, Zheng Gong¹, Zhiqiang Ma¹, Kaijie Wang^{1,2,3}, Deyuan Zhang¹, and Yonggang Jiang¹
¹Beijang University, Beijing, CHINA, ²Beijing Tongren Hospital, CHINA, and ³Capital Medical University, CHINA
- B2-248j SENSITIVITY ENHANCEMENT IN VACUUM PACKAGED RESONANT MEMS STRAIN SENSORS WITH ON-CHIP STRAIN AMPLIFICATION MECHANISM**
Luca Belsito, Luca Masini, and Alberto Roncaglia
National Research Council, ITALY
- B2-249j SINGLE-CHIP INTEGRATION OF CMOS COMPATIBLE MEMS TEMPERATURE/HUMIDITY AND HIGHLY SENSITIVE FLOW SENSORS FOR HUMAN THERMAL COMFORT SENSING APPLICATION**
Izhar¹, Wei Xu², Hadi Tavakkoli¹, Jose Cabot¹, Xu Zhao¹, Mingzheng Duan¹, and Yi-Kuen Lee¹
¹Hong Kong University of Science and Technology, HONG KONG and ²Shenzhen University, CHINA
- B2-250j THEORETICAL AND EXPERIMENTAL STUDIES OF ELECTROCHEMICAL IMPEDANCE BASED MICRO CALORIMETRIC FLOW SENSOR**
Xuankai Xu¹, Zetao Fang¹, Jiufu Zheng¹, Bo Gao², and Wei Xu¹
¹Shenzhen University, CHINA and ²Hong Kong University of Science and Technology, CHINA
- B2-251j ULTRASENSITIVE SURFACE ACOUSTIC WAVE GAS SENSOR FOR TRACE VOCS DETECTION BASED ON SENSING MECHANISM OF GAS-LIQUID PHASE TRANSITION**
Xishan Guo^{1,2}, Jing Zhang², Yinong Chen¹, Yujie He¹, Liren Wang¹, and Yinfei Zheng^{1,2}
¹Zhejiang University, CHINA and ²Zhejiang Lab, CHINA

- B2-252j ANTI-FREEZING AND ANTI-DRYING ORGANOHYDROGEL COATED WITH GRAPHENE FOR HIGHLY SENSITIVE AND ULTRASTRETCHABLE STRAIN SENSING**
Xing Yang¹, Zixuan Wu¹, Yaoming Wei¹, Haojun Ding¹, Zhenyi Li¹, Kai Tao², and Jin Wu¹
¹Sun Yat-sen University, CHINA and ²Northwestern Polytechnical University, CHINA
- B3-335j 0.5MM×0.5MM HIGH-TEMPERATURE PRESSURE SENSORS FABRICATED WITH IC-FOUNDRY-COMPATIBLE PROCESS IN (100)/(111) HYBRID SOI WAFERS**
Peng Li^{1,2}, Jiachou Wang¹, and Xinxin Li^{1,2}
¹Chinese Academy of Sciences (CAS), CHINA and ²Fudan University, CHINA
- B3-336j A COMPACT HIGH-SENSITIVITY TEMPERATURE SENSOR USING AN ENCAPSULATED CLAMPED-CLAMPED MEMS BEAM RESONATOR**
Xuecui Zou¹, Sally Ahmed¹, Nizar Jaber², and Hossein Fariborzi¹
¹King Abdullah University of Science and Technology (KAUST), SAUDI ARABIA and ²King Fahd University of Petroleum and Minerals (KFUPM), SAUDI ARABIA
- B3-337j A MICROMACHINED RESONANT LOW-PRESSURE SENSOR USING AN ISLAND-DIAPHRAGM STRUCTURE**
Yu Zheng^{1,2}, Sen Zhang^{1,2}, Deyong Chen¹, Junbo Wang¹, and Jian Chen¹
¹Chinese Academy of Sciences (CAS), CHINA and ²University of Chinese Academy of Sciences (UCAS), CHINA
- B3-338j A RESONANT DIFFERENTIAL PRESSURE MICROSENSOR WITH COMPENSATIONS OF TEMPERATURE AND STATIC PRESSURE**
Chao Cheng^{1,2}, Yadong Li^{1,2}, Yulan Lu^{1,2}, Junbo Wang^{1,2}, Deyong Chen^{1,2}, and Jian Chen^{1,2}
¹Chinese Academy of Sciences (CAS), CHINA and ²University of Chinese Academy of Sciences (UCAS), CHINA
- B3-339j A SYSTEM BASED ON PIEZOELECTRIC MICROMACHINED ULTRASOUND TRANSDUCER FOR SOCIAL DISTANCING AND HUMAN-MACHINE INTERACTION**
Tao Ruan, Qi Wang, Qingda Xu, Bin Yang, and Jingquan Liu
Shanghai Jiao Tong University, CHINA
- B3-340j AN L-SHAPED 2-DIMENSIONAL PARTICLE VELOCITY SENSOR**
Zhezhen Zhu, Lingmeng Yang, Wenhan Chang, Chengchen Gao, Yilong Hao, and Zhenchuan Yang
Peking University, CHINA
- B3-341j FABRICATION OF ULTRA-THIN GLASS SHEET FOR ON-CHIP GLASS PRESSURE SENSOR**
Yapeng Yuan^{1,2}, Yaxiaer Yalikun^{2,3}, Yigang Shen^{1,2}, and Yo Tanaka^{1,2}
¹Osaka University, JAPAN, ²RIKEN, JAPAN, and ³Graduate School of Nara Institute of Science and Technology, JAPAN
- B3-342j FLEXIBLE SMART ACOUSTIC WAVE PATCHES FOR EFFECTIVE DETECTION AND ELIMINATION OF SURFACE CONDENSATION**
Qian Zhang^{1,2}, Yong Wang^{1,2,3}, Tao Wang¹, Dongsheng Li¹, Jin Xie¹, Hamdi Torun², and YongQing Fu²
¹Zhejiang University, CHINA, ²University of Northumbria, UK, and ³Westlake University, CHINA
- B3-343j IN-SITU DEPOSITION OF PRESSURE AND TEMPERATURE SENSITIVE E-SKIN FOR ROBOTIC APPLICATIONS**
Jarred W. Fastier-Wooller¹, Trung Hieu Vu¹, Canh-Dung Tran², Toan Dinh², Van Thanh Dau¹, and Dzung Viet Dao¹
¹Griffith University, AUSTRALIA and ²University of Southern Queensland, AUSTRALIA
- B3-344j OPTIMIZING HARBOR SEAL WHISKER MORPHOLOGY FOR DEVELOPING 3D-PRINTED FLOW SENSOR**
Xingwen Zheng¹, Amar M. Kamat¹, Vinayak S. Harish¹, Ming Cao¹, and Ajay Kottapalli^{1,2}
¹University of Groningen, NETHERLANDS and ²Massachusetts Institute of Technology, USA
- B3-345j POLYMER BASED ACOUSTIC WAVE SENSOR USING HOT EMBOSsing TECHNIQUE**
Jungyoon Kim, Tianyi Zhang, Quan Guan, John Sartori, Lauren Linderman, Vuk Mandic, and Tianhong Cui
University of Minnesota, USA

- B3-346j SELF-HEATING CMOS FLOW SENSOR**
Reshmi Waikhom, Lung-Jieh Yang, Horng-Yuan Shih, and Cai-Ruo Kuo
Tamkang University, TAIWAN
- B4-438j A CONFIGURABLE MEASUREMENT RANGE AND BANDWIDTH MEMS DISK RESONATOR GYROSCOPE**
Hao Wang, Jianbing Xie, and Honglong Chang
Northwestern Polytechnical University, CHINA
- B4-439j A MASS SENSOR BASED ON AN ALUMINUM NITRIDE MEMS OSCILLATOR FOR GAS SENSING APPLICATIONS**
Chien-Hao Weng, Gayathri Pillai, and Sheng-Shian Li
National Tsing Hua University, TAIWAN
- B4-440j ANALYSIS OF QUADRATURE AND FREQUENCY SPLIT IN A MEMS VIBRATING RING GYROSCOPE WITH STRUCTURAL IMPERFECTIONS**
Mehran Hosseini-Pishrobat, and Erdinc Tatar
Bilkent University, TURKEY
- B4-441j BIOMIMETIC ARTIFICIAL HAIR SENSOR ARRAY: TOWARDS SELF-HEALING SENSORS**
Minerva G. Vargas Gleason and Walter Lang
University of Bremen, GERMANY
- B4-442j DESIGN AND MODELLING OF A COMPLIANT CONSTANT-FORCE SURGICAL TOOL FOR OBJECTIVE ASSESSMENT OF OSSICULAR CHAIN MOBILITY**
Loïc Tissot-Daguette¹, Charles Baur¹, Axel Bertholds², Pere Llosas², and Simon Henein¹
¹*École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND* and ²*Sensoptic SA, SWITZERLAND*
- B4-443j DESIGN, MODELING AND VALIDATION OF A FLEXIBLE STRAIN SENSOR BASED ON MOIRE PATTERNS AND IMAGE PROCESSING**
Xiaoke Ding and Long Que
Iowa State University, USA
- B4-444j DEVELOPMENT OF A THERMO-COMPUTING PLATFORM**
Vahideh Shirmohammadli and Behraad Bahreyni
Simon Fraser University, CANADA
- B4-445j ELECTRIC FIELD SENSOR WITH STABILIZED INTERFEROMETRIC READOUT**
Hajrudin Besic¹, Andreas Kainz², Matthias Kahr², Wilfried Hortschitz², and Franz Keplinger¹
¹*Vienna University of Technology (TU Wien), AUSTRIA* and ²*Danube University Krems, AUSTRIA*
- B5-534j A COMPACT LOW-POWER MEM RESONATOR-BASED ANALOG TO DIGITAL CONVERTER WITH FEEDTHROUGH SIGNAL CANCELLATION**
Sally Ahmed, Xuecui Zou, and Hossein Fariborzi
King Abdullah University of Science and Technology (KAUST), SAUDI ARABIA
- B5-535j A KIRIGAMI MEMS VELOCITY ACOUSTIC TRANSDUCER**
Sangmin Oh¹, Benyamin Davaji², James Richie¹, Amit Lal², and Chung Hoon Lee¹
¹*Marquette University, USA* and ²*Cornell University, USA*
- B5-536j A NOVEL 0-5 KPA PIEZORESISTIVE PRESSURE SENSOR BASED ON PENINSULA STRUCTURE DIAPHRAGM**
Chengwu Gao, Fengyang Li, Fang Yang, and Dacheng Zhang
Peking University, CHINA
- B5-537j A ROBUST AUTOPARAMETRICALLY EXCITED ANGULAR RATE SENSOR**
Bhargav Gadhvi, Farid Golnaraghi, and Behraad Bahreyni
Simon Fraser University, CANADA

- B5-538j DEVELOPMENT OF WEIGHING SYSTEMS WITH IMPROVED DYNAMIC RANGE USING HIGH-RESOLUTION RESONANT MEMS STRAIN SENSORS**
Luca Belsito, Matteo Ferri, Luca Masini, and Alberto Roncaglia
National Research Council, ITALY
- B5-539j ELECTROMECHANICAL MODELING AND EXPERIMENTAL VALIDATION OF A DUAL-TRANSDUCTION ELECTRODYNAMIC WIRELESS POWER RECEIVER**
Miah A. Halim, Spencer E. Smith, Adrian A. Rendon-Hernandez, and David P. Arnold
University of Florida, USA
- B5-540j FABRICATION PROCESS AND EVALUATION OF PRINTED STRAIN SENSORS FOR DETECTION OF MAXIMUM STRAIN DIRECTION**
Daniel Zymelka and Takeshi Kobayashi
National Institute of Advanced Industrial Science and Technology (AIST), JAPAN
- B5-541j INVESTIGATIONS ON NONLINEARITIES OF ROOF TILE-SHAPE MODES FOR PRESSURE MEASUREMENT APPLICATIONS**
Tobias Zengerle¹, Michael Stopp¹, Abdallah Ababneh², and Helmut Seidel¹
¹Saarland University, GERMANY and ²Yarmouk University, JORDAN
- B5-542j MULTI-FREQUENCY THIN FILM HBAR MICROSENSOR FOR ACOUSTIC IMPEDANCE SENSING OVER THE GHZ RANGE**
Jesus Yanez, Arantxa Uranga, and Nuria Barniol
Universitat Autònoma de Barcelona, SPAIN
- B5-543j NUMERICAL STUDY AND EXPERIMENTAL INVESTIGATION OF AN ELECTROHYDRODYNAMIC DEVICE FOR INERTIAL SENSING**
Thu-Hang Nguyen¹, Ngoc Van Tran², Thien Xuan Dinh³, Canh-Dung Tran⁴, Van Thanh Dau⁵, Trinh Duc Chu¹, Hai Nguyen Hoang¹, and Tung Thanh Bui¹
¹Vietnam National University, VIETNAM, ²Academy of Military Science and Technology, VIETNAM, ³Explosion Research Institute Inc., VIETNAM, ⁴University of Southern Queensland, AUSTRALIA, and ⁵Griffith University, AUSTRALIA
- B5-544j RADIO FREQUENCY TEMPERATURE TRANSDUCERS BASED ON INSULATOR-METAL PHASE TRANSITION IN VO₂ AND GE-DOPED VO₂ ALD THIN FILMS**
Andrei A. Muller¹, Riyaz Khadar¹, Kham M. Niang², Guandong Bai², Elison Matioli¹, John Robertson², and Adrian M. Ionescu¹
¹École Polytechnique Fédérale de Lausanne (EPFL), SWITZERLAND and ²Cambridge University, UK
- B5-545j RF RING OSCILLATOR GRAPHENE-BASED STRAIN SENSOR**
Mohamed W. Tawfik, Abdelhameed Sharaf, and Mohamed Serry
American University, Cairo, EGYPT
- B5-546j ROBUST AND SENSITIVE THERMAL SENSOR USING THE 3-OMEGA-METHOD TO MEASURE THE CONCENTRATION OF BINARY MIXTURES**
Ralf E. Bernhardsgrütter^{1,2}, Christoph J. Hepp¹, Katrin Schmitt², and Jürgen Wöllenstein²
¹Innovative Sensor Technology IST AG, SWITZERLAND and ²University of Freiburg, GERMANY

k - RF MEMS, Resonators and Oscillators

- B2-253k AN ULTRA-BROADBAND CONTACT-CAPACITIVE RF MEMS SWITCH FOR 15-110GHZ APPLICATIONS**
Yulong Zhang¹, Huiliang Liu², and Zewen Liu¹
¹Tsinghua University, CHINA and ²China Academy of Space Technology, CHINA

- B2-254k DESIGN AND FABRICATION OF LAMB WAVE RESONATOR BASED ON 15% SCANDIUM-DOPED ALUMINUM NITRIDE THIN FILM**
Shuai Shao^{1,2,3}, Zhifang Luo^{1,2,3}, and Tao Wu¹
¹ShanghaiTech University, CHINA, ²Chinese Academy of Sciences (CAS), CHINA, and
³University of Chinese Academy of Sciences (UCAS), CHINA
- B2-262k SILICON BASED MEMS MANUFACTURING SOLUTIONS FOR EMERGING APPLICATIONS**
Tan Yen Aik, Soundara Pandian Mohanraj, Kantimahanti Arjun Kumar, and Madhaven Venkatesh,
Silterra Malaysia SDN BHD, MALAYSIA
- B3-347k BOOSTING Q OF <100> ALIGNED ALN-ON-SILICON LATERALLY VIBRATING RESONATORS BY WIDE ACOUSTIC BANDGAP PHONONIC CRYSTAL ANCHORS**
Renhua Yang¹, Jingui Qian¹, and Joshua E.-Y. Lee^{1,2}
¹City University of Hong Kong, HONG KONG and
²Agency for Science, Technology and Research (A*STAR), SINGAPORE
- B3-348k IN-HOUSE FABRICATION OF SOLENOID INDUCTOR AND MULTILAYER METAL CORE USING 3D PRINTING, SELECTIVE ELECTROLESS PLATING, ELECTROPLATING, AND PRESSING**
Jun Ying Tan, Abdulfeta Ahmed, and Jungkwun “JK” Kim
Kansas State University, USA
- B3-349k Ku-BAND FREQUENCY SELECTIVE 3D VERTICAL PILLAR ARRAY**
Saber Fahmida Shiba¹, Jun Ying Tan¹, Cheolbok Kim², Sung Jin Kim³, and Jungkwun Kim¹
¹Kansas State University, USA, ²Corning Inc., USA, and ³University of Miami, USA
- B4-446k TAPPING BANDWIDTH WIDENING OF CMOS-MEMS VIBRO-IMPACTING RESONATORS BASED ON DOUBLE-SIDED STOPPER STRUCTURES**
Chun-Pu Tsai, Hsuan-Wei Wang, and Wei-Chang Li
National Taiwan University, TAIWAN
- B4-447k TRACE GAS SPECTROSCOPY USING CAVITY OPTOMECHANICS**
Joris Baraillon, Pierre Labeye, and Laurent Duraffourg
Université Grenoble, FRANCE
- B4-458K BUBBLE MEMS® FOR AUGMENTED REALITY AND 3D SENSING**
Jan Przytarski and Benedikt Kläs
OQmented GmbH, GERMANY
- B5-547k CMOS COMPATIBLE ALUMINIUM NITRIDE SOLIDLY MOUNTED RESONATOR WITH AN INTEGRATED MICROHEATER FOR TEMPERATURE MODULATION**
Jan Peter Specht, Siavash Esfahani, Marina Cole, and Julian William Gardner
University of Warwick, UK
- B5-548k HIGH-Q GALLIUM NITRIDE THICKNESS-SHEAR BAW RESONATORS WITH REDUCED TEMPERATURE SENSITIVITY**
Mayur Ghatge¹, Mina Rais-Zadeh², and Roozbeh Tabrizian¹
¹University of Florida, USA and ²NASA Jet Propulsion Laboratory, USA

1 - Wearable and In-Vivo Medical Devices and Microsystems

- B2-255I OMNIDIRECTIONAL POLYHEDRAL ULTRASOUND TRANSDUCER FOR POWERING IMPLANTABLE MICRODEVICES**
Sayemul Islam¹, Moonchul Park¹, Seung Hyun Song², and Albert Kim¹
¹Temple University, USA and ²Sook Myung Women's University, KOREA

- B2-2561 RELIABLE CONNECTION BETWEEN STRETCHABLE ELECTRODES ON PDMS AND FLEXIBLE FLAT CABLE BY INTRODUCING THERMAL RELEASE TAPE**
Bowen Ji¹, Yuhao Zhou¹, Zhejun Guo², Kai Zhang¹, Minghao Wang³, Kai Tao¹, Huicheng Feng¹, Honglong Chang¹, and Jingquan Liu²
¹Northwestern Polytechnical University, CHINA, ²Shanghai Jiao Tong University, CHINA, and ³Hangzhou Dianzi University, CHINA
- B3-3501 A SILICON RECORDING PROBE WITH INTEGRATED AG/AGCL REFERENCE ELECTRODE FOR IN-SITU PH SENSING**
Longchun Wang¹, Zhejun Guo¹, Bowen Ji², Ye Xi¹, Bin Yang¹, and Jingquan Liu¹
Shanghai Jiao Tong University, CHINA and ²Northwestern Polytechnical University, CHINA
- B3-3511 A SILK-BASED MICRONEEDLE PATCH FOR CONTROLLED MULTI-DRUG DELIVERY IN GLIOMA TREATMENT**
Zijing Wang^{1,2}, Keyin Liu¹, Nan Qin¹, and Tiger H. Tao^{1,3,4,5}
¹Chinese Academy of Sciences (CAS), CHINA, ²Shanghai Normal University, CHINA, ³University of Chinese Academy of Sciences (UCAS), CHINA, ⁴ShanghaiTech University, CHINA, and ⁵Shanghai Research Center for Brain Science and Brain-Inspired Intelligence, CHINA
- B3-3521 BIOMIMIC ANTIBACTERIAL SENSING SILK BIO-PATCH**
Zhiheng Gao^{1,2}, Tiger H. Tao^{1,2,3,4}, and Keyin Liu¹
¹Chinese Academy of Sciences (CAS), CHINA, ²ShanghaiTech University, CHINA, ³University of Chinese Academy of Sciences (UCAS), CHINA, and ⁴Shanghai Research Center for Brain Science and Brain-Inspired Intelligence, CHINA
- B3-3531 DEVELOPMENT OF ATTACHABLE TRANSPARENT ULTRASONIC TRANSDUCER : A VERSATILE PHOTOACOUSTIC IMAGING DEVICE FOR BODY SENSOR NETWORK**
Ya-Han Liu, Chih-Ying Li, Li-Xiang Chen, Hsin-Yi Su, Yeong-Her Wang, and Chih-Hsien Huang
National Cheng-Kung University, TAIWAN
- B3-3541 SELF-HEALABLE SOFT IONOTRONIC SKIN FOR GESTURE RECOGNITION**
Yanghong Zhang^{1,2}, Mengwei Liu^{1,2}, Zhitao Zhou¹, Yujia Zhang^{1,2}, and Tiger H. Tao^{1,2,3,4}
¹Chinese Academy of Sciences (CAS), CHINA, ²University of Chinese Academy of Sciences (UCAS), CHINA, ³ShanghaiTech University, CHINA, and ⁴Shanghai Research Center for Brain Science and Brain-Inspired Intelligence, CHINA
- B4-4481 A BAND-AID TYPE SENSOR FOR WEARABLE PHYSIOLOGICAL MONITORING**
Thanh-Vinh Nguyen, Hironao Okada, Yusuke Takei, Atsushi Takei, and Masaaki Ichiki
National Institute of Advanced Industrial Science and Technology (AIST), JAPAN
- B4-4491 A COMPARATIVE EVALUATION OF A WEARABLE MEMS TACTILE SENSORS ARRAY AND A PHOTOPLETHYSMOGRAPHY SENSOR FOR ATRIAL FIBRILLATION DETECTION UNDER SITTING CONDITION**
Weijie Luo, Vikas Sharma, and Darrin J. Young
University of Utah, USA
- B4-4501 DEVELOPMENT OF A CLINICAL-GRADE OCT/OCT-ANGIOGRAPHY ENDOMICROSCOPE FOR IMAGING IN THE BLADDER**
Gerardo González-Cerdas¹, Yanis Taege¹, Felix Jund¹, Christoph Bauer², Dragan Sandic², Hans Zappe¹, and Çağlar Ataman¹
¹University of Freiburg, GERMANY and ²Blazejewski MEDI-TECH GmbH, GERMANY
- B4-4511 FLEXIBLE MICROELECTRODE ARRAYS WITH IN-PLANE SHIELDING FOR HIGH QUALITY ELECTROCORTICOGRAPHY RECORDING**
Feihong Xu^{1,2}, Zhitao Zhou¹, Haoyuan Li³, Xiaoling Wei^{1,2}, and Tiger H. Tao^{1,2,4,5}
¹Chinese Academy of Sciences (CAS), CHINA, ²University of Chinese Academy of Sciences (UCAS), CHINA, ³Fudan University, CHINA, ⁴ShanghaiTech University, CHINA, and ⁵Shanghai Research Center for Brain Science and Brain-Inspired Intelligence, CHINA

- B4-452I** **PIEZOELECTRICALLY AND CAPACITIVELY INTEGRATED WEARABLE DEVICE WITH STRETCHABLE ABILITY FOR MONITORING RAPID CHANGE IN GAIT AND PRECISELY STEP COUNTING**
Guo-Hua Feng¹ and Cheng-Yen Chiang²
¹National Tsing Hua University, TAIWAN and ²National Chung Cheng University, TAIWAN
- B4-453I** **POLYIMIDE (PI) FLEXIBLE HOLLOW MICRONEEDLE ARRAY PREPARED BASED ON OPTIMIZED DUAL-MOULDING PROCESSES**
Yingjie Ren, Junshi Li, Zhongyan Wang, Tingyu Li, Dong Huang, and Zhihong Li
Peking University, CHINA
- B4-454I** **SALT-PERCOLATED, ANTI-DRYING, ANTI-FREEZING AND TRANSPARENT HYDROGELS FOR STRETCHABLE TEMPERATURE AND STRAIN SENSOR**
Zixuan Wu¹, Haojun Ding¹, Yaoming Wei¹, Xing Yang¹, Kai Tao², Zhenyi Li¹, Wenxi Huang¹, and Jin Wu¹
¹Sun Yat-sen University, CHINA and ²Northwestern Polytechnical University, CHINA
- B5-549I** **3D PRINTED DIFFERENTIAL FORCE AND POSITION SENSOR BASED ON LOSSY TRANSMISSION LINES**
Martijn Schouten, Parth Patel, Remco Sanders, and Gijs Krijnen
University of Twente, NETHERLANDS
- B5-550I** **A TUNABLE MORPHING POLYELECTROLYTE SYSTEM FOR SMART OCULAR APPLICATIONS**
Ansu Sun, Sreepathy Sridhar, Xue Chen, Yifan Li, and Ben B. Xu
Northumbria University, UK
- B5-551I** **FINGER-WORN DENSE PRESSURE-SENSOR ARRAY FOR ARTERIAL PULSE ACQUISITION**
Jianzhong Chen^{1,2}, Yi Sun¹, Ke Sun¹, Rong Zheng³, Heng Yang¹, Yifei Zhong³, and Xinxin Li^{1,2}
¹Chinese Academy of Sciences (CAS), CHINA, ²ShanghaiTech University, CHINA, and ³Longhua Hospital, Shanghai University of Traditional Chinese Medicine, CHINA
- B5-552I** **OPTIMIZATION OF MOTOR-BASED ROTATIONAL TRIBOELECTRIC NANOGENERATORS (ROTENGs) FOR NEURAL STIMULATION**
Minseok Kang, Heejae Shin, Youngjun Cho, Jaeu Park, Jinwoong Jeong, and Sanghoon Lee
Daegu Gyeongbuk Institute of Science and Technology (DGIST), KOREA
- B5-553I** **OPTOGENETIC STIMULATOR WITH μ LED-COUPLED OPTICAL FIBER ON FLEXIBLE SUBSTRATE VIA 3D PRINTED MOUNT**
Keonghwan Oh^{1,2}, Yong-Ak Song^{1,2}, and Sohmyung Ha^{1,2}
¹New York University, USA and ²New York University, Abu Dhabi, UAE

m	Just-In Time
---	--------------

- B3-355m** **DEVELOPMENT OF A SUSPENDED NANOMESH HEATER PLATFORM FOR USE AS A GAS SENSOR BASED ON 3D METAL-OXIDE JUNCTION NETWORKS**
Taejung Kim, Wootaeek Cho, and Heungjoo Shin
Ulsan National Institute of Science and Technology (UNIST), KOREA
- B2-257m** **FABRICATION OF AIR COUPLED PMUTS WITH REDUCED FREQUENCY VARIATION ON A CHIP AND WAFER-LEVEL**
Abhilash Thanniyil Sebastian, Cyril Baby Karuthedath, James Dekker, Stefan Mertin, and Tuomas Pensala
VTT Technical Research Centre of Finland, FINLAND
- B3-356m** **MEMS-ACTUATED METASURFACE ALVAREZ LENS**
Zheyi Han, Shane Colburn, Arka Majumdar, and Karl F. Böhringer
University of Washington, USA

B2-258m STABILIZATION THREE-DIMENSIONAL REFRACTIVE-INDEX IMAGING SYSTEM OF SINGLE SUSPENSION CELL WITHOUT LABELING

Fei Liang, Peng Zhao, Yongxiang Feng, Huichao Chai, and Wenhui Wang
Tsinghua University, CHINA

B2-259m THROUGH SILICON VIA WITH A THIN CARBON CEILING FOR C-MEMS DEVICE PACKAGING

Jong-Hyun Kwak, Pijus Kundu, Beomsang Kim, Shin-Kwan Kim, Gun-Ho Kim, and Heungjoo Shin
Ulsan National Institute of Science and Technology (UNIST), KOREA

B2-260m LANGASITE-BASED SAW HIGH TEMPERATURE SENSOR OPERATING AT TEMPERATURES UP TO 1300C

Xiaorui Liang, Qiulin Tan, Xuhang Zhou, Jijun Xiong, and Wendong Zhang
North University of China