

# 20th International Symposium on Electrets

1-5 September 2025

Matsue, Japan



## ISE20 PROGRAM AT A GLANCE

<b>Mon Sep 1</b>	10:00-12:00	Tutorial	
	12:00-13:00	Lunch Break	
	13:00-15:20	Tutorial	
	15:20-16:50	Special Anniversary Program 100th Anniversary from Mototaro Eguchi's Carnauba-wax Electret	
	17:00	Transfer by bus to Welcome Reception	
<b>Tue Sep 2</b>	9:00-9:20	ISE20 Opening	
	9:20-10:05	Bernhard Gross Memorial Lecture Michael Wübbenhorst, KU Leuven	
	10:20-10:50	Plenary Talk 1 Pooi See Lee, Nanyang Technological University, Singapore	
	10:50-11:20	Break & Exhibit Inspection	
	11:20-12:20	Oral Session 1 Electret/Triboelectric Energy Harvesting 1	
	12:20-13:20	Lunch	
	13:20-14:20	Tribute session for Dr. Eiichi Fukada	
	14:20-15:05	Plenary Talk 2 Takashi Nakanishi, National Institute of Materials Science, Japan	
	15:05-15:40	Break & Exhibit Inspection	
	15:40-17:00	Oral Session 2 Piezoelectret /Electret 1	
	<b>Wed Sep 3</b>	9:00-9:45	Plenary Talk 3 Philippe Basset, Université Gustave Eiffel / ESIEE Paris, France
9:45 - 10:20		Break & Exhibit Inspection	
10:20-12:20		Oral Session 3A Electret/Triboelectric Energy Harvesting 2	Oral Session 3B Heterogenous/3D Electrets
12:20-13:20		Lunch	
13:20-14:05		Plenary Talk 4 Kenjiro Fukuda, Osaka University, Japan	
14:05-14:30		Break	
14:30-16:30		Poster Sesssion	
16:30-16:40		Break	
16:40-18:00		Oral Session 4A Measurement Methods for Electrets	Oral Session 4B New Applications
<b>Thu Sep 4</b>		9:00-9:45	Plenary Talk 5 Xin Chen, Shanghai Jiaotong University, China
	9:45 - 10:20	Break & Exhibit Inspection	
	10:20-12:20	Oral Session 5A Vital Sensing	Oral Session 5B Charge Stability
	12:30	Departure for Excursion and Banquet	
<b>Fri Sep 5</b>	9:00-10:40	Oral Session 6 Material Design with DFT	
	10:40-12:00	Oral Session 7 Piezoelectret /Electret 2	
	12:00-12:40	Invited Talk & ISE21 Announcement	
	12:40-12:50	Closing	

## WELCOME MESSAGE FROM THE CHAIRS

It is our great pleasure to welcome you to the 20th IEEE International Symposium on Electrets (ISE20) in Matsue, Japan. Matsue City, located in Shimane Prefecture, is a place whose history dates back to some of Japan's oldest mythology.

The IEEE International Symposium on Electrets series began in 1967 as "Electrical & Related Electrostatic Charge Storage Phenomena" and has been known as ISE since 1985. The present symposium continues this long-standing tradition of providing a vibrant forum for specialists to exchange ideas and engage in discussions on all aspects of electret materials and their applications.

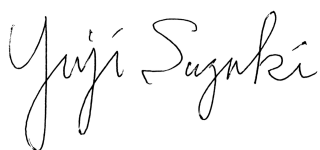
This year's program features six plenary talks, including the Bernhard Gross Memorial Lecture, 47 oral presentations, and 41 posters. A tutorial session with four lectures precedes ISE20, followed by a Special Session on the "100th Anniversary of Mototaro Eguchi's Carnauba-Wax Electret." In addition, a tribute session will be held on the opening day to honor Dr. Eiichi Fukada.

The past two years of preparing the 2025 edition of ISE have been both challenging and rewarding. We are deeply grateful to all authors for providing the essential building blocks of the symposium, and we acknowledge with appreciation the generous financial support from Matsue City and Shimane Prefecture.

Last but not least, we sincerely thank the exhibitors, benefactors, and the IEEE Dielectric & Electrical Insulation Society for their invaluable support. We also greatly appreciate the dedicated efforts of Echizen & Associates in managing this symposium.

We thank you for your participation and hope you will find both the scientific program and the social events stimulating and enjoyable.

Yuji Suzuki, General Chair  
Takashi Nakajima, Program Chair



## ISE20 OFFICIALS

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Yuji Suzuki, The Univ. of Tokyo

### Technical Program Chair

Takashi Nakajima, Tokyo University of Science

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Dorina Opris, Empa Federal Laboratories for Materials Science and Technology, Switzerland

Cheolmin Park, Yonsei University, Korea

Xunlin Qiu, East China University of Science and Technology, China

Dmitry Rychkov, Deggendor Institute of Technology, Germany

Heinz von Seggern, Technical University of Darmstadt, Germany

Gerhard Sessler, Technical University of Darmstadt, Germany

Yuji Suzuki, The University of Tokyo, Japan

Tofail Syed, University of Limerick, Ireland

Yumi Tanaka, Tokyo University of Science, Japan

Jan van Turnhout, Delft University of Technology, The Netherlands,

Jim West, Johns Hopkins University, USA

Michael Wübbenhorst, University of Leuven, Belgium

Qiming Zhang, The Pennsylvania State University, USA

Xiaoqing Zhang, Tongji University, China

# GENERAL INFORMATION

## CONFERENCE VENUE

Venue: Kunibiki Messe  
Kunibiki Messe (Shimane Prefectural Convention Center)  
1 Chome-2-1 Gakuenminami, Matsue, Shimane 690-0826  
Phone: +81-852-24-1111

## MEETING ROOM LOCATIONS

See the meeting space floor plan on the last page of this program.

Plenary Presentations	International Conference Hall
Parallel Session A	International Conference Hall
Parallel Session B	Small Hall
Poster Session	Multipurpose Hall
Exhibits	Multipurpose Hall
Breaks	Multipurpose Hall (except Monday - breaks in the foyer)
Lunch	Multipurpose Hall (except Monday - lunches served in the foyer)
Registration Desk	International Conference Hall Foyer

## REGISTRATION & INFORMATION DESK HOURS

Registration and Information Desk will be open during the times listed below.

Monday September 1	9:00 – 17:00
Tuesday September 2	8:30 – 17:00
Wednesday September 3	8:30 – 18:00
Thursday September 4	8:30 – 13:00
Friday September 5	08:30 – 13:00

## TECHNICAL PROGRAM INFORMATION

All oral sessions including the plenary talks and special sessions will take place in the International Conference Hall.

During Parallel Oral Sessions, A sessions, (eg. Oral 3A, etc.) will be held in International Conference Hall and B sessions, (eg. Oral 3B, etc.) will be held in Small Hall.

Posters will be on display in Multipurpose Hall during the week of ISE20.

Date and Time of Poster Session: Wednesday 3 September 14:30 - 16:30

Poster session will be divided into two parts

Part 1 14:30-15:30 For posters with odd number (eg. P1, P3, P5, etc)

Part 2 15:30-16:30 For posters with even number (eg. P2, P4, P6, etc)

During the presentation time, authors will stand at their poster for questions and discussion.

## **WIRELESS INTERNET SERVICE**

Wireless Internet is available throughout the ISE20 area.

- Select "Senyou1" from the list of available networks.
- Once prompted, the password is "ise20"

## **CELLULAR PHONES AND ALARMS**

As a courtesy to our speakers and other attendees, please silence any cellular phones and alarms during sessions.

## **VIDEO RECORDING**

Video recordings are strictly prohibited in the sessions, poster presentations and the exhibit area.

## **LUGGAGE ROOM**

A luggage room will be available on Friday only and will be located in the Registration Desk area. Please note that this room is unsecured. Leave personal property at own risk.

## **IN CASE OF EMERGENCY**

In case of an emergency please contact the Registration desk personnel or meeting room assistants in the session rooms.

## **WELCOME RECEPTION**

**Monday September 1 at Matsue Horikawa Local Beer Hall**

**Bus will leave from the venue at 17:00**

## **EXCURSION AND CONFERENCE BANQUET**

**Thursday September 4**

**Bus will leave from the venue at 12:30**

The tour specially organized for the ISE 20 participants will first take a stop at Inasa Beach known for the myths of Kuniyuzuri (the transfer of the land) and Kunibiki (the pulling of the land). Followed by the visit to Izumo-taisha ("Izumo Grand Shrine"), one of the oldest and the most important Shinto shrines in Japan.

After the visit to the shrine, we will take a ride on Ichibata Electric Railway, a local train that connects Izumo and Matsue. We will have the train cars to ourselves with cold drinks while and enjoying the magnificent view of the lake Shinji and surrounding mountains.

After the train ride, the conference banquet will be held at Yushien where you can enjoy Japanese dinner with the traditional performance of Iwami Kagura, dance and music.

# ISE20 FINAL PROGRAM

Star (★) indicates finalists for the Dilip Das-Gupta Memorial Award

## Monday September 1

**Tutorial** 10:00-14:50

Chair: Takashi Nakajima, Tokyo University of Science

- 10:00-10:10     **Opening**  
Yuji Suzuki, University of Tokyo
- 10:10-11:00    **Piezoelectrets Based on Space-charge Polymer Electrets**  
Xiaoqing Zhang, Tongji University
- 11:00-11:10    Break
- 11:10-12:00    **Quantum Chemical Analysis and Materials-Informatics Techniques Toward Dielectric Engineering**  
Masahiro Sato, University of Tokyo

12:00-13:00    Lunch Break

**Tutorial** 13:00-14:50

Chair: Xiaoqing Zhang, Tongji University

- 13:00-13:50    **Molecular Design of Fluorinated Polymer Electret with Deep Charge Trap**  
Yuji Suzuki, University of Tokyo
- 13:50-14:00    Break
- 14:00-14:50    **Electrets Using Ion-Conduction Ceramics**  
Yumi Tanaka, Tokyo University of Science
- 14:50-15:20    Coffee break

**Special Anniversary Program** 15:20-16:50

Chair: Yuji Suzuki, University of Tokyo

### 100th Anniversary from Mototaro Eguchi's Carnauba-wax Electret

- 15:20-15:30    **Opening**
- 15:30-15:50    **A Short History of Mototaro Eguchi**  
Yuji Suzuki, University of Tokyo
- 15:50-16:10    **Surface Potential Measurement of Eguchi's Electret in 2024**  
Yoshinobu Yasuno, Kobayashi Institute of Physical Research
- 16:10-16:30    **Mototaro Eguchi and Physics in Early 20th-Century Japan**  
Hiroto Kono, National Museum of Nature and Science
- 16:30-16:50    **Early Electret Research after Eguchi's Seminal Work**  
Reimund Gerhard, University of Potsdam
- 17:00            Transfer by bus to Welcome Reception

## Tuesday September 2

- 9:00-9:20      **Opening**  
Yuji Suzuki, University of Tokyo  
Takashi Nakajima, Tokyo University of Science
- 9:20-10:05      **Bernhard Gross Memorial Lecture**  
Chair: Yuji Suzuki, University of Tokyo
- Molecular Dipoles in Electrets: Probing Static and Dynamic Polar Order by Dielectric and Pyroelectric Techniques**  
Michael Wübbenhorst, KU Leuven
- 10:05-10:50      **Plenary Talk 1**  
Chair: Takashi Nakajima, Tokyo University of Science
- Polarization Induced Charge Trapping in Energy Harvesting and Sensing**  
Pooi See Lee, Nanyang Technological University, Singapore
- 10:50-11:20      Break & Exhibit Inspection
- 11:20-12:20      **Oral Session 1 Electret/Triboelectric Energy Harvesting 1**  
Chair: Fei Wang, Southern University of Science and Technology
- 1.1 PHYSICAL RESERVOIR COMPUTING USING AN ELECTRET-BASED MEMS VIBRATIONAL ENERGY HARVESTER**  
Hiroyuki Mitsuya<sup>1</sup>, Hisayuki Ashizawa<sup>1</sup>, Masahiro Morita, Takuma Ishiguro<sup>1</sup>, Gen Hashiguchi<sup>2</sup>, Hiroshi Toshiyoshi<sup>3</sup>  
<sup>1</sup>Saginomiya Seisakusho, Inc., <sup>2</sup>Shizuoka University, <sup>3</sup>The University of Tokyo
- 1.2 FINE-TUNING DIELECTRIC AND PIEZOELECTRIC PROPERTIES OF POLYVINYLIDENE FLUORIDE: TOWARDS HIGH-PERFORMANCE HYBRID PIEZOELECTRIC/TRIBOELECTRIC NANOGENERATORS**  
Wee Chen Gan  
Xiamen University Malaysia
- 1.3 ELECTRET-BASED WIND ENERGY HARVESTER AND ITS APPLICATION TO ENVIRONMENTAL MONITORING**  
Tomoya Miyoshi<sup>1</sup>, Esteban Balasque<sup>2</sup>, Yuji Suzuki<sup>1</sup>  
<sup>1</sup>The University of Tokyo, <sup>2</sup>Université Savoie Mont Blanc
- 12:20-13:20      Lunch
- 13:20 - 14:20      **Tribute session for Dr. Eiichi Fukada**  
Chair: Reimund Gerhard, University of Potsdam
- A Tribute to Eiichi Fukada, Father of Piezoelectric Polymer**  
T. Furukawa, Kobayashi Institute of Physical Research
- From Luigi Galvani to Eichii Fukada and Beyond: Electricity in Biological Systems as it Sparks Today**  
Syed Tofail, University of Limerick
- 14:20-15:05      **Plenary Talk 2**  
Chair: Yuji Suzuki, University of Tokyo
- Soft Electrets based on  $\pi$ -Liquids and  $\pi$ -Gels**  
Takashi Nakanishi, National Institute of Materials Science, Japan

15:05-15:40 Break & Exhibit Inspection

15:40-17:00 **Oral Session 2 Piezoelectret /Electret 1**

Chair: Syed Tofail, University of Limerick

**★2.1 EXTENSION OF PIEZOELECTRET THEORY AND ITS IMPORTANCE FOR THE DEVELOPMENT OF PIEZOELECTRET METAMATERIALS**

Qianqian Hu<sup>1</sup>, Tongyan Zhang<sup>1</sup>, Gerhard Martin Sessler<sup>2</sup>, Heinz von Seggern<sup>2</sup>, Alexander Anton Altmann<sup>2</sup>, Mario Kupnik<sup>2</sup>, Zhiming Shi<sup>1</sup>, Xiaoqing Zhang<sup>1</sup>

<sup>1</sup>Tongji University, <sup>2</sup>Technische Universität Darmstadt

**2.2 HIGHLY STRETCHABLE MULTIPHASE COMPOSITE PIEZOELECTRET WITH LARGE LONGITUDINAL AND TRANSVERSE PIEZOELECTRIC SENSITIVITY FOR SELF-POWERED BIOSENSORS**

Tiantian Gao<sup>1</sup>, Xunlin Qiu<sup>1,2</sup>, Yanfeng Lyu<sup>1</sup>, Jian Li<sup>1</sup>, Zheng Hu<sup>1,2</sup>, Yanxun Xiang<sup>1</sup>, Fu-Zhen Xuan<sup>1</sup>

<sup>1</sup>East China University of Science and Technology, <sup>2</sup>Shanghai Institute of Aircraft Mechanics and Control

**2.3 ELECTRIC DOUBLE-LAYER ELECTRETS FORMED BY IN-SITU POLYMERIZATION OF IONIC LIQUIDS FOR IONTRONIC APPLICATIONS**

Shimpei Ono<sup>1</sup>, Kazumoto Miwa<sup>2</sup>

<sup>1</sup>Tohoku University, <sup>2</sup>Central Research Institute of Electric Power Industry

**2.4 SURFACE POTENTIAL OF CARNAUBA WAX ELECTRET 100 YEARS AFTER ITS FABRICATION**

Yoshinobu Yasuno<sup>1</sup>, Norio Okubo<sup>1</sup>, Masahiro Maejima<sup>2</sup>, Hiroto Kono<sup>2</sup>, Yuji Suzuki<sup>3</sup>

<sup>1</sup>Kobayasi Institute of Physical Research, <sup>2</sup>National Museum of Nature and Science,

<sup>3</sup>The University of Tokyo

## Wednesday September 3

9:00-9:45

**Plenary Talk 3**

Chair: Takashi Nakajima, Tokyo University of Science

**Conditioning Systems for Tribo-electret Kinetic Energy Harvesters**

Philippe Basset, Université Gustave Eiffel / ESIEE Paris, France

9:45 - 10:20

Break & Exhibit Inspection

10:20-12:20

**Oral Session 3A Electret/Triboelectric Energy Harvesting 2**

Chair: Peng Fang, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences

**3A.1 SURFACE POTENTIAL EVALUATION OF SELF-ASSEMBLED ELECTRETS FORMED IN MICRO-CAVITY STRUCTURES**

Yuichiro Sunagawa<sup>1</sup>, Shuma Kawamura<sup>1</sup>, Kuki Kawazu<sup>1</sup>, Takuro Seno<sup>1</sup>, Yuya Tanaka<sup>2</sup>, Daisuke Yamane<sup>1</sup>

<sup>1</sup>Ritsumeikan University, <sup>2</sup>Gunma University

**3A.2 TWO-AXIS 3D-PRINTED PLA-BASED VIBRATION ENERGY HARVESTER**

D. Flachs<sup>1</sup>, S. Zhukov<sup>2</sup>, A. A. Altmann<sup>2</sup>, H. von Seggern<sup>2</sup>, M. Kupnik<sup>2</sup>, C. Thielemann<sup>2</sup>

<sup>1</sup>Technische Hochschule Aschaffenburg, <sup>2</sup>Technische Universität Darmstadt,

**3A.3 FRICTION-DRIVEN SURFACE ENGINEERING OF P(VDF-TRFE)/BATIO<sub>3</sub> FOR DUAL ENERGY HARVESTING AND ANTIBACTERIAL ACTION**

K. O'Dwyer, K. Roy, C. O'Mahony, D. Barnana, S.A.M. Tofail, Ehtsham-U Haq  
University of Limerick

**3A.4 DNA-HELIX-INSPIRED KIRIGAMI NANOGENERATOR WITH DUAL-FUNCTION ENERGY ABSORPTION AND CONVERSION**

Xinhui Mao, Kai Tao  
Northwestern Polytechnical University

**3A.5 COUPLED ELECTROSTATIC-CIRCUIT SIMULATION OF TRIBOELECTRIC NANOGENERATORS**

Qingyang Zhou, Takashi Ikuno  
Tokyo University of Science

**★3A.6 SELF-POWERED PIEZO-/PYROELECTRIC INTEGRATED DEVICES USING ELECTROSPUN FLUOROPOLYMER ELECTRET FIBERS**

Krittish Roy<sup>1,2</sup>, Sujoy Kumar Ghosh<sup>3</sup>, Syed A. M. Tofail<sup>1</sup>  
<sup>1</sup>University of Limerick, <sup>2</sup>CURAM, Research Ireland Centre for Medical Devices, <sup>3</sup>SRM Institute of Science and Technology

10:20-12:20

**Oral Session 3B Heterogenous/3D Electrets**

Chair: Dmitry Rychkov, Deggendorf Institute of Technology

**3B.1 INDUCING PYROELECTRICITY IN AMORPHOUS POLAR POLYSILOXANES BY ADDITION OF TITANIA**

Thulasinath Raman Venkatesan<sup>1</sup>, Patrick M. Danner<sup>1,2</sup>, Dorina M. Opris<sup>1,2</sup>  
EMPA - Swiss Federal Laboratories for Materials Science and Technology, <sup>2</sup>ETH Zürich

**3B.2 ADDITIVE MANUFACTURING OF FERROELECTRETS WITH HIGH PIEZOELECTRIC PERFORMANCE**

Ningzhen Wang<sup>1</sup>, He Zhang<sup>1</sup>, Jan van Turnhout<sup>2</sup>, Reimund Gerhard<sup>3</sup>, Yang Cao<sup>4</sup>  
<sup>1</sup>Beijing Forestry University, <sup>2</sup>Delft University of Technology, <sup>3</sup>University of Potsdam, <sup>4</sup>University of Connecticut

**3B.3 MOS STRUCTURE WITH HIGH-POTENTIAL ELECTRET FOR NON-VOLATILE MEMORY DEVICES**

Masaya Iwanaga<sup>1</sup>, Hiroaki Honma<sup>1</sup>, Hiroshi Toshiyoshi<sup>2</sup>, Akio Uesugi<sup>1</sup>, Koji Sugano<sup>1</sup>, Yoshitada Isono<sup>1</sup>  
<sup>1</sup>Kobe University, <sup>2</sup>The University of Tokyo

**3B.4 DESIGN AND OPTIMIZATION OF PIEZOELECTRIC COAXIAL FIBER SENSORS**

Lian Zhou, Tongyan Zhang, Xiaoqin Zhang  
Tongji University

**3B.5 NANOFIBROUS BASED PIEZOELECTRIC MATERIALS FOR ENERGY HARVESTING APPLICATIONS**

Leonardo Gasperini, Davide Fabiani  
University of Bologna

**3B.6 ONE-DIMENSIONAL POSITION DETECTION USING CABLE PIEZOELECTRIC SENSOR**

Yusuke Yamazoe<sup>1</sup>, Kento Ise<sup>2</sup>, Sayaka Kohno<sup>2</sup>, Korenari Higashi<sup>2</sup>, Daisuke Terashi<sup>2</sup>, Junei Kobayashi<sup>1</sup>, Takashi Nakajima<sup>1</sup>  
<sup>1</sup>Tokyo University of Science, <sup>2</sup>Fujikura Ltd

12:20-13:20

Lunch

13:20-14:05

**Plenary Talk 4**

Chair: Martin Kaltenbrunner, Johannes Kepler University Linz

**Potentials and Challenges of Ultraflexible Electronics**

Kenjiro Fukuda, Osaka University, Japan

14:05-14:30

Break

14:30 - 16:30 **Poster Session**

### **Charge Injection, Transport and Trapping**

**P01** INFLUENCE OF CORONA DISCHARGES ON THE SURFACE CONDITION OF POLYMER INSULATORS: CHARGE INJECTION, TRANSPORT AND TRAPPING PROCESSES IN POLYMER.

C. Zogning, J. Lobry, F. Moïny  
University of Mons

★ **P02** REAL CHARGE TRAPPING IN HYDROXYAPATITE THIN FILMS PREPARED BY PULSED LASER DEPOSITION

Veronika Hidaši Turiničová<sup>1</sup>, Magdaléna Poláčková<sup>1</sup>, Viktor Šroba<sup>1</sup>, Tomáš Roch<sup>1</sup>, Hema Dinesh Barnana<sup>2</sup>, E. Ul-Haq<sup>2</sup>, Syed A.M. Tofail<sup>2</sup>, Maroš Gregor<sup>1</sup>  
<sup>1</sup>Comenius University in Bratislava, <sup>2</sup>University of Limerick

**P03** ULTRALOW K COVALENT ORGANIC FRAMEWORKS ENABLING HIGH FIDELITY SIGNAL TRANSMISSION AND HIGH TEMPERATURE ELECTRO MECHANICAL SENSING

Donglin Chen<sup>1</sup>, Juncheng Sha<sup>1</sup>, Xudong Mei<sup>1</sup>, An Ye<sup>1</sup>, Zhengping Zhao<sup>1</sup>, Xunlin Qiu<sup>1,2</sup>, Xiaoyun Liu<sup>1</sup>, Yueping Niu<sup>1</sup>, Peiyuan Zuo<sup>1</sup>, Qixin Zhuang<sup>1</sup>  
<sup>1</sup>East China University of Science and Technology, <sup>2</sup>Shanghai Institute of Aircraft Mechanics and Control

**P04** ELECTRET CHARGE STABILITY OF POLYPROPYLENE HOMOPOLYMER BLENDS WITH POLAR POLYETHYLENE COPOLYMERS AT LOW COMONOMER CONTENT

Anna Guliakova<sup>1,2</sup>, Arthur Henderyckx<sup>3,4</sup>, Peng Fang<sup>5</sup>, Frederik Desplentere<sup>4</sup>, Dmitry Rychkov<sup>1</sup>  
<sup>1</sup>Deggendorf Institute of Technology, <sup>2</sup>Herzen State Pedagogical University of Russia, <sup>3</sup>Beaulieu International Group, <sup>4</sup>KU Leuven, <sup>5</sup>Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences

★ **P05** OPEN-CIRCUIT PHOTO-STIMULATED DISCHARGE MEASUREMENT OF POLYMER ELECTRETS

Rui Wang, Yuji Suzuki  
The University of Tokyo

**P06** CARNAUBA WAX ELECTRET CHARGED WITH SOFT X-RAY

Kuniko Suzuki, Yuji Suzuki  
The University of Tokyo

### **Thermally Stimulated Current and Dielectric Relaxation**

**P07** COMPARISON OF ELECTRET CHARGE STABILITY FOR POLYPROPYLENE ELECTRET FILMS WITH DIFFERENT CLASSES OF CHARGE ENHANCING ADDITIVES

Arthur Henderyckx<sup>1,2</sup>, Anna Guliakova<sup>3,4</sup>, Frederik Desplentere<sup>2</sup>, Dmitry Rychkov<sup>4</sup>  
<sup>1</sup>Beaulieu International Group, <sup>2</sup>KU Leuven, <sup>3</sup>Herzen State Pedagogical University, <sup>4</sup>Deggendorf Institute of Technology

**P08** COMPARISON OF THERMALLY STIMULATED CURRENT IN ALICYCLIC AND BISPHENOL A-BASED EPOXY RESINS

Hana Kim<sup>1</sup>, Masayuki Hikita<sup>1</sup>, Masahiro Kozako<sup>1</sup>, Minoru Ueshima<sup>2</sup>  
<sup>1</sup>Kyushu Institute of Technology, <sup>2</sup>Daicel Corporation

## **Nanoscale Measurements of Electrostatic Phenomena**

### **P09 LOCAL THERMOELECTRIC CHARACTERIZATION OF SINGLE-WALLED CARBON NANOTUBES USING AFM-BASED CURRENT MEASUREMENTS**

Kanta Watanabe, Junei Kobayashi, Takashi Nakajima  
Tokyo University of Science

## **Ferroelectric, Piezoelectric & Pyroelectric Phenomena**

### **P10 CRYSTOOLS: CUSTOM PYTHON PACKAGE FOR HIGH-THROUGHPUT ELECTROMECHANICAL CALCULATIONS OF FUNCTIONAL MOLECULAR CRYSTALS**

Pierre-André Cazade, Sarah Guerin, Tofail Syed  
University of Limerick

### **P11 SHEAR MODE PIEZOELECTRICITY IN ORIENTED CELLULOSE DIACETATE FILMS DETERMINED BY PIEZOELECTRIC RESONANCE MEASUREMENT**

Haruya Okawa<sup>1</sup>, Hidekazu Kodama<sup>2</sup>, Junei Kobayashi<sup>1</sup>, Takashi Nakajima<sup>1</sup>  
<sup>1</sup>Tokyo University of Science, <sup>2</sup>Kobayasi Institute of Physical Research

### **★P12 DIELECTRIC AND PIEZOELECTRIC PROPERTIES OF POLYACRYLONITRILE AND POLY (ACRYLONITRILE/VINYL ACETATE) COPOLYMER.**

Miu Umeda<sup>1</sup>, Hidekazu Kodama<sup>2</sup>, K. Yoshitake<sup>1</sup>, Junei Kobashi<sup>1</sup>, Takashi Nakajima<sup>1</sup>  
<sup>1</sup>Tokyo University of Science, <sup>2</sup>Kobayasi Institute of Physical Research

### **P13 Study of the Electrocaloric Effect of Nematic Liquid Crystal**

Tianrui Deng, Tomoya Miyoshi, Yuji Suzuki  
The University of Tokyo, Japan

### **P14 PIEZOELECTRICITY IN PARALLEL-ALIGNED SILK SHEETS**

Aina Kitajima<sup>1</sup>, Norio Okubo<sup>1</sup>, Hidekazu Kodama<sup>2</sup>, Junei Kobayashi<sup>1</sup>, Takashi Nakajima<sup>1</sup>  
<sup>1</sup>Tokyo University of Science, <sup>2</sup>Kobayasi Institute of Physical Research

## **Ferro- and Piezoelectrets**

### **P15 PIEZOELECTRET-BASED DUAL-MODE FLEXIBLE PRESSURE SENSOR FOR ACCURATE WRIST PULSE SIGNAL ACQUISITION IN HEALTH MONITORING**

Tiantian Gao<sup>1</sup>, Xunlin Qiu<sup>2</sup>, Peng Xu<sup>1</sup>, Zheng Hu<sup>2</sup>, Jianjun Yan<sup>1</sup>, Y. Xiang<sup>1</sup>, Fu-Zhen Xuan<sup>1</sup>  
<sup>1</sup>East China University of Science and Technology, <sup>2</sup>Shanghai Institute of Aircraft Mechanics and Control

### **P16 HETEROGENEOUS MULTIPHASE COMPOSITE PIEZOELECTRET: FABRICATION AND PIEZOELECTRIC PERFORMANCE**

Shiyu Wu<sup>1</sup>, Xunlin Qiu<sup>2</sup>, Tiantian Gao<sup>1</sup>, Zheng Hu<sup>2</sup>, Yanxun Xiang<sup>1</sup>  
<sup>1</sup>East China University of Science and Technology, <sup>2</sup>Shanghai Institute of Aircraft Mechanics and Control

### **P17 TUNABLE PIEZOELECTRIC EFFECT IN PIEZOELECTRET METAMATERIALS WITH A DOUBLE-V STRUCTURE**

Zhiming Shi<sup>1</sup>, Qianqian Hu<sup>1</sup>, Alexander Anton Altmann<sup>2</sup>, Heinz von Seggern<sup>2</sup>, Gerhard Martin Sessler<sup>2</sup>, Mario Kupnik<sup>2</sup>, Sergey Zhukov<sup>2</sup>, Xingchen Ma<sup>1</sup>, Xiaoqing Zhang<sup>1</sup>  
<sup>1</sup>Tongji University, <sup>2</sup>Technische Universität Darmstadt

### **P18 PIEZOELECTRIC PROPERTIES OF CORONA-POLED NYLON FILMS**

Tomoya Shimada<sup>1</sup>, Hidekazu Kodama<sup>2</sup>, Junei Kobayashi<sup>1</sup>, Takashi Nakajima<sup>1</sup>  
<sup>1</sup>Tokyo University of Science, <sup>2</sup>Kobayasi Institute of Physical Research

**P19 THREE-DIMENSIONAL POSITION DETECTION USING CELLULAR POLYPROPYLENE ELECTRET ULTRASONIC MICROPHONE**

Ryosuke Yoshii<sup>1</sup>, Yoshinobu Yasuno<sup>2</sup>, Hidekazu Kodama<sup>2</sup>, Junei Kobayashi<sup>1</sup>, Takashi Nakajima<sup>1</sup>

<sup>1</sup>Tokyo University of Science, <sup>2</sup>Kobayasi Institute of Physical Research

**Bioelectrets**

**P21 BIO-PIEZOELECTRICITY HYDROGELS USED FOR BIOMEDICAL APPLICATIONS**

Songzhi Lin<sup>1</sup>, Kai Tao<sup>1,2</sup>

<sup>1</sup>Zhejiang University, <sup>2</sup>Hangzhou Global Scientific and Technological Innovation Centre

**★ P22 GLYCINE PIEZOELECTRIC THIN FILMS BASED ON PHYSICAL VAPOR DEPOSITION.**

Shixuan Xu, Kao Tai

Zhejiang University

**P23 INVESTIGATION OF ELECTRET PROPERTIES OF POLY(LACTIC ACID)/CURCUMIN COMPOSITE FILMS**

Temenuzhka Yovcheva, Asya Viraneva, Maria Marudova, Aleksandar Grigorov, Sofia Milenkova, Rumen Mladenov

University of Plovdiv

**P24 CURCUMIN CONTAINING PLA BASED FILMS AS ACTIVE FOOD PACKAGING MATERIALS**

Asya Viraneva, Maria Marudova, Aleksandar Grigorov, Sofia Milenkova, Temenuzhka Yovcheva, Rumen Mladenov

University of Plovdiv

**Electrets in Organic Electronics**

**P27 SURFACE POTENTIAL DISTRIBUTION OF MICRO-PATTERNED SELF-ASSEMBLED ELECTRETS**

Ryu Kumagai<sup>1</sup>, Yuichiro Sunagawa<sup>2</sup>, Kyoichi Kakuno<sup>2</sup>, Yuji Takata<sup>1</sup>, Takaaki Suzuk<sup>1</sup>, Daisuke Yamane<sup>2</sup>, Yuya Tanaka<sup>1</sup>

<sup>1</sup>Gunma University, <sup>2</sup>Ritsumeikan University

**P28 PHOTOINDUCED DEPOLARIZATION IN TRIS(8-HYDROXYQUINOLINATO)ALUMINIUM THIN FILMS: DEPENDENCE ON IRRADIATION WAVELENGTH**

Ayato Jingu<sup>1</sup>, Daisuke Yamane<sup>2</sup>, Yuji Takata<sup>1</sup>, Takaaki Suzuki<sup>1</sup>, Yuya Tanaka<sup>1</sup>

<sup>1</sup>Gunma University, <sup>2</sup>Ritsumeikan University

**Electro-electrets**

**P29 SENSITIVITY CHANGE IN THE ELECTRET CONDENSER MICROPHONE WITH LONG-TERM PRESERVATION**

Yoshinobu Yasuno

Kobayasi Institute of Physical Research

**★ P30 ELECTRET PROPERTIES OF MG-DOPED YAG CERAMICS AND THEIR DEPENDENCE ON MICROSTRUCTURE AND CONDUCTIVITY**

Shota Hasegawa<sup>1</sup>, Suguru Iwasaki<sup>1</sup>, Takuya Igashira<sup>2</sup>, Noriyuki Matsushita<sup>2</sup>, Kazuhiko Kano<sup>2</sup>, Yumi Tanaka<sup>1</sup>

<sup>1</sup>Tokyo University of Science, <sup>2</sup>DENSO CORPORATION

## **Electrostatic/Electret Energy Harvesting**

### **P31 ABNORMALITY DIAGNOSIS SYSTEM COMBINING VIBRATION ENERGY HARVESTING AND BATTERY**

Daiki Watanabe, Junei Kobayashi, Takashi Nakajima  
Tokyo University of Science

### **P32 ENHANCED OUTPUT PERFORMANCE OF TRIBOELECTRIC NANOGENERATOR USING IONIC LIQUID-EMBEDDED PDMS FILM**

Masahiro Otsude, Qingyang Zhou, Yumeng Zheng, Kentaro Kinoshita, Takashi Ikuno  
Tokyo University of Science

### **P33 EFFECT OF CURE TEMPERATURE ON CHARGE RETENTION OF AMORPHOUS FLUORINATED POLYMER FOR ENERGY HARVESTING**

Kenta Ichikawa, Seiya Fujino, K. Kumi, Kenta Iitani, Kohji Mitsubayashi  
Institute of Science Tokyo

### **P34 POLYMER-ION INTERACTION IN ALL-FIBER TRIBOELECTRIC NANOGENERATORS FOR WIRELESS HEALTHCARE APPLICATIONS**

H. Duo<sup>1</sup>, Y. Liu<sup>1</sup>, Haitao Wang<sup>2</sup>, Hiroaki Sakamoto<sup>1</sup>  
<sup>1</sup>University of Fukui, Japan, <sup>2</sup>Nagoya University

### **★P35 A BUILT-IN CHARGING ELECTRET ROTATIONAL ENERGY HARVESTER FOR KINETIC ENERGY AT ULTRA-LOW FREQUENCY**

Weihan Xu<sup>1</sup>, Shanghao Gu<sup>1</sup>, Anxin Luo<sup>1,2</sup>, Kai Tao<sup>3,4</sup>, Fei Wang<sup>1</sup>  
<sup>1</sup>Southern University of Science and Technology, <sup>2</sup>Dongguan University of Technology, <sup>3</sup>Northwestern Polytechnical University in Shenzhen, <sup>4</sup>Northwestern Polytechnical University

### **P36 DEVELOPMENT OF STRETCHABLE POLYMER ELECTRET BY KNEADING**

Ryuki Horibe, Kuniko Suzuki, Rui Wang, Yuhan Gu, Tomoya Miyoshi, Yuji Suzuki  
The University of Tokyo

### **P37 INFLUENCE OF AMBIENT HUMIDITY ON THE CHARGE EMISSION BEHAVIOR OF OXYHYDROXYAPATITE ELECTRETS**

K. Yamano<sup>1</sup>, S. Iwasaki<sup>1</sup>, T. Igashira<sup>2</sup>, N. Matsushita<sup>2</sup>, K. Kano<sup>2</sup>, Y. Tanaka<sup>1</sup>  
<sup>1</sup>Tokyo University of Science, <sup>2</sup>DENSO CORPORATION

## **Soft Actuators & Sensors**

### **P38 FUNDAMENTAL STUDY ON COMPRESSIVE STRESS MEASUREMENT USING GEL SENSOR BASED ON HIGH VOLTAGE DIELECTRIC SPECTRUM ANALYSIS**

Tomohiro Kawashima<sup>1</sup>, Daichi Kono<sup>1</sup>, Hayato Katsume<sup>1</sup>, Rentaro Takeuchi<sup>1</sup>, Muneaki Kurimoto<sup>2</sup>  
<sup>1</sup>Toyohashi University of Technology, <sup>2</sup>Nagoya University

### **★P39 EVALUATION OF CONTRACTION FAILURE OF HASEL ACTUATOR BASED ON DIELECTRIC SPECTRUM ANALYSIS**

Rentaro Takeuchi, Tomohiro Kawashima  
Toyohashi University of Technology

### **P40 FLEXIBLE MULTILAYER PVDF PIEZOELECTRIC ACTUATOR**

Padraig Doyle, Sarah Guerin  
University of Limerick

### **★P41 GAIT DETECTION SYSTEM USING PIEZOELECTRIC MATRIX SENSOR**

Yuki Sakurai, Kohei Watanabe, Junei Kobayashi, Takashi Nakajima  
Tokyo University of Science

**Others**

**P42 HIGH SENSITIVITY OF TWO-DIMENSIONAL SNS2 GAS SENSOR BASED ON MSM STRUCTURE**

Jone F. Chen<sup>1</sup>, Qi-Rui Qiu<sup>1</sup>, Sheng-Po Chang<sup>2</sup>

<sup>1</sup>National Cheng Kung University, <sup>2</sup>National Kaohsiung University of Science and Technology

**P43 ECOFRIENDLY REMOVAL OF AS FROM DRINKING WATER USING A PLASMA**

Jan van Turnhout, Roos Goedhart  
Delft University of Technology

16:30-16:40 Break

- 16:40-18:00    **Oral Session 4A Measurement Methods for Electrets**  
 Chair: Feipeng Wang, Chongqing University
- ★**4A.1** PHASE MODULATED ELECTRO-ACOUSTIC REFLECTOMETRY  
 Qiyao Tang, Maréchal, Emmanuel Géron, Stephane Holé  
 ESPCI Université PSL
- ★**4A.2** INVESTIGATION OF MAXIMUM SURFACE POTENTIAL IN THIN SILICON  
 OXIDE ELECTRETS FILM DOPED WITH POTASSIUM IONS  
 Masahiro Mikasa<sup>1</sup>, Hiroaki Honma<sup>1</sup>, Hiroshi Toshiyoshi<sup>2</sup>, Akio Uesugi<sup>1</sup>, Koji Sugano<sup>1</sup>,  
 Yoshitada Isono<sup>1</sup>  
<sup>1</sup>Kobe University, <sup>2</sup>The University of Tokyo
- 4A.3** GATEKEEPER OF CHARGE DYNAMICS THE ROLE OF ELECTRODE  
 MATERIALS IN SPACE CHARGE INJECTION  
 Shuojie Gao, Dongjun Yang, Yewen Zhang, Feihu Zheng, Zhikang Yuan  
 Tongji University
- 4A.4** EXAMINATION OF ELECTRET MATERIALS ON THE NANOSCALE BY AFM  
 Georg Papastavrou  
 University of Bayreuth
- 16:40-18:00    **Oral Session 4B New Applications**  
 Chair: Takeo Furukawa, Kobayasi Institute of Physical Research
- 4B.1** ELECTROSTATIC MULTILAYER SYSTEMS: CHALLENGES AND  
 OPPORTUNITIES FOR SOFT TRANSDUCERS  
 D. Preninger, M. Kaltenbrunner  
 Johannes Kepler University Linz
- ★**4B.2** BIO-PIEZOELECTRIC PEPTIDE ASSEMBLIES FOR BIOMEDICAL  
 APPLICATIONS  
 Haoran Wu, Kai Tao  
 Zhejiang University
- 4B.3** ECOFRIENDLY DISINFECTION OF SEEDS USING PLASMA TECHNOLOGY  
 Jan van Turnhout, Luutzen Wymenga, Henk van Zeijl  
 Delft University of Technology
- 4B.4** PYROELECTRIC ENHANCED SOLAR WATER SPLITTING BY  
 FERROELECTRIC-SEMICONDUCTOR HYBRID-MEMBRANES  
 Sebastian Engel, Michael Kober, David Smykalla, Michael Stelter  
 Friedrich-Schiller-Universität Jena

## Thursday September 4

- 9:00-9:45    **Plenary Talk 5**  
 Chair: Michael Wubbenhorst, KU Leuven
- Modulate Electrocaloric Effect via High Polar Entropy Ferroelectrics**  
 Feihong Du, Shanghai Jiaotong University, China
- 9:45 - 10:20    Break & Exhibit Inspection
- 10:20-12:20    **Oral Session 5A Vital Sensing**  
 Chair: Davide Fabiani, DEI - University of Bologna

**5A.1 HIGHLY CONDUCTIVE NANOFIBROUS NETWORKS ALLOW EFFICIENT INTERFACES FOR ENERGY STORAGE AND BIOELECTRICAL SIGNAL SENSING.**

Huimin He

Nanjing University of Aeronautics and Astronautics

**5A.2 BIODEGRADABLE AND TRANSPARENT SOFT PIEZOELECTRET FILM WITH AN ARTIFICIALLY-FOAMED AIR CELL FOR SUSTAINABLE BIOELECTRONICS**

Xingchen Ma, Xiaoqing Zhang

Tongji University

**5A.3 DEVELOPMENT OF A SELF-POWERED ELECTRICAL ARTIFICIAL SKIN WITH CONTACT POSITION DETECTION**

Wataru Hijikata, Akira Matsumoto, Kazuho Satoh, Kenta Ichikawa

Institute of Science Tokyo

**5A.4 APPLICATION OF PIEZOELECTRIC BRAIDED CORD TO APNEA SYNDROME ANALYSIS SYSTEMS**

Yoshiro Tajitsu<sup>1</sup>, Saki Shimada<sup>2</sup>, Takuto Nonomura<sup>2</sup>

<sup>1</sup>Kansai University, <sup>2</sup>Nishikawa Co., Ltd.

**5A.5 AN ELECTRET-BASED WRIST-WORN PRESSURE SENSOR FOR HUMAN PULSE AND BLOOD PRESSURE MONITORING**

Yiming Li, Yingyu Zhou, Jia Lu

Harbin Institute of Technology

**5A.6 INVESTIGATION OF THE SPEED RECOGNITION PERFORMANCE OF A BATTERY-FREE MOTION RECOGNITION SYSTEM USING THE HUMAN BODY AS AN ELECTRODE**

Haruki Higoshi, Keisuke Yamashita, Hiroki Shigemune,

Shibaura Institute of Technology

10:20-12:20

**Oral Session 5B Charge Stability**

Chair: Xunlin Qiu, East China University of Science and Technology

**5B.1 CHARGE STABILIZATION IN MELTBLOWN POLYPROPYLENE FOR FILTER APPLICATIONS**

Dmitry Rychkov<sup>1</sup>, Anna Guliakova<sup>1</sup>, Fabian Ertl<sup>2</sup>, Andreas Baderschneider<sup>2</sup>, Andreas Seeberger<sup>2</sup>

<sup>1</sup>Deggendorf Institute of Technology, <sup>2</sup>IREMA-Filter GmbH

**5B.2 PROTECTION-BASED IMPROVEMENT OF THE STABILITY OF SPONTANEOUSLY-POLARIZED ELECTRETS**

Seyedali Sabzpoushan, Henry Juncker, Peter Woias

University of Freiburg

**5B.3 SENSING MECHANISM OF FORCE SENSOR USING SURFACE SHEAR PIEZOELECTRICITY**

Norio Okubo<sup>2</sup>, Aina Kitajima<sup>1</sup>, Hidekazu Kodama<sup>2</sup>, Takashi Nakajima<sup>1</sup>

<sup>1</sup>Tokyo University of Science, <sup>2</sup>Kobayasi Institute of Physical Research

**5B.4 INFLUENCE OF SURFACE ROUGHNESS CONTROL ON LOW - PRESSURE DC FLASHOVER BEHAVIOR OF EPOXY**

Jiazhi Gao, Feipeng Wang

Chongqing University

**5B.5 ELUCIDATION OF MICROSCOPIC PIEZOELECTRICITY OF POLED POLAR POLYMERS**

Hidekazu Kodama<sup>1</sup>, Tomohiro Sugano<sup>2</sup>, Takashi Nakajima<sup>2</sup>, Takeo Furukawa<sup>1</sup>

<sup>1</sup>Kobayasi Institute of Physical Research, <sup>2</sup>Tokyo University of Science

**5B.6 DEEP CRATER-LIKE BREAKDOWN SITES IN METAL INSULATOR METAL STRUCTURES**

Herbert Kliem  
Saarland University

12:30 Departure for Excursion and Banquet

## Friday September 5

9:00-10:20 **Oral Session 6 Material Design with DFT**

Chair: Michael Wubbenhorst, KU Leuven

**6.1 DATA-DRIVEN INSIGHTS INTO PIEZOELECTRICITY: MACHINE LEARNING FOR SUSTAINABLE MATERIALS**

Robert Guest, Sarah Guerin  
University of Limerick

**6.2 QUANTUM CHEMICAL ANALYSIS OF PERFLUORINATED ELASTOMER ELECTRET**

Yuhan Gu, Rui Wang, Kuniko Suzuki, Yuji Suzuki  
The University of Tokyo

**6.3 CORRELATING ACTUATOR FLEXIBILITY TO SINGLE CRYSTAL DFT PREDICTIONS OF MECHANICAL STABILITY**

Niamh Hickey, Pierre Cazade, Sarah Guerin  
University of Limerick

**6.4 HIERARCHICAL DESCRIPTOR-BASED PREDICTION OF POLYMER ELECTRET PROPERTIES**

Hiroto Yokoyama, Takahiro Umemoto, Akiko Kumada, Masahiro Sato  
The University of Tokyo

10:40-12:00 **Oral Session 7 Piezoelectret /Electret 2**

Chair: Wee Chen Gan, Xiamen University Malaysia

**7.1 DIELECTRIC RELAXATION AND CHAIN DYNAMICS IN CRYSTALLINE, NONCRYSTALLINE AND MOLTEN PHASES OF HOMO AND COPOLYMERS OF VINYLIDENEFLUORIDE**

Takeo Furukawa, Hidekazu Kodama  
Kobayasi Institute of Physical Research

**7.2 APPLICATION OF ELECTRIC FIELD USING ION-CONDUCTING CERAMIC ELECTRETS**

S. Iwasaki<sup>1</sup>, S. Hasegawa<sup>1</sup>, T. Igashira<sup>2</sup>, N. Matsushita<sup>2</sup>, K. Kano<sup>2</sup>, Y. Tanaka<sup>1</sup>  
<sup>1</sup>Tokyo University of Science, <sup>2</sup>DENSO CORPORATION

**Cancelled: 7.3 PYROELECTRIC PROFILING (LIMM) OF SAMPLES ON A SUBSTRATE**

B. Ploss<sup>1</sup>, D. Smykalla<sup>1,2</sup>

<sup>1</sup>University of Applied Sciences Jena, <sup>2</sup>Friedrich-Schiller-University Jena

**7.4 CURE KINETICS AND COMPLEX RELAXATION BEHAVIOR IN SELF-HEALING THERMOREVERSIBLE DIELECTRIC ELASTOMERS**

J. Mangialetto<sup>1</sup>, N. Van den Brande<sup>1</sup>, M. Wübbenhorst<sup>2</sup>  
<sup>1</sup>Vrije Universiteit Brussel, <sup>2</sup>KU Leuven

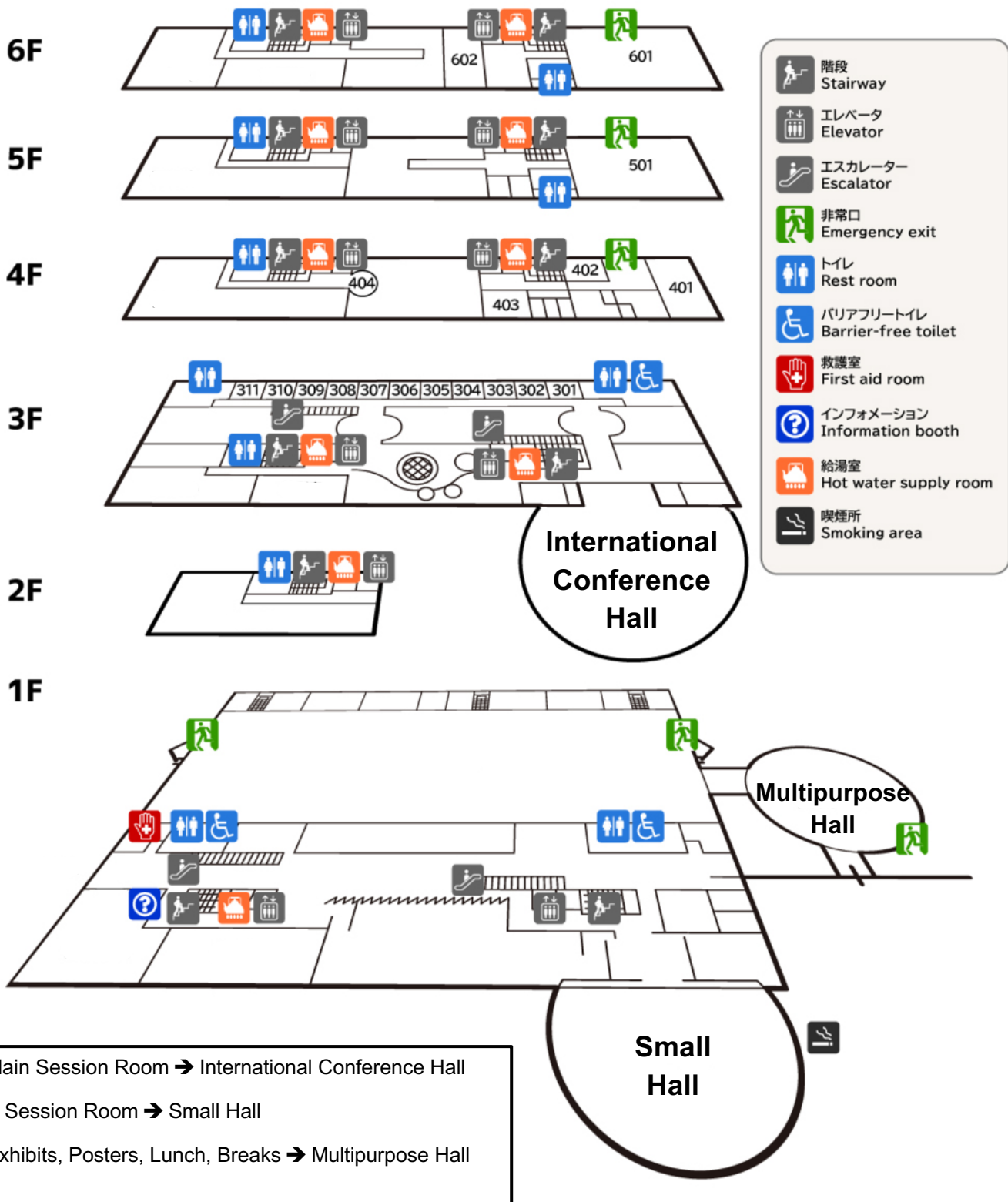
12:00-12:40 **Invited Talk & ISE21 Announcement**

Chair: Yuji Suzuki, University of Tokyo

Y. Cao, University of Connecticut

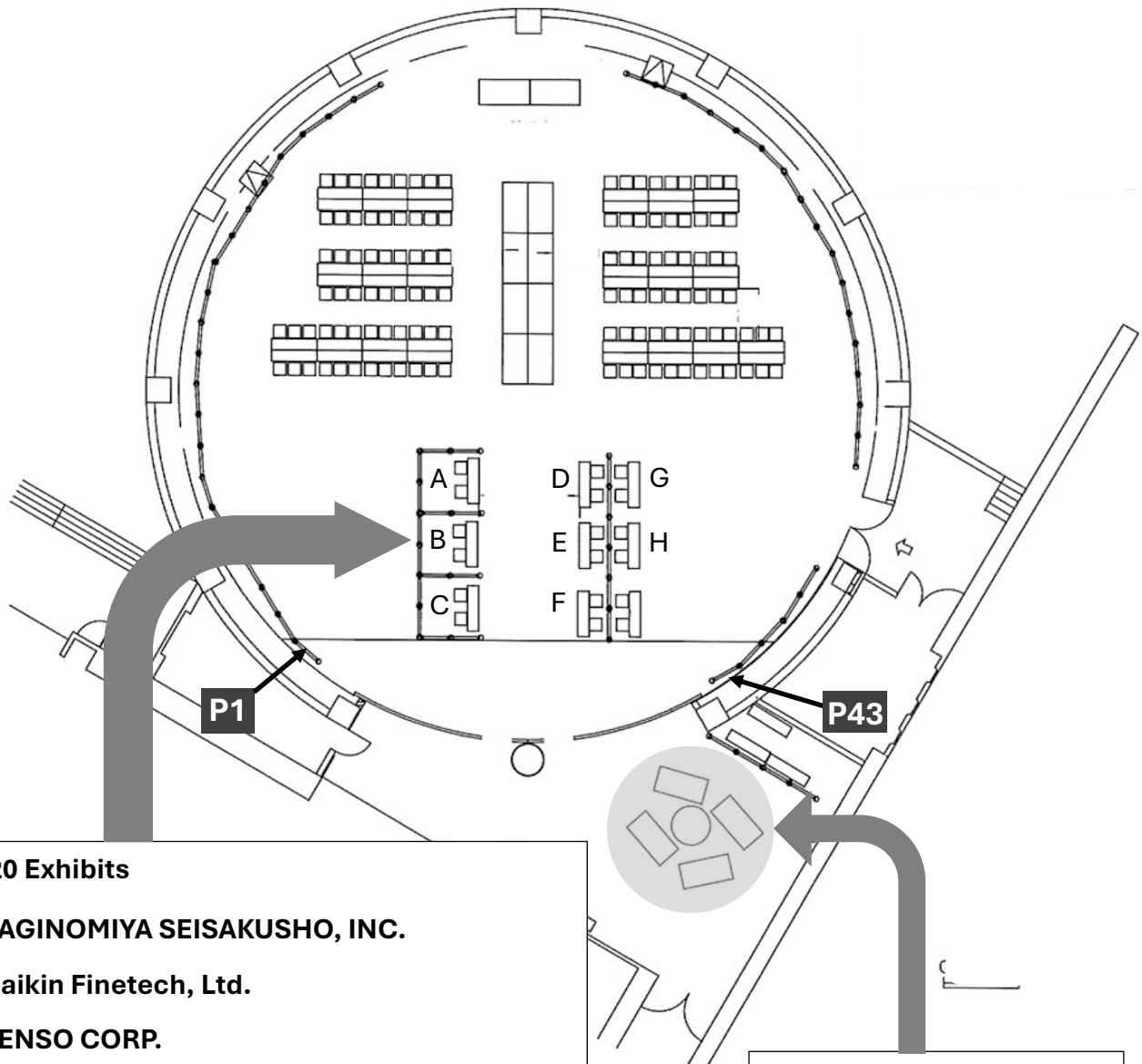
12:40-12:50 **Award Ceremony and Closing**

# Kunibiki Messe Floor Layouts



# Multi Purpose Hall

Posters along the wall are numbered clockwise from P1 to P43



## ISE20 Exhibits

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- B Daikin Finetech, Ltd.
- C DENSO CORP.
- D Seika Digital Image Corporation
- E OWL Solution Co., Ltd
- F Audio Tech
- G Replica of Eguchi's Carnauba-wax Electret
- H IEEE DEIS

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Demonstration  
Tuesday & Wednesday  
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