2020 INTERNATIONAL SYMPOSIUM ON ELECTRICAL INSULATING MATERIALS

September 13-17, 2020

Virtual web conference, alternative to

Waseda University, Tokyo, Japan

Sponsored by
IEEJ Technical Committee on Dielectrics and Electrical Insulation

Technically Co-sponsored by
IEEE Dielectrics and Electrical Insulation Society
IEEE DEIS Japan Chapter

Co-sponsored by
Kagami Memorial Laboratory for Materials Science and Technology, Waseda University

Supported by
JSPS KAKENHI (Grant No.: JP20HP0303)
Support Center for Advanced Telecommunications Technology Research (SCAT) Foundation
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LOCAL ARRANGEMENT COMMITTEE

Chair: N. Hirai (Waseda University)
Members: H. Miyake, Y. Ehara (Tokyo City University), S. Matsumoto (Shibaura Institute of Technology)
Workshop on “Space Charge Measurement Using the PEA Method -Advanced Measurement Techniques and Typical Applications-”

Chair: Y. Tanaka (Tokyo City University)
Assist. coordinator: H. Uehara (Kanto Gakuin University)

Special planned session’s coordinator

K. Kato (Niigata University): Session SP1, Organic Electronics and Bioelectronics for Innovative Devices
Y. Ehara (Tokyo City University) and K. Uchida (Chubu Electric Power Co., Inc.): Session SP3, Asset Management and Diagnosis for Electric Power Equipment
M. Kozako (Kyushu Institute of Technology) and T. Imai (Toshiba Infrastructure Systems & Solutions Co.): Session CS: Emerging Technologies for Next Generation Electrical Insulating Material and Its Application
Conference Information

ISEIM 2020 was scheduled to be held on September 13-17, 2020, in Waseda University in Tokyo after the Olympic and Paralympic Games Tokyo 2020. However, owing to COVID-19 coronavirus pandemic, the organizing committee of ISEIM 2020 decided to refrain from holding the symposium in Waseda University, but to hold ISEIM 2020 as a web conference. We believe that, even in the web conference of ISEIM 2020, the participants will have fruitful time for presentation, discussion and information exchange on electrical insulating materials in the similar level as the past ISEIMs (1st: Tokyo in 1995, 2nd: Toyohashi in 1998, 3rd: Himeji in 2001, 4th: Kitakyushu in 2005, 5th: Yokkaichi in 2008, 6th: Kyoto in 2011, 7th: Niigata in 2014 and 8th: Toyohashi in 2017). The organizing committee cordially invites you to participate in the conference.

Conference style

The conference will be held as an on-line conference using Zoom and Microsoft Teams in parallel. Zoom will only be used for real-time events such as memorial and plenary lectures, workshop as well as some organized sessions. Other normal presenters are required to upload their materials to the Teams platform prior to the conference. The first step to set up the Teams account is to receive the guest account invitation email from secretariat via email. The secretariat will send the invitation email to the registration purchasers' address after the confirmation of the payment.

Each paper is required not only the acceptance of the final full paper after the conference review process but also the submission of the presentation materials made as a Microsoft PowerPoint file or a PDF file. A final full paper submission, submission of the presentation electronic file, and complete payment of the presenter's registration fee are the essential requirement for the final acceptance of the paper and for the procedure to publish the paper on the IEEE Xplore after the conference. Also submission of the signed copyright transfer form is required, but the authors are considered to agree the copyright transfer written on the copyright transfer form if they will not submit the copyright transfer form and have submitted their paper.

Main Topics

1. Space charge, surface and interfacial phenomena
2. Electrical properties of dielectrics and measurement and testing techniques
3. Nanotechnology for dielectrics
4. Inorganic and functional dielectric materials
5. Organic thin films and electronics
6. Dielectric materials for electronics and telecommunication
7. Dielectric properties of biological objects and biodielectronics
8. Converter surges
9. Partial discharge
10. Asset management for dielectrics applied apparatus
11. Insulation design, reliability, aging and degradation, their detection and monitoring
12. Polymeric insulators and outdoor insulation
13. Eco-friendly dielectric materials and recycling
14. Electrical insulation phenomena and charging under cosmic and radiological environment
15. Electrical insulation for power electronics
16. Computational techniques for dielectrics
17. Collaborate work with industries and universities
18. Novel technologies for dielectrics

Workshop on "Space Charge Measurement Using the PEA Method -Advanced Measurement Techniques and Typical Applications-"

An English book entitled “Space Charge Measurement Using the PEA Method -Advanced Measurement Techniques and Typical Applications-” has just been published from IEEJ as its new technical report. The book is edited by the Investigating R&D Committee for Standardization of Calibration and Advanced Measurements for Space Charge Distribution at High Temperature Using the Pulsed Electro-acoustic Method (Chair: Prof. Y. Tanaka, 2017-2020), and it is composed of the investigations by noted Japanese expert committee members.

As you know, there is a lot of measurement results obtained using the PEA are published on Journal and conference papers. The PEA measurement system was established by Prof. Takada, and many Japanese researchers have been concerning its improvements. The book introduces the fundamental of the measurement, applications, and typical results by the Japanese researchers, and it must be useful for many researches in this field. To let you know about the book, an on-line delivered workshop (live!) about the book will be held in ISEIM 2020. Participants of the ISEIM 2020 are supposed to get the book (pdf version) with a discount rate, and participants who bought the book can attend in the workshop.

In the ISEIM workshop, Japanese expert committee members will provide information on the PEA method various environments and many applied methods. Application to the workshop can be made through the conference registration system, which will be disclosed soon.

Note: audiences who want to take part in this program are needed to apply through the registration system.

MVP (Mutual Visiting type Presentation) Session

This session aims to encourage and improve the presentation and discussion abilities of attendees, and give a chance to discuss other presentations. Attendees are required to present their scientific findings not only to the attendees who do not present in the session but also to the other presenters of the session. All the attendees of the MVP session that is all the presenters of the MVP session have rights of voting the good presentation, definite replay in discussion, and beautiful poster. The excellent presenter(s) will be awarded.

SS (Industry) Session

Responding to a great demand from many Japanese companies in this field, Sun-Shine session (SS session, Industry session) has been held in a series of ISEIM, to promote the relation and exchange between industry such as private companies and academic communities such as universities. This session will be good oppotunity to introduce your company, by introducing developed and developing technologies and products to attendees especially young researchers such as university students and graduate students.
Japan-Korea Young Researcher Exchange Program

Technical committees on dielectrics and electrical insulations both in Japan and Korea have started new exchange program for young researchers since ISEIM 2014. Winners are selected from domestic annual conferences in both countries, and get a chance to have presentation under the financial aid. ISEIM and its base, SEEIMAS (Symposium on Electrical and Electronic Insulating Materials and Applications in Systems) have selected total three Japanese students to let them have presentation in Korean conference. We have also welcomed the same number of Korean students to introduce their research activities to Japanese participants. This year’s Korean winner’s presentation will be held in Session B, Space Charge on Dielectric Interface and Simulation.

Language

The working language of the symposium is English. All printed matter will appear in English.

Registration Fee

Registration fee including is 8,000 JPY (Japanese yen) and ¥5,000 for students with valid IDs. Manuscript publication fee is 5,000 JPY per manuscript. This fee will be deducted from the registration fee for the authors presenting their papers, although the maximum deduction is 5,000 JPY per attendee. Attendees having more than one paper should choose another publication fee for the rest of the papers. Exception is only adopted if invited lecturers present by him/herself. Lecturers for Inuishi memorial, plenary, and Korea-Japan exchange program are the invited lecturers.

The payment is very important for all the responsible authors, because publication of your paper on the conference proceedings requires submission of your paper in PDF file and the payment of your registration fee. The paper will not be published if you will fail your registration fee payment until the deadline, that is 11:59:59 am, 5th Aug., 2020 (JST). The publication of your paper on IEEE Xplore requires the publication of your paper on the proceedings of ISEIM2020 and submission of your presentation materials.

<table>
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<th>Items</th>
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<tr>
<td>Mandatory registration</td>
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<td>Overpage fee (per page)</td>
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<tr>
<td>Workshop Ticket</td>
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a) Services will be transferred as emails which include the set of ID/PW to download the proceeding data as well as the invitation letter to join Microsoft Teams, which is the conference platform for normal sessions. Note that printed proceeding booklets are not published in this conference. Due date of service transfer: At the conference (Sept. 13, 2020 - Sept. 17, 2020). Receipt is issued from the Treasury vice chair.

b) This is for authors who have more than one paper. This fee will be deducted from the registration fee for the authors presenting their papers, although the maximum deduction is 5,000 JPY per attendee. IMPORTANT: papers neither registered nor paid the publication fee will be deleted from the symposium proceedings, and also will not
disclosed on IEEE Xplore.

c) An English book entitled “Standarization of Calibration and Advanced Measurements of Space Charge Distribution at High Temperature Using the Pulsed Electro-acoustic Method”, published from IEEJ, is included in this ticket with a special discount.

**Digest Reports from Investing R&D Committees and Cooperative Research Committee**

The TC-DEI in IEEJ runs investigating R&D committees and cooperative research committee that organize several technical meetings a year. Their roles are to survey trends in basic and applied insulating technology broadly both in Japan and overseas, and to scientifically classify the technological needs shared by various areas of new technology development as well as the problems involved. The proceedings data of ISEIM 2020 includes digest results of these efforts.

**System structure of ISEIM2020**

- **Conference web site**
  http://www2.iee.or.jp/~adei/ISEIM2020/

- **Registration site**
  https://adei.ocnk.net/
  ‘On site’ registration is opened till Sept. 17.

- **Conference proceedings**
  Available on the publishing company, JPC Co., Ltd.
  URL, ID and password is sent from Treasury Chair.

- **Microsoft Teams virtual conference**
  Available for entire conference period
  Invitation letter is sent to the registration purchaser from Online System Chair.
  No presentations use real-time system on Teams.

- **Zoom real time event**
  Available only for the session time
  Meeting ID and password will be disclosed on the conference web site.

The participant guide is also available on the conference web site.

**IMPORTANT:** Saving, screen-capturing, sound-recording, video-recording, as well as redistributing the transmitted materials with any and all methods are strictly prohibited.
The Way of Presentation

All papers accepted for ISEIM 2020 must be presented at the conference.

1. General information

✓ Presentation material file is strongly recommended to be pptx file or ppsx format by Microsoft PowerPoint, if you DO NOT ALLOW the other attendees TO DOWNLOAD your presentation material.

✓ The presentation file prepared by pptx and ppsx files are not downloadable. The organizing committee asks all attendees not to record the presentation material with any and all methods, however, please be kindly accepted it is impossible to prohibit undesirable recording by the other attendees completely.

✓ If you ALLOW the other attendees TO DOWNLOAD your presentation material, mp4 and pdf files are also acceptable. Note that mp4 and pdf files ARE DOWNLOADABLE, so be careful in your preparation, not including some secured data and results and so on.

✓ All the presentation materials such as pptx file and ppsx file should be uploaded according to the notice on the lowest part of this page.

✓ Limitation of the presentation material are corresponding to the session type, which will be shown later.

✓ All the presentation materials uploaded to the conference specified Microsoft Teams shall be deleted on Sept. 28 by the conference secretary.

2. Session structure

ISEIM2020 consists of following five kinds of sessions. Presentation material in each session can be prepared in different way, and the discussion in each session has different way.

a. Invited sessions: Inuishi Memorial lecture and Plenary lecture.

b. Normal sessions: presentation number of A-1 to G-6 on the program.

c. Special planned sessions: presentation number of SP1-1 to SP3-6 and CS-1 to CS-8.

d. Industry session, i.e. Sun Shine session (SS session): presentation number of SS-1 to SS-8.

e. MVP sessions: presentation number of VA-1 to VL-8.

2a. Oral sessions

✓ The invited sessions are held as real-time based sessions using ZOOM, and electronically recorded lectures will be released on the conference specified Microsoft Teams, which will be available until Sept. 25, 2020.

✓ Only a few questions will be accepted after the real-time lecture on ZOOM. Additional questions are accepted on the QA sheet that is linked on the "Team" - "Real time events" on the conference specified Microsoft Teams. No questions on the chat of ZOOM are acceptable. You will refer the e-mail sent from the conference secretary to access the conference specified Microsoft Teams.

✓ The additional questions accepted on the QA sheet will be answered from the corresponding lecturer until Sept. 23, 2020. You will visit the QA sheet to confirm the answers.

2b. Normal sessions

✓ All the presentations nominated in the normal sessions should be electronically submitted, with their file size of 300 MB or less. Thus, the presenter may include movies and voice on the presentation material until the file
size limit and presentation duration shown in the next item. Any electronic file with file size of more than 300 MB is NOT ACCEPTABLE.

✓ The presentation material should be prepared with an image of an oral presentation with 20 minutes for its presentation duration excluding Q&A time.

✓ The presentation material should be uploaded until Sept. 4, 2020.

✓ The discussion term is from Sept. 14, 2020 to Sept. 25, 2020, which is conducted on the QA sheet, not on the chat, of the conference specified Microsoft Teams. All presenters are required to respond to questions to their presentation within three (3) days.

2c. Special planned sessions and collaborative special session

✓ The special planned sessions have two way of presentations and discussions;
  ➢ Special Planned Session 1 (SP1-1 to SP1-6) is a real-time session held in Zoom on Sept. 16. Only a few questions will be acceptable on the real-time event, and other questions are acceptable on the QA sheet.
  ➢ Other special sessions (SP2-1 to SP3-6 and CS-1 to CS-8) will only be conducted in MS Teams with the same way as the normal sessions mentioned on 2b.

✓ The presentation material should be uploaded until Sept. 4, 2020.

2d. SS session

✓ All the presentations nominated in the SS session should be electronically submitted, with their file size of 300 MB or less. Thus, the presenter may include movies and voice on the presentation material until the file size limit and presentation duration shown in the next item. Any electronic file with file size of more than 300 MB is NOT ACCEPTABLE.

✓ The presentation material should be prepared with an image of an oral presentation with 5 minutes or a poster presentation with 5-minute explanation for its presentation duration.

✓ The presentation material should be uploaded until Sept. 4, 2020.

✓ The discussion term is from Sept. 14, 2020 to Sept. 25, 2020, which is conducted on the QA sheet, not on the chat, of the conference specified Microsoft Teams.

2d. MVP sessions

✓ All the presentations nominated in the MVP sessions should be electronically submitted, with their file size of 300 MB or less. Thus, the presenter may include movies and voice on the presentation material until the file size limit and presentation duration shown in the next item. Any electronic file with file size of more than 300 MB is NOT ACCEPTABLE.

✓ The presentation material should be prepared with an image of an oral presentation with 5 minutes or a poster presentation with 5-minute explanation for its presentation duration.

✓ The presentation material should be uploaded until Sept. 4, 2020.

✓ The discussion term is split into three stages:
  ➢ The first stage is from Sept. 14 to 15, 2020, which is only for the submission of questions raised by the other presenters in the same session. All the question raised by other attendees will be deleted.
  ➢ The second stage is from Sept. 16 to 17, 2020, which is only for the submission of answer from each presenter to the questions raised above. No questions are allowed to be posted on the second stage.
  ➢ On the third stage, questions from all attendees are acceptable and each presenter is required to respond to
As the same manner of the past ISEIM and SEEIMS, the excellent presenters will be awarded as the MVP awards. Thus, all the presenters of the MVP session will be required to score the other presentations in his/her session. The score sheet will be sent to the presenters by e-mail directly, and the scored sheet should be submitted to iseim2020@ieej.org by e-mail until Sept. 20, 2020. The awarded presenter will be notified directly by e-mail and on the conference web site on Sept. 25, 2020. Note that the score by the presenters are just reference information and the decision of the MVP award is 100% left to the program committee of ISEIM2020. Decision process of the award will not be disclosed and no inquiry about this issue is acceptable. It is also noted that the questions raised in SS session will be taken consideration into the MVP awards. The program committee of ISEIM2020 expects the exciting discussions.
# ISEIM2020 Scientific Program

All time indicators shown are based on Japan Standard Time.

## Mon. Sept. 14th, 20:00 - 21:10

**Invited Lecture** (Real time event on Zoom)

*Chair: N. Hayakawa (Nagoya University, Japan), Y. Tanaka (Tokyo City University, Japan)*

- **Opening Remarks**
  - Naoki Hayakawa (Nagoya University, Japan)

- **Inuishi Memorial Lecture**
  - **Inuishi [2004001] The Role of Theory in Understanding Space Charge Distributions**
  - L. A. Dissado (University of Leicester, UK)

## Tue. Sept. 15th, 19:00 - 21:30

**Workshop on “Space Charge Measurement Using the PEA Method -Advanced Measurement Techniques and Typical Applications-” (Real time event on Zoom, only available for ticket purchasers)**

19:00-19:05  **Opening Remarks**
- Y. Tanaka (Tokyo City University, Japan)

19:05-19:20  **Introduction of the Technical Report**
- H. Uehara (Kanto Gakuin University, Japan)

19:20-20:00  **Fundamentals and Advanced PEA Measurement**
- T. Takada (Tokyo City University, Japan)

20:00-20:30  **PEA Measurement for Cable Geometry Sample**
- N. Hozumi (Toyohashi University of Technology, Japan)

20:30-20:50  **Evaluation of Charge Mobility by PEA Method with Current Measurement**
- K. Kadowaki (Ehime University, Japan)

20:50-21:10  **Basics and Applications of Q(t) Method**
- Y. Sekiguchi (Sumitomo Electric Industries, Ltd., Japan)

21:10-21:30  **Various Typical Measurement Results**
- **Closing**
  - Y. Tanaka (Tokyo City University, Japan)

## Wed. Sept. 16th, 20:00 - 21:40

**Special Planned Session 1: Organic Electronics and Bioelectronics for Innovative Devices (Real time event on Zoom)**

*Chair: K. Kato (Niigata University, Japan)*

*Co-chair: T. Manaka (Tokyo Institute of Technology, Japan)*

SP1-1  **[2003007] Vapor-deposition Polymerization and Insulating Characteristics of Silsesquioxane Thin Films**
- Yamato Ogawa, Satsuki Mayuzumi and Hiroaki Usui (Tokyo University of Agriculture and
SP1-2 [2003005] Development of Stretchable Devices Using Multi-layer Organic Materials
Atsushi Takei and Manabu Yoshida (National Institute of Advanced Industrial Science and Technology, Japan)

SP1-3 [2003003] Optical Second Harmonic Microscope for Visualizing the Electric Field in Organic Thin Films
Takaaki Manaka (Tokyo Institute of Technology, Japan)

SP1-4 [2002035] Colorimetric Probe Based on Destabilization of Silver Nanoparticles from Polysaccharide Matrix for Creatinine Detection
Chutiparn Lertvachirapaiboon, Akira Baba, Kazunari Shinbo and Keizo Kato (Niigata University, Japan)

SP1-5 [2001025] “Iontronics” – Electrochemistry of Biodevices –
Mitsuyoshi Onoda (Himeji City Fire Bureau, Japan)

Thur. Sept. 17th, 20:00 - 21:10
Plenary Lecture (Real time event on Zoom)
Chair: T. Takahashi (Central Research Institute of Electric Power Industry, Japan),
M. Kozako (Kyushu Institute of Technology, Japan)

Plenary Lecture
Plenary [2004002] Effects of Thermal Aging on the Characteristics of Kraft Paper in various Liquid Insulating Materials
Suwarno and Alvin Ritonga (Institut Teknologi Bandung, Indonesia)

Closing Remarks
Yoshimichi Ohki (Waseda University, Japan)
Toshihiro Takahashi (Central Research Institute of Electric Power Industry, Japan)

Entire conference period, virtual QA sheet sessions (available on Microsoft Teams)
Session A: Space Charge Measurement and Simulation
Chair: G. Teyssedre (LAPLACE, Université Paul Sabatier, France)
Co-chair: H. Miyake (Tokyo City University, Japan)

Chao Dai¹, Tie Jiang¹, Ashish Paramane¹, Xiangrong Chen¹ and Yasuhiro Tanaka² (¹Zhejiang University, China, ²Tokyo City University, Japan)

A-2 [2001096] On the Temporal Variation of Boundary Fields and Non-uniform Distribution of Homocharges in LDPE
Avnish Kumar Upadhyay and C. C. Reddy (Indian Institute of Technology Ropar, India)

A-3 [2001097] On the Delineation of Roles of Homocharge Conduction, Injection and Diffusion in LDPE
Avnish Kumar Upadhyay and C. C. Reddy (Indian Institute of Technology Ropar, India)

A-4 [2001123] Analysis of Pulsed-electroacoustic Signal Propagation Based on Viscoelastic Model
Ryotaro Ozaki, Kizuki Ochi, Sota Sanda, Shinji Yudate and Kazunori Kadowaki (Ehime University, Japan)

Shosuke Morita¹, Norikazu Fuse¹, Toshihiro Takahashi¹, Tsuguhiro Takahashi¹ and Naohiro Hozumi² (¹Central Research Institute of Electric Power Industry, Japan, ²Toyoohashi University of Technology, Japan)

Session B: Space Charge on Dielectric Interface and Simulation
Chair: P. Morshuis (Solid Dielectric Solutions, The Netherlands)
Co-chair: T. Sakurai and N. Shigemori (Furukawa Electric Co., Ltd., Japan)

B-1 [2001076] Simulation of Space Charge Distribution in the Insulation Layer of XLPE HVDC Cable under Different Temperatures
Yani Wang¹, Xingwu Yang¹, Aiqing Ma¹ and Yi Yin²,³ (¹Shanghai University of Electric Power, China, ²Shanghai Jiao Tong University, China, ³Ministry of Education, China)

B-2 [2001002] Effect of Silicone Grease Swelling with Corona Aging on the Interfacial Charge of XLPE/SR
Huanan Wang¹, Dong Yu² and Xia Wang³ (¹Guangdong Power Grid Limited Liability Company Guangzhou Power Supply Bureau, China, ²State Grid Fujian Fuzhou Electric Power Supply Company, China, ³Xi’an Jiaotong University, China)

B-3 [2001063] Improved Interface Charge Transport Model of HVDC Cable Joint – Considering Carrier Dynamic Equilibrium
H. C. Liang¹, B. X. Du¹, Z. H. Wang², P. X. Song³, Z. J. Li³, J. Li¹, Ang Li², X. Li³, Z. Z. Meng³ and Y. Yu³ (¹Tianjin University, China, ²Chengnan Power Supply Company, State Grid Tianjin Electric Power Company, China, ³Electric Power Research Institute, State Grid Tianjin Electric Power Company, China)

B-4 [2001105] Effect of Laminating Direction on Space Charge and Conduction Current in Laminate Elastomer Sheets
Shinichi Mitsumoto¹, Muneaki Kurimoto², Masayuki Fuji³, Masumi Fukuma⁴ and Len. A. Dissado⁵ (¹National Institute of Technology, Toyota College, Japan, ²Nagoya University, Japan, ³National Institute of Technology, Oshima College, Japan, ⁴National Institute of Technology, Matsue College, Japan, ⁵University of Leicester, UK)

B-5* [2006008] A Study on the Behavior of Interfacial Space Charge at Polymer Dielectric Double-Layer Simulating the HVDC Cable Joints
Yeong-Guk An, Chul-Ho Kim, Tae-Woo Nam and June-Ho Lee (Hoseo University, Korea)

* Japan-Korea Young Researcher Exchange Program

(To be continued on to the next page)
### Session C: Application of Current Integrated Charge Method

**Chair:** C. C. Reddy (Indian Institute of Technology Ropar, India)

**Co-chair:** M. Fujita (Showa Cable Systems Co., Ltd., Japan)

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<tr>
<th>No.</th>
<th>Title</th>
<th>Authors</th>
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<tbody>
<tr>
<td>C-1</td>
<td>Parallel Measurements of Space Charge Distribution and Q (t)</td>
<td>Masumi Fukuma(^1) and Yoitsu Sekiguchi(^2) ((^1)National Institute of Technology, Matsue College, Japan, (^2)Sumitomo Electric Industries, Ltd., Japan)</td>
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<tr>
<td>C-2</td>
<td>Conduction Phenomena of AC- and DC-XLPE Analyzed by Q(t) Method</td>
<td>Yoitsu Sekiguchi, Kohei Hosomizu and Takanori Yamazaki (Sumitomo Electric Industries, Ltd., Japan)</td>
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<tr>
<td>C-3</td>
<td>Q(t)-measurements of Electrically Deteriorated Polymeric Materials Under Environmental Testing</td>
<td>Ryota Kitani and Shinya Iwata (Osaka Research Institute of Industrial Science and Technology, Japan)</td>
</tr>
<tr>
<td>C-4</td>
<td>Space Charge Injection Behaviors in XLPE Composite Doped with Polycyclic Aromatic Compounds Using Q(t) Method and Quantum Chemical Calculation</td>
<td>J. Li(^1), R. Y. Zhao(^1), C. L. Han(^1), Z. J. Li(^2), P. X. Song(^2), Y. Yu(^2), X. Li(^2), Z. Z. Meng(^2), B. X. Du(^1) and T. Takada(^3) ((^1)Tianjin University, China, (^2)State Grid Tianjin Electric Power Company, China, (^3)Tokyo City University, Japan)</td>
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<td>C-5</td>
<td>Study on Characteristics of Electrical Tree in Epoxy Resin Measured by Current Integrated Charge Method</td>
<td>Masayuki Fujii(^1), Koki Matsushita(^2), Masumi Fukuma(^3) and Shinichi Mitsumoto(^4) ((^1)National Institute of Technology, Oshima College, Japan, (^2)Fuji Electric Co., Ltd., Japan, (^3)National Institute of Technology, Matsue College, Japan, (^4)National Institute of Technology, Toyota College, Japan)</td>
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### Session D: Degradation Mechanism and Its Diagnostic Technologies I

**Chair:** Prof. Shengtao Li (Xi’an Jiaotong University, China)

**Co-chair:** Y. Hirano (Toshiba Infrastructure Systems & Solutions Corporation, Japan)

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<tr>
<td>D-1</td>
<td>Partial Discharge Inception Voltage Characteristics at Low Frequencies: The Role of Electrostatic Charges</td>
<td>P. Seri(^1), G. Giovanetti(^1), L. Zanotti(^1), H. Santoso(^2), A. Cavallini(^1) and G. Mazzanti(^1) ((^1)University of Bologna, Italy, (^2)Institut Teknologi Bandung, Indonesia)</td>
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| D-3 | Detection Using Frequency Domain Reflectometry of the Permittivity Change in a Cable Induced by the Exposure to Steam | Naoshi Hirai\(^1\) and Yoshimichi Ohki\(^1,2,3\) (\(^1\)Research Institute for Materials Science and ...
### Session E: Degradation Mechanism and Its Diagnostic Technologies II

**Chair:** T. Hammarström (Chalmers University of Technology, Sweden)

**Co-chair:** T. Kondo (NGK INSULATORS, Ltd., Japan)

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### Session F: Electrical Properties and Application of Dielectrics and Bio-dielectrics

**Chair:** Y. Yin (Shanghai Jiaotong University, China)

**Co-chair:** H. Nishikawa (Shibaura Institute of Technology, Japan) and N. Hirai (Waseda University, Japan)

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F-5 [2001035] Insulation Performance of Safety-Related Electrical Penetrations for Pressurized Water Reactors under Simulated Severe Accident Conditions
WATANABE Aiki, IKEDA Masaaki, MINAKAWA Takefumi, HIRAI Naoshi and OHKI Yoshimichi (1) Research Institute for Materials Science and Technology, Waseda University, Japan; 2 Department of Electrical Engineering and Bioscience, Waseda University, Japan)

F-6 [2001175] Effect of High Current Pulses on Germinability of Radish Sprout Seeds
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F-7 [2001077] Insulation Design of the UHVDC Submarine Cable under the Background of Global Energy Interconnection
Yao Liu, Xiaoling Zhao, Jiawei Wu, Jinyu Xiao, Yi Yin, Hongliang Zhang and Yani Wang (1) Global Energy Interconnection Development and Cooperation Organization, China; 2 Shanghai Jiao Tong University, China; 3 Ministry of Education, China; 4 Shanghai University of Electric Power, China)

Session G: Nanotechnology and Power Module Application
Chair: R. Sarathi (Indian Institute of Technology, India)
Co-chair: K. Tohyama (National Institute of Technology, Numazu College, Japan)

G-1 [1912002] Surface Discharges and Flashover Voltages: Investigation of XLPE Samples with SiO2 and Al2O3 Nanoparticles
K. Daskalopoulos, D. Verginadis, Y. Yin, M. G. Danikas and R. Sarathi (1) Democritus University of Thrace, Greece; 2 Shanghai Jiao Tong University, China; 3 Indian Institute of Technology Madras, India)

M. M. F. Darwish, Hanaa M. Ahmed and Diaa-Eldin A. Mansour (1) Department of Electrical Engineering, Benha University, Egypt; 2 Department of Mathematics and Engineering Physics, Benha University, Egypt; 3 Tanta University, Egypt)

G-3 [2001125] Dielectrophoretic Devices Fabricated by Proton Beam Writing for Concentration, Assembly, and Detection of Nanoparticles
Toshiki Kimura, Ryousuke Kawashima, Ken Yamamoto, Satoshi Uchida, Yasuyuki Ishii and Hiroyuki Nishikawa (1) Shibaura Institute of Technology, Japan; 2 Tokyo Metropolitan University, Japan; 3 National Institutes for Quantum and Radiological Science and Technology, Japan)

G-4 [2001079] Study on Charge Distributions in Irradiated Insulation Materials of Power Electronics
Yoshitaka Miyaji¹, Hirotaku Ishikawa¹, Kunihiko Tajiri¹, Hiroki Shiota¹, Kaisei Enoki², Hiroaki Miyake² and Yasuhiro Tanaka² (¹Mitsubishi Electric Corporation, Japan, ²Tokyo City University, Japan)

G-5 [2001095] The Impact of Impregnating Resins in Ensuring the Reliability Of Inverter-Fed Machines
Alberto Rumi, Andrea Cavallini and Jacopo Marinelli (University of Bologna, Italy)

G-6 [2001044] Carbonization Phenomena Dependence on Pressure between Insulation Sheets by Steeper Inverter Surge at Inverter Fed Motor
Yuichiro Yoshitake¹, Hiroaki Kojima¹, Yuki Kasai², Shoichi Maruyama², Hiroki Kojima³ and Naoki Hayakawa³ (¹Hitachi, Ltd., Japan, ²Hitachi Industrial Products, Ltd., Japan, ³Nagoya University, Japan)

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Chair: T. Imai (Toshiba Infrastructure Systems & Solutions Corporation, Japan) and M. Kozako (Kyushu Institute of Technology, Japan)

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### Special Planned Session 3: Asset Management and Diagnosis for Electric Power Equipment

**Chair: Y. Ehara (Tokyo City University, Japan) and K. Uchida (Chubu Electric Power Co., Inc., Japan)**

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Takashi Kurihara¹, Hirotoshi Makino², Masafumi Yashima², Tomoyuki Sato³, Tsuyoshi Yurugi⁴ and Manabu Sakata³ (¹Central Research Institute of Electric Power Industry, Jaspan, ²Tohoku University, Japan, ³Tohoku Electric Power Co., Inc., Japan, ⁴Tohoku Electric Power Network Co., Inc., Japan)

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Kiyoshi Umezu, Akira Takeshita and Rina Nishizono (ECG KOKUSA I Co., Ltd., Japan)

SS-2 [2002008] Introduction of Tuning Type Partial Discharge Detector that Adopts Very Narrow-band Method
Ryuya Asagi, Takuya Tomizawa, Takeshi Ato and Terutsugu Tsunekage (Fujikura Dia Cable Ltd., Japan)

SS-3 [2002018] On-line Partial Discharge Monitoring/Diagnosis System
Sadayuki Kanazawa, Yasuhiro Nakayama, Singo Kase, Ryosuke Shinoki, Taku Sato, and Yuto Yamamoto (¹SOKEN ELECTRIC Co., Ltd., Japan)

SS-4 [2002017] Tank Vibration Analysis of Extra-High-Voltage Transformer
Yoshinori Konishi¹, Masamichi Kato¹, Masayuki Hasegawa¹, Hikaru Aoyama² and Satoshi Matsumoto³ (¹Yuka Industries Co., Ltd., Japan, ²East Japan Railway Company, Japan, ³Shibaura Institute of Technology, Japan)

SS-5 [2001160] Rise Time Measurement of PWM Waveform during No-load Operation of Inverter-fed Motor
Takahiro Nakamura, Hayato Furukawa, Jintong Sun, Aoto Izumi and Kazunari Karasawa (Toshiba Mitsubishi-Electric Industry Systems Corporation, Japan)

SS-6 [2001165] Observation of Electrical Tree in Mica/Epoxy Nano-composite Insulation
Hiromitsu Hiri¹, Takahiro Imai¹, Kotaro Mura², Yu Yamashita² and Tetsuo Yoshimitsu² (¹Toshiba Infrastructure Systems & Solutions Corporation, Japan, ²Toshiba Mitsubishi-Electric Industrial Systems Corporation, Japan)

SS-7 [2001041] Study on Combined Environmental Stress Insulation for Creepage Structures
HAYASE Yuji, SUZUKI Haruka and YAMASHIRO Keisuke (Fuji Electric Co., Ltd., Japan)

SS-8 [2002020] New Accelerated Ageing Test for Polymer Insulators
Takanori Kondo¹, Ryo Inoue¹ and Kevin Edmonds² (¹NGK INSULATORS, Ltd., Japan, ²NGK-LOCKE, Inc, USA)

MVP Session A: Space Charge Behavior and Measurement I

Chair: K. Kadowaki and R. Ozaki (Ehime University, Japan)

VA-1 [2001019] Effect of Quenching Treatment on Morphology and Properties of Eco-friendly Polypropylene Copolymer for Cable Insulation
Y. Liu1, K. Yang1, Y. Tian2, Y.T. Liu2, J.Y. Li1 and Z.H. Jing3 (1Xi’an Jiaotong University, China, 2Electric Power Research Institute of Liaoning Power Grid Company Limited, China, 3Sinopec Yanshan Petrochemical Company, China)

VA-2 [2001069] Research on Conductivity Characteristics of Polypropylene under Extra High Electric Field
Xi Zhu1, Suman Peng1, Jiandong Wu1,2 and Yi Yin1,2 (1Shanghai Jiao Tong University, China, 2Ministry of Education, China)

VA-3 [2002007] Space Charge and Conduction Current under DC High Stress in Modified Polypropylene
Kouta Hashimoto1, Natsumi Ohshima1, Yasuhiro Tanaka1, Hiroaki Miyake1 and Yoitsu Sekiguchi2 (1Tokyo City University, Japan, 2Sumitomo Electric Ind., Ltd., Japan)

VA-4 [2001070] Effect of Thermal Aging on Dielectric Properties of XLPE Insulated HVDC Cable
Jun Cao1, Xi Zhu1, Pengfei Su1, Jiandong Wu1,2 and Yi Yin1,2 (1Shanghai Jiao Tong University, China, 2Key Laboratory of Control of Power Transmission and Conversion, China)

Edo Bagus Prastika1, Shafira Zahra1, Xiaoxin Li1, Yoshinobu Murakami1, Tomohiro Kawashima1, Naohiro Hozumi1 and Yoonhyoung Kim2 (1Toyohashi University of Technology, Japan, 2LS Cable & System Ltd., Korea)

VA-6 [2001161] Effect of Mechanical Tensile on Nonlinear Conductivity of Silicon Carbide/Silicone Rubber Composites for Prefabricated Joint of HVDC Cable
Chong Han1, Boxue Du1, Zhonglei Li1 and Zhuoran Yang2 (1Tianjin University, China, 2State Grid Nanjing Power Supply Company, China)

Naoki Kirigaya, Kumiko Iguchi, Hiroaki Miyake and Yasuhiro Tanaka (Tokyo City University, Japan)

MVP Session B: Space Charge Behavior and Measurement II
Chair: N. Hozumi and T. Kawashima (Toyohashi University of Technology, Japan)

VB-1 [2002010] A New Method of Measuring Electron-hole Pairs with the PEA Method Just after Electron Irradiation
Kazuki Endo, Kaisei Enoki, Hiroaki Miyake and Yasuhiro Tanaka (Tokyo City University, Japan)

VB-2 [2002011] Development of Pulsed Electro-acoustic Measurement System with High Positional Resolution at High Temperature using P(VDF/TrFE) Thin Film
Hironori Aoki1, Yoshitaka Nojiri2, Kaisei Enoki1, Hiroaki Miyake1, Yasuhiro Tanaka1 and Hiroyuki Nishikawa2 (1Tokyo City University, Japan, 2Shibaura Institute of Technology, Japan)

VB-3 [2001185] Improved Method for Evaluation of Dielectric Breakdown Strength of Epoxy / Silica Nanocomposite Thin Films
Yusuke Kida1, Rina Sankawa1, Kohei Takahashi1, Shuhei Yamamoto1, Takanobu Watanabe1,
Kotaro Mura\textsuperscript{2}, Yoshihiro Ohgashi\textsuperscript{2}, Tetsuo Yoshimitsu\textsuperscript{2} and Takahiro Imai\textsuperscript{3} (\textsuperscript{1}Waseda University, Japan, \textsuperscript{2}Toshiba Mitsubishi-Electric Industrial Systems Corporation, Japan, \textsuperscript{3}Toshiba Infrastructure Systems & Solutions Corporation, Japan)

VB-4 [2001015] The Analysis of Electrical Properties of Modified Graphene Oxide/Epoxy Composites
Beibei Jia, Yongfei Li, Jun Zhou and Kai Wu (Xi’an Jiaotong University, China)

VB-5 [2001008] Study of Asymmetrical Leakage Currents of Metal Oxide Surge Arrester due to Multiple Current Impulses
C. Chuayin\textsuperscript{1}, M. Zinck\textsuperscript{2}, A. Kunakorn\textsuperscript{1} and N. Pattanadech\textsuperscript{1} (\textsuperscript{1}King Mongkut's Institute of Technology Ladkrabang, Thailand, \textsuperscript{2}Paralec Energy Co., Ltd., Thailand)

VB-6 [2002031] Study on Space Charge Behavior in DC Model Cable under Thermal Gradient and Polarity Reversal
D. Irvandy\textsuperscript{1}, H.H. Duong\textsuperscript{2}, G. Teyssedre\textsuperscript{2}, L. Berquez\textsuperscript{2}, I. Sinisuka\textsuperscript{3} and T.T.N. Vu\textsuperscript{4} (\textsuperscript{1}Pt. PLN, Indonesia, \textsuperscript{2}Laplace, CNRS and University of Toulouse, France, \textsuperscript{3}Bandung Institute of Technology, Indonesia, \textsuperscript{4}Electric Power University, Vietnam)

VB-7 [2002039] A Study on Space Charge Behavior in Double-layer Dielectrics for Eco-friendly Power Cable Joint
Chul-Ho Kim, Tae-Woo Nam, Yeong-Guk An, Quang Ho and June-Ho Lee (Hoseo University, Korea)

\textbf{MVP Session C: Space Charge Behavior and Measurement III}
\textit{Chair: H. Uehara (Kanto Gakuin University, Japan)}

VC-1 [2001043] Prediction of the Space Charge Related Maximum Electric Field of XLPE Insulation by Sparse Bayesian Learning
Xinyuan Li, Weiwang Wang, Zhiqiang Guo, Wen Bu and Shengtao Li (Xi’an Jiaotong University, China)

VC-2 [2001080] Study on the Difference of Space Charge Distribution in EPDM under DC and AC Electric Fields
Linxin Miao\textsuperscript{1}, Jiandong Wu\textsuperscript{1,2}, Yi Yin\textsuperscript{1,2} and Jun Cao\textsuperscript{1} (\textsuperscript{1}Shanghai Jiao Tong University, China, \textsuperscript{2}Key Laboratory of Control of Power Transmission and Conversion, China)

VC-3 [2001099] Charge Behavior Measurement near the Interface Parallel to the Electric Field
Junichi Hoshi\textsuperscript{1}, Kazuya Sakamoto\textsuperscript{1}, Tomohiro Kawashima\textsuperscript{1}, Naohiro Hozumi\textsuperscript{1}, Yoshinobu Murakami\textsuperscript{1}, Hiroki Shiot\textsuperscript{2} and Kazutake Kadowaki\textsuperscript{2} (\textsuperscript{1}Toyohashi University of Technology, Japan, \textsuperscript{2}Mitsubishi Electric Corporation, Japan)

VC-4 [2001111] Numerical Simulation of Transient Behavior of Packet-Like Space Charge in Low Density Polyethylene
Kazuya Takeda, Shinji Yudate, Ryotaro Ozaki and Kazunori Kadowaki (Ehime University, Japan)

VC-5 [2001110] Current Reduction Caused by Strong Local Field in Low-Density Polyethylene under Various Temperatures
Takahiro Mihara, Shinji Yudate, Ryotaro Ozaki and Kazunori Kadowaki (Ehime University, Japan)

VC-6 [2001167] Investigation of the Effect of DC Voltage Increasing Rate on Space Charge Distribution and Dielectric Breakdown in Low Density Polyethylene
Koki Morikawa, Kotaro Ogura, Hiroaki Miyake and Yasuhiro Tanaka (Tokyo City University, Japan)

VC-7 [2001173] Special Behaviors of Space Charge inside Insulating Materials under Different Polarization Conditions
Hanwen Ren1, Yasuhiro Tanaka2, Haoyu Gao1, Chengqian Li1 and Qingmin Li3 (1North China Electric Power University, China, 2Tokyo City University, Japan)

MVP Session D: Liquid Dielectrics and Their Application
Chair: H. Kojima (Nagoya University, Japan)

VD-1 [2001144] Investigation of the Effect of Silver Sulfide on the Dielectric Properties of Mixed Insulating Liquid
A. J. Amalanathan1, R. Sarathi1, Noureddine Harid2 and Huw Griffiths2 (1Indian Institute of Technology Madras, India, 2Khalifa University, UAE)

VD-2 [2001153] Statistical Analysis of Natural Ester based Insulating Liquid using Hypothesis Testing
Niharika Baruah1, Rohith Sangineni1, Manas Chakraborty2 and Sisir Kumar Nayak1 (1Indian Institute of Technology Guwahati, India, 2Central Power Research Institute, India)

VD-3 [2001057] Space Charge Behavior of Oil-paper Insulation in Transformer under AC Fields
Guiyue Zhou1, Yi Yin1,2, Jiandong Wu1,2, Lu Che1, Qiaohua Wang1,2, Zhihao Wang1,2 and Yue Hu1,2 (1Shanghai Jiao Tong University, China, 2Ministry of Education, China)

VD-4 [2001014] Contributions of Ionization and Injection to Charge Transportation in Oil-paper Insulation
Yang Wu, Kai Wu, Rui Su, Yifei He, Jiaxin Chen and Zengpeng Lv (Xi’an Jiaotong University, China)

VD-5 [2001058] Effect of Moisture on Space Charge Characteristics of Oil-paper Insulation under AC-DC Electric Field
Lu Che1, Jiandong Wu1,2, Yi Yin1,2, Guiyue Zhou1 and Qiaohua Wang1,2 (1School of Electronic Information and Electrical Engineering, China, 2Ministry of Education, China)

VD-6 [2002016] Partial Discharge Characteristics of Mineral Oil Immersed Transformer Compared with Natural Ester and Palm Oil Immersed Transformer under Different Periods of Impregnation
Sakda Maneerot and Norasage Pattanadech (King Mongkut’s Institute of Technology, Thailand)

VD-7 [2002024] Effect of Catalyst on Dielectric Breakdown Characteristics of Esterified Rice Oil
Hiroki Nagai, Yuichi Murakami and Yuji Muramoto (Meijo University, Japan)

VD-8 [2001119] Addition Effect of Nitrogen Fine Bubbles and Nonionic Polymer Surfactant to Pure Wateron Resistivity and Negative Lightning Impulse Breakdown Voltage of Pure Water
Masaki Miyama, Norimitsu Takamura, Nobutaka Araoka and Masahiro Hanai (Fukuoka University, Japan)
VE-1 [2001151] Study on the Dielectric Performance of XLPE Nanocomposite against the Electrical Tree Propagation
N. S. Mansor¹, N. S. M Nazar, D. Ishak¹, M. Mariatti², H. S. A. Halim³, A. B. A. Basri³ and M. Kamarol¹ (¹School of Electrical and Electronic Engineering, Universiti Sains Malaysia, Malaysia, ²School of Material and Mineral Resources Engineering, Universiti Sains Malaysia, Malaysia, ³TNB Research, Malaysia)

VE-2 [2001178] Partial Discharge Activity of Al₂O₃ Nanofluid Impregnated Paper Insulation System
Eman G. Atiya¹, Diaa-Eldin A. Mansour¹ and Mohamed A. Izzularab² (¹Department of Electrical Power and Machines Engineering Faculty of Engineering, Egypt, ²Minoufiya University Shebin El-Kom, Egypt)

VE-3 [2001010] Space Charge and Breakdown Characteristics of XLPE/BNNSs Nanocomposites
Guochang Li¹, Xuguang Zhou¹, Guoqiang Su², Yanhui Wei¹, Chuncheng Hao¹ and Qingquan Lei (¹Qingdao University of Science and Technology, China, ²Grid Shandong Electric Power Research Institute, China)

VE-4 [2001141] Effect of Interphase on the Space Charge Performance of Al-Epoxy Nanocomposites
Chillu Naresh¹, Ramanujam Sarathi¹ and Rengaswamy Jayaganthan² (¹Department of Electrical Engineering, Indian Institute of Technology Madras, India, ²Department of Engineering Design, Indian Institute of Technology Madras, India)

VE-5 [2001169] Impact of Ultraviolet Irradiation on Space Charge Dynamics and Surface Properties of Epoxy Micro-Nano Composites
Myneni Sukesh Babu¹, Ramanujam Sarathi¹ and Takahiro Imai² (¹Indian Institute of Technology Madras, India, ²Toshiba Corporation, Japan)

VE-6 [2001143] The Influence of Water Aging on Dielectric and Space Charge Behaviour of MgO filled Epoxy Nanocomposites
Nagaraju G and Sarathi R (Indian Institute of Technology Madras, India)

VE-7 [2001027] DC Insulation Properties of Commercial Grade 320 kV HVDC XLPE/MgO Nanocomposite Material
Ashish Paramane¹, Dai Chao¹, Linwei Yu, Xiangrong Chen¹ and Yasuhiro Tanaka² (¹Zhejiang University, China, ²Tokyo City University, Japan)

VF-1 [2001001] Surface Modification of Nano-BaTiO₃ by Perfluorosilane Coupling Agent and its Effects on Dielectric Properties of High-k Photosensitive Composites
Zhi-Hui Jiang, Wen-Dong Li, Xiong Yang, Chao Wang, Ming-Yu Chen and Guan-Jun Zhang (Xi’an Jiaotong University, China)
Takeru Tachibana, Kosei Kikuike, Tomohiro Kawashima, Naohiro Hozumi and Yoshinobu Murakami (Toyoohashi University of Technology, Japan)

VF-3 [2001142] Understanding the Electrical and Mechanical Properties of Epoxy Alumina Nanocomposites
Neelmani1, Hisayuki Suematsu2 and Ramanujam Sarathi1 (1Indian Institute of Technology Madras, India, 2Nagaoka University of Technology, Japan)

VF-4 [2001149] Investigating the Characteristic Properties of Epoxy Nickel Nanocomposites
Amizhtan S K1, M.G. Danikas2 and R. Sarathi1 (1Indian Institute of Technology Madras, India, 2Democritus University of Thrace, Greece)

VF-5 [2002029] Dielectric Breakdown Characteristic of Refining Treatment Fullerene Doped Epoxy Plate-like Specimens
Kristiawan Agung Satria1,2,3, Kotaro Ozuno1, Yoshiyuki Inoue1, Masahiro Kozako1, Masayuki Hikita1, Suwanno1, Umar Khayam1, Takeshi Igarashi1 and Hiroaki Kaji1 (1Kyushu Institute of Technology, Japan, 2PT. PLN, Indonesia, 3Institut Teknologi Bandung, Indonesia, 4Showa Denko K. K., Japan)

VF-6 [2001100] Electric Field Grading by Permittivity and Conductivity Graded Materials (ε/σ-FGM) for HVDC Gas Insulated Power Apparatus
Rachmawati1, Atsuhiro Izu1, Ryuichi Nakane1, Hiroki Kojima1, Katsumi Kato2, Nabila Zebouch13 and Naoki Hayakawa1 (1Nagoya University, Japan, 2National Institute of Technology, Niihama College, Japan, 3Cardiff University, UK)

Jiachi Yao1, Guanghao Qu1, Zhonghua Zhao1, Guowei Zhang2, Daomin Min1, Jie Liu3 and Shengtao Li1 (1Xi’an Jiaotong University, China, 2Northwest Institute of Nuclear Technology, China, 3Chinese Academy of Sciences, China)

VF-8 [2002005] Quantum Chemical Calculation Analysis of Electric Charge Trap Site in Epoxy Resin Cured Using Novel Imide Type Hardener
Kosuke Sato1, Hiroaki Miyake1, Yasuhiro Tanaka1 and Ayumi Yanaka2 (1Tokyo City University, Japan, 2UNITIKA Ltd., Japan)

MVP Session G: Bio and Organic Dielectrics
Chair: Y. Aoki (Mie University, Japan) and A. Baba (Niigata University, Japan)

VG-1 [1912001] Rice Types Classification by Using Dielectric Properties Measurement with Saline Water Increasing Technique
Wittawat Wasusathien, Samran Santalunai, Thanaset Thosdeekoraphat and Chanchai Thongsopa (Suranaree University of Technology, Thailand)

VG-2 [2001088] Dielectric Property Measurement of Freshwater Fishes and Parasite Affecting Infection Opisthorchis Viverrini for Dielectric Heating Application
Supatinee Kornsing, Samran Santalunai, Thanaset Thosdeekoraphat and Chanchai Thongsopa (Suranaree University of Technology, Thailand)

VG-3 [2002023] Effect of Ethanol Concentration on Escherichia coli and Saccharomyces cerevisiae Sterilization by High Electric Field Pulse Application
Masaki Takamori, Yuichi Murakami and Yuji Muramoto (Meijo University, Japan)

VG-4 [2001130] Micro-structuring of PVDF-TrFE by Proton Beam Writing for Tactile Sensors
Yoshitaka Nojiri¹, Hidetaka Hayashi², Yasuyuki Ishii³ and Hiroyuki Nishikawa¹ (¹Shibaura Institute of Technology, Japan, ²Eco-design Promotion Network, Japan, ³National Institutes for Quantum and Radiological Science and Technology, Japan)

VG-5 [2002036] Tuning the Luminescent Intensity by Controlling the Distance between Gold Quantum Dots and Silver Nanoprisms
Wataru Sato, Chutiparn Lertvachirapaiboon, Akira Baba, Kazunari Shinbo and Keizo Kato (Niigata University, Japan)

VG-6 [2001085] Analysis of the Emitted Frequency Spectra of Breakdowns in SF₆ Gas as well as in Alternative Insulating Gases for Gas Insulated Systems
Johannes Wiener¹, Volker Hinrichsen¹, Felix Goll² and Karsten Juhr² (¹Technical University Darmstadt, Germany, ²Siemens Energy, Germany)

MVP Session H: Power Module Application
Chair: T. Umemoto and Y. Miyaji (Mitsubishi Electric Co., Japan)

VH-1 [2001017] Electrical Tree Propagation in Epoxy Resin under Bipolar Square Wave Field with Varied Frequencies
Chuang Zhang, Hang Fu, Jiao Xiang, Zhuolin Cheng, Shihang Wang and Jianying Li (Xi’an Jiaotong University, China)

VH-2 [2001059] Influence of High Frequency Voltage with Harmonic Contents and Temperature on Breakdown of Epoxy Resin Used in Power Electronic Transformer
Xin Wang, Weiwang Wang, Ying Liu, Jiefeng He and Shengtao Li (Xi’an Jiaotong University, China)

VH-3 [2001064] Research on Partial Discharge Detection Technique under Square Wave
Yi Ding¹,², Wenyi Li¹,², Yalin Wang¹,², Jiandong Wu¹,² and Yi Yin¹,² (¹Shanghai Jiao Tong University, China, ²Key Laboratory of Control of Power Transmission and Conversion, China)

VH-4 [2001109] Nondestructive Fault Localization of Semiconductor Devices with Ultrasound Heating
Takuto Matsui¹, Hayato Hayashi¹, Tomohiro Kawashima¹, Yoshinobu Murakami¹, Naohiro Hozumi¹ and Toru Matsumoto² (¹Toyoohashi University of Technology, Japan, ²Hamamatsu Photonics K.K., Japan)

VH-5 [2001177] Electric Field Strength and Tree Propagation Speed for Electrical Treeing in Silicone Gel
Wataru Yabuuchi, Ayaka Wada, Sinpei Sasaki, Yu Kawai, Jeon Hyeon-Gu, Masaharu Fujii and Haruo Ihori (Ehime University, Japan)
**MVP Session I: Dielectric Phenomena on Dielectric Surface and Outdoor Insulation**

*Chair: K. Yaji (National Institute of Technology, Kagoshima College, Japan)*

**VI-1** [2001139] Optimization of the Superhydrophobic Insulation Longevity Covered with Water Drops under DC Voltage  
K. Hamour¹, F. Bouchelga¹, R. Boudissa¹, S. Kornhuber² (¹University A. Mira of Bejaia, Algeria, ²University of Applied Sciences Zittau/Görlitz, Germany)

**VI-2** [2001148] Understanding the Space Charge variation in Silicone rubber with different Low Molecular Weight Siloxanes  
Pabbati Vinod¹, Ramanujam Sarathi¹ and Stefan Kornhuber² (¹Indian Institute of Technology Madras, India, ²University of Applied Sciences Zittau/Görlitz, Germany)

**VI-3** [2002009] Surface and Internal Charge Measurement in Fluorinated Polymer Irradiated by Electron Using Non-contact Type PEA Method Measurement Apparatus  
Kaisei Enoki, Kazuki Endo, Hiroaki Miyake and Yasuhiro Tanaka (Tokyo City University, Japan)

**VI-4** [2001066] The Study of Surface Flashover Affected by Corona Discharging via Non-invasive Surface Potential Measurement  
Lu Fan, Yifan Rui, Yalin Wang and Yi Yin (Shanghai Jiao Tong University, China)

**VI-5** [2001051] Conductivity Distribution in Air by Charging Process on Solid Dielectrics under DC Voltage  
Ryuichi Nakane¹, Hiroki Kojima¹, Naoki Hayakawa¹ and Hitoshi Okubo² (¹Nagoya University, Japan, ²Aichi Institute of Technology, Japan)

**VI-6** [2001150] Surface Voltage Measurement of XLPE Insulated Covered Overhead Conductor  
Ajith John Thomas, Iyyappan. C and C.C. Reddy (Indian Institute of Technology Ropar, India)

**MVP Session J: Partial Discharge, Degradation Mechanism and Diagnostic Technologies I**

*Chair: K. Suenaga (JFE Advantech Co., Ltd., Japan) and Y. Makino (Central Research Institute of Electric Power Industry, Japan)*

**VJ-1** [2001018] Influence of Thermal Ageing on the Optical Performance of XLPE Cable Insulation  
Xian Yang¹, Yuanyuan Zhang², Hongming He¹, Manshi Qiu², Xin Yu¹ and Jianying Li² (¹Electric Power Research Institute of Guangdong Power Grid Corporation, China, ²Xi’an Jiaotong University, China)

**VJ-2** [2002019] Observation and Modeling of Water Tree in 60 kV-class XLPE Cable – Investigation of AC Loss Current and Electric Field Using Transient Electric Field Analytical Model –  
Tetsuya Har¹, Koudai Itagaki¹, Masafumi Yashima¹, Takashi Kurihara² and Toshihiro Takahashi² (¹Tohoku University, Japan, ²Central Research Institute of Electric Power Industry, Japan)

**VJ-3** [2001113] Evaluation of Change in Bow-tie Tree Degradation Due to Additional Voltage Application by Image Processing  
Takeshi Ishiguro¹, Yuta Shimoda¹, Yasuo Suzuki¹, Fumitaka Komori², Muneaki Kurimoto³ and Takeyoshi Kato³ (¹Aichi Institute of Technology, Japan, ²NIT, Toba College, Japan, ³Nagoya
VJ-4 [2001087] Microwave Detection Technology for Internal Defects of Composite Post Insulators
Huaiyuan Jiang¹, Hongwei Mei¹, Xiaobing Zou², Lanxin Li¹ and Liming Wang¹ (¹Tsinghua Shenzhen International Graduate School, Tsinghua University, China, ²Department of Engineering, Tsinghua University, China)

VJ-5 [2001188] Effect of Background Noise Discrimination on Partial Discharge Pattern Recognition Using Neural Network and Support Vector Machine
Beom An¹, Sungho Yoon¹, Sanggoon Lee¹, Jeongtae Kim¹, Yeonha Jung² and Taein Jang² (¹Daejeon University, Korea, ²KEPCO Research Institute, Korea)

VJ-6 [2001093] A Novel On-Line Monitoring System for Diagnostics Parameters of EHV GIS Electrical Apparatuses of Transmission Networks
Andrea Caprara, Giacomo Ciotti and Mirko Melloni (Techimp, Italy)

VJ-7 [2002027] Proposal of Noise Rejection in Automatic Measurement System of Repetitive Partial Discharge Inception Voltage
Yasutaka Nishigaki¹, Sho Takenouchi¹, Masahiro Kozako¹, Masayuki Hikita¹, Takahiro Nakamura², Jintong Sun², Aoto Izumi², Takayuki Sakurai², Kazunari Karasawa² and Tatsuya Hirose³ (¹Kyushu Institute of Technology, Japan, ²Toshiba Mitsubishi-Electric Industrial Systems Corporation, Japan, ³Toshiba Infrastructure Systems & Solutions Co., Ltd., Japan)

Satya Hari Wibowo¹,²,³, Umar Khayam², Suwarno², Yasutomo Kakimoto³, Masahiro Kozako³ and Masayuki Hikita³ (¹PT PLN, Indonesia, ²Institut Teknologi Bandung, Indonesia, ³Kyushu Institute of Technology, Japan)

MVP Session K: Partial Discharge, Degradation Mechanism and Diagnostic Technologies II
Chair: Y. Muramoto and Y. Murakami (Meijo University, Japan)

VK-1 [2001081] Effect of Impurity Bridges on Breakdown Strength of PFAE under Lightning Impulse Stress
S. Saaidon¹,² and M.Kamarol¹ (¹Universiti Sains Malaysia, Malaysia, ²Centre of Instructor and Advanced Skills Training, Malaysia)

VK-2 [2001082] Breakdown Characteristics of Cone-type ε-FGM Spacer for Gas Insulated Switchgears
Yusaku Miyazaki¹, Atsuo Izu¹, Zhaoyuan Liang¹, Hiroki Kojima¹, Hidetaka Masui², Hiroshi Mitsudome², Hironori Yanase², Kenji Okamoto², Keiji Watanabe², Katsumi Kato³ and Naoki Hayakawa¹ (¹Nagoya University, Japan, ²Fuji Electric Co., Ltd., Japan, ³Nagase ChemteX Co., Ltd., Japan, ⁴National Institute of Technology, Niigama College, Japan)

VK-3 [2001128] The Breakdown Characteristics of Oil-Paper Insulation in Converter Transformers
Kun Zuo¹, Wei Shen², Huize Cui³, Guangming Zhou², Weiwang Wang³ and Shengtao Li³ (¹Shaanxi Electric Power Corporation, China, ²Shaanxi Electric Power Research Institute, Shaanxi Electric Power Corporation, China, ³Xi’an Jiaotong University, China)

VK-4 [2001127] Investigating the Internal Winding Resonance Characteristics of Various Power Transformer
Winding Designs
Sriyono¹, Suwarno² and Umar Khayam² (¹PT PLN, Indonesia, ²Institut Teknologi Bandung, Indonesia)

VK-5 [2001034] Study on The Influence of Surface State of Copper Conductor of Oil-immersed Power Transformer on Sulfur Corrosion
Dong Ding¹, Lijun Yang¹, Yuan Yuan², Sihang Gao³ and Yuncai Lu⁴ (¹State Key Laboratory of Power Transmission Equipment and System Security and New Technology, Chongqing University, China, ²College of Material Science and Engineering, Chongqing University, China, ³Chongqing University of Posts and Telecommunications, China, ⁴State Grid Jiangsu Electric Power Co., Ltd., China)

VK-6 [2001183] Effect of Pre-heating on AC Breakdown Strength of Oil Barrier Tube
G Nithin Reddy and C. C. Reddy (Indian Institute of Technology Ropar, India)

VK-7 [2002037] Comparison between Positive and Negative Corona Discharges by Hydrodynamic Plasma Simulations
Calvin ZOGNING, Jacques LOBRY and Francis MOINY (University of Mons, Belgium)

MVP Session L: Partial Discharge, Degradation Mechanism and Diagnostic Technologies III
Chair: Y. Nakamura (Toshiba Infrastructure Systems & Solutions Corporation, Japan)

VL-1 [2001054] Characteristics of Partial Discharge in XLPE during Electrical Tree Initiation Process under Different Temperatures
Suman Peng¹, Xi Zhu¹, Jiandong Wu¹,² and Yi Yin¹,² (¹Shanghai Jiao Tong University, China, ²Ministry of Education, China)

VL-2 [2001086] Investigation of Partial Discharge Activity in the Slot of a Hairpin-wound Stator
Chuxuan He, Chandra Prakash Beur and Stefan Tenbohlen (University of Stuttgart, Germany)

VL-3 [2001126] Study on the Relation between PD Characteristics and Degradation of PP Films for Power Capacitors by Utilizing Artificially Formed Through Holes
Naoki Matsuda¹, Yasuo Suzuoki¹, Yudai Takemoto², Muneaki Kurimoto², Takeyoshi Kato², Fumitaka Komori³, Yuya Sano⁴, Shinkichi Hamada⁴, Shintaro Ogura⁴ and Yukio Sasatani⁴ (¹Aichi Institute of Technology, Japan, ²Nagoya University, Japan, ³NIT Toba College, ⁴NISSIN ELECTRIC Co., Ltd., Japan)

VL-4 [2001133] Assessment of Charge Behavior in Electrical Tree Tube Based on Characteristics of Partial Discharge Waveform
Nobuyuki Takeda, Tomohiro Kawashima, Yoshinobu Murakami and Naohiro Hozumi (Toyohashi University of Technology)

VL-5 [2001137] Comparison of Partial Discharge Activity in Mineral Oil and PFAE Containing Multiple Spherical Metal Particles
Kiasatina Azmi¹, Dahaman Ishak¹, Nor Asiah Muhamad¹, Ahmad Zuhairi², Umar Khayam³ and Mohamad Kamarol¹ (¹School of Electrical and Electronic Engineering, Universiti Sains Malaysia, Malaysia, ²School of Chemical Engineering, Universiti Sains Malaysia, Malaysia, ³School of Chemical Engineering, Universiti Sains Malaysia, Malaysia,
Institut Teknologi Bandung, Indonesia)

VL-6 [2002025] Examination of Impulse PD Inception Location by Electric Field Analysis in Ester Oil/Pressboard Composite Insulation System
Taichi Yamada¹, Masahiro Kozako¹, Masayuki Hikita¹, Shigeyoshi Yoshida², Haruki Hamada² and Takahiro Umemoto² (¹Kyushu Institute of Technology, Japan, ²Mitsubishi Electric Corporation, Japan)

VL-7 [2002026] Discharge Inception Characteristics Analysis of Epoxy/Silica Nanocomposites in SF₆ Gas Using Volume-time Theory
Yoshiyuki Inoue¹, Kotaro Ohzuno¹, Masahiro Kozako¹, Masayuki Hikita¹, Hidetaka Masui², Hiroshi Mitsudome², Hironori Yanase² and Kenji Okamoto² (¹Kyushu Institute of Technology, Japan, ²Fuji Electric Co., Ltd., Japan)

VL-8 [2002022] Aging Behavior of Soft and Hard Epoxy Resins in Simulated Nuclear-Power-Plant Environments
Hiroyuki Ishii¹, Naoshi Hirai² and Yoshimichi Ohki¹² (¹Department of Electrical Engineering and Bioscience, Waseda University, Japan, ²Research Institute for Materials Science and Technology, Waseda University, Japan)

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Digest Report from Cooperative Research Committee and Investigating R&D Committees
(No presentations)

Yoshiyasu Ehara¹ and Takashi Kurihara² (¹Tokyo City University, Japan, ²Central Research Institute of Electric Power Industry, Japan)

DR-2 [2006001] Digest Report of Investigating R&D Committee on Advancing Tailor-made Composite Insulation Materials and Their Applications
Takahiro Imai¹, Muneaki Kurimoto², Hideki Misaka³ and Ryotaro Shimada⁴ (¹Toshiba Infrastructure Systems & Solutions Corporation, Japan, ²Nagoya University, Japan, ³Central Research Institute of Electric Power Industry, Japan, ⁴Hitachi, Ltd., Japan)

DR-3 [2006002] Digest Report of Investigating R&D Committee on Information for Asset Management of Electric Power Apparatus Based on Insulation Deterioration
Katsumi Uchida¹, Kiyoka Suenaga² and Yuta Makino³ (¹Chubu Electric Power Co., Inc., Japan, ²JFE Advantech Co, Ltd., Japan, ³Central Research Institute of Electric Power Industry, Japan)

DR-4 [2006003] Digest Report of Investigating R&D Committee on Electrical Insulation Reliability of Power Modules
Masahiro Kozako¹, Naoya Kishi² and Yuji Hayase³ (¹Kyushu Institute of Technology, Japan, ²Zeon Corporation, Japan, ³Fuji Electric Co., Ltd., Japan)

DR-5 [2006004] Digest Report of Investigating R&D Committee on Application of Quantum Chemical Calculations in the Field of Electrical and Electronic Insulation Materials
Satoshi Matsumoto¹, Hiroaki Miyake², Yoitsu Sekiguchi³ and Masamichi Kato⁴ (¹Shibaura Institute of Technology, Japan, ²Tokyo City University, Japan, ³Sumitomo Electric Industries, Ltd., Japan, ⁴Yuka Industries, Japan)

DR-6 [2006005] Digest Report of Investigating R&D Committee on Standardization of Calibration and Advanced Measurements for Space Charge Distribution at High Temperature using Pulsed Electro-acoustic Method
Yasuhiro Tanaka¹, Hiroaki Uehara², Yoshinobu Murakami³ and Hiroki Mori⁴ (¹Tokyo City University, Japan, ²Kanto Gakuin University, Japan, ³Toyohashi University of Technology, Japan, ⁴Furukawa Electric Co., Ltd., Japan)

DR-7 [2006006] Digest Report of Investigating R&D Committee on Advanced Nanomaterials and Nanostructure Control for Innovative Organic Devices and Life Science
Keizo Kato¹, Shin-ichiro Nakajima², Yusuke Aoki³ and Akira Baba¹ (¹Niigata University, Japan, ²Japan Aviation Electronics Industry, Ltd., Japan, ³Mie University, Japan)

DR-8 [2006007] Digest Report of Cooperative Research Committee on EINA Magazine Publication
Masayuki Nagao¹, Yoshiyuki Inoue², Masahiro Kozako³ and Norikazu Fuse⁴ (¹Toyohashi University of Technology, Japan, ²Toshiba Mitsubishi-Electric Industrial Systems Corporation, Japan, ³Kyushu Institute of Technology, Japan, ⁴Central Research Institute for Electric Power Industry, Japan)