Electrical Insulation News in Asia

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PREFACE

Prof. T. Takada

International cooperative research and education start from visiting each other.

The 1996 Asian International Conference on Dielectric and Electrical Insulation is going to be held in Xiang, China from October 8 to 11, and the 5th International Conference on Properties and Applications of Dielectric Materials is held from June 20 to 24 in Seoul, Korea. These meeting is the result of how Asian researchers are getting more and more active in working together both on research and education. I believe that the research activity itself is the education for the young researchers. Developing cooperative research among foreign groups is such an effective and attracting way to accomplish the purpose of educating young researchers. Here I introduce my own experience of how the cooperative research has started between my laboratory and others in foreign countries.

In 1981 I had an opportunity to have a cooperative research with a laboratory abroad for the first time. There were three researchers from Asian countries including me, from Japan, who was 40 years old at that time, and a great and powerful professor from China, and a young graduate student from Korea. The Chinese professor was Prof. Zyu Liu who organized the 1st ICPADM. He was one of the great professors who were visiting major universities of the world to inspect and to study, right after the end of the great culture revolution in China. I learned a lot about the educational condition and students of their universities through communications with them. So many things were new to me. Even though they are neighboring countries, I had poor knowledge about them. And then I got interested in visiting their universities in China and Korea.

In 1985 I visited China for the first time to participate in the 1st ICPADM which was held in Xaing. The most impressive thing was the eagerness of the graduate students. Those young students worked hard for the meeting in the background to make it successful. They were so interested in the United States, Europe, and Japan. They asked me many things about my country such as the campus life, economic activities and many other topics. Now 10 years has passed since then, they are playing important roll in various places of the world. I felt that the international academic meetings stimulates young people and give them chance for starting new researches.

In 1989 I traveled in Korea for a week with one of my friends visiting universities, research centers and industrial companies. Each place, we had such a warm welcome. What impressed me most was that how well young researchers, who had acquired an academic degree in foreign universities, took us around their laboratories. They are very enthusiastic about their research work and concerning education. It seems that they are very much concerned about what they want or should do for the future. Many of them are now working for the 5th ICPADM meeting, which is held in Seoul in 1997, as the committee member. I am looking forward to join that to meet my old friends and to be friend with young researchers.

Each time I visit international academic meetings and foreign laboratories, I discussed about the opportunities of having cooperative research work with them including exchanging students and mutual visiting of students. Through my experience, I believe that mutual visiting of laboratories and cooperative research work have so much means to improve the research work of the young generation.

Tatsuo Takada
Musashi Institute of Technology

EDITORIAL

Prof. Y. Ohki

Can Science Bear a New Technological Revolution in Electrical Insulation?

A truly innovative technology cannot be borne without a discovery of a new principle or theory in natural science. First, let me look back briefly on the history of science. It seems to me that there have been four revolutionary periods in which science made remarkable advances.

The first revolution was born in the period of Four Great Civilizations. However, even though Democritos (ca. 460 B. C. - 370 B. C.) proposed 'Atomic Theory', it cannot be regarded as natural science since it was developed without doing experiments and without showing scientific evidence. What followed this period in the history of natural science was the Great Black Era lasting for over 1700 years.

The door of the second revolution was opened by G. Galilei (1564 - 1642), who established 'proof by experiments' and 'analysis and simplification by mathematics' and is sometimes called the Father of Natural Science. I. Newton (1643 - 1727) is another giant in this revolution. Lots of new principles in physics which were clarified in this revolution became the cradle of the Industrial Revolution.

The third revolution was started by C. A. Coulomb (1736 - 1806) and A. Volta (1745 - 1827) and completed by J. C. Maxwell (1831 - 1879). New principles and theories born in this revolution let the first half of the 20th century become the Era of Electricity.

The fourth revolution was dramatically opened in the last moment of the 19th century. In 1900, M. Planck (1858 - 1947) proposed the discontinuity of energy, which was the first concept of the quantum theory. Another significant theory of this revolution is the theory of relativity by A. Einstein (1879 - 1955). We are now enjoying the Era of Electronics (or Photonics) thanks to the success of this revolution.

Then, will the fifth revolution come? At the end of the 19th century, physics was in the badly chaotic situation. This chaos is considered to be the mother of revolution. It is said such a chaos is not seen in today's physics.
While it is true that we are living in the era of electronics, is the electrical insulation technology truly utilizing the achievements of the latest revolution? It seems the answer is not fully affirmative. Therefore, we must make every effort to take as many achievements as possible in the electrical insulation technology. Exchange of information should surely give good assistance. I hope this small booklet can be a big step of our such endeavor to promote information exchange.

Yoshimichi Ohki
Waseda University

ACTIVITIES OF THE TECHNICAL COMMITTEES ON DEI IN IEEJ

Outline of Investigation Committees

Activities of investigation committees in the technical committees on DEI are reproduced here from the Proceedings of the 28 th Symposium on Electrical Insulating Materials (Sept. 1996).

Digest Report of the Investigation Committee on High Electric Field Phenomena and Space Charge in Dielectric/Insulating Materials

K. Miyairi (Shinshu University)
Y. Suzuoki (Nagoya University)
N. Hozumi (CRIEPI)
Y. Tanaka (Musashi Institute of Technology)

The committee was set up in October 1992 with 22 members in order to research the high electric field phenomena and the space charge effect on electrical conduction and breakdown in solid dielectric/insulating materials. Demands to use higher voltage in power cables and apparatuses and needs for their miniaturization as well as realization of very high field in electronic devices urged the need for better insulating materials and better insulating designs. More exact and detailed knowledge on high field phenomena in these materials is required not only for the development of the high voltage systems but also for thin film technology in electronics industry. The investigation from the theoretical point of view based on the physics and chemistry is essential to understand the intrinsic process. The recent development in data processing and measurement techniques has provided experimental results and information on the field and space charge distribution and has enabled to analyze high field conduction and breakdown phenomena more precisely and quantitatively.

The main subjects to be investigated are as follows.

(1) Experimental results and theories of electrical conduction
(2) Experimental results and theories of dielectric breakdown
(3) Influence of space charge on electrical conduction and breakdown and its evaluation
(4) Pre-breakdown phenomena in solid dielectric/insulating materials
(5) Basic process of degradation related to electrical conduction and breakdown

Several programs ware executed to accomplish the above subject: joint experiments with standard samples, survey of literature and so on.

Digest Report of the Investigation Committee on High Reliability Insulation Technology for Printed Wiring Board

S. Kobayashi (Tokyo University of Agriculture and Technology)
T. Tsukui (Tokai University)
Y. Yamano (Chiba University)

The printed circuits on an insulating board becomes fine and high density, according to compact packaging design and high ability of electronic equipments and systems. The high density wiring design decreases the distance between the printed wires on the board. This results in high electric field strength

between the wires. The high field strength may cause insulating failures. One of the typical failures in caused by ionic migration from the wire on the board. Systematic studies on the insulating failure due to the ionic migration, however, were not conducted sufficiently.

From these points of view, the committee has started from April 1993 and closed in March 1996. During 3 year's activities, we have held 19 times of the study meetings, and more than 90 reports were surveyed to obtain the informations mainly on the characteristics, mechanism and prevention of the ionic migration. Based on the studies and discussions in the meetings, the committee will publish soon the technical report. The contents of the report will be as follows.

1. Preface.
2. Background.
3. Terms.
4. Test method for insulation reliability of circuit board.
5. Characterization and Evaluation of test results.
6. Mechanisms and characteristics of ionic migration.
7. Relation between dielectric or insulating characteristics and deterioration of circuit board.
8. Afterward.

Digest Report on the Investigation Committee of Electrical and Optical Properties of Molecular Films and Characterization Methods of the Films

M. Iwamoto (Tokyo Institute of Technology)
Y. Ohmori (Osaka University)
K. Kudo (Chiba University)
K. Saito (ETL)

The purpose of this investigation committee is to review the electrical and optical properties of highly-ordered molecular films, the technology used for the characterization of the films, and the present status of molecular electronics and the future prospect. The main subjects of investigation are as follows:

1) Electrical and optical properties of molecular films, in particular, the films whose thickness is less than 10 nm.
2) Preparation method of molecular films and manipulation technology.
3) Molecular electronics and Nano-Molecular technology.
4) Topics in the fields of organic ultra thin film and molecular electronics.

Since the start of this investigation committee in October, 1993, we have hold 6 study meetings every year. We have discussed our mutual interests on molecular films and the characterization methods of molecular films. During the last three study meetings, we took lectures given by non-members of this investigation committee. The three-year activity of this committee will be published in Technical Report of IEEJ.

Digest Report of the Investigation Committee of Fundamental Process of Treeing Degradation

K. Kudo (Meiji University)
Y. Shimizu (Nagoya University)
H. Muto (The Furukawa Electric Co., LTD.)

The committee was established in April, 1994 with the term of three years in order to survey and discuss the fundamental processes of electrical and water trees in insulating materials for power cables. Although the preceding committees concerning treeing phenomena in IEEJ had activities in the period of 1967 to 1990, the fundamental processes of treeing degradation have not been fully understood. Furthermore, the recent development of measurement techniques has provided information about the details of microstructures and morphology of trees. Accordingly, it is timely to survey and discuss the recent data concerning the fundamental processes of treeing degradation.

The items of survey are:

(1) Fundamental process of initiation and propagation of electrical tree under ac voltage
(2) Fundamental process of initiation and propagation of electrical tree under dc or impulse voltage
(3) Fundamental process of initiation and propagation of water tree
(4) Propagation process of electrical tree originating in water tree

Since the start of this investigation committee in April, 1994, we have held 13 committee meetings and 5 secretary meetings. About 120 papers were presented and discussed in the committee. The three years activity of this committee will be published in Technical Report of IEEJ.

Digest Report of the Investigation Committee on Interfacial Phenomena in Composite Electrical Insulation

T. Tanaka (Central Research Institute of Electric Power Industry, Kyushu University)
M. Nagao (Toyohashi University of Technology)
H. Muto (Furukawa Electric Co., Ltd.)
H. Homma (Central Research Institute of Electric Power Industry)

The insulating systems for power cables and electrical machines are usually fabricated from a combination of different materials rather than a single material. Even in the case of XLPE cables there exist interfaces related to the morphological multiphases and the semiconducting layer. The overall behaviors in the combination of materials often deviate from those expected from the individual component material and are often governed by the interfaces.

The purpose of this committee is to survey and discuss the influence of interfaces on the electrical insulating properties of composite insulating systems. The committee started its three-year term activity in January 1995 by 28 members. We have held 8 committee meetings and 3 secretary meetings up to July 1996. The main subjects of the investigation and survey in the meetings are as follows.

(1) Electrical insulation properties of external and internal interfaces in composite insulation systems.
(2) Evaluation method of electrical insulation performance of interface.
(3) International Round Robin Tests of electrical insulation at external and internal interfaces in composite insulation system and the analysis of the results in collaboration with CIGRE TF15-06-02 (Interfaces).
(4) Study visit to the research institutes and industries in Japan related to the composite electrical

insulation.

More than 100 papers were presented and discussed in the committee. The three years activity of this committee will result in the Technical Report of IEEJ.

Digest Report of the Investigation Committee on High Temperature Insulation

T. Okamoto (Central Research Institute of the Electric Power Industry)
M. Ishida (University of Tsukuba)
H. Mitsui (Toshiba Corporation)
G. Tanimoto (Showa Electric Cable & Wire Co., Ltd.)

The committee was set in January 1996 with 30 members in order to survey technical information concerning high temperature insulations (HTIs) and their applications.

(1) Purpose of establishment
Many power equipments and cables have been compacted and applied to severer environmental use at high temperature and therefore the design stress for the insulating materials increased not only in electrical stress but also in thermal stress. HTIs materials could be one of the solutions for the requirements for insulation in severer use. This committee aims to survey the modern HTIs and their applications.

(2) Investigation Items
The committee determined the investigation items as follows;
1) Classes and kinds of high temperature insulating materials
2) Electrical properties of HTI
3) Physical and chemical properties of HTI
4) Applications of HTI
5) Test methods of HTI performance
6) Future trends of HTI

(3) Activity
Since the establishment of the committee, three regular meetings and a secretary meeting have been held. About 50 papers were presented and discussed in the committee. The activity are in the first stage where selected papers will be reviewed and discussed. Three years activity of this committee will be published in a Technical Report of IEEJ.

Digest Report of the Investigation Committee on Deterioration of Insulation Materials and Standardization of Diagnosis for Power Apparatus

T. Hayami (Musashi Institute of Technology)
T. Ito (Musashi Institute of Technology)
K. Umemoto (Toshiba Co., Ltd.)
K. Uchida (Chubu Electric Power Co., Inc.)

This new Committee, established in January 1996, is scheduled to be active for three years. The Committee consists of members from colleges, research institutes, power electric companies and power apparatus manufacturers.

While the diagnosis of power apparatus is an important research area to prevent failures due to the degradation of electrical insulation in advance, there are still unknown phenomena to be investigated on the degradation mechanism.

The following activities have been achieved by the Committee:

(1) Investigation on relationship between the fundamental degradation phenomena such as partial discharge, electrical and water trees, and various electrical signals due to the degradation.
(2) Investigation on present criteria for determination of the existence of degradation for power apparatus.

3 ~ 33 kV distribution power equipment was investigated including rotating machines, cables, transformers, capacitors, and switch gears.

The Committee has held 5 meetings and discussed on 58 submitted reports as of June 25, 1996. It has also asked the members from colleges lecturing on the degradation phenomena of power apparatus. Three lectures have been completed.

The Committee plans to actively participate in domestic conferences and symposiums in the field of dielectric and insulation materials. In addition, nine papers have been submitted by the Committee to Japan-China Joint Conference (AICDEI 96) to be held in October 1996.

The Committee will terminate in December 1998.

Digest Report on the Investigation Committee of the Root Principles of Electro-Optic Conversion Functions and their New Application Fields

K. Hidaka (The University of Tokyo)
T. Takada (Musashi Institute of Technology)
Y. Murooka (Musashi Institute of Technology)
T. Maeno (Ministry of Posts and Telecommunications, Comm. Res. Lab.)
N. Inoue (Mitsubishi Cables Co., Ltd.)

The plan of this investigation committee has been drawn up by Y. Murooka, T. Takada and K. Hidaka. This committee started in April, 1996 after two years discussion among DEI technical committee members and will be continued until March, 1999. The purpose of it is to review the fundamental functions and the physical properties of electro-optic conversion, to understand the essentials of the electro-optic conversion functions and to propose new engineering applications. Optical measurement techniques using the electro-optic conversion such as electro-optic effect have been developed since 1970's, and some optical devices have been incorporated into electric power systems and also have been implemented to obtain a better physical understanding of dielectric and electrical-discharge phenomena. Typical examples characterizing the electro-optic conversion functions are: Pockels effect, Kerr effect, Faraday effect, electro-gyration effect, magnetic Kerr effect, opto-magnetic effect, optical anisotropy of liquid crystal and so on. As each effect has been independently applied to some engineering fields, many useful effects will be systematically reviewed and discussed in this committee.

The items of survey are

(1) Physical root principle of electro-optic conversion functions (electro-optic effect, magneto-optic effect, opto-elastic effect, nonlinear optic effect, optical phase conjugate effect, optical anisotropy),
(2) Application technology of electro-optic conversion functions (sensors, energy conversion technology, optical telecommunication),
(3) Essential components for application of electro-optic conversion functions (light sources, optical fibers, optical crystals, photodetectors, signal processing, image processing), and
(4) Feasibility of new application of electro-optic conversion functions.

This committee consists of a chairperson (K. Hidaka), two secretaries (T. Maeno and S. Inoue) and 26 members from 11 universities and 15 companies. Six technical meetings are scheduled to be held in a

year. One or two experts will be invited to every meetings to give lectures in their individual field relevant to electro-optic interaction and conversion and to discuss related items with committee members. The three years activity of the committee will be published in Technical Report of IEEJ.

Digest Report of the Investigation Committee on Evaluation Methods of High Reliability Insulation Technology for Electronic Equipment.

T. Tsukui (Tokai University)
Y. Yamano (Chiba University)
K. Shutoh (Science University of Tokyo)
M. Nonogaki (Mitsubishi Electric)

Electronic equipment is becoming small-sized and high in performance. The printed wiring board of electronic equipment is becoming fine and high density. Therefore, the distance between the foil conductor is small, and the electric field strength between the foil conductor increases. Such a high electric field may cause insulating failures.

Therefore, an investigation of insulation reliability comes up as an important problem for the design of electronic equipment and systems.

From these points of view, the investigation committee started in April 1996.

The main subjects of the investigation will be as follows.

(1) Make a survey of test methods for insulating failures due to the ionic migration.
(2) Compare and contrast the factors affecting insulating failures by the method of life tests.
(3) Investigation of assessment of the standard test method of insulation reliability.
(4) Research of cause of the insulation failure of electronic equipment and systems.

Since the start of this investigation committee, we have held 2 committee meetings and one organizer meeting. Now, we are planing the round robin tests of the ionic migration, where we will carry out joint tests.

Digest Report of the Cooperative Research Committee on Electrical Insulation News in Asia

H. Yamashita (Keio University)
K. Furukawa (Sumitomo Electric Industries)
Y. Inoue (Toshiba Corporation)
T. Niwa (Fujikura Ltd.)

Preceding committee (Cooperative Research Committee of Asian Interlink on Dielectrics and Electrical Insulation) worked from Jan. 1991 to Dec. 1992. The committee reviewed the present status of scientific and technical cooperation in the field of dielectrics and electrical insulation among Japan and the newly developed and developing countries in Asia and sought the appropriate ways to promote it. As a specific activity discussed in the committee, the Cooperative Research Committee of Electrical Insulation News in Asia was established in Apr. 1994 and edited and published "Electrical Insulation News in Asia" No. 1 (Sept. 1994), and No. 2 (Sept. 1995). Although the committee ended in March 1996, it was considered that the activity of publishing Electrical Insulation News in Asia should be continued. To fulfill the purpose, The second Cooperative Research Committee of Electrical Insulation News in Asia has been established in Apr. 1996 and will publish the News after No. 3 which will be published (Sept. 1996).

Main subjects of the news are as follows:

Preface

Editorial

Activities of the Technical Committee on DEI including title of papers presented at the technical meetings and technical reports

Technical Exchanges between Asian Countries

Extract from the technical report by Cooperative Research Committee of Asian Interlink on Dielectrics and Electrical Insulation

Conference (held in Asia) records

Announcement of international conference which will be held in Asia

Miscellaneous (application for membership in IEEJ, way for purchasing proceedings of IEEJ technical meetings and IEEJ technical reports)

Front and rear covers show color photos of industrial products or experimental facilities and fundamental research achievements

Papers Presented at the Technical Meetings

Theme: Organic Thin Film
Sept. 8, 1995 Aoyama Gakuin University

DEI-95-67 Deposition of PTFE Thin Films by Ionization-assisted Evaporation Method.
Hiroaki Usui, Katsuyuki Kurachi, Hiroshi Koshikawa and Kuniaki Tanaka (Tokyo University of Agriculture and Technology)

DEI-95-68 Characteristics of Interfacial Discharge under Impulse Voltage Application.
Tadasuke Saito*, Hiroaki Fukushima, Yasushichi Gosho, Masao Endo (Chuo University)

DEI-95-69 Impulse Interfacial Discharge Occurring at the Dielectric-Dielectric Interface
Hiroaki Fukushima*, Tadasuke Saito, Yasushichi Gosho, Masao Endo (Chuo University)

DEI-95-70 Measurement of Phase Transition Temperature of Lipid Membranes by Thermally Stimulated Displacement Current.
Woo-Yeon Kim, Mitsumasa Iwamoto (Tokyo Institute of Technology)

DEI-95-71 Electrical conduction fullerene sublimed thin films
Kazuya Saito, Fujio Kaneko, Masayoshi Masui, Manabu Takeuchi, Naoyuki Sato, Takashi Ikehata, Hiroshi Mase (Ibaraki University)

DEI-95-72 Photoconduction Properties of C60/Poly (benzo [c] thiophene) Layer.
Mitsuyoshi Onoda* (Himeji Institute of Technology), Kazuya Tada, Katsumi Yoshino (Osaska University)
Anvar A. Zakhidov (Uzbekistan Academy of Sciences)

DEI-95-73 Photoelectric Effect of Multi-Layered Organic Cells.
Masaaki Iizuka*, Shoichi Muraguchi, Shigekazu Kuniyoshi, Kazuhiro Kudo, Kuniaki Tanaka (Chiba University)

DEI-95-74 Optical and Electrical Characteristics of Organic Multiple-Quantum-Well Structure Utilizing Dye Materials.
Yutaka Ohmori, Masayoshi Yoshida, Akihiko Fujii, Katsumi Yoshino (Faculty of Engineering, Osaka University)

DEI-95-75 Nonlinear Optical Properties of Polyurea Thin Films by Vapor Deposition Polymerization - Effects of Molecular Structure on Polymerization and Orientation.
Takeshi Segi*, Yasuo Suzuoki, Akimori Tabata, Teruyoshi Mizutani (Nagoya University)

DEI-95-76 Image Analysis of Dielectric Breakdown of Plasma-Polymerized Hexamethyldisilazane Films.
Minoru Kusabiraki, Hironobu Matsuura, Kenji Tanaka, Yoshiharu Maekawa, Masao Aozasa (Osaka City University)

DEI-95-77 Study on Deterioration Mechanism in Organic EL Devices Using XPS Technique.
Naoya Nakanishi, Akinori Maeda, Shizuyasu Ochiai, Yoshihiro Takahashi, Kenzo Kojima, Masayuki Ieda (Aichi Institute of Technology)
Tsutomu Kojima (Daido Steel Co., Ltd.)

DEI-95-78 Evaluation of Azobenzene LB films adsorbing Cyanine dyes using ATR method.
Tetsuo Fukami*, Kazunari Shinbo, Keizo Kato, Futao Kaneko (Niigata Univ.)
Takashi Wakamatsu (Ibaraki National College of Technology)

DEI-95-79 Electrical Conduction in the Surface Direction in Al/C12TCNQ/C20/Al LB Heterofilms.
Masahito Kushida, Shiro Fujimaki, Kieko Harada, Kyoichi Saito, Kazuyuki Sugita (Chiba University)

Theme: High Electric Field Phenomena and Space Charge, Insulation for Equipment and Cable
Nov. 27 - 28, 1995 Holiday Inn Crown Plaza Toyohashi

DEI-95-80 Effect of Heat Treatment on Dielectric Breakdown and Molecular Orientation of Polyimide by Vapor Deposition Polymerization.
Kazuo Iida, Can Liao, Jing Huang Shuhei Nakamura, Goro Sawa (Mie University)

DEI-95-81 Thermally Stimulated Current in Polymethylpentene.

Hidenori Suzuki*, Hirofumi Kuroda, Sotaro Asai, Yoshimichi Ohki (Waseda University)

DEI-95-82 TSC of EPR Mixed with Additive Agent.
K. Tachiki (Meijo University), et. al.

DEI-95-83 Compensation Effect of Electrical Conduction in High Molecular Dielectrics.
Y. Hidaka (Shinshu University), et. al.

DEI-95-84 3 Dimensional Measurement of Non-Uniform Electric Field in Nitrobenzene.
H. Ihori (Ehime University), et. al.

DEI-95-85 Observation of Charge Behavior in Organic Photoconductor.
Y. Satoh, H. Katoh, Y. Tanaka, T. Takada (Musashi Institute of Technology)

DEI-95-86 Wave Form of Loss Current in Oxide of Polypropyren Film under High Stress with Superposition DC Voltage.
K. Toyama (Numazu National College of Technology), et. al.

DEI-95-87 SEM Image Simulation of Rows of belts of Dielectrics on Metal Plate.
E. Ban (NBI Techne)

DEI-95-88 Formation of Space Charge Distribution by Polymeric Solid Electrolyte.
K. Fukunaga (Communications Research Laboratory), et. al.

DEI-95-89 Property of Electrification of Spherulitic Polypropyren.
K. Ikezaki (Keio University)

DEI-95-90 Surface Potential on Polymer Film Formed by Residual Charge.
Isao Kitani (Ehime University), et. al.

DEI-95-91 Measurement of Space Charge Distribution at High Temperature using the Pulsed Electro-Acoustic (PEA) Method (Development of Measurement System)
Hironori Kitajima, Yosuke Mito, Yasuhiro Tanaka, Tatsuo Takada (Musashi Institute of Technology)

DEI-95-92 Space Charge Properties of New Type Polyethylene (No. 2).
Shinan Wang, Fumio Aida, Yasutaka Fujiwara (Showa Electric Wire & Cable Co., Ltd.)

DEI-95-93 Measurement of Space Charge in PE/EVA Laminated Sheet by LIPP Method.
K. Kisa (Kyushu University), et. al.

DEI-95-94 Measurement of Space Charge Distribution in Multiple Insulating Materials.
T. Murakami (Tokyo Denki University), et. al.

DEI-95-95 Some Factors for Space Charge Formation of Polyethylen Part. 2.
Ayako Yokoyama, Hiroyuki Miyata, Tohru Takahashi (Fujikura Ltd.)

DEI-95-96 Space Charge Behavior in Polyethylen Under DC High Electric Field.
Naohiro Hozumi, Toshinao Takeda, Hiroshi Suzuki, Tatsuki Okamoto (Central Research Institute of Electric Power Industry)
Kazuo Watanabe, Akitoshi Watanabe & Hiroyuki Miyata (Fujikura Ltd.)

DEI-95-97 Effect of Acetophenone on High Field Electrical Conduction in Polyethylene Film.
Shinichi Mitsumoto*, Takao Tsurimoto, Masayuki Nagao, Masamitsu Kosaki (Toyohashi University of Technology)

DEI-95-98 Properties of magnet wires coated with enamel containing inorganic materials.
Hisayasu Mitsui, Hiroyoshi Tsuchiya, Yoshihiro Ito, Tetsushi Okamoto (Toshiba Corp.)
Toshiro Atsuchi (Nishishiba Electric CO., LTD.)
Futoshi Kanemitsu, Masatada Fukushima, Tatsumi Hirano, Yukio Tojo (Showa Electric Wire & Cable Co., Ltd.)

DEI-95-99 Measurements of Pressure Wave at Electrical Breakdown in Polymer Film.
Masumi Fukuma, Masayuki Nagao (Matsue National College of Technology)
Masamitsu Kosaki (Toyohashi University of Technology)

DEI-95-100 Space Charge Accumulation Phenomena under AC stress.
Kaminaga Kenji, Yoshifuji Naohisa (Tokyo Electric Power Company)
Chathan M. Cookke (Massachusetts Institute of Technology)
Inaoka Kazuyoshi, Muto Hideji (The Furukawa Electric Co., Ltd.)

DEI-95-101 Space Charge Distribution in Various Cables under DC Electric Stress.
Y. Murata (Hitachi Cable Ltd.), et. al.

DEI-95-102 Study of Packet-like Space Charge in Polyethylen for Cable Insulation.

Hiroyuki Kon*, Yasuo Suzuoki, Teruyoshi Mizutani (Nagoya University)
Naohisa Yoshifuji (Tokyo Electric Power Co.)

DEI-95-103 Measurement of Space Charge in Various insulating Materials Used in XLPE Cables.
T. Nakagawa (Kansai Electric Power Co.), et. al.

DEI-95-104 Consideration on Properties of Growth of Water Tree Under High Temperature.
A. Toya (Tokyo Electric Power Co.), et. al.

DEI-95-105 Absorption Current Measurements and Shape Observation for CV Cables with Water Tree.
Toshifumi Arai*, Katsutoshi Kudo (Meiji University), Mitsugu Aihara (Showa electric Wire and Cable Co., Ltd.)

DEI-95-106 Primary Consideration on Deterioration Mechanism of XLPE Cables.
K. Kaminaga (Tokyo Electric Power Co.), et. al.

DEI-95-107 Properties of Deterioration of Aged 66kV Cable under Accelerated Aging Test in Water
A. Toya (Tokyo Electric Power Co.), et. al.

DEI-95-108 Study for Verification of 500kV CV Cables.
M. Fukawa (Tokyo Electric Power Co.), et. al.

DEI-95-109 Relation between the Super Structure and the Dielectric Breakdown in Semi crystalline Polymers.
Takayuki Yamakita (Kansai University)

DEI-95-110 Impulse Tree Characteristics in Polyethylene with Polar Groups.
N. Shimizu, N. Tohyama, H. Sato (Nagoya University)

DEI-95-111 Shape of Tree in Treeing Deterioration and Phase Analysis of Illuminance Intensity Distribution.
H. Kamikubo (Musashi Institute of Technology), et. al.

DEI-95-112 Space Charge Distribution in Polyethylen Sheet Degraded by Water Tree Influence of Moisture Contents on the Space Charge Behaviors.
Ying Li, Jiro Kawai, Yasumitsu Ebinuma, Yasutaka Fujiwara (Showa Electric Wire and Cable Co., Ltd.)

DEI-95-113 Phenomena of Surface Discharge Caused by Waterdrops on a Drainage Surface.
N. Sakaguchi (Kitami Institute of Technology), et. al.

Theme: Functional Thin Film
Nov. 17, 1995 Niigata University

DEI-95-114 Preparation of Electlytic-Polymerized Heterofilms and the Electrical properties.
Masaki Takeuchi, Kazunari Shinbo, Keizo Kato, Futao Kaneko (Niigata University)

DEI-95-115 Response characteristic of NO2 Sending Elements with Polystyrene Thin Films.
Shinnichi Takeda (Takushoku University)

DEI-95-116 Electrical Properties of Organic Monolayer Films on material surface.
Mitsumasa Iwamoto (Tokyo Institute of Technology)

DEI-95-117 Molecular Space Control of Pyrrole Containing LB Films.
Seimei Sha Shiratori, Koujirou Tachi, Kazuo Ikezaki (Keio University)

DEI-95-118 Optical Evaluation of Dye Adsorption LB Films deposited on Optical Fibers.
Kenichi Kako, Kazuhiko Itadera, Shigekazu Kuniyoshi, Kazuhiro Kudo, Kuniaki Tanaka (Chiba University)

DEI-95-119 Relation between Complex Index and Light Absorption in Organic Thin Films.
Kazuhiro Saito, Takashi Wakamatsu*, Hiroshi Yokoyama (Electrotechnical Laboratory)

DEI-95-120 Enhanced Photocurrent in Photoelectric Cells Based on Surface Plasmon Excitation.
Takashi Wakamatsu (Ibaraki National College of Technology)
Kazuhiro Saito, Youichi Sakakibara, Hiroshi Yokoyama (Electrotechnical Laboratory)

DEI-95-121 Electrical Properties of Azobenzen LB Films Adsorbing Cyanine Dyes.
K. Shinbo, T. Kotani, M. Watanabe, K. Kato, F. Kaneko, S. Kobayashi (Niigata University)

DEI-95-122 Control of charge-transfer complex formation by a bias voltage applied LB Technique.
Kazuhiro Kudo, Kazuhiko Itadera, Shigekazu Kuniyoshi, Kuniaki Tanaka (Chiba University)

Theme: Insulation Material Analysis and Radiation-induced Degradation
Dec. 12, 1995 Waseda University

DEI-95-123 Three-Dimensional Space Charge Distribution Measurement in Electron Beam Irradiated Dielectrics.
Yoichi Imaizumi, Ken Suzuki, Yasuhiro Tanaka, Tatsuo Takada (Musashi Institute of Technology)

DEI-95-125 Effects of Electron Beam Irradiation on Electrical Characteristics of Poly (Ether Ether Ketone).
Katsuyoshi Shinyama*, Makoto Baba, Shigetaka Fujita (Hachinohe Institute of Technology)

DEI-95-126 Heat/Radiation Combined aging on Low-voltage CV cable.
Shinichi Okamoto, Tokuhiro Ohnishi (University of Osaka Prefecture)
Yoshihiro Ueda, Tsutomu Murao, Takuo Tanaka (Tatsuta Electric Wire & Cable Co., Ltd.)

DEI-95-127 Study of Life Evaluation for Low-voltage cable with Time Domain Dielectric Spectrometer.
Shinichi Okamoto, Tokuhiro Ohnishi (University of Osaka Prefecture)
Yoshihiro Ueda, Tsutomu Murao, Takuo Tanaka (Tatsuta Electric Wire & Cable Co., Ltd.)

DEI-95-128 High Temperature γ-ray Irradiation Effects of Varnish Wires.
Toshiaki Yagi, Yousuke Morita, Tadao Seguchi (JAERI Takasaki)
Hitoshi Yamato, Hironori Yonemoto, Shin Kusunoki (Totoku Toryo Co., Ltd.)

DEI-95-129 Electrical and Optical Properties of Ta_2O_5 Thin Films.
Shinji Hirasawa, Keiichi Miyairi, Tadao Seguchi (Shinshu University)
Masashi Miyashita (Shinkou Electric Industries Co., Ltd.)

DEI-95-130 Structural stabilization induced by post-irradiation of plasma in TEOS-SiO_2 films deposited at low temperature.
Takashi Noma*, Takaharu Sugiura, Keisuke Ishii, Yoshimichi Ohki, Yoshimasa Hama (Waseda University)

DEI-95-131 Electron Spin Resonance Study of Defects in Ion-Implanted Thermal SiO_2 Films.
Hiroshi Fukui, Hiroyuki Nishikawa, Eiki Watanabe, Daisuke Ito (Tokyo Metropolitan University), Makoto Takiyama (Nippon Steel Corp.)

DEI-95-132 Temperature Dependence of Photoluminescence in High-Dose Gamma-Ray Irradiated High Purity Silica.
Yuryou Sakurai, Kaya Nagasawa(Shonan Institute of Technology)
Hiroyuki Nishikawa (Tokyo Metropolitan University)
Yoshimichi Ohki, Yoshimasa Hama (Waseda University)

Jan. 18, 1996 Nagoya University

DEI-96-2 Electrical Measurement System for Olfactory Receptor Cells Isolated form a Newt.
Masao Ikeya, Masumi Hayashi, Shinzo Morita (Nagoya University)

DEI-96-3 Evaluation of Electrical Properties in Evaporated p-, n-Organic Films by in-situ FET Measurement.
Tsutomu Sumimoto, Kouji Hiraga, Shigekazu Kuniyoshi, Kazuhiro Kudo, Kuniaki Tanaka (Chiba University)

DEI-96-4 Characterization of Organic/Inorganic Composite Thin Films.
Toshinobu Inagaki, Tatsuo Mori, Teruyosi Mizutani (Nagoya University)

DEI-96-5 A Study on EL Mechanism of Organic EL Device with Multilayer Structure.
Koji Obata, Tatsuo Mori, Teruyosi Mizutani (Nagoya University)

DEI-96-6 Several Properties and Applications for Electroluminescent Devices of Soluble Conducting Polymers.
Mitsuyoshi Onoda (Himeji Institute of Technology), Kazuya Tada, Katsumi Yoshino (Osaka University), Anvar A. Zakhidov (Uzbek Academy of Science)

Theme: Printed Circuit Board and Ion Migration
Jan. 23, 1996 Asakusa Training Center

DEI-96-7 Migration of Conduction Paste of Silver and Copper Powder with Oblique Structure
Satoshi Fujiki (Toyama Industrial Technology Center), et. al.

DEI-96-8 Migration and Application of Aramid-Epoxy Circuit Board.
A. Okuno （Nippon LEC Inc.）

DEI-96-9 Influencee of Paste Concerned with Anti-Migration Properties of FPC.
Misako Osoegawa (Sumitomo electric Industries, Ltd.), et. al.

DEI-96-10 Study of Ion-Migration at NASDA.
Mitsunori Yonemaru (NASDA), et. al.

DEI-96-11 Anti-Migration Properties of Thermoplastic Polyimide.
Kyoichi Ishigaki (Mitsui Toatsu Chemicals Inc.), et. al.

DEI-96-12 Insulation of Printed Circuit Board Exposed to Ozone.
Tatsuo Motoyama (National Institute of Industrial Safety), et. al.

DEI-96-13 Printed Circuit Board Damage from Shock and the Current Resistivity of Conductor Foil.
K. Shutoh (Science University of Tokyo)

DEI-96-14 DC Tracking of Organic Insulating Materials.
Duboxue (Tokyo University of Agriculture and Technology), et. al.

Theme: Gas Discharge, Liquid Discharge and High Voltage
Jan. 26, 1996 Fukuoka University

DEI-96-15 Surface Discharge Mechanism at Positive Impulse Voltage Application.
Masayuki Taniguchi (Fukuoka Universty) et. al.

DEI-96-16 Generating Process of Surface Discharge at Negative Impulse Voltage Application.
Kiyoshi Obana (Fukuoka Universty), et. al.

DEI-96-17 Generating Characteristics and Formation of Surface Discharge on Insulated Surface.
Toshiyuki Nishi (Toyama National College of Technology), et. al.

DEI-96-18 Discharge Process and Characteristics at the Presence of Barrier between Air Gaps.
Masaharu Toyofuku (Fukuoka Institute of Technology), et. al.

DEI-96-19 Influence of Floating Electrode to Impulse Flashover on the Stained Surface.
Akira Tominaga (Oita University)

DEI-96-20 Frequency Characteristics of Optical Current Sensor System for Power Distribution and the Measurement of Power Supply Harmonic Waves.
Masamitsu Kaneko (Miyazaki Public University), et. al.

DEI-96-21 On-line Insulation Diagnosis of XLPE Cables Using an Expert System and the Prediction of Degradation Development.
H. Kubota (Tokai University), et. al.

DEI-96-22 Change of Characteristics of Insulators built-in ZnO for High Voltage Power Distribution Caused by Repeating Operation.
Takashi Hikami (Miyazaki University), et. al.

DEI-96-23 Surface Discharge Characteristics of PE Insulated Wire Surface in Oil upon Impulse Voltage Application.
Tomoichi Miyakawa (Kanazawa Institute of Technology), et. al.

DEI-96-24 On-Resistance Characteristics of a Mechanical opening Switch Using Superconducting Materials.
Shinya Otsuka (Kyushu University), et. al.

DEI-96-25 EHD Pumping Action to Insulation Liquid Applicated Non-uniform Propagating Electric Wave.
Toru Oda (Nishinippon Institute of Technology), et. al.

DEI-96-26 Mechanism of the Surface and Volume Effects of Insulation Breakdown Characteristics at Liquid Nitrogen.

Naoki Hayakawa (Nagoya University), et. al.

DEI-96-27 Behavior of Bubble and Characteristics of Insulation Breakdown of Liquid Helium Applicated Non-uniform Electric Field.
Hiroyasu Yoshizuka (Kyushu University), et. al.

DEI-96-28 Multiple Stress Effect Concerned with Electric Insulation Breakdown of Saturated Superfludity Helium.
Kinya Ohno (Kyushu University), et. al.

Theme: Report on International Conference
Mar. 1, 1996 Asakusabashi Training Center

DEI-96-29 4th International Conference on Insulated Power Cables (Overview of JICABLE95).
Z. Iwata (Furukawa Electric), et. al.

DEI-96-30 Overview of 5th International Conference on Conduction and Breakdown in Solid Dielectrics.
K. Fukunaga (CRL), M. Fukuma (Matsue National College of Technology), Y. Sekii (Chiba Institute of Technology), T. Takada (Musashi Institute of Technology)

DEI-96-31 A report on the 1995 Conference on Electrical Insulation and Dielectric Phenomena (CEIDP).
Yoshimichi Ohki (Waseda University)

DEI-96-32 Report on 1995 CIGRE SC15 Germany Meeting.
Toshikatsu Tanaka (Central Research Institute of Electric Power Industries, Kyushu University), Kazutoshi Gotoh (Toshiba), Masayuki Nagao (Toyohashi University of Technology)

DEI-96-33 The Report on IEC TC 15 Meeting held in Milan.
Shigeo Kobayashi (Tokyo University of Agriculture and Technology)

DEI-96-34 Actual Conditions of Electrical Technology Research Shanghai Jiao-Tong University.
Shinan Wang (Showa Electric Wire & Cable Co., Ltd.)

DEI-96-35 Study in Connecticut of U.S.A.
Hiroya Honma (Central Research Institute of Electric Power Industries)

Theme: Terminal Treatment, Interface Treatment and Composite Insulation
Mar. 1, 1996 Asakusabashi Training Center

DEI-96-36 Accelerated Aging Test of Polymer Insulators.
Isao Nakajima, Hiroyuki Shinokubo, Kuniaki Kondo, Ryosuke Matsuoka (NGK Insulators, Ltd.)

DEI-96-37 Influence of Internal Microscopic Interface on Electric Breakdown Characteristics of FRP
Kenji Ichikawa, Tatsuo Motoyama (National Institute of Industrial Safety), Kenzo Kadotani (Hitachi Chemical Co.)

DEI-96-38 Effect of Water Absorption on Dielectric and Electrical Properties in Composite Insulating Materials.
M. Nagao, A. Nakamura, Y. Muramoto, M. Kosaki (Toyohashi University of Technology), T. Tanaka (Central Research Institute of Electric Power Industries, Kyushu University)

DEI-96-39 Influence of The Water Immersion on Dielectric and Electrical Insulation Properties of Composite Insulating Materials for Outdoor Use - CIGRE TF15-06-02 (Interfacial Phenomena) Round Robin Test -.
Atsushi Fukuda, Hisayasu Mitsui, Tsuyoshi Tanii (Toshiba Corporation)

DEI-96-40 Development of Electrode System for Evaluating Partial Discharge Degradation Characteristics at Interface in Solid Insulation.
Hiroshi Kuno*, Yasuo Suzuoki, Teruyoshi Mizutani (Nagoya University)
Fumitaka Komori (Toba National College Maritime Technology)

DEI-96-41 Development of Model Specimen for Evaluating Insulation Properties of Solid Internal Interface.

K. Yamamoto, M. Nagao, Y. Muramoto, M. Kosaki (Toyohashi University of Technology)
T. Tanaka (Central Research Institute of Electric Power Industries, Kyushu University)

DEI-96-42 Space Charge Formation in Cross-linked Polyethylen under AC Voltage.
Koichi Murata, Yasuhiro Tanaka, Tatsuo Takada (Musashi Institute of Technology)

DEI-96-43 Improvement of Semicon-Interface of an XLPE Power Cable with Interface Diffusion Method.
Tatsuki Okamoto, Naohiro Hozumi, Hiroshi Suzuki, Masayoshi Ishida(*)
(Central Research Institute of Electric Power Industries)

Theme: Treeing and Discharge
July 22 - 23, 1996 Iwate University

DEI-96-44 Neutron Release from Palladium needle Electrode Caused by Glow Discharge in Heavy Hydrogen Gas.
Kazuyoshi Uchiyama (Iwate University), et. al.

DEI-96-45 Reduction and Removal of NOx using Barrier Discharge.
T. Suzuki, K. Takaki, S. Kato, T. Fujiwara, H. Yamada (Iwate University)
S. Maekawa (HESCO)

DEI-96-46 Control of Electron Temperature and Electron Density in rf Discharge Plasma.
Kunioh Sayama, Minoru Itagaki, Shoji Kato, Tamiya Fujiwara (Iwate University)

DEI-96-47 Effects of Thickness of Electrode to Pseudo Spark Discharge Starting Voltage.
Hisashi Taguchi (Iwate University), et. al.

DEI-96-48 Improved Hollow Electrode for a Decrease in ac PD.
Yoshiaki Yamano, Tatsuya Tsurumizu (Chiba University)

DEI-96-49 Breakdown Characteristics of Cryogenic Gases in Parallel Plane Electrode System with Spacer.
Atsushi Minoda, Katsuhiko Hatakeyama, Masayuki Nagao, Masamitsu Kosaki (Toyohashi University of Technology), Takashi Satoh (National Institute for Fusion Science)

DEI-96-50 The Effect of SO_2 Acid Rain on The Tracking Resistance of Pure Organic Insulating Materials.
Seiichi Hasegawa (Akita National College of Technology), Seiji Kumagai, Wang Xinsheng, Kenichi Kobayashi, Noboru Yoshimura (Akita University)

DEI-96-51 TSC Properties of Electron Beam Irradiated of Polyetheretherketone.
Katsuyoshi Shinyama*, Makoto Baba, Shigetaka Fujita (Hachinohe Institute of Technology)

DEI-96-52 Effect of X-Ray Irradiation on Partial Discharge Inception for a Void in Insulating Material.
Osamu Usui, Taketoshi Hasegawa, Haruhisa Fujii (Mitsubishi Electric Corporation)

DEI-96-53 Partial Discharge Characteristics of XLPE Cable lines with different kinds of Defects.
Katsumi Uchida, Masahiro Yamamoto (Chubu Electric Power Co., Ltd.), Toshiyuki Sato, Hidetoshi Yasui (The Furukawa Electric Co. Ltd.)

DEI-96-54 Mechanism of DC Deterioration in Material for DC Cable.
Ginzo Katsuta, Takao Itaya (Tokyo Electric Power Co. Ltd.), Toru Nakatsuka, Hiroyuki Miyata, Shuji Yamamoto (The Fujikura Ltd.)

DEI-96-55 Analysis of Luminous Image and Discharge Magnitude at Each Phase Angle Area on Treeing Phenomena.
Koji Urano, Masamu Naoe, Yoshiyasu Ehara, Tairo Ito (Musashi Institute of Technology)

DEI-96-56 The Effect of Fillerparticle Size on Ultrasonic Image of Electrical Breakdown Region in Filler-added Insulating Materials.
Y. Takeda (Musashi Institute of Technology), M. Yoshizawa (Tokyo Metropolitan College of Technology), E. Watanabe, T. Moriya (Tokyo Metropolitan University)

DEI-96-57 Measurements of Space Charge Distribution in Cross-linked Polyethylene with Water Tree in Small Area Using PEA Method.
Ken. Suzuki, Yoichi Imaizumi, Yasuhiro Tanaka, Tatsuo Takada (Musashi Institute of Technology), Li Ying, Yasumitsu Ebinuma (Showa Electric Wire and Cable Co., Ltd.)

DEI-96-59 A Study of the Electrical Properties of Water Trees in 6kV XLPE Power Cables as Detected

by the AC Superposition Method.
Takao Kumazawa (Chubu Electric Power Co., Inc.), Shinichi Sugiyama, Masahiro Hotta, Toshinari Hashizume, Tsuneo Tani (Yazaki Electric Wire Co., Ltd.)

DEI-96-60 Relation between Spherulites and Water trees in Polypropylene.
Fan Zong-huai, Noboru Yoshimura (Akita University), Masateru Yanagiwara (Akita National College of Technology)

DEI-96-61 Electrical Tree Initiation under High Field.
Hideaki Kawamura (Meijo University), Masamitsu Kosaki (Toyohashi University of Technology), Yasuo Sekii (Chiba Institute of Technology)

DEI-96-62 Electrical Tree Initiation as Degradation Phenomena at Low Electric Field.
Noriyuki Shimizu (Meijo University), Goro Sawa (Mie University), Eiki Watanabe (Tokyo Metropolitan University)

DEI-96-63 Propagation of Electrical Trees.
Naohiro Hozumi (CRIEPI), Takamasa Yamakita (Kansai Univ.), Yasuro Ito (Musashi Inst. Tech.), Katsutoshi Kudo (Meiji Univ.)

DEI-96-64 Structure and Chemical Characteristics of Water Tree.
Muto Hideji (The Fukuwara Electric Co., Ltd.), Katsuta Ginzo (Tokyo Electric Power Company), Yoshimura Noboru (Akita University)

DEI-96-65 Electrical Properties of water tree.
Toshinari Hashizume (Yazaki Electric Wire Co., Ltd.), Shinichi Nakagawa (The Kansai Electric Power Company Inc.)

DEI-96-66 Characteristics of Formation and Growth of Water Tree.
Thoru Nakatsuka (Fujikura Ltd.), Kenichi Hirotsu (Sumitomo Electric Industries, Ltd.), Akira Someya (Mitsubishi Cable Industries, Ltd.)

DEI-96-67 Generating Mechanism of Electrical Trees from Water Trees.
Yasumitsu Ebinuma (Showa Electric Wire & Cable Co., Ltd.), Shoshi Katakai (Hitachi Cable, Ltd.), Masahiro Yamamoto (Chubu Electric Power Co., Inc.)

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B : Power and Energy
C : Electronics, Information and System
D : Industry Applications
¥ : Japanese Yen