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CONTENTS

PREFACE

Prof. Kunihiko Hidaka	1
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OUTLINE OF TECHNICAL COMMITTEES ON DEI

AND RELATED TC IN IEEJ	2
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Technical Committee on Dielectrics and Electrical Insulation
Technical Committee on Electrical Discharge
Technical Committee on Electromagnetic Compatibility
Technical Committee on Pulsed Electromagnetic Energy
Technical Committee on High Voltage Engineering
Technical Committee on Electrical Wire and Cables

ACTIVITIES OF THE TECHNICAL COMMITTEES ON DEI IN IEEJ

Digest Reports of Investigation Committees in DEI	8
IEEJ Technical Reports Edited by TC-DEI and Related TCs	14

TECHNOLOGIES FOR TOMORROW

Dust Cycle Test – An Advanced Contamination Test Method	15
Thermal Deterioration Diagnosis by Optical Fiber Sensors for Induction Motors	16
The Introduction of Multi Range Plug-in Cable Sealing End	17

RESEARCH ACTIVITIES AND TECHNICAL EXCHANGES IN ASIAN COUNTRIES

Conference Records	18
* The 5th K-J Symposium on ED & HVE	
* The 10th Asian Conference on Electrical Discharge (ACED-2000)	
* 2001 IDC on Nano Interface Controlled Electronic Devices (IDC-NICE 2001)	
* 2001 International Symposium on Electrical Insulating Materials	
Announcement of International Conference to be Held in Asia	22
* ICEPOM-4, * ICEE2002, * IEEE/PES T&D Asia, * IEEE TENCON'02	
* ACED2002, * 2nd IDC-NICE, * ICPADM2003	
Introduction of Research Activities on High Voltage Engineering and Insulation in Indonesia	24
Electric Power Industry in Vietnam: the Overview	26

MISCELLANEOUS

Photos of Front and Rear Covers	28
Application for Membership in IEEJ	29
Way for Purchasing Proceedings of IEEJ Technical Meetings and Technical Reports	29
Members of EINA Magazine Committee	30

PREFACE

Prof. K. Hidaka

Material Development Versus Environment

A feature of the consumer society in a country might be the idea that waste or non-utilitarian expenditure was good and an indicator of how far the country had advanced. As the result, we cannot help noticing the waste created by excessive packaging and the roadsides piled with no-longer-wanted or unfashionable appliances.



In December 1997, representatives from throughout the world gathered in Kyoto to work towards reducing global greenhouse gas emissions. While the meeting helped put us on the stage of international environmental diplomacy, it may disguise the fact that we are still struggling with local problems such as waste and pollution. Global environmental problems have become a major international concern since the late twentieth century, often overshadowing serious problems that we have yet to solve within our own country. Unless these problems are dealt with, no country can be considered to be a truly-advanced nation capable of showing leadership in the world.

Let us show an example of pollution problems to be tackled in Japan. A newspaper says that dioxin (polychlorinated dibenzo-p-dioxins) contamination in Japan is the worst in the world. The toxicity of dioxins became evident in the large number of children with birth defects whose mothers had contact with defoliants used in large quantity by the United States military during the Vietnam War. Later a Japanese research team examined ashes from waste incinerators and reported detection of dioxins.

The following explanation is made for the abnormally high levels of dioxins in Japan. One major characteristic of waste disposal in Japan is the high reliance on the incineration of waste, irrespective of whether its origins are domestic or industrial. This enables us to reduce the volume of waste to about 5 per cent of its original volume, and it is considered an effective way to eliminate bacteria and odors. A major problem with this is the high proportion of plastics such as polyvinyl chloride, much of which includes chlorides that create dioxins on being burnt.

Material engineers as well as many other engineers have believed that they had succeeded in introducing industrial technologies which minimized size and maximized performance, and then had overcome any pollution problems. They should never finish it as considering this self-confidence as only a myth. It is now expected for the material engineers to play an important role of leading environment-friendly technologies, while meeting public demand for not only global but also local environment.

Dr. Kunihiko Hidaka

(Professor, Department Chair of Electrical Engineering, the University of Tokyo)

OUTLINE OF TECHNICAL COMMITTEES ON DEI AND RELATED TC IN IEEJ

Technical Committee on Dielectrics and Electrical Insulation (DEI)

Chairperson:	Y. Ohki (Waseda University)
Secretaries:	K. Kimura (Kyushu Institute of Technology) T. Okamoto (CRIEPI)
Assistant Secretaries:	M. Okashita (Showa Electric Wire and Cable) H. Nishikawa (Shibaura Institute of Technology)

This Technical Committee (TC-DEI) was set up in 1979 succeeding the Permanent Committee on Electrical Insulating Materials upon the reorganization of IEEJ. The activities of the Committee have been covering mainly solid and composite dielectric materials and their technologies.

The primary activity of TC-DEI is the annual Symposium of Electrical and Electronic Insulating Materials and Applications in Systems, formerly called Symposium on Electrical Insulating Materials.

The 32nd Symposium was held in Nagano on November 16 and 17, 2000. Prof. L. A. Dissado of Leicester University and Prof. M. Taylor of Wales University, both from U. K., gave invited lectures. Special sessions on “Eco-friendly insulation technologies” and “International standards” were organized. Including these topical papers, 91 papers were heard.

The 33rd Symposium in 2001 will be held at the Hotel Sungarden, Himeji on November 19 –22

jointly with IEEE DEIS, Chinese Electrotechnical Society, Korean Institute of Electrical and Electronic Material Engineers, the Kansai Section of IEEJ, IEEJ Investigation Committee on Insulation Lifetime of Dielectric Materials and Electrical Apparatus, and Himeji Institute of Technology. It will be held as a joint international conference of the 2001 International Symposium of Electrical Insulating Materials (ISEIM 2001) and the 2001 Asian Conference on Electrical Insulation Diagnosis (ACEID 2001). More than 200 papers are to be presented in this four-day symposium. The details of ISEIM 2001 can be seen on its web site:

<http://www.waseda.ac.jp/conference/ISEIM2001/index.html>

The TC-DEI currently runs seven Investigating Committees (IC) which organize Technical Meetings (95 papers in 2000) and one Cooperative Research Committee (CRC) which edits and publishes this EINA

Table 1 Investigation and Cooperative Research Committees in TC-DEI

Research Subject	Chairperson
Assessment and Improvement of the Interface in Composite Electrical Insulation (3 years from Jan. 1999)	T.Tanaka (Waseda University & CRIEPI)
Various Problems with High Reliability for Insulation of Electronic Equipment (3 years from Apr. 1999)	T. Tsukui (Tokai University)
Insulation Lifetime of Dielectric Materials and Electrical Apparatus (3 years from Apr. 1999)	T. Ito (Musashi Institute of Technology)
Development of Dielectric and Electrical Insulation Technology to Organic Molecular Device Engineering (3 years from Jan. 2000)	M. Iwamoto (Tokyo Institute of Technology)
Future Prospect of the Research and Development of Electrical and Electronics Insulation and its Systems (2 years from Apr. 2000)	T.Tanaka (Waseda University & CRIEPI)

Functions of Organic Molecular Films and Organic/Inorganic Composites (3 years from July 2000)	F. Kaneko (Niigata University)
Advanced Measurement Methods on Partial Discharges in Electrical Apparatus (2 years from Jan. 2001)	K. Kimura (Kyushu Institute of Technology)
EINA Magazine (2 years from Apr. 2000)	T. Tanaka (Waseda University & CRIEPI)

Technical Committee on Electrical Discharge (ED)

Chairperson:	K. Hidaka (The University of Tokyo)
Secretaries:	M. Yumoto (Musashi Institute of Technology) M. Nagao (Toyohashi University of Technology)
Assistant Secretaries:	T. Nakano (National Defense Academy) T. Murata (Toshiba Corporation)

The Technical Committee on Electrical Discharge (TC-ED) has been charged with offering the opportunities for the members of IEE of Japan in the research field of electrical discharge to present their achievements, and studying and reporting on current status and future challenges in electrical discharge engineering. It was established formally in 1980, but its root goes back to the start of Expert Committee on Electrical Discharge in 1954. In order to meet the objective, a few subcommittees are organized in the TC-ED every year to survey the up-to-date subject and their activities continue for three years normally.

In the past, the following subcommittees were active and published the Technical Research Reports on a relevant subject: Discharge Simulation Methods, Surface Discharges in Diverged Fields, V-t Characteristics in SF₆, Conduction and Breakdown in Dielectric Liquids, Plasma Processing, Fundamental Processes in Non-LTE Plasma, Simulation in Non-LTE Plasma, Field Measurements in Electrical Discharges, Breakdown Mechanism and Characteristics of Gas Mixtures, Modeling of Long Sparks, Interaction between Sparks and Laser, Space Charge Effects on Electrical Breakdown in Insulating Liquids, Effects of Interface and Foreign Matters on Electrical Breakdown in Insulating Liquids, High Stress Phenomena in Cryogenic Liquids, Plasma Reactors, Plasma Display, Database on Gas Discharges, Beam and Swarm Data for Gas Discharges and Plasma; Plasma Chemistry,

Electrical Breakdown in Vacuum, and so on. The total number of the established subcommittees is 42 and the published technical reports reach 33 as of September 2001.

Now nine subcommittees are running for a survey of the listed subjects. Each subcommittee consists of 20-30 members who are the specialists in the relevant research subject or are interested in it.

The TC-ED is supporting more than ten domestic research meetings on electrical discharges every year where researchers, engineers, university professors and students report almost 250 full papers from both academic and industrial sides.

The international and domestic conferences and annual seminar for young researchers are also promoted by the TC-ED in cooperation with the Technical Committee on Dielectrics and Electrical Insulation, IEE of Japan, the Institute of Electrostatics of Japan and the Japan Research Group on Electrical Discharge which consists of about 400 members whose backgrounds covers a wide area of electrical properties of solids, liquids and gases. As hosted international conferences, "Japan-Korea Joint Symposium on Electrical Discharge and High Voltage Engineering" and "International Workshop on High Voltage Engineering (IWHV)" are held annually or every other year.

Table 2 Investigation Committees in TC-ED

Research Subject	Chairperson / Secretaries /Assistant Secretaries
Physical and Chemical Reaction of Electrons, Ions and Excited Particles in Discharge Plasma	H. Itoh / Y. Nakamura, Y. Saito / S. Suzuki
Ultra Long Discharge Characteristics	T. Shindo / S. Matsumoto, N. Takagi / M. Miki
Construction and Application of Database on Surface Discharge	M. Endo / M. Chiba, S. Matsumoto /
Behavior of Charged Particles in Liquid and its Simulation Technique	Y. Sakai / R. Hanaoka, Y. Nakagami / S. Mori
Technology of Material and Gas Treatment by Using Plasma Processing	M. Sugawara / M. Ouchi, S. Ono / A. Matsuoka
Control Technology of Electrical Discharge in Vacuum Relevant to Generation of High Energy Density	M. Yumoto / Y. Saito, O. Yamamoto /
Partial Discharge Phenomena in Gas Insulation Apparatus and their Diagnosis Technology	H. Fujii / N. Hayashi, T. Kato / T. Gouda
Interaction Effect between Charged / Excited Particles and Atoms / Molecules	Y. Nakamura (to be established in October, 2001)
Electrical Discharge in Nitrogen Gas and its Application Technology to Plasma Processing	Y. Kondo (to be established in October, 2001)

Technical Committee on Electromagnetic Compatibility (EMC)

Chairperson : T. Takuma (Kyoto University)
 Secretaries : Z. Kawasaki (Osaka University)
 S. Yokoyama (Central Research Institute of Electric Power Industry,
 Kyushu University)
 Assistant Secretary : K. Miyajima (Central Research Institute of Electric Power Industry)

Our modern life today is full of electromagnetic fields due to naturally-originated sources like lightning as well as artificial ones in almost all ranges of frequency. The EMC (electromagnetic compatibility) issues are increasing their importance more and more with the recent development of the electricity-dependent life. The establishment of the TC-EMC in the Institute of Electrical Engineers of Japan (IEE, Japan) is based on the increasing significance of the field together with the fact that both sources and influences in the EMC issues have a close relation with electrical engineers. The TC-EMC started in April 1999 in the Fundamentals and Materials Society (A-Society), the IEE, Japan. It followed the breaking-up of the former Technical Committee on Applied Physics of Electricity (APE) into four TC's.

Two Investigation Committees (IC's) now

belong to the TC-EMC. One of them, the IC on "Lightning Damages in the Highly Information-Oriented Society", began its activity in January 2000. The chairperson is Dr. S. Yokoyama, one of the TC secretaries. Until now, it has examined the Various damage experiences caused by lightning, in particular, related to such low-voltage devices as in communication, informatics, control and computers. It also intends to extract research items in order to establish efficient countermeasures against lightning damages.

The other is the IC on "EMC Issues in the Electric Power Industry", which Prof. Z. Kawasaki, the other TC secretary, chairs. Although there exist a number of EMC issues already examined by various organizations, the principal purpose of the new IC is to extract such recently noticed or important items as have been not fully elaborated in the electric power industry. Its examination

activity covers various related issues ranging from higher harmonics caused by power electronics devices to the connection between ionosphere phenomena and long-distance transmission lines.

As an important research topic related to the TC-EMC, the EMF issue, that is, the possible effect of electromagnetic fields on human health is investigated by a Special Committee on "Human Health Effect of Electromagnetic Fields". The

chairperson is emeritus Prof. Y. Sekine. The Committee started in December, 1995 and published its first-stage examination report in October, 1998. In February this year, it also published an elementary book for the general public entitled "Life with electricity and health fear - how far is the effect of electromagnetic fields made clear? (in Japanese)". The price is only 900 yen with many colored illustration.

Technical Committee on Pulsed Electromagnetic Energy (PEE)

Chairperson	Kiyoshi Yatsui (Nagaoka University of Technology)
Secretaries	Kazuhiko Horioka (Tokyo Institute of Technology) Weihua Jiang (Nagaoka University of Technology)
Assistant Secretary	Hidekazu Tsuchida (Central Res. Inst. Electric Power Industry)

The Technical Committee on Pulsed Electromagnetic Energy (TC-PEE) was set up in July, 1999, to offer the opportunities for the members of IEE of Japan in the fields of the R & D on pulsed power technology and associated applications.

It has been successfully available to achieve extremely high energy density state by the pulsed power technology, for very short time duration, though. To study from various points of views is very important not only from a physical aspect, but also from a lot of applications. Such an extreme state achieved is closely correlated with many applications because it involves extremely high temperature, high pressure, high electric field, high density, high magnetic field strength, and so on. Regularly, Technical Committee Meetings will be held four times per year. Furthermore, once a year, the Meeting will be held outside of Japan. In October 2000, it was held in Korean Electrophysics Research Institute (KERI) as "International Symposium on Pulsed Power and Plasma Applications" (ISPP-2000), in the collaboration with the Korean Institute of Electrical Engineers, where 44 papers were presented from 7 countries. In 2001, the second one (ISPP-2001) will also be held in KERI, where representatives will participate from China. From the next year, this series of Symposium will be held in Japan, Korea and China.

As of 2001, there is one investigation

committee in TC-PEE, the name of which is "Generation and Control of Pulsed Electromagnetic Energy". The chairperson, secretary and assistant secretary are Weihua Jiang (Nagaoka University of Technology), Sunao Katsuki (Kumamoto University), and Hidekazu Tsuchida (Central Research Institute of Electric Power Industry), respectively. Regularly, there will be four meetings per year.

The main themes/topics to be discussed in the regular research meetings (Pulsed Power Technology: PPT) are as follows: development of pulsed power technology (e.g., power supply, switches, insulation technology), energy transfer technology of pulsed power (e.g., electron beam, ion beam, neutral beam, laser beam, pinch discharge, plasma focus), production, control, evaluation/diagnostics, theoretical and computer simulation of extremely high energy-density state, applications of extremely high energy density state (e.g., microwave, materials, environment, radiation source, particle acceleration, flier acceleration, strong electromagnetic wave, free electron laser, X-ray laser, excimer laser, ultrahigh pressure/ density/temperature/magnetic field strength, inertial confinement fusion, diagnostics, luminescence/ display), and others.

The regular research meetings (PPT) are open for everybody who is interested in the pulsed power technology and associated applications.

Technical Committee on High Voltage Engineering (HV)

Chairperson: M. Ishii (The University of Tokyo)
 Secretaries: A. Inui (Toshiba Co.), I. Aono (Mitsubishi Electric Co.)
 Assistant Secretary: H. Motoyama (Central Research Institute of Electric Power Industry)

This technical committee (TC) belongs to Power & Energy (P&E) Society of the IEE of Japan, and supervises activity of investigation on technical subjects related to high voltage engineering. Five investigation committees listed in Table 1 are active in October 2001. The scope of this TC resembles that of the CIGRE Study Committee 33 (Power System Insulation Coordination).

This TC jointly organized 2nd International Workshop on High Voltage Engineering (IWHV) in November 2000 at Tottori, Japan, with two other TCs of IEEJ, namely on Switchgear and Protection (SP), which also belongs to P&E Society, and on Electrical Discharge (ED). This workshop, chaired by the chairperson of the TC on High Voltage Engineering, is characterized by discussion on full-length papers in English, and selected papers make a special issue of Trans. IEEJ-B. The first workshop held in Naha, Okinawa collected 49 papers and its special issue of January 2000 comprised 15 papers from the workshop. The second workshop collected 44 papers, and 8 papers and one review are on the special issue of Trans. IEEJ, No. 8 of 2001. The third workshop is planned in January 2003.

In September 2001, the TC sponsored another

international meeting in Toyama, named International Symposium on Winter Lightning, co-sponsored by CRIEPI and Hokuriku Electric Power Co. This is a second meeting after 5 years, but is first sponsored by this TC and held as a technical meeting of IEEJ. Due to the crippled air traffic after the tragedy in the United States in the previous week of this symposium, 4 out of the 11 invited speakers from abroad could not attend. Nevertheless, the two-day symposium was actively held with about 300 attendees.

In November 2001, a joint technical meeting of IEEJ with TCs on ED and SP is planned in Yonago, and one of the sessions on lightning is held as an English session, with two papers from abroad.

TC on High Voltage Engineering meets four times a year. One of the meetings is associated with a technical visit, and a visit to Genkai Nuclear Power Plant is planned by the committee this fiscal year. The members of the committee other than the chairpersons of the investigation committees are from universities (2), a research institute (1), electric power utilities (4) and manufacturers (9).

Table 3 Investigation Committees in TC-HV

Research Subject	Chairperson
Insulator Contamination (Application and Evaluation of Insulators under Variety of Environments)	K. Takasu (CRIEPI)
Common Electrical Insulation Technology in Power Apparatuses of Electric Power System	H. Okubo (Nagoya University)
Estimation of Lightning Performance of Distribution Line	M. Ishii (The University of Tokyo)
Analyzing Methods on Surges in Power Systems Incorporating New-Type Power Apparatuses	T. Hara (Kansai University)
Recent Trends and Tasks in Power System Insulation Coordination	K. Hidaka (The University of Tokyo)

Technical Committee on Electrical Wire and Cables (EWC)

Chairperson: Yasuo Sekii (Chiba Institute of Technology)
Secretaries: Kunio Iwasaki (The Furukawa Electric Co., Ltd.)
Kazuhito Mizunami (Sumitomo Electric Industries, Ltd.)
Assistant Secretary: Mikio Umezaki (Hitachi Cable, Ltd.)

Technical Committee on Electrical Wire and Cables (TC-EWC) is a committee organized to support the IEEJ Power and Energy Society, and includes members from universities, power and communication utilities, the JR railway company and cable manufacturers. The technical committee hold technical meetings to promote R & D activities in this field and provides an opportunity to present the results of technical achievements. Three technical meetings are planned for this year. One of the meetings was held on September 13, 2001, in Tokyo, and focused on the subject of monitoring and surveillance technology of power and communication transmission lines. In addition to organizing such technical meetings, the technical committee supervises investigation committees dealing with new subjects, which are related to electrical wire and cables. During the several years of activity, investigation committees such as the Investigation Committee for DC Cable Systems, the Investigation Committee for Examining International Technical Trends in

Power Cable Systems, the Investigation Committee for Technology of Wires and Associated Accessories for Overhead Transmission lines, and the Investigation Committee for Computer Software and Its Application for Power Cable Lines were organized. These investigation committees have published technical reports such as the report entitled "Recent Technical Trends in DC Cables" and "International Technical Trends in Power Transmission Cable Systems". This year two original investigation committees were organized and went into new actions. The names and chairpersons of the committees are listed in Table 4. The TC-EWC usually meets 4 times a year. Occasionally a technical visit by the committee members is made to encourage study on the most advanced science and technology. This year, the committee visited the Access Network Service Laboratories of the NTT Corp. and the Isogo Coal-fired Thermal Power Station of the EPDC (Electric Power Development Co.,Ltd., Japan).

Table 4 Investigation Committees in TC-EWC

Name of Investigation Committee	Chairperson
Investigation Committee for Degradation and Corrosion of Wires for Overhead Power Transmission Lines	T. Kikuchi
Investigation Committee for Cables and Accessories for 20 kV Power Distribution Cable Lines	S. Nishimura

ACTIVITIES OF THE TECHNICAL COMMITTEE ON DEI IN IEEJ

Digest Reports of Investigation Committees in DEI

Investigation Committee on Assessment and Improvement of the Interface in Composite Electrical Insulation

T. Tanaka¹, K. Goto², M. Nagao³, N. Hozumi³, H. Homma⁴, A. Kuwaki⁵, Y. Hirano²

1 (Waseda University, Central Research Institute of Electric Power Industry)

2 (Toshiba Co.) 3 (Toyohashi University of Technology)

4 (Central Research Institute of Electric Power Industry)

5 (Showa Electric Wire & Cable Co.,Ltd.)

1. Purpose of the committee

Interface is a new challenging area of investigation. This area has emerged, because of the recent requirement for extremely compact design of insulation and simple installation for its application. The purpose of Investigation Committee on Assessment and Improvement of the Interface in Composite Electrical Insulation is to survey and discuss the influence of interfaces on the electrical insulating properties of composite electrical insulating systems. The committee is composed of WG1 (interfacial problem in XLPE cable joint) and WG2 (polymer composite insulator). In both WGs, round robin tests are being carried out in collaboration with CIGRE WG15-10 and WG 15-04.

2. Activities

The committee was established in January, 1999. Until now 28 times of meetings had been held including general meetings, WGs 1 and 2 and executive meetings. The discussions were mostly based on the results of cooperative tests. In addition, research information in this field was acquired and exchanged. The activity was corresponded to the domestic committee of CIGRE SC-15, and the information was distributed to the concerning WGs of CIGRE international committee. The items being investigated by each working group are as follows.

WG1:

- (1) Survey and comparison of features of electrode systems modeling the interface in XLPE cable joints and terminations.
- (2) Cooperation to International Round Robin Test for assessing interfacial electrical insulation properties in cable splices.
- (3) Manualization of the assembling procedure of model electrode systems.

- (4) Survey of papers in- and outside Japan on interfacial electrical insulation properties and their assessment.

WG2:

- (1) Conducting the Round Robin Test of Salt Fog Chamber Method according to CIGRE WG-15.04 recommendation.
- (2) Development of standard measuring system of surface discharge and leakage currents for outdoor insulation assessment.
- (3) Survey and comparison of features of accelerated aging tests for polymer composite insulators
- (4) Hydrophobicity of polymer materials and fundamental phenomena of discharges.

3. Technical report of IEEJ

The committee is now summarizing technical report of IEEJ. The report will be divided into two parts.

Part 1 (WG1) deals with the survey of cable joints which are being developed and applied. It also describes the testing methods for the assessment of internal interfaces. Especially, assembly, testing condition and experimental result of testing electrodes are described in detail. The features of electrodes are then compared. Moreover, fundamental phenomena in respect to internal interface are reviewed.

Part 2 (WG2) deals with the salt fog test for polymer materials (mostly silicone rubbers) based on the round robin test. Testing conditions, discharge measurement, and validity of data and methodology as well as the possibility of new testing methods are summarized.

As for aging of the materials, discharges are categorized into three kinds to discuss their effect on the materials. In addition, relation between lab acceleration test and field aging is discussed.

Investigation Committee on Various Problems with High Reliability for Insulation of Electronic Equipment

T.Tsukui (Tokai University), Y.Yamano (Chiba University)
K.Shutoh (Science University of Tokyo),
S.Yoda (Hioki Electric Co. Ltd.)

Electronic equipment is becoming small in size, light in weight, and high in performance. The printed wiring boards for the equipment are designed in fine and high density with multi layer, which result in small distance and high electric field strength between the foil conductors on the board. The insulating failures may occur on the board under such conditions. Therefore, an insulating reliability comes up to an important problem for the design of electronic equipment and systems. However, the study on the insulating reliability for the printed wiring board has not been systematically carried out.

One of the reasons for this may be a low operating voltage in the electronic circuit. Furthermore, it is impossible to evaluate the reliability of the board by long term testing, because the electronic products such as personal computer or portable telephone must be designed within short-range term by request of a market.

In the previous investigation committee with the insulation reliability of the printed wiring board, the round robin tests of the ionic migration were carried out by more than 10 members to establish the evaluation method for the reliability by the environmental aging test. However, the tests under various environmental conditions have not been carried out yet.

From these viewpoints, a new investigation committee has started in April 1999 with 27 members.

The main subjects of the committee are as follows.

- (1) Survey on test methods for insulating failures due to the ionic migration.
- (2) Survey on the insulating reliability with multi-constructed printed board.
- (3) Survey on insulating strength between the conductors against surge of high voltage.

We have held 15 committee meetings and 3 study meetings since the start of the committee. From last year, we have started the round robin test with the surge endurance of the printed wiring board. In the round robin test, the surge endurance in air is studied for the printed wiring board on which the distance between the foil conductors ranges from 30 μ m to 500 μ m. The influence of the surge endurance upon long-term exposure of high humidity and contaminated gas is investigated by some of the members. Furthermore, the endurance test is performed for the board with surface coating.

Now, we are discussing the experimental results obtained from the committee members. Also, we are surveying on practical problems with the insulating reliability occurring in the product of electronics equipments and products. We have started to edit the technical report based on the results of the round robin test and the surveys, which will be published at the end of the committee.

Investigation Committee on Insulation Lifetime of Dielectric Materials and Electrical Apparatus

T.Ito (Musashi Institute of Technology)
M.Miyamoto (Fuji Electric Corporate Research and Development, Ltd)
K.Uchida (Chubu Electric Power Co., Inc.)
Y.Ehara (Musashi Institute of Technology)
K.Segawa (Toshiba Corporation)

The committee was established in April 1999 with the term of three years. The committee consisted of 30 members from universities, research institutes, electric power companies, power apparatus manufactures and user companies. The diagnosis of insulating performance in power apparatus is an important research area to estimate the lifetime of electric apparatus, power cable and several electric installations. There are unknown deterioration mechanism still to be investigated on the insulating material and several electric apparatus. The following activities have been achieved by this committee;

- (1) Investigation on relation between the deterioration mechanism of insulation material such as partial

discharge, treeing and other signals for the deterioration.

- (2) Investigation on the diagnosis for power apparatus and power cable prior to breakdown.
- (3) Investigation on the prediction of life limitation with rotating machine, cable, transformer, capacitor and power system.

The committee has held 5 meetings in 1999, 7 meetings in 2000 and 5 meetings in 2001 respectively. In 1999, the committee promotes the Asian Conference on Electrical Insulation Diagnosis (ACEID), and sent 17 papers from Japan. In 2001 International Symposium on Electrical Insulating Materials (ISEIM), committee jointly promotes ACEID with ISEIM,

consequently many papers will be present from China and Korea. The committee will be promoted the study meeting with insulation lifetime and diagnosis of

dielectric materials and electrical apparatus in national convention record IEE Japan at March 2002.

Investigating Committee on Development of Dielectric and Electrical Insulation Technology to Organic Molecular Device Engineering

Mitsumasa Iwamoto (Tokyo Institute of Technology),
Mitsuyoshi Onoda (Himeji Institute of Technology), and
Akihiko Sugimura (Osaka Sangyo University)

Abstract

The committee started in January 2000 by 21 members to investigate and discuss on the interfacial electronic phenomena and functional properties of organic thin films and will be continued until December 2002. We have held 10 committee meetings and 10 secretary meetings up to August 2001. The main investigation subjects in the meetings are as follows.

- (1) Trends and topics on the nanometric interfacial controlled molecular device.
- (2) Control and electronically and optical functions on charge transfer at the nanometric molecular-interfaces and trends and topics on their evaluation technique.
- (4) Relationship between electronic states and injection mechanism at the nano-metric molecular-interfaces and topics on the injection type organic devices.
- (4) Trends and topics on the molecular dynamics and modification of organic materials.
- (5) Trends and topic on the interfacial phenomena the dielectric and electrical insulation technology.
- (6) Trends and topics on the fabrication of the organic molecular devices and their application to information systems.
- (7) Other trends and topics concerning the interfacial phenomena for organic materials.

This committee is actively in action under various planning such as the enforcement of the international conference and the publication of the special issue, etc. The results of investigation and survey will be published in Technical Report of IEEJ.

Purpose of establishment and activity

As organic materials have excellent insulating and dielectric abilities, they play an important role as covering and insulating materials for power and communication cables and other electrical equipment. However, recently the techniques of constructing highly-ordered and super-structured organic films have developed rapidly and its achievements and also essential electronically and optically functionality of organic materials have become a center of attraction. In order to utilize their functions sufficiently, the understanding on the electronic phenomena and electronic energy states on the order of nanometer scale at the molecular films/electrode interface and between quite different molecular films interface is indispensable. It seems to be the most probable that highly-ordered organic thin films will be put to practical use as an

intellectual films with learning effects, etc. from the completely new viewpoints in the electrical and electronic fields.

In the present situation, we are under investigation mainly that what the electronic and optical properties at the interface of highly-controlled organic thin films were clarified by what kind of techniques so far, what types of their intellectual functionality were studied so far from the viewpoints of the electronic and optical properties and then what are the subjects of this matter for a future study, etc. That is,

- (1) Trends and topics on the nanometric interfacial controlled molecular device.
- (2) Control and electronically and optical functions on charge transfer at the nanometric molecular-interfaces and trends and topics on their evaluation technique.
- (3) Relationship between electronic states and injection mechanism at the nanometric molecular- interfaces and topics on the injection type organic devices.
- (4) Trends and topics on the molecular dynamics and modification of organic materials.
- (5) Trends and topic on the interfacial phenomena in the dielectric and electrical insulation technology.
- (6) Trends and topics on the fabrication of the organic molecular devices and their application to information systems.
- (7) Other trends and topics concerning the interfacial phenomena for organic materials.

Since the establishment of this committee, the study meeting was held 10 times up to August 2001. Furthermore, the special issue entitled "Present Status and Future Scope of Organic Molecular and Material Electronics" has been published in the Transaction of IEEJ, part A in 2001, July, and The 1st International Discussion & Conference on Nano-Interface Electronic Devices had been held at KyongJu, Korea on July 16-20, 2001 (The papers presented there will be published in a special issue of Journal of Korean Institute of Electrical Engineers), and the annual meeting on dielectrics and electrical insulation ,IEEJ entitled "Organic Thin Films" has been planned in this committee and held in October, 2001. And also in April 20, 2001, this committee gave a course in trends and topics on the electrical and optical functionality and evaluating technique for highly-controlled organic alignment films sponsored by Tokyo chapter, IEEJ. The three years activity of the committee will be published in Technical Report of IEEJ.

Investigation Committee on Future Prospect of the Research and Development of Electrical and Electronics Insulation and its Systems

Toshikatsu Tanaka (Waseda University and CRIEPI)

Kazutoshi Goto (Consultant)

Masayuki Nagao (Toyohashi University of Technology)

Hiroyuki Nishikawa (Shibaura Institute of Technology)

Electrical insulation has been regarded as a matured technology. Since the demand for electricity in Japan is expected to grow one or two percent per year in the next half of the century, the present technologies remain good enough to respond to the future demands for the next 50 years. There may be even a concern about the progress of the electrical insulation technology.

On the other hand, there have been social changes such as concerns to the global environments and deregulations in the power industry, which may lead to the future innovation in the power industry. In response to these issues, proposal of alternative technologies including both hardware and software have been made, such as Power Former, Dry Former, DC Microgrids, and demand side power networks. In view of these emerging technologies, the present committee will address to the issues on the future prospect of the research and development of electrical and electronic insulation and its systems.

In the area of insulation technologies for electronics and microelectronics, rapid progress has been made to realize the miniaturization and advanced functions of these devices. Such progress leads to the situation where the required properties of the materials such as breakdown strength and dielectric constants almost reached to the intrinsic values of the materials. For example, alternative high-k dielectrics for MOS gate and low-k dielectrics for the inter-level dielectric layers have been intensively studied for further downsizing of LSI.

With this background, the present investigation committee started activities in April 2000, focusing on the future prospect of the research and development of electrical and electronic insulation and its system. In this committee, nearly matured technologies in electrical insulation and emerging technologies in electronics insulation are reviewed for future prospect of their R&D. Electrical insulation should be matched with social and technological requirements such as environmental protection, transition from component technologies and system technologies, and downsizing and low cost. Electronics insulation faces with extreme downsizing and needs counter measures against insulation degradation under the high electric stress.

The Electricity Technology Roadmap has been investigated and issued by EPRI (USA). Also, a governmental committee has been formed to pursue a roadmap for electric power technology.

In our present committee, future prospect of the electrical insulation technologies will be discussed in connection with the activities of these committees.

We focus on the analyses of the following points:

- (1) The changes in the social and technological requirements to the new electrical and electronic insulation and its systems.
- (2) Achievements and future prospects of apparatus and cables
- (3) Achievements and future prospects of electronic and microelectronic devices
- (5) Achievements and future prospects of basic phenomena in electrical insulation
- (6) Achievements and future prospects of testing, monitoring, and maintenance of electrical insulating materials.

From these activities, we will present the future prospect of the research and development of electrical and electronic insulation and its systems, thereby giving an impact on the activities in education, research and development in the related area.

Since established, both formal and informal meetings including five committee meetings and a symposium session, have been organized by the present committee until now. A draft of Technical Report of IEEJ will be issued on the basis of the two-year activity of this committee by the end of March 2002.

In conclusion, nearly matured technologies in electrical insulation and emerging technologies in electronics insulation has been intensively explored for future prospect of their R&D. Electrical insulation should be matched with social and technological requirements such as environmental protection, transition from component technologies to system technologies, and downsizing and low cost. Electronics insulation faces with extreme downsizing and needs countermeasures against degradation under the high electric stress

Investigation Committee on Functions of Organic Molecular Films and Organic/Inorganic Composites

Futao Kaneko (Niigata University)
Yasuo Suzuoki (Nagoya University)
Keizo Kato (Niigata University)
Kazunari Shinbo (Niigata University)

The committee was established in July 2000, with the term of three years. The investigation has focused attention on the functions of organic molecular films and organic/inorganic composites related to:

1. fabrication techniques and functions of molecular ultrathin films and organic thin films,
2. functions of organic/inorganic composites,
3. evaluations of organic/inorganic ultrathin films, and
4. optical and electrical properties of ultrathin film interfaces and device applications.

Up to September 2001, seven committee meetings were held and three meetings of them were held for visiting distinguished laboratories in Japan, that is, Chiba Univ., Nagoya Univ., Tokyo Institute of Tech. Lectures were given by the researchers at the labs about hybrid organic electroluminescent transistors,

evaluation of organic thin film structure using photoelectron spectroscopy, fabrication and optical properties of organic/inorganic hybrid materials, fabrication and passivation of organic light emitting diodes, liner and non-liner optics of surface plasmon sensor, dynamic control of polymer film using light irradiation, and so on. Observations of their research laboratories were also carried out after their lectures. Furthermore, detailed discussions among the members of the committee were also carried out for their researches. There have been further lectures by the member and non-member researchers.

The results of the investigation will be summarized at the end of the term in 2003 as a technical report. Investigations for fabrications and evaluations of organic thin films and organic/inorganic composites are very useful for new functional devices in the future.

Investigation Committee on Advanced Measurement Methods on Partial Discharges in Electrical Apparatus

Ken Kimura and Masayuki Hikita (Kyushu Institute of Technology)
Naohiro Hozumi (Toyohashi University of Technology)
Naoshi Hirai (Waseda University)

According to deregulation policies all over the world, electric utilities have to compete each other and against independent power producers (IPP) in price and quality of electricity. For cost reduction of power generation, availability of facilities in power stations (PS) should be improved using advanced technology. One of the approaches is so called condition-based maintenance (CBM) with multiple on-line monitors.

In the case of rotating machines too, on-line partial discharge (PD) monitors have been intensively developed and commercially available at present. Generally, newly developed monitors tend to adopt higher frequency in detecting circuits to avoid the noise in lower frequency regions. On the other hand, rotating machines have large inductance and capacitance along windings, which cause the deformation of original wave form of PD pulse during propagation from PD source to detecting couplers. So more discussions and cautions are necessary for practical application of the

monitors as CBM tools.

Recently IEEE Power Engineering Society has issued a new guide : IEEE Std 1434 -2000 "IEEE Trial-Use Guide to the Measurement of Partial Discharges in Rotating Machinery". The standard involves important and beneficial information especially for maintenance engineers.

Dielectric and Electrical Insulation Technical Committee, IEE Japan has also strong concerns on on-line PD measurements of rotating machines with above-mentioned reasons and started a new investigation committee. The new committee started January 16th, 2001 with 20 members from electric power utilities, universities and manufactures. Based upon the bibliography of IEEE Std 1434, original papers on PD monitoring including Japanese papers are investigated in detail. Final Technical Report will be issued from IEE Japan in 2003.

Cooperative Research Committee on EINA Magazine

Chairperson	T. Tanaka (Waseda University and CRIEPI)
Secretary	Y. Inoue (Toshiba Corporation)
Secretary	Y. Maruyama (Furukawa Electric Co. Ltd.)

HISTORY OF COMMITTEE

Preceding committee (Cooperative Research Committee (CRC) 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 Asian countries and sought the appropriate ways to promote it.

As an important activity discussed in the committee, "CRC of Electrical Insulation News in Asia" (the chairman of the committee was Prof. H. Yamashita, Keio Univ.) was established in Apr. 1994 and edited and published "Electrical Insulation News in Asia (EINA)" No. 1 (Sept. 1994), and No. 2 (Sept. 1995). As the EINA magazine was hoped to continue to be published, Prof. Yamashita chaired the CRC from 1994 to 1999 and published EINA magazines to No. 6.

In 2000, Dr. T. Tanaka succeeded to the activity and established a new CRC of EINA Magazine".

ACTIVITY OF COMMITTEE

The present committee has a Chairman, two secretaries and 26 members. It has a general meeting and two or three secretary meetings a year and discusses the activity and contents for the next edition of the EINA.

We had a meeting to discuss academic and technological information exchange on Electrical Insulation in Asia on the occasion of International Conference on Properties and Application of Dielectric

Materials (ICPADM 2000) held in Xian Jiaotong University, China. In the meeting, the expectation of information exchange through internet WEB and mutual information exchange, which agreed with chairman's idea, was presented.

The committee published EINA No.7 in November, 2000 and opened an EINA WEB SITE (<http://boss.eee.tut.ac.jp/eina/>) in March, 2001.

The committee will publish EINA No.8 (this EINA) in November, 2001 and enrich the content of the WEB page.

MAIN SUBJECTS OF EINA

Main subjects of EINA are as follows:

- Preface
- Outline of technical committees on Dielectric and Electric Insulation (DEI) and related TCs in IEEEJ
- Activities of the Technical Committee on DEI
- Technologies for Tomorrow
- Technical Exchanges between Asian Countries
- Records and announcements of international conferences in Asia
- Introduction of laboratories in Asia
- Letters from readers
- Front and rear covers show color photos of the state of the art industrial products or experimental facilities and fundamental research achievements

The committee expects your contributions to the EINA Magazine and the WEB page.



No.1 (1994)



No.5 (1998)



No.6 (1999)



No.7 (2000)

Front Covers of Back Numbers

IEEEJ Technical Reports Edited by TC-DEI and Related TCs

Technical reports listed here are made by investigation committees in the technical committee on DEI and related investigation committees since the publication of EINA No. 7 (2000). They are described in Japanese.

- No. 810 : “Application of discharge plasma to reform of environment”,
(A), p.62, Nov., 2000, ¥3,500
- No. 817 : “Toward advanced chemical sensor — Active chemical sensor—”,
(E), p.30, Feb., 2001, ¥2,400
- No. 824 : “Evaluation and control of structure and performance of molecular ultra thin film
and organic thin film — application to devices and new development—”,
(A), p.62, June, 2001 ¥2,400
- No. 830 : “Plasma display discharge and efficiency of luminescence”,
(A), p.86, May, 2001, ¥3,100
- No. 834: “Measuring method of space charge distribution and standardization”,
(A), p.74, Apr., 2001, ¥2,400
- No. 836: “Electromagnetic phenomena due to earthquake”,
(B), p.66, May, 2001, ¥2,300.
- No. 840: “Traceability of high voltage measurements”, (B), p.32, July, 2001, ¥1,900.
- No. 841: “Earth environmental load of SF₆ and SF₆ merged gas insulation and
substitution gas insulation”, (A), p.62, May, 2001, ¥2,300

N. B. : (A – E) after titles mean a Society in which Technical Committees work :

- A: Fundamentals and Materials, in which the TC-DEI is included
- B: Power and Energy
- C: Electronics, Information and System
- D: Industry Applications
- E: Sensors

¥ : Japanese Yen

By Mr. Yoshio Maruyama (Furukawa Electric Co., Ltd.)

TECHNOLOGIES FOR TOMORROW

Dust Cycle Test - An Advanced Contamination Test Method

Current contamination test methods

Withstand voltage characteristics of contaminated insulators have been evaluated by clean fog and salt fog methods prescribed in IEC60507, as standard test methods, which have been applied widely for the purpose of commercial test as well as experimental study. By the way, these test method are very effectively for contamination mainly containing sea salt, but it is very difficult to make evaluation of insulators having cumulative contamination derived from such as fine sand in desert area and industrial contaminants. Recent year, DCM has been proposed as a new test method, which seems effective to study the insulator behavior in such cumulative contamination area ^[1].

Dust cycle test

Seven years ago, a new approach named "Dust Cycle Method (DCM)" was proposed by STRI. The specimen insulators are subjected initially to a chamber with dry environment as shown in Fig. 1, and test is making in accordance with test sequence shown in Fig.2. The components of dust, quantity of fog/rain and drying in the sequence are able to vary according to the actual environmental conditions.

An example of test results simulated industrial contamination

Industrial contamination of insulators generally occurs under dry and breeze conditions with occa-



Fig. 1 Inside of Test chamber of DCM equipment

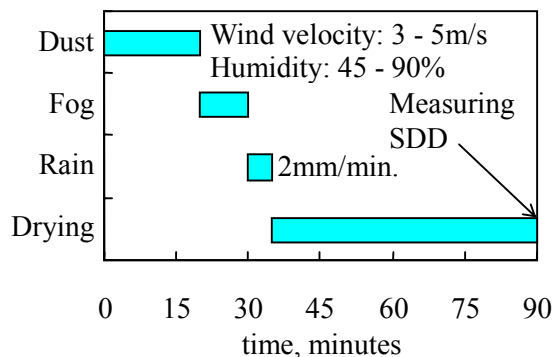

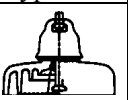



Fig. 2 Test sequence of single cycle

sional wetting due to fog and rain. Table 1 shows contamination degree after 1, 2 and 4 cycles of tests. Contamination degree of SDD of the outer rib type insulator was about 10% of that on the fog type insulator. This result is in good interrelation with exposure test results at Shanghai in China.

Table 1 Ratio of SDD(Bottom, Fog=100)

Specimens		Normal type	Fog type	Outer-rib type
				
Test condition				
DCM	1cycle	37	100	10
	2cycles	72	100	11
	4cycles	156	100	12
1 year exposure at Shanghai, CHINA		-	100	10-20

Reference

- [1] "Natural and Artificial Ageing and Pollution Testing of Polymeric Insulators", CIGRE TF 33.04.07, June 1999.

By NGK High Voltage Laboratory
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<http://www.ngk.co.jp>

Thermal Deterioration Diagnosis by Optical Fiber Sensors for Induction Motors

A novel non-destructive optical diagnosis for insulating resins of induction motors has been developed. The key feature of this diagnosis is the use of light sources of two wavelengths to measure the change in reflective absorbance (ΔA_R) between the two wavelengths which decreases the effect of coil surface roughness. Then, chemical kinetics is used to predict the lifetimes of the insulating resins. When resins darken with age, the ΔA_R increases. This means that the cross-linking density in the insulating resin increases due to thermal oxidation, so that conjugation in the resin expands, and the electronic transition absorption (equivalent to reflective absorbance A_R) increases. When the cross-linking density of a resin increases, its elasticity corresponding to the material's life increases, resulting in cracks produced by vibration or heat cycling. This diagnosis detects the extent of aging of an insulating resin as a chemical structure change, non-destructively, before any cracks are formed.

Figure 1 shows the developed diagnostic apparatus. The optical sensor consists of two optical fiber cables (one for light transmission, the other for light reception; each with a length of about 3 m and core diameter of 1 mm), two kinds of near IR laser diodes (LD) as light sources, and an optical power meter (Si-photodiode) as a detector, and so it is very compact and lightweight (less than 2 kg). The optical fiber cables have a bundle structure (diameter of elemental glass fiber is 50 μm), like an image fiberscope, so very little fluctuation of transmission loss is observed when they are bent. The two wavelengths should be chosen from 600nm to 900nm according to the spectroscopic characterization of an insulating resin. In these wavelengths, there are several commercialized LDs, for example, 635, 650, 670, 780, 830 nm-LD.

As this apparatus can be operated using batteries, it is suitable for diagnosing electric equipment, such as induction motors in the field.

By Dr. Y. Takezawa

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Fig. 1. Developed diagnostic apparatus.



Fig. 2. The optical probe on the coil surface of an induction motor

The introduction of Multi Range Plug-in Cable Sealing End

The overview

It developed as the underground distribution cable sealing end part which is used for $U_m=36\text{kV}$ voltage class gas insulated equipment (i.e. Switch gears, switches and transformer) in 1999. Connection work at the site is very easy. Because it is plug-in type sealing end. Moreover the bushing is designed to fit with various size of cable.

The good point of the cable sealing end part

The main good points of the cable sealing end part are as follows.

- 1) It is the plug-in connection structure, which separates the bushing parts of equipment and the cable sealing end parts.
- 2) Connection work is completed in the site when

connection material is included into the cable and inserted into the bushing.

3) The insulation material of bushing is excellent epoxy resin in the electric character and the mechanical character.

4) This bushing is able to insert the XLPE cable of the various size ($U_m=24\sim 36\text{kV}$, Conductor cross section= $70\sim 630\text{mm}^2$).

5) To improve the free degree of the arrangement, flange shape of bushings is designed to 144mm square

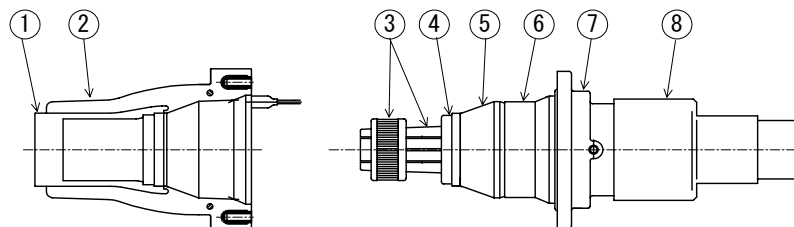
6) This bushing parts have two designs for choice, "With test point" and "Without test point".

7) The small bushing of the exclusive using for the voltage tap is prepared.

The performance

Maximum operating voltage	$U_m=36\text{kV}$
Nominal current	1250A
Applicable cable conductor size	$U_m=24\sim 36\text{kV}$ Conductor cross section: $70\sim 630\text{mm}^2$
Power frequency withstand voltage	$81\text{kV}\cdot 5\text{min}$
Partial discharge extinction voltage	Not more than 10pC at 30kV Not more than 20pC at 36kV
Impulse withstand voltage	$\pm 170\text{kV}$ for 10times
Direct current withstand voltage	-108kV for 30minutes

The structure of the cable sealing end



Bushing parts

- ① Conductor
- ② Epoxy resin

Sealing end parts

- ③ Plug unit
- ④ Stopper ring
- ⑤ Pre-molded stress relief cone
- ⑥ Compression unit
- ⑦ Protecting cover
- ⑧ Heat shrinkable tube



← The appearance whole aspect of Cable sealing end



← Bushing parts for Cable sealing end

→ Bushing parts for Voltage tap termination



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RESEARCH ACTIVITIES AND TECHNICAL EXCHANGES IN ASIAN COUNTRIES

Conference Records

The 5th Korea-Japan Joint Symposium on Electrical Discharge and High Voltage Engineering (2000 K-J Symposium on ED & HVE)

The 5th Korea-Japan Joint Symposium on Electrical Discharge and High Voltage Engineering was held on Oct. 5-6, 2000, in Ulsan University, Ulsan, Korea. The first symposium was held in Kumi, Korea, in 1996, and since then it has been held every year in Japan and Korea by turns, organized by Electrical Discharge and High Voltage Society of KIEE and the Technical Committee on Electrical Discharge of IEEE, Japan. The chairperson of the symposium was served by Prof. Kyu-Chol Lee. The symposium has been planned to provide the opportunity for scientists and engineers, especially for the Master and Doctor course students as well as younger researchers in each countries, to mutually exchange and discuss the scientific and technological ideas, information, practical experiences on electrical discharge and high voltage engineering research field they are involved.

Ninety three researchers (Japan: 41, Korea: 50, others: 2) attended the symposium, and 80% of them are younger researchers. Sixty papers (Japan: 30, Korea: 30) are finally accepted and published in *the proceedings of 2000 korea-japan Joint Symposium on Electrical Discharge and High Voltage Engineering*.

A total of ten sessions involved papers covering the wide variety of topics such as the surge analysis, environmental and industrial application, fundamental of electrical discharge, detection of PD and AE, field measurement, lightning discharge, electrical breakdown in gas/liquid/solid insulators, polymer insulators, EMC, bio-electromagnetism, distribution technology, and so on. In particular many papers from both countries deal with the application of the plasma technology to the environmental treatment and thin film production, and diagnostics of the electrical insulation by using the PD detection technology. Some of the papers presented by Japanese researchers propose the introduction of functionally graded materials (FGM) as an insulation material, which lead to the new concept of solid insulation. This symposium is the first international conference for many Japanese students to attend, and provides the first and valuable experience to communicate with each other in English, which is exactly what this symposium aims at.

The next J-K Joint Symposium on ED & HVE will be held at Miyazaki Municipal University, Miyazaki, Japan, in 2001. It will be chaired by Prof. C. Honda, Miyazaki University, Japan.



Fig. 1 Photograph of all participants in 2000 K-J Joint Symposium on ED & HVE



Fig. 2 Snap shot of Banquet at 2000 K-J Joint Symposium on ED & HVE

By Dr. Noriyuki Hayashi (Kyushu University)

The 10th Asian Conference on Electrical Discharge (ACED-2000)

The 10th Asian Conference on Electrical Discharge (ACED-2000) was held on Nov. 6-7, 2000, in Kyoto University, Kyoto, Japan, followed by one-day technical tour. ACED started in 1988 in order to provide the opportunity for Asian scientists and engineers to present and discuss the latest progress in the research field of electrical discharges and their applications. The chairperson of the commemorative 10th ACED was served by Prof. Tadasu Takuma.

A total of 149 participants from seven countries attended the conference, and more than one third of them were Master and Doctor course students, which means that many students in Asian countries are still interested in the future of electrical discharge technology, high voltage engineering, and plasma application technology.

One hundred and eight papers including the six invited papers from Japan, China, Korea,

Indonesia, Thailand, and Canada were presented in either oral or poster sessions. Topics of the conference and the numbers of papers related with each topic are shown in the following table. It is no doubt that many papers are related to the electric power engineering. However it is

Topics	Num. of Papers
Review	6
Discharge in Gases	21
Discharges in Liquid and Solid	10
Discharge along Interface	15
Plasma and Its Applications	23
Lightning and Overvoltages	6
High Voltage Equipment and Test Technology	21
EMF-Related Issues and Technology	6



Fig. 1 Photograph of all participants in ACED-2000

notable that there are many papers concerning with the applications of electrical discharge and plasma such as plasma processing, ozonizer, exhausted gas treatment, PDP, and so on.

The conference started with the keynote speech by Prof. Akazaki, the chairperson of International Steering Committee, in which the whole history of ACED from the first conference

in 1988 was introduced. The oral sessions started with the invited papers which introduced the recent topics in electrical discharge field in the authors' countries. The oral and poster sessions had 39 and 69 papers, respectively, in total.

The next ACED will be held in 2002 at Soongsil University, Seoul, Korea, and be chaired by Prof. Hoo-Re. Kwak.



Fig. 2 Snap shot of Opening Ceremony at ACED-2000.

By Dr. Noriyuki HAYASHI
(Secretary of ACED, Kyushu University)

2001 International Discussion and Conference on Nano Interface Controlled Electronic Devices (IDC-NICE 2001)

The 1st International Discussion & Conference on Nano-Interface Electronic Devices (IDC-NICE) was successfully held during 16-20 July 2001 at KyongJu Chosun Hotel in KyongJu, Korea. It was mainly organized by the Center for Intelligent & Integrated Port Management Systems in Korea and Dong-A University and supported by the Technical Committee on Dielectric and Electrical Insulation Materials, Japan and the Korean Institute of Electrical Engineers.

This conference was planned to provide opportunities for the researchers, engineers both Japan and Korea, especially young scientists being concerned with organic electronics, to present and discuss on the interfacial electronic phenomena and functional properties of organic thin films. More than 70 high-ranked and distinguished experts participated from 2 countries.

The main topics of this Symposium are;

- ☐ Novel techniques and characterization of nano-interface phenomena
- ☐ Devices fabrications using organized molecular films
- ☐ Fabrication and molecular dynamics of nano-interface
- ☐ related aspects and phenomena

Only 18 papers which incorporate sufficient results were presented discussed during the conference and they had much sense in holding the conference. The papers presented there will be published on November 2001 as a special issue of Journal of Korean Institute of Electrical Engineers.

The second IDC-NICE will be held in Japan. We hope that this conference will continue to grow both in attendance and in the number of high quality papers presented



By Prof. Mitsumasa Iwamoto (Tokyo Institute of Technology) and
Prof. Mitsuyoshi Onoda (Himeji Institute of Technology)

2001 International Symposium on Electrical Insulating Materials (ISEIM 2001) and 2001 Asian Conference on Electrical Insulation Diagnosis (ACEID 2001)

A Brief Report of the symposium and conference just before the opening is described here. A detailed report will appear in the next EINA magazine to be published in November 2002.

ISEIM 2001 and ACEID 2001 is to be held at Hotel Sungarden in Himeji, Japan on November 19-22, 2001, sponsored by IEE-Japan Technical Committee on Dielectrics and Electrical Insulation and technically co-sponsored by IEEE DEIS.

The outline is as follows:

(1) Conference Organization

General Chair Y. Ohki (Waseda University)

Steering Committee

Chair: Y. Ohki (Waseda University)

Members: T. Ito (Musashi Institute of Technology), M. Iwamoto (Tokyo Institute of Technology), K. Kimura (Kyushu Institute of Technology), M. Kosaki (Gifu National Technical College), K. Matsu-ura (Osaka University), M. Miyamoto (Fuji Electric), T. Mizutani (Nagoya University), M. Nagao (Toyohashi University of Technology), H.

Nishikawa (Shibaura Institute of Technology), T. Okamoto (CRIEPI), M. Okashita (Showa Electric Wire and Cable), M. Onoda (Himeji Institute of Technology), Shimizu (Meijo University), Y. Suzuoki (Nagoya University), T. Takada (Musashi Institute of Technology), T. Tanaka (Waseda University)

Technical Program Committee

Chair: T. Okamoto (CRIEPI).

International Advisory Committee

Chair: A. Bulinski (Canada)

Members: T. Blackburn (Australia), D. K. Das-Gupta (UK), U. Gäfvert (Sweden), R. Gorur (USA), M. Iwamoto (Japan), Ho-Gi Kim (Korea), M. Kosaki (Japan), C. Laurent (France), J-U. Lee (Korea), Y. H. Lee (Korea), T. Mizutani (Japan), G. C. Montanari (Italy), M. Nagao (Japan), Y. Ohki (Japan), M. Onoda (Japan), R. Patsch (Germany), J. C. Paul (India), S. Sangkasaad (Thailand), K. T. Sirait (Indonesia), J. Smit (Netherlands), G. Stone (Canada), M. Taylor (UK), H. Xie (China), Z. Yan (China)

Local Arrangement Committee

Chair: M. Onoda (Himeji Institute of Technology)

Members: K. Kimura (Kyushu Institute of Technology), S. Isojima (Sumitomo Electric Industries), K. Tada (Himeji Institute of Technology)

Publication Committee

Chair: H. Nishikawa (Shibaura Institute of Technology)

ACEID Liaison Committee

Chair: T. Ito (Japan),

Members: J-U. Lee (Korea), K. Matsu-ura (Japan), M. Miyamoto (Japan), Z. Yan (China)

Secretariat: N. Hirai (Waseda University)

(2) Preparation as of October 17, 2001

Number of Abstracts Received: 237

Number of Abstracts Rejected: 0

Number of Abstracts Accepted: 237

Number of Manuscripts Received: 216

Number of Presentations Withdrawn: 22

Number of Abstracts Withdrawn: 22

Number of Manuscripts Received: 216

(including one manuscript accepted without receiving its abstract)

Number of Pre-Registered Participants: 150

Number of Participants Anticipated: 180

(3) Invited Talks

Inuishi Memorial Lecture: by Dr. Toshikatsu Tanaka (Waseda University and CRIEPI)

Title: Insight into Technologies in Electrical Insulation toward the Middle of the 21st Century

Plenary Invited Talk: by H. -G. Kranz

(Wuppertal University, Germany)

Title: Advanced PD Noise Suppression and its Relevance for Computer Aided PD Defect Identification

In-session Invited Talks: by

(A-1) R. Patsch and F. Berton

(B-1) S. M. Gubanski, U. W. Gedde, V. Cooray, and S. Kroll

(D-1) A. Zargari and T. R. Blackburn

(G-1) D. K. Das-Gupta

(G-2) C. Laurent

(H-1) A. Cavallini, D. Fabiani, G. Mazzanti, and G. C. Montanari

(H-2) S. S. Bamji and A. T. Bulinski

(J-1) T. Mizutani

(K-1) J. J. Smit

(K-2) Z. Yan, Y. Shang, and M. Dong

(L-1) D. M. Taylor and D. J. Morris

(M-1) J. C. Paul

(O-1) M. Onoda and K. Tada

(Q-1) M. Nagao, K. Oda, K. Nishioka, Y. Muramoto, and N. Hozumi

(R-1) G. C. Stone, V. Warren, and M. Fenger

(4) Social Events

Welcome Party

Banquet

Technical Tours

Course A: Japan Synchrotron Radiation Research Institute (Spring-8)

Course B: Communications Research Laboratory, Kansai Advanced Research Center (KARC)

Course C: Mitsubishi Electric Corporation, Ako Works (Large Transformers)

(5) Proceedings

The proceedings are to be printed by November 17. The approximate number of total pages is 920.

By Prof. Yoshimichi Ohki (Waseda University)
(General Chair of the ISEIM 2001)

Announcement of International Conference to be held in Asia

4th International Conference on Electronic Processes in Organic Materials (ICEPOM-4)

The conference will be held in Lviv, Ukraine on June 3-8, 2002.

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International Conference on Electrical Engineering 2002 (ICEE2002)

ICEE 2002 will be held in Jeju Island, Korea on July 7-11, 2002. Topics cover wide areas of Electrical Engineering field.

Schedule:	Submission of abstract:	Jan. 31, 2002
	Notification of Acceptance:	Feb. 28, 2002
	Submission of Full Papers:	May 1, 2002
	The Conference	July 7-11, 2002

Conference language: English

Organized by: The Korean Institute of Electrical Engineers (KIEE)

Co-organized by: The Institute of Electrical Engineers of Japan (IEEJ)

Chinese Society for Electrical Engineering (CSEE)

The Hong Kong Institute of Electrical Engineers (HKIE)

Inquiry to: ICEE Secretariat

The Korean Institute of Electrical Engineers

RM 901, Korean Science and Technology Center, 635-4 Yucksam-dong, Kangnam-gu, Seoul 135-703, Korea

E-mail: icee2001@kiee.or.kr, Fax: 82-2-566-9957, URL: <http://www.kiee.or.kr/icee/>

IEEE/PES Transmission and Distribution Conference and Exhibition 2002: Asia Pacific

The conference and Exhibition is the 1st International Conference and Exhibition on Transmission and Distribution in the Asia Pacific region. The Conference theme, "New Wave of T&D Technology from Asia Pacific", focuses on powering advantages in worldwide T&D technology from the Asia Pacific region, in line with today's expanding, diversified and transfiguring power systems.

Schedule:	Submission of abstract:	Nov. 16, 2001
	Notification of acceptance:	December 20, 2001
	Submission of final manuscript:	March 1, 2002
	Notification of final acceptance:	June 1, 2002
	The Conference and Exhibition	October 6-10, 2002

Venue: "Pacifico Yokohama", Pacific Convention Plaza Yokohama, Yokohama, Japan

Contact: IEEE/PES T&D 2002 Asia Pacific Secretariat

c/o International Communications Specialists, Inc.

Sabo Kaikan Bekkan, 2-7-4 Hirakawa-cho, Chiyoda-ku Tokyo 102-8646, Japan.

Tel.: +81-3-3263-6474, Fax: +81-3-3263-7077,

Email: t-d2002ap@ics-inc.co.jp

Internet: <http://www.ics-inc.co.jp/t-d2002ap/>

IEEE Region 10 Technical Conference on Computers, Communications, Control and Power Engineering (IEEE TENCON'02)

The conference will be held in Beijing, China on October 28-31, 2002

Schedule:	Submission of Papers:	March 15, 2002
	Notification of Acceptance:	May 15, 2002
	Submission of Camera-ready Papers:	June 30, 2002
	The Conference	October 28-31, 2002

Sponsored by IEEE Region 10, Organized by IEEE Beijing Section

Conference Chair: Prof. Zong Sha, China, Co-chair: Prof. Jung U. Seo, Korea

Contact: <http://TENCON02.njtu.edu.cn/>

The 11th Asian Conference on Electrical Discharge (ACED-2002)

The Conference will be held at Soongsil University, Seoul, Korea and be chaired by Prof. Hoo-Re. Kwak. The details are now worked out.

If you have any question on this conference, please contact with Dr. N. Hayashi, Secretary of ACED Int'l Steering Committee, by the e-mail to hayashi@asem.kyushu-u.ac.jp.

Noriyuki HAYASHI (Kyushu University, Japan; Secretary of ACED Int'l Steering Committee)

The 2nd International Discussion Conference on Nano Interface Controlled Electronic Devices

The conference will be held in Japan. The details are now worked out.

7th IEEE International Conference on Properties and Applications of Dielectric Materials (ICPADM 2003)

ICPADM-2003 will be held in Nagoya, Japan, in June 2-5, 2003. This conference is sponsored by the IEEE Dielectrics and Electrical Insulation Society (DEIS) and it will be cosponsored by the IEE Japan.

The details will be in the Call for Papers which will be distributed later.

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Introduction of Research Activities on High Voltage Engineering and Insulation in Indonesia

M.T. Suwarno, Parouli Pakpahan and Ngapuli I. Sinisuka

Department of Electrical Engineering,
Institut Teknologi Bandung (ITB), Indonesia



Dr. M.T. Suwarno

Indonesia is situated around the equator where the sun is overhead in the sky throughout the year. This condition leads to the so-called tropical climate where the seasonal migration of the sun and its movements dominate the climate in Indonesia. The climate affects the insulation system in Indonesian electric power network.

Research activities

Research activities in Indonesia are driven by the needs to provide a reliable electricity supply. So far, research activities that relate with the application of high voltage industries are not significant. The research activities described briefly here – under are:

a. Lightning research.

Since the lightning frequency in Indonesia is high and the electric system often fails due to lightning, the investigation of lightning is important. There are two group of lightning research. Firstly, rocket triggered lightning research group which was concluded several years ago. Secondly, natural lightning research group using the TDD (time different and distance) and TOA (time of arrival) systems. Both systems are operated by Bandung Institute of Technology. By using the two systems, some of lightning parameters such as lightning flash density, current amplitude and stepness can be estimated. The lightning performances of high voltage transmission lines were also investigated.

b. Investigation on polymeric insulating materials

Tropical effects on the polymeric insulations such as cycloaliphatic Epoxy (CEP) and Elastomer Silicone Rubber are being investigated. The investigation carried out on the above mentioned materials is emphasized mainly on their performance under tropical conditions, which as previously stated are characterized by high humidity, high solar radiation level and the

number of lightning strokes occurrence. The experiment consists of accelerated aging and natural aging tests under tropical conditions. Bulk as well as surface properties of the materials were observed and some parameters were measured and discussed. The parameters concerned are: Water Absorption, Dielectric constant and losses, Hydrophobicity and Thermal Analysis.

c. Ceramics Insulators and pollution

There are many heavy polluted areas in Indonesia. The pollution may be industrial, salt/coastal or sulfuric pollution. The influences of the pollution on the insulators were investigated by some groups. In order to improve the performance of ceramics insulators especially in polluted area, coating using silicone compound was introduced in some countries. However, the effectiveness of the coating in tropical region like Indonesia is under question. High ultra violet (UV) radiation intensity throughout the year and high annual rainfall are among factors should be taken into account in applying silicone rubber coating to improve the quality of ceramics insulators under heavy pollution. In this connection, investigation on the effects of silicone compound coatings on insulator under tropical condition is also carried out in our laboratory. Long term performance and aging are investigated both in laboratory and in field.

d. Effect of Electromagnetic Field on Biological Systems

The introduction of extra high voltage of 500 kV in Indonesia has arisen concerns of the society on the effects of the electromagnetic field (EMF) to the biological systems and human being; there are some research groups in Indonesia investigating the level of the EMF caused by the lines. The effects of the EMF on biological systems such as; on mouse, chicken and fungus were also investigated.

High Voltage Engineering Society of Indonesia.

In November 1998, 1st National Seminar on High Voltage Engineering was initiated in Bandung Institute of Technology and chaired by Dr. Suwarno. Prof. Teruyoshi Mizutani of Nagoya University and Prof. Masayuki Nagao of Toyohashi University of Technology presented invited papers at the seminar. Inter-University Forum on High Voltage Engineering (FOSTU) was established in 1999 to promote the advance of studies and researches on the high voltage engineering including electrical insulation technology in Indonesia. Since that occasion, the National Seminar on High Voltage Engineering was held annually. The 2nd Seminar was held in Gajahmada University. Prof. Kobayashi from Saitama University and Prof. van der Laan from Eindhoven Technical University delivered invited lectures. The 3rd seminar was held in Indonesia University, Jakarta. Mr. Iwa Garniwa chaired the seminar and special presentations were given by Prof. Shamir Shihab from Royal Melbourne

Institute of Technology and Prof. M. Nagao from Toyohashi University of Technology. This year the 4th National Seminar on High Voltage Engineering is scheduled to be held in Batam Island 5 – 6 November 2001 in conjunction with Seminar on Electric Power Tariffication. 80 technical papers will be presented. FOSTU also published The Indonesian Journal on High Voltage Engineering since its inception in 1999. By the end of 2002, a Regional Conference on High Voltage Engineering will be held in Bandung. The conference will be co-sponsored by FOSTU, Bandung Institute of Technology and HEDS-JICA.

In November 1998, Bandung Institute of Technology has also hosted the 9th Asian Conference of Electric Discharge (ACED) which has been attended by more than 150 people coming from Japan, Korea, Thailand and Indonesia.



Participants of 9th Asian Conference of Electric Discharge (ACED), hosted by ITB

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Electric Power Industry in Vietnam : the Overview



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Institute of Energy, Electricity of Vietnam

(Now studying at Toyohashi University of Technology, Japan)

Vietnam is a developing country which recently experienced rapid growth in economy. The growth rate is averaged around 9% per year from 1993 to 1997 and 7% from 1998 to 2000. Naturally, electric power industry became one of the most important and biggest economic sectors in term of capital investment and its development speed. Every year, it required 1.5 billions USD for investment (about 1.1% of GDP). This article will present some general information about organization and operation of electric power industry in Vietnam.

Presently, electric power sector is under control of Vietnamese government; in other words, it is national institution named Electricity of Vietnam (EVN). EVN is operated under direct supervise of Ministry of Industry. Under EVN, generally, the business is divided into three sectors which are responsible for electrical generation plants; electrical transmission lines and electrical distribution systems plus one national electric power system coordination center. There are also supporting institutions inside EVN: research institute (institute of energy); testing center; information center.

Operation of EVN will be presented with some statistical figures described bellow.

1. Structure of Electric Generation and Transmission.

By 31/December/1999, the general output capacity of all electric generation plants in Vietnam is 5,384 MW in which 53.2% come from hydro-electric plants; 11.3% from coal-consumed

plants; 15.1% from oil and diesel-consumed plants and 20.4% from gas turbines (Fig.1). According to the fig.1, the electric generation in Vietnam is heavily depended on hydro-electric plants. During dry season (from January to May), the output of hydro-electric plants is falling because of lack of water supply while electrical consumption increases. This sometime causes serious black out of the whole electrical system. In order to overcome this problem, presently, EVN is working on projects of constructing more oil-consumed and gas turbine generation plants.

The transmission system consists of one ultra-high voltage 500kV line from North to South Vietnam with the length of 1,487km and network of 110, 200kV lines connected with this 500kV line. The total length of transmission lines (110, 220, 500kV) is about 8,000km. The distribution system consists of 35, 10 and 6kV-distribution network and substations. The total capacity of distribution stations is 7,166kVA. In the daily life, consuming voltage is 220V.

2. Electric Consumption Structure (by 1999)

Total electric consumption in 1999 is 19,592 GWh, in which 7,590GWh is from industrial sector; 582GWh from agricultural sector; 10,020GWh from household sector and 1,400GWh from service and transportation sector. They are shown in Fig.2. According to this figure, the electrical demand of household sector occupied over 50% of total demand; moreover it is the main sector which has been creating the peak of load.

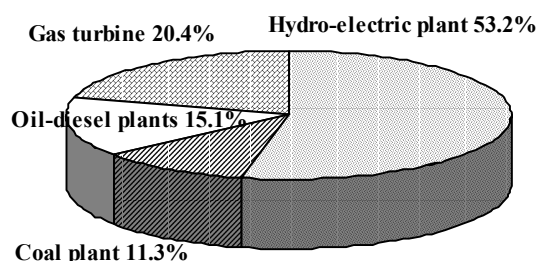


Fig.1 Structure of Electric generation

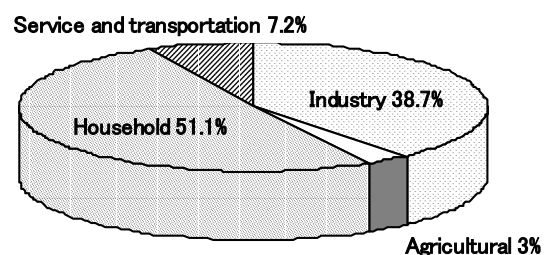


Fig.2 Electric consumption structure

Vietnamese GDP is estimated about 143.1 billions USD in 1999. From this total, 33% come from industry sector, 26% came from agriculture sector and 41% from service sector. Over 67% labor force are working in the agricultural sector and 26% of GDP is coming from this sector, but it only occupied 3% of total electrical energy demand (Fig.2). This shows that the agricultural sector still has a slow level of development compared with the other economic sectors. Increasing the electrical consumption for this sector will be great motivating factor for economic and social development of Vietnam.

In conclusion, with the renovation strategy (“doimoi” in Vietnamese), Vietnamese economy has been enjoying high growth rate recently. To meet this growth rate, electric power supply should increase more rapidly. According to the EVN, in period 2001-2005, every year, the general output capacity should be increased about 600-700MW.

Source: Ministry of Industry
Electricity of Vietnam
18 Tran Nguyen Han St. Hanoi, Vietnam

MISCELLANEOUS

Photos of Front and Rear Covers

Front cover:

A demonstration plant of seawater pumped-storage power plant started to operate in March 1999. This is the world's first high head type pumped - storage power plant using seawater. This plant is located in Okinawa island which is in the south of Japan, and is constructed to conserve the land and sea, and the animals and coral occupying those areas. The plant has maximum output of 30MW and a variable speed pumped-storage power generation system, based on gate turn off thyristor converter-inverter ac excitation system. A cross-sectional outline is as a diagram below. The project was implemented by the Electric Power Development Co., Ltd. as entrusted by the Ministry of international Trade and industry of Japan

(The photo is offered by the Electric Power Development Co., Ltd.)

A cross-sectional outline of seawater pumped-storage power plant in Okinawa

Rear cover:

Organic electroluminescent display is expected as a flat panel display in the next generation. Principle of the organic electroluminescence was published in 1960's.

A recent type of display using organic electroluminescence was invented by Tang and others, Kodak, USA in 1987, which was based on the organic electroluminescent device consists of very thin layered insulator films.

Comparing to LCD which is most widely applied today as a flat panel display, organic electroluminescent display has excellent merits such as a thin and light device, high brightness,

self luminescence, low power consumption, wide view angle and high speed response.

The displays shown on the photo are full color active organic electroluminescent displays developed by technology combination of organic electroluminescent device and low temperature p-Si TFT technology. Two size types are shown on the photo. One is a type 2.4(852 x 222 dots) and another is a type 5.5(QVGA).

(by Hisakazu Takahashi,
SANYO Electric Co., Ltd.)

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Total fee for joining IEEJ as a general member is ¥ 12,400 which consists of initiation fee ¥ 1,200, annual membership fee ¥ 10,000 and overseas postage of journal ¥ 1,200 (¥ : Japanese Yen).

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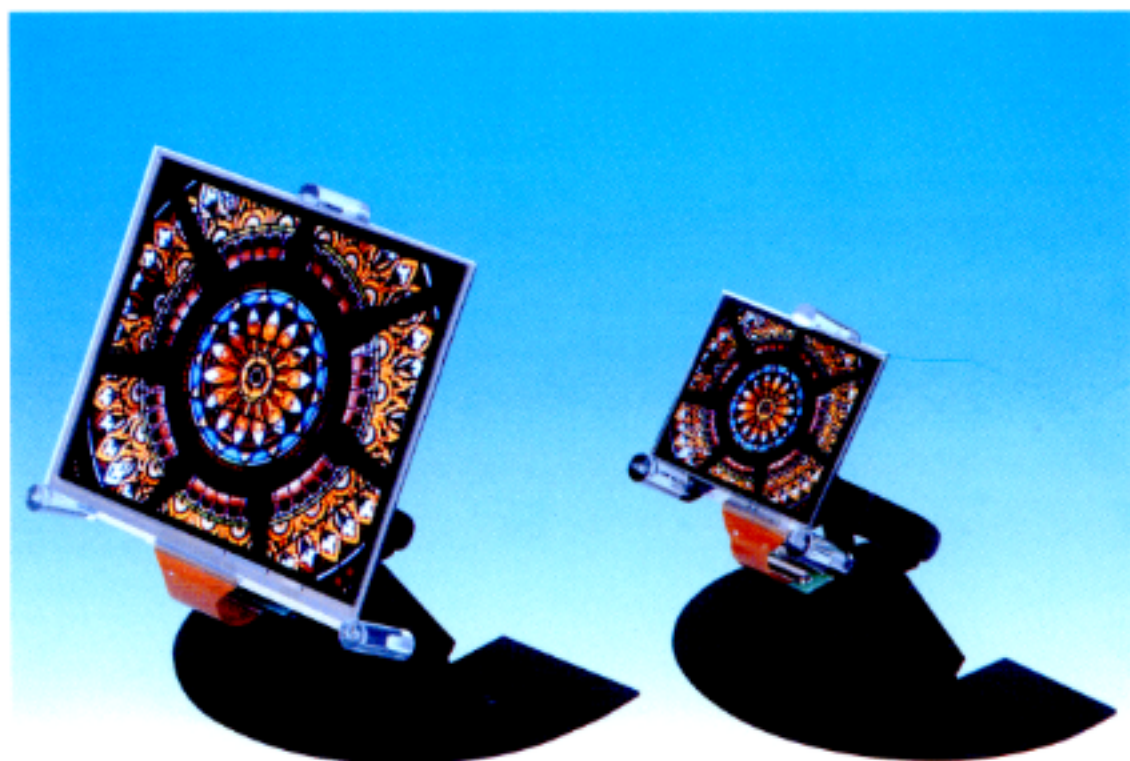
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