

ICEMPE2019

2nd International Conference on Electrical Materials and Power Equipment

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WELCOME MESSAGE FROM THE CHAIRMAN

It's our great pleasure to invite you to join us for the 2nd IEEE International Conference on Electrical Materials and Power Equipment (ICEMPE 2019), which will provide a forum within the international academic and engineering community in the field of electrical materials and power equipment.

The ICEMPE 2019 will be held in Guangzhou, China on April 7th-10th, 2019. It is co-sponsored by the Engineering Dielectrics Committee of China Electrotechnical Society (CES) and the IEEE Dielectrics and Electrical Insulation Society (DEIS), and it will be organized and technically supported by South China University of Technology. ICEMPE is an extension of National Conference on Engineering Dielectrics (NCED) in China, which was founded in 1983 as a biennial forum and has already been successfully conducted for 16 sessions. In 2017, the 1st ICEMPE has been successfully held in Xi'an, China.

The ICEMPE 2019 will be the 2nd conference of the series. The scientific research and development of electrical engineering are meeting new challenges as renewable energy sources are being greatly promoted. In the field of dielectrics and electrical insulation, people are paying more attention to eco-friendly dielectrics and recycling insulating materials, nanodielectrics and superconducting techniques, as well as electrical insulation phenomena and charging under cosmic and radiological environment. Additionally, internationalization of the power equipment industry is going so prompt that high voltage equipment manufacturers possess factories/workshops in many countries. Thus, there comes a growing demand to organize an international conference on electrical materials and power equipment to promote close interaction between academics and engineers, which is exactly the aim of the ICEMPE 2019.

Guangzhou, also known as Canton, is the capital and most populous city of the province of Guangdong. Located in southern China on the Pearl River, the third largest river in China, Guangzhou is about 120 km northwest of Hong Kong and 145 km north of Macau. Guangzhou has a history of over 2200 years and was a major terminus of the maritime Silk Road. Moreover, it continues to serve as a major port and transportation hub today, as well as one of three largest cities in China.

We are looking forward to meeting you in the very beautiful city Guangzhou, China, during April 7th-10th, 2019. Definitely, the ICEMPE 2019 will provide you a pleasant experience and new contacts in Guangzhou.

Shengtao Li

Chairman of ICEMPE 2019

CONFERENCE COMMITTEES

International Advisory Board

George Chen (UK, Chair)	Kazuo Adachi (Japan)
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Yanpeng Hao (China, Executive Chair)	Guanning Wu (China)
Lin Yang (China, Secretary)	Peng Li (China)
Hong Zhao (China)	Boxue Du (China)
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Shuhong Xie (China)	

Technical Committee

Mingli Fu (Chair)	Jianning Li	Zhouyiao Zou	Zhanhao Feng
Lisheng Zhong	Yewen Zhang	Yuan Fu	Yun Chen
Yanpeng Hao	Yanwen Chen	Yao Zheng	Ying Liu
Lin Yang	Jie Wei	Jikai Bi	Zhaohong Yao
George Chen	Zhimin Zhang	Qiang Fang	Jiahao Peng

LOCATION

The ICEMPE2019 will be held at **Soluxe Hotel Guangzhou** in Guangzhou City, Guangdong Province, China. We are sure that your stay in the city will be very enjoyable.

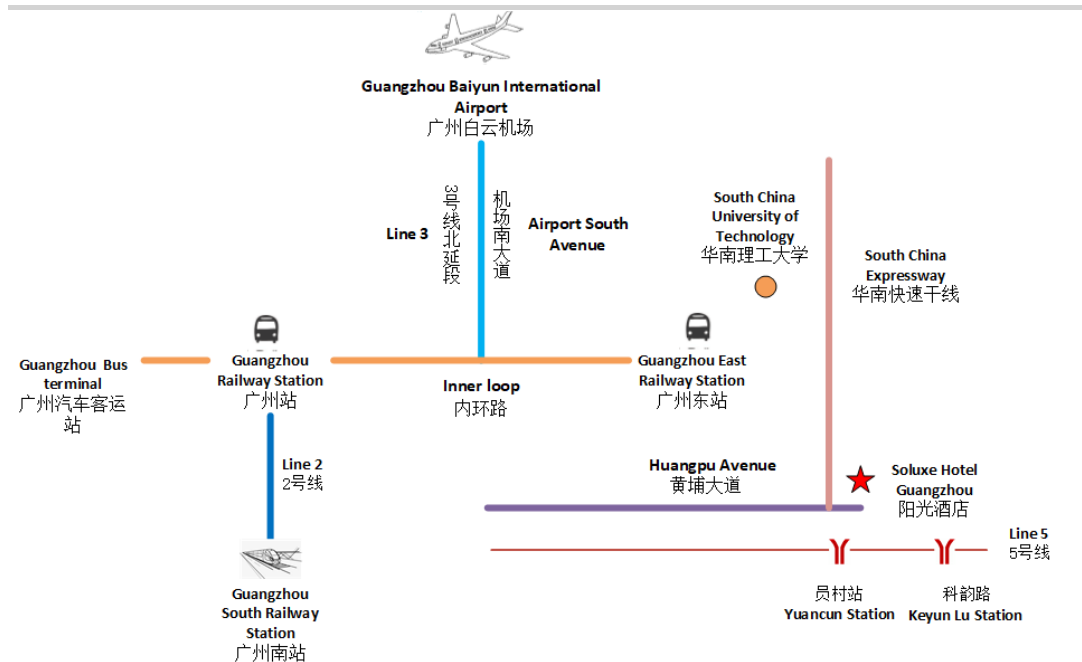
Conference Location: Soluxe Hotel Guangzhou

Hotel: Soluxe Hotel Guangzhou (Chinese Name: 广州阳光酒店)

Address: No.199 Huangpu Avenue Middle, Tianhe District, Guangzhou, Guangdong, 510655 China.

(中国广东省广州市天河区黄埔大道中 199 号)

Tell: +86 20 38018888.



To Soluxe Hotel Guangzhou :

- 1) From Guangzhou Baiyun International Airport:** the hotel is 43 km away from the airport. It takes 50 minutes to reach the hotel **by taxi**; or take Guangzhou Metro Line 3 to Ti Yu Xilu, Zhujiang New Town, transfer to Line 5 to Keyun Lu, transfer to No.518/40/43/218/44 bus to Chengjie Cun, then walk 150 m to the hotel.
- 2) From Guangzhou South Railway Station:** the hotel is 27 km away from Guangzhou South Railway Station. It takes 40 minutes to reach the hotel **by taxi**; or take Guangzhou Metro Line 7 to Higher Education Mega Center S., transfer to Line 4 to Chebeinan, transfer to Line 5 to Keyun Lu, walk 380 m to Yuancundong, take No.518/40/43/218/44 bus to Chengjie Cun and walk 150 m to the hotel.
- 3) From Guangzhou Railway Station:** the hotel is 17 km away from Guangzhou Railway Station. It takes 25 minutes to reach the hotel **by taxi**; or take Guangzhou metro Line 5 to

Keyun Lu, walk 380 m to Yuancundong, take No.518/40/43/218/44 bus to Chengjiecun and walk 150 m to the hotel.

- 4) **From Guangzhou East Railway Station:** the hotel is 10 km away from Guangzhou East Railway Station. It takes 25 minutes to reach the hotel **by taxi**; or take No. 43 bus to Yuancun, and walk 120 m to the hotel.

Connections to Guangzhou



By Air: Guangzhou Baiyun International Airport (ICAO: ZGGG, IATA: CAN) is a civil airport located about 28 km north of Guangzhou, Guangdong Province. Flights are available to all other major Chinese cities including Beijing, Shanghai, Xi'an, Hong Kong, Macau etc. There are direct international flights between Guangzhou and UK, France, Italy, Canada, Russia, Korea, Singapore, Japan, Indonesia, Netherlands, Malaysia, and Thailand. Travelers from Europe, America and other countries can also get to Beijing, Shanghai, Hong Kong or Macau.

Taxi cabs and the airport shuttle bus are the major transportation tools between downtown and the airport. The one-way bus ticket is 25 RMB per person, and the taxi costs about 160 RMB.

By Train: There are three major railway stations. Guangzhou South Railway Station, Guangzhou East Railway Station and Guangzhou Railway Station. Guangzhou South Railway Station remains the largest in Guangzhou. It is one of the four largest railway passenger transportation hubs in China. It is an interchange station and a terminus between Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL), Guangzhou-Zhuhai Intercity Railway and Beijing-Guangzhou High Speed Rail (HSR).

Connections from Hong Kong to Guangzhou: If you come from Hong Kong, you can entry to customs at West Kowloon, and take a high-speed railway from West Kowloon, Hongkong to Guangzhou South Railway Station, Guangzhou (50 minutes); or entry to customs at Hung Hom Station, and take a railway from Hung Hom Station, Hongkong to Guangzhou East Railway Station, Guangzhou (2 hours, near the conference hotel); or by air to Guangzhou Baiyun Airport. You can book railway tickets on trip.com, its link as follows. https://www.trip.com/?locale=en_US

There are direct trains from Guangzhou to Beijing, Shanghai, Xi'an, Shenzhen, etc. Potential train riders from foreign countries are advised to compare with traveling by air, as it takes many hours by train to get to other major tourist attractions in China (such as Beijing, Shanghai, Xi'an), and air ticket (especially with discount) sometimes costs less than the train ticket.



CONFERENCE INFORMATION

Official Language

The official language of the conference is English, which will be used in all presentations and printed materials.

Name Badges and On-site Registration

Participants are required to wear name badges at all times in order to enter the conference area and participate social activities. Participants can make on-site registration at the registration desk located in the lobby of Soluxe Hotel Guangzhou (1st F). Service hours of registration desk are as follow.

Sunday	April 7, 2019	08:00–21:00
Monday	April 8, 2019	08:00–20:30
Tuesday	April 9, 2019	08:00–20:30

Participants can still make on-site registration in service hours.

Category	Early Registration (Before February 28th, 2019)		Late Registration (After February 28th, 2019)		Registration fee covers
Student (IEEE member)	USD 400	RMB 2700	USD 450	RMB 3050	-Conference Material -Admission to Session -Welcome Reception -Lunch& Dinner -Banquet -Technical Tour
Student (non-IEEE member)	USD 450	RMB 3050	USD 500	RMB 3400	
IEEE members	USD 600	RMB 4050	USD 650	RMB 4400	
IEEE DEIS Members	USD 550	RMB 3750	USD 600	RMB 4050	
Others	USD 650	RMB 4400	USD 700	RMB 4750	
Accompanying Person	USD 200	RMB 1350	USD 200	RMB 1350	-Welcome Reception -Lunch & Dinner -Banquet -Technical Tour

Lunch & Dinner

Lunch & Dinner will be provided during the conference. All participants and accompanying persons can have buffet in Soluxe Coffee on the 2nd F (except the welcome reception of April 7th on the Meeting Room 1, 7th F and banquet of April 9th on the International Convention Hall, 1st F) at Soluxe Hotel Guangzhou with your meal coupons in the bag.

Wi-Fi Access

Wireless Internet will be available in Soluxe Hotel Guangzhou

Message and Announcement Boards

Message and Announcement Boards will be set up in the registration areas so that participants can

get useful information from the secretariat or other participants.

Guidelines for Oral Presentation Presenters

Each paper in an oral session is allocated **20 minutes**. This includes time required for introduction of the speaker, as well as time for questions from the audience. Therefore, authors are advised to prepare a **15-minutes** talk and leave **5 minutes** for questions at the end. Each invited talk is allocated **25 minutes, including 20 minutes of presentation and 5 minutes of Q&A**.

Please submit your PPT via icempe2019@scut.edu.cn, or submit via USB flash drive at the registration desk. Please arrive at your session at least 10 minutes before the start of your session. If you choose to bring PPT slides with video clips on USB, you can bring your materials in a couple of different PPT versions and try out prior to the presentation. Only PowerPoint® files (.ppt or .pptx) with the version of 2019 or earlier are supported for oral presentation.

Please bring your presentations as a PDF file on USB Flash Memory if you do not have any video clips, with all fonts embedded so that all the mathematical symbols and equations will project properly. This generally avoids the problem of incompatible PPT editors. A laser pointer and a microphone will be provided for your use. Any additional technical equipment should be requested at least one month in advance of the presentation.

If you need additional audio/visual equipment, please notify us by email icempe2019@scut.edu.cn before 1st April. If your presentation includes videos or animations, it is strongly recommended to convert them into the graphic interchange format (GIF) before inserting them into the PowerPoint® document because special video format might not be displayed on the computer.

If you have to be absent from the ICEMPE 2019 for some irresistible reasons, please inform us in advance via icempe2019@scut.edu.cn

Guidelines for Poster Presenters

The dimension of the post board is 100 cm in width by 240 cm in height. The poster presentation should include following items in addition to the main contents.

- Title of the presentation
- Authors' names and their organizations
- Introduction
- Conclusion

The poster boards are marked with the sequence No. of corresponding paper. Please do not cover the numbers. A poster information desk with fixing materials will be available.

Please put up your poster prior to the start of the poster session and remove it shortly after the session.



OFFICIAL & SOCIAL EVENTS

Welcome Reception

You are invited to join us at the Welcome Reception to welcome colleagues.

Date & Time: 18:00 – 21:00, April 7th (Sunday)

Location: Meeting room 1, Soluxe Hotel Guangzhou(7th F)

Opening Ceremony and Chen Jidan Award & Memorial Lecture

Date & Time: 08:30 – 9:45, April 8th (Monday)

Location: International Convention Hall, Soluxe Hotel Guangzhou (1st F)

Banquet

Date & Time: 18:30 – 20:30, April 9th (Tuesday)

Location: International Convention Hall, Soluxe Hotel Guangzhou (1st F)

Excellent Student Paper Awards and Closing Ceremony

“Excellent Student Awards” will be awarded before Closing Ceremony. All student presenters are advised to attend the closing ceremony.

Date & Time: 17:30 – 18:00, April 10th (Wednesday)

Location: International Convention Hall, Soluxe Hotel Guangzhou (1st F)

Excellent Student Paper Awards

Excellent Student Paper Awards are granted to student presenter demonstrating excellent research works. At the same time, the award aims to inspire young students who have been very active in Electrical Materials and Power Equipment.

TECHNICAL VISIT

Technical visit is planned to make your conference experience even more interesting and enjoyable. Please confirm your attendance at the registration desk on Sunday, April 7th.

Date & Time	14:00 – 18:30, April 9 th (Tuesday)
Itinerary	Soluxe Hotel Guangzhou ±800KV Suidong Converter Station
Assembly Point	Lobby of Main Entrance (1 st F), Soluxe Hotel Guangzhou
Assemble Time	14:00

±800 kV Suidong Converter Station

The ±800 kV Suidong Converter Station is located at Fenghu village in Zengcheng city, Guangzhou Municipality, 16 km away from the city center of Zengcheng. The Station is constructed in the mode of combined operation of AC and DC, covers an area of 29.85 hectares, among which, 22.48 hectares are in the station envelope. Pole 2 was put into operation on 28 December 2009 and it realized bipole operation on 18 June 2010.

The bipole rated capacity of the Suidong Converter Station is 5000MW, and the single-pole is 2500 MW. The DC rated voltage is ±800 kV (rectified current side). Each of the DC bipole connection adopts two groups of 12 flutter valves in series (400 kV+ 400 kV). The converter transformers are equipped with 24 single-phase double-winding equipment (four as standby equipment). The 500 kV AC yard adopts one and a half circuit breaker connection. Altogether there are four circuits of incoming lines of converter transformer, six circuits of 500 kV outgoing lines, one 500 kV station transformer, four groups of AC filters, which compose six complete series and three incomplete series. The 500 kV AC filters have separate filter jumbo groupbusbars. The capacity of reactive power compensation is designed to be 3010 MVar (500 kV), and is divided into four major groups and 15 mini-groups, among which seven mini-groups use 190 MVar (500 kV) filters (four groups of double-tuning AC filters of 11, 24 subharmonic, three groups use double-tuning AC filters of 13, 36 subharmonic), and eight mini-groups use 210 MVar (500 kV) shunt capacitors. The station power adopts two circuits of working power and one circuit of the spare power supply. One circuit of working power is connected to the 500 kV series of the converter station, and the other circuit of working power connects up to one circuit of 110 kV wires from the 220 kV Licheng Substation. The spare power supply is connected to one circuit of 110 kV wires from the 110 kV Zhucun Substation.

The Suidong Converter Station is the first ±800 kV DC Transmission Project in China and the landing station of Yun-Guang Ultra-high Voltage Transmission project. Upon its completion, it will be one of the major west-to-east power transmission channels of CSG networks, reflecting committed implementation of national west-to-east power transmission strategy. The completion of the project is a scientific practice of optimized allocation of eastern and western China resources, and is a significant step in executing the central government's policies of "ensuring development, livelihood of the people, and social harmony". It helps to meet the increasing power demand in Guangdong and facilitate economic and social development of the province. It is a key measure in practicing Scheme of reform and development of Pearl River Delta regions promulgated by the State Council. The station will play an important role in relieving power construction strain in Guangdong and adapting to load development in Dongguan and Guangzhou.



GENERAL INFORMATION

Local Time

GMT +8 hours (Beijing Time)

Climate and Weather

Guangzhou is located in Southern China and has a humid subtropical climate influenced by the East Asian monsoon. The usual temperature in April is 25°C. April is the rainy season in Guangzhou, we recommend that you carry an umbrella.

Currency

The Unit of currency in China is the Chinese Yuan (RMB). Notes occur in 100, 50, 20, 10, 5, and 1 Yuan denominations, while coins occur in 1, 0.5, 0.1 Yuan denominations.

Business Hours

Government office hours are usually from 9:00 to 17:00 on weekdays and closed on weekends. Banks are open from 9:00 to 16:00 on weekdays and from 10:00 to 15:00 on weekends. Major stores are open every day from 10:00 to 21:00.

Useful Phone Numbers

-Police 110 / Fire 119 / Ambulance 120

-Secretaries:

Lin Yang +86-15989184979 (Mobile)

CHEN JIDAN AWARD & MEMORIAL LECTURE



Studies on Space Charge Accumulation Properties in Dielectric Materials

—Measurement Methods and Quantum Chemical Calculation Analysis

Emeritus Professor Tatsuo Takada

Tokyo City University, Japan

Individual Contributions

Prof. T. Takada has made outstanding contributions to the developing for measurement techniques of space charge distribution in solid and liquid dielectric materials. The measurement techniques of space charge distribution great contribute to the scientists in the field of dielectric materials and the engineers in the field of insulating engineering.

He has published more than one hundred papers in leading Journals in US, UK, Japan. As he has been an extremely active researcher, he was asked to serve as Chairman for the Technical Committee on Dielectrics and Electrical Insulation, IEEJ, the Tokyo Chapter of the DEI Society, IEEE and Convener of TF15-12-01 (space charge measurement), CIGRE.

Synopsis

With the development of HVDC Light project since 1990's, it is necessary to construct the large scale electric power grid with reliable DC insulation system, connecting wind farms to power grid, underground power links, connecting asynchronous grids, etc. Therefore, it is important to propose advanced detection technique under DC high electrical stress, evaluate the space charge characteristics and explore novel insulating materials. This article describes the short developing history of the electric charge accumulation measurement techniques in insulating materials using acoustic and optical methods, and the analytical methods using quantum chemical calculation.

Biography

Tatsuo Takada was born in August 8, 1939, received his B.E. degree in electrical engineering from Musashi Institute of Technology, Japan, in 1963, his M.E. degree from Tohoku University, Japan, in 1966, and his doctoral degree from Tohoku University in 1975. Appointed a lecturer at Musashi Institute of Technology in 1967, he became an associate professor at the same university in 1974 and a professor in 1987. He was a visiting scientist at MIT (USA) from 1981 to 1983 and he is a consulting professor of Xian Jiaotong University, China.

He has now undertaken several research projects on the development of acoustic and optical advanced methods for measuring electric charge distribution in dielectrics. For example, in order to investigate the space charge effect in solid dielectric material, the dynamic surface charge distribution on solid dielectrics and the electric field vector distribution in liquid insulating materials. He received the progress award from the IEE of Japan in 1996. He has also received Whitehead Memorial Award in 1999 by his pioneering work on PEA, and gave an Award Lecture in IEEE CEIDP (Conference on Electrical Insulation and Dielectric Phenomena). He is a Life Fellow member of IEEE. His e-mail: takada@me.musashi-tech.ac.jp

INVITED SPEAKER



Some Ideas about Engineering Dielectrics Researches

Professor Shengtao Li

Xi'an Jiaotong University, China

Synopsis

The specific meaning of Lewis interface and Tanaka interface is analyzed, hard/soft interface of nano polymeric composites is proposed, new concepts of structural complexity, uncertainty and mutability are described, and the scale and physical and chemical properties of hard and soft surfaces are analyzed. New thoughts are inspired from the perspective of Einstein reductionism, emergent phenomena of P W Anderson, and scientific prediction of R P Feynmann. Constraints of existent conditions of space charge limited current (SCLC) are studied, and hierarchical levels of its self-structure, complex interface, electrode contact, concomitant electronic and ionic conductivity and other factors in polymers or their composites have serious impacts on SCLC. It is proposed that SCLC is not solely determined by carriers which are the same as injected carriers in the transition from ohmic region to high field region, i.e., electrode injection SCLC region. In particular, the contribution of ionic conductivity to the current in low and high field region is of close scrutiny when measurement conditions are determined. Therefore, the main features and distinction methods of ionic and electronic conductivity are listed. In view of pulse related space charge measurement methods, especially pulsed electroacoustic (PEA) method has been mainly adopted in the world, advantages and disadvantages of PEA, and the method for verifying the accuracy and repeatability of measurement results are proposed. According to the features of polymer structure, a pressure stimulated current (PSC) device should be built up for distinguishing space charges derived from concentration gradient of electrons, ions, and dipoles to compensate the serious shortcomings of PEA measurements.

Biography

Shengtao Li received the Ph.D. degree in electrical engineering from Xi'an Jiaotong University (XJTU), China, in 1990. He was a Lecturer, Associate Professor, and Professor of XJTU in 1990, 1993, and 1998, respectively. He was a Research Fellow at Waseda University, Japan, in 1996, and was also a Senior Visiting Scholar at University of Southampton, UK, in 2001. From 1993 to 2003, he was a deputy director of the State Key Laboratory of Electrical Insulating and Power Equipment (SKLEIPE) at XJTU. Since 2003, he has been an executive deputy director of SKLEIPE. He was awarded a Distinguished Young Scholar of China by the National Science Foundation in 2006. He gave Liu Ziyu Memorial Lecture on the 11th International Conference on the Properties and Applications of Dielectric Materials (ICPADM) in 2015. He was the chair of the 6th International Conference on Conditional Monitoring and Diagnosis (CMD) in 2016, the 1st International Conference on Electrical Materials and Power Equipment (ICEMPE) in 2017 and the 12th International Conference on the Properties and Applications of Dielectric Materials (ICPADM) in 2018. His research interests include dielectrics and their application, insulating materials, and electrical insulation. He can be reached by email at sli@mail.xjtu.edu.cn.

INVITED SPEAKER



Transformer Liquids Research: Transforming Industry

Professor Zhongdong Wang

The University of Manchester, UK

Synopsis

Research on Ester based transformer liquids and oil regeneration at the University of Manchester has been transforming the UK transformer industry over the last decade. Key studies on electrical and thermal characteristics are introduced in this presentation, as well as the resulting solutions for design and operation. Successful engineering projects and impacts are given as examples.

Biography

Received the B.Eng. and M. Eng. degrees in high-voltage engineering from Tsinghua University, Beijing, China, in 1991 and 1993, respectively, and the Ph.D. degree in electrical engineering from UMIST, Manchester, U.K., in 1999. She is currently a Professor of High Voltage Engineering at the University of Manchester. Her research interests include transformer modeling, oil/paper insulation aging mechanisms, condition assessment, and transformer life management.

INVITED SPEAKER



Structure-Activity Relationship and Molecular design for Discovery of Environmentally Sustainable Dielectric Gases

Professor Keli Gao

China Electric Power Research Institute, China

Synopsis

Novel environmentally sustainable dielectric gases are highly desired for electric applications to replace sulfur hexafluoride (SF₆) which is the most potent greenhouse gas. The state-of-the-art structure-activity relationship for high-through screening of the dielectric gases has been obtained successfully using the electron density and electrostatic potential parameters. Moreover, a new strategy to discover the environment-friendly dielectric gases has been achieved by means of a priori molecular design. A series of viable alternative dielectric gases with the unique combination and balance of the paradoxical properties of performance are presented and will greatly inspire experimental synthesis and field tests on the new chemistry for dielectric use.

Biography

Executive Vice President of China Electric Power Research Institute, Professor, Ph.D. Supervisor, CSEE (Chinese Society for Electrical Engineering) Fellow, IEEE Senior Member, long-term engagement in the research of EHV&UHV power transmission and electrical equipment operation technology.

INVITED SPEAKER



Origins of Chemiluminescence in Polymeric Insulating Materials

Professor Yoshimichi Ohki

Waseda University, Japan

Synopsis

One of inevitable weak points of electrical insulation with industrially synthesized organic polymers is oxidative degradation. For detecting such oxidation induced in polymeric materials, a spectroscopic analysis method called chemiluminescence (CL) is known. It has widely been believed that singlet molecular oxygen and electronically excited triplet carbonyl products are its two luminous sources. To confirm the validity of this assumption, CL was measured for a variety of polymers. Fourier-transform mid-infrared absorption spectroscopy was also conducted before and after the CL measurements. As a result, it has become clear that the formation process of the cross-linked structure in silicone rubber by bridging two neighboring siloxane backbones via oxygen and the curing process of epoxy resin as well induce the CL.

Biography

Yoshimichi Ohki is a Professor of Waseda University, Japan and is also an honorary Professor of Xi'an Jiaotong University, China. He was a Visiting Scientist at the Massachusetts Institute of Technology (MIT).

Dr. Ohki is at present President of Japanese Electrotechnical Committee and was President of the Institute of Engineers on Electrical Discharges in Japan and also Vice President of the Institute of Electrical Engineers of Japan. He is a recipient of Prize for Science and Technology awarded by the Minister of Education of Japan, IEEE DEIS Forster and Whitehead Memorial Awards, Outstanding Achievement Award and Best Paper Award (2 times) of IEE Japan, Research Award of Waseda University (3 times), and other awards.

He has written more than 450 papers (in English: more than 350, in Japanese: more than 100, in Chinese: 1). For example click: https://www.researchgate.net/scientific-contributions/73051193_Yoshimichi_Ohki

INVITED SPEAKER



Prospect of Computational High Voltage Engineering

Doctor Xuzhu Dong

China Southern Power Grid, China

Synopsis

With research and development of high voltage technologies, electrical materials, computational simulation technologies, and plasma physics, the concept of the computational high voltage engineering (CHVE) is proposed, as a new discipline, to solve or explain practical problems of high voltage engineering with support of applied mathematics and computer science. This paper introduces the technical and engineering application drivers of CHVE, elaborates its definition, research scope and discipline architecture, and discusses the theoretical research foci and potential engineering application of this subject. CHVE will cover the study of discharge modeling, computation of multi physical field coupling, application of cloud computing and super computers, 3D printing of insulation components, and the precision testing and measurement of multi physical fields. On this basis, we look forward to future development of CHVE and its challenges.

Biography

Dr. Xuzhu Dong was born in Shaanxi, China. He received his first PhD in high voltage engineering from Tsinghua University in 1998, and the second PhD in electrical engineering from Virginia Tech in 2002. He is Deputy Chief Engineer of CSG EPRI. He was Director of Smart Grid Institute at CSG EPRI. Before joining CSG in 2010, he worked with Progress Energy, FirstEnergy, and EPRI solutions in USA, as senior engineer, staff engineer, and lead engineer. His research interests were high voltage engineering, smart grid, and power equipment asset management. He is involved into several key smart grid demonstration projects at CSG. Dr. Dong is senior member of IEEE and member of CIGRE.

INVITED SPEAKER



Space Charge Accumulation Properties in Various Insulating Materials under DC High Electric Field at High Temperature

Professor Yasuhiro Tanaka

Tokyo City University, Japan

Synopsis

While many kinds of polymeric materials have been developed for being used at high temperature in various devices, there is a few cases that they are used as an electric insulating material for dc high electric stress. However, according to the development of power electric devices in recent years, the demand of an insulating material which show a good performance even at high temperature more than 100 °C has been increasing. Under such severe condition, especially in HVDC (high voltage DC) systems, the space charge accumulation property must be a key factor to evaluate the performance of them. Therefore, we tried to measure the space charge distributions in many kinds of polymers at high temperature (~ 150 °C) under high electric stress (~ 120 kV/mm) using the originally developed PEA (pulsed electro-acoustic) system for high temperature measurement. Judging from the results, the obtained data can be available to evaluate the performance of them under such severe condition.

Biography

Yasuhiro Tanaka was born in Fukuoka, Japan in 1961. He received the B.E., the M.E. and Ph. D. degrees in Electrical Engineering from Waseda University, Japan, in 1986, 1988 and 1991, respectively. He became a Lecturer, an Associate Professor and a Professor at Musashi Institute of Technology (presently Tokyo City University), in 1992, 1998 and 2004, respectively. He was a Visiting Scientist at University of Southampton from 1999 to 2000. He received the Excellent Paper Award from the IEE of Japan in 2009, the IEC1906 Award in 2013, Liu Ziyu Memorial Lecture Award in 2018, and IEEE Caixin Sun and Stan Grzybowski Lifetime Achievement Award in 2018. Currently, he is researching and developing the measurement system for the space charge distribution in various solid dielectric materials at high temperature, under ultra-high electric field or under high energy e-beam irradiation. He was a chair of Technical Committee of Dielectrics and Insulating Materials in IEEJ from June 2013 to May 2018, a vice president of The Institute of Engineers on Electrical Discharges in Japan from April 2016, and a vice chair of IEEE DEIS Japan Chapter from April 2017. He is a member of CIGRE SC D1, and he is also IEEE DEIS Society Administrative Committee Members-at-large (2015-2017, 2018-2020), and a convener of IEC TC 112 WG8 from Sept. 2015.

INVITED SPEAKER



Measurement of Space Charge Distribution for a Real Long HV Cable and Uncertainties in Space Charge Measurement

Professor Yewen Zhang

Tongji University, China

Synopsis

To show three ways to measure space charge distribution for a real long HV cable: 2 ways by using PEA method, and one way by using laser PWP method.

To discuss uncertainties in the measurement of space charge distribution, and show some main possible error sources.

Biography

Yewen Zhang was born in Zhejiang, China in 1955. He received the B.Eng., M.Sc. and the Ph.D. degrees in electrical engineering, from Xi'an Jiaotong University, China in 1982, 1984 and 1988 respectively. He then joined Ecole Supérieure de Physique et de Chimie Industrielles de la Ville de Paris (ESPCI) as a Postdoctoral Research Fellow, subsequently being appointed Research Fellow. In 1996, he moved to the Department of Applied Physics, Hong Kong Polytechnic University, as a Research Fellow, and joined the Department of Physics, Tongji University, as a full professor in 1997. Since 2012, he is a full professor in Department of electrical Engineering, Tongji University. He was the senior member of IEEE DEI since 2013. His research interests lie mainly in the field of space charge in dielectrics. Recently, he has begun working on photonic crystals and metamaterials for microwave application.

INVITED SPEAKER



Lessons from Three-Dimensional Imaging of Electrical Trees

Professor Simon Rowland

The University of Manchester, UK

Synopsis

Electrical trees are artifacts resulting from aging of polymeric insulation in high electrical fields which can lead to the ultimate failure of the host insulation. This paper reviews developments in observations of the growth of trees. In particular, consideration is given to the benefits of generating three-dimensional replicas of real trees from X-ray computed tomography (XCT) and serial block face scanning electron microscopy (SBFSEM), and how these can facilitate better understanding of tree development mechanisms. It is concluded that both two- and three-dimensional imaging are necessary, and these need correlating with partial discharge measurements to develop models of tree growth and effective asset management tools.

Biography

Simon Rowland graduated in physics from The University of East Anglia, and subsequently gained a PhD at London University in 1984. He worked in commercial research and manufacturing for STC, BICC, and Corning before joining The School of Electrical and Electronic Engineering in The University of Manchester in 2003. He was appointed Professor of Electrical Materials in 2009, and Head of School in 2015. He was President of the IEEE Dielectric and Electrical Insulation Society in 2011 and 2012.

INVITED SPEAKER



Post-Irradiation Effect Analysis on XLPE-Insulated LV Cables Used in Nuclear Power Plants

Professor Davide Fabiani

University of Bologna, Italy

Synopsis

Low-voltage electrical cables are extensively used throughout nuclear power plants (NPPs) for instrumentation and control of equipment, power transmission and communication of signals and data. These cables can be exposed to an extensive range of severe environmental conditions and stresses, like e.g., temperature, radiation, mechanical stresses and humidity, mainly inside the containment area. Most of the NPP commissioned in '70s and '80s are now reaching end-of-life but, since decommissioning costs are very high, NPP regulators are trying to extend NPPs life up to other 60 (possibly even 80) years. Since electric cables are one of the long-life equipment that have not considered for replacement during the design life of a NPP, usually 40 years, evaluating degradation condition and predicting residual life are very critical issues.

Cable insulation and jackets are made of polymer-based compounds, whose degradation state is traditionally assessed through destructive methods, like tensile testing or thermal analysis. Non-destructive techniques based e.g. on electrical quantities are not commonly used in NPP to evaluate cable insulation condition. This was the aim of the European project FP7 ADVANCE (Aging Diagnostics and Prognostics of low voltage I&C cables). The project, finished in 2014, was focused on the study and the analysis of the results of accelerated aging tests performed on a representative selection of cables already installed in European NPPs in order to evaluate the ability of electrical Condition Monitoring (CM) techniques to detect local and global cable aging. The results were compared and correlated to those obtained with more conventional CM techniques for validation. Electrical permittivity, for instance, was found to be effectively associated with oxidation induced by aging. Post-irradiation effects have been also observed which may change material properties some months after irradiation, due to slow diffusion and reaction rate of some chemical radicals created by aging. Both phenomena must be taken into account to develop effective CM techniques for electrical insulation under such stress conditions.

In this paper, crosslinked polyethylene (XLPE) cable samples aged through high temperature and two different radiation levels have been analyzed through dielectric spectroscopy technique in order to evaluate the change in electrical response of the insulation with aging. Tests have been carried out immediately after aging and years after the radiation source has been turned off. Significant changes in dielectric response and mechanical properties have been observed due to post-irradiation effects, suggesting that degradation continues even after the aging source has been removed. This implies that a loss-of-coolant accident (LOCA), for instance, could affect cable insulation degradation even years after the accident as occurred. Therefore, proper diagnostic techniques should be applied for long terms to monitor the insulation state of the affected cables.

Biography

Davide Fabiani received the M.Sc. and Ph.D. in Electrical Engineering with honors in 1997 and 2002, respectively. He is Associate Professor at the Department of Electrical Electronics and Information Engineering of University of Bologna. His fields of research are mainly related to development, characterization and diagnosis of electrical insulation systems for applications in electrical and electronic apparatus. He is author or co-author of about 200 papers, most of them published on the major international journals and conference proceedings. He is Associate Editor of IET High Voltage Journal, Senior Member of IEEE DEIS, member of DEIS AdCom and Chair of the Meetings Committee since 2016.

INVITED SPEAKER



Effect of Accelerated Thermal Aging on the Properties of Paper-Ester from Palm Oil Composite Insulation

Professor Harjo Suwarno

Institut Teknologi Bandung, Indonesia

Synopsis

Mineral oil is widely used for transformer liquid insulation. However, due to environmental consideration and the availability of the liquid in the future, many efforts are being done to find new type of insulations. Recently, new type liquid insulation from natural like ester is being investigated for possible application in high voltage transformers. This presentation reports experimental results on the effects of thermal aging on the kraft transformer paper in natural ester made from palm oil. The natural ester from palm oil with paper combined with copper strips were put in closed aging bottles. The sample composition was designed to simulate the condition in an actual transformer. The sample was subjected to an accelerated thermal aging at 120°C in a controllable oven. The aging period was done until up to 1008 hours. The effects of thermal aging on the paper characteristics was investigated by measuring the tensile strength and degree of polymerization of paper. Comparison among measured parameters was done. Chemical change in the paper was examined using energy dispersive X-ray spectroscopy (EDS). Experimental results showed the reduction of tensile strength as well as degree of polymerization (DP) with aging time. The tensile strength and DP are strongly correlated each other. The EDS measurement indicated that the thermal aging increased the C element in the paper and inversely reduced the oxygen in the paper. At the later aging, small amount of K element was observed in the paper which was considered as the esterification by product during manufacturing the natural ester from palm oil. As a comparison in mineral oil instead of K, a small amount of S was detected.

Biography

Suwarno received BSc and MSc from Electrical Eng Dept. ITB, Bandung in 1988 and 1991 respectively and D. Eng from Nagoya University, Japan in 1996. His research interests are High Voltage Insulating Materials and Technology, Diagnostics of HV Equipments, and High Voltage Industrial Application. Currently, Suwarno is Professor and Head of Electrical Power Engineering Research Group Institut Teknologi Bandung, Indonesia. He is The General Chairman of ICPADM 2006, ICEEI 2007 and CMD 2012. Prof. Suwarno is a senior member of IEEE, Editor in Chief International Journal IJEEI and editor member of JET and reviewers of several international journals such as IEEE, IET, Elsevier, Simulation International and Springer Verlag. He has published over 150 international journal or conference papers and over 90 domestic papers. He can be reached at suwarno@ieee.org.

INVITED SPEAKER



High Electric Field Behavior and Energetic Processes in Poly(ethylene naphthalate)

Doctor Gilbert Teyssède

Université de Toulouse, France

Synopsis

Poly(ethylene 2,6-naphthalate) -PEN is structurally similar to the most commercially important saturated polyester PET - Poly(ethylene terephthalate). PEN is competitive with PET in certain performance-driven markets based on its superior strength, heat stability and barrier properties.

Whereas PET is widely produced for many applications ranging from textile, to packaging, to flexible electronics and to capacitors, PEN is relatively newer, more expensive such that its superior properties are not necessarily exploited. Replacing a phenyl ring by a naphthyl ring has some consequences on the mechanical properties, making the polymer chain stiffer. It also has great consequences on the optical, electronic, and vibrational response. Because of the naphthyl unit in its repeat unit, PEN is a relatively high luminescence yield material: Many recent studies focus on the application of PEN to scintillators for radiation detection.

From the dielectric properties point of view, Ohki et al. made recently a comparative study on the (low field) dielectric properties of PET and PEN: due to similar chemical structures, PET and PEN have many parallel dielectric properties controlled mainly by an increase about 50°C (from ≈70 to ≈120°C) of the glass transition temperature. Both are polar materials, producing relatively high dielectric losses in a given frequency range. We have investigated the high field behavior of PEN over the last 20 years, considering especially its electroluminescence (EL) properties. Indeed, owing to its high luminescence yield, strong nonlinear behavior at high field and high field withstanding, it has been considered as a model material for electroluminescence analysis.

Our purpose in this communication is to review the high field behavior of PEN in relation to its photo-physical properties. The topics addressed range from the optical and luminescence properties of PEN, to the electrical properties regarding current-voltage characteristics and orientation polarization and space charge. Finally, the question of electroluminescence vs. field characteristics and the dynamic response in electroluminescence, the nature of the emissions as revealed from the electroluminescence spectrum and the relation to ageing will be discussed.

Biography

Gilbert Teyssède was born in May 1966 in Rodez, France. He received his Engineer degree in materials physics and graduated in solid state physics in 1989 at the Institut National des Sciences Appliquées (INSA), Toulouse. Then he joined the Solid State Physics Lab in Toulouse and obtained the Ph.D. degree from Paul Sabatier University in 1993 for work on ferroelectric polymers. He entered the Centre National de Recherche Scientifique -CNRS in 1995 and has been working since then at the Electrical Engineering Lab (now Laplace – Laboratory on Plasma and Energy Conversion), a joint research unit between CNRS and University of Toulouse. His research activities concern the development of luminescence techniques in insulating polymers with focus on chemical and physical structure, degradation phenomena, space charge and transport properties. He is currently Senior Research at CNRS. He has been head of the Solid Dielectrics and Reliability group at Laplace from 2004 to 2015. He has held numerous governmental and industrial research grants in the field of electrical insulation and has co-authored about 140 contributions to scientific journals and book chapters and 200 conference proceedings. He is member of the scientific committee of several conference series as CEIDP since 2016, ICD, ICEMPE, and Ji Cable.

INVITED SPEAKER



Dielectric Materials for Electro-Active (electret) and/or Electro-Passive (insulation) Applications

Professor Reimund Gerhard

University of Potsdam, Germany

Synopsis

Dielectric materials for electret applications usually have to contain a quasi-permanent space charge or dipole polarization that is stable over large temperature ranges and time periods. For electrical-insulation applications, on the other hand, a quasi-permanent space charge or dipole polarization is usually considered detrimental. In recent years, however, with the advent of high-voltage direct-current (HVDC) transmission and high-voltage capacitors for energy storage, new possibilities are being explored in the area of high-voltage dielectrics. Stable charge trapping (as e.g. found in nano-dielectrics) or large dipole polarizations (as e.g. found in relaxor ferroelectrics and high-permittivity dielectrics) are no longer considered to be necessarily detrimental in electrical-insulation materials. On the other hand, recent developments in electro-electrets (dielectric elastomers), i.e. very soft dielectrics with large actuation strains and high breakdown fields, and in ferroelectrets, i.e. polymers with electrically charged cavities, have resulted in new electret materials that may also be useful for HVDC insulation systems. Furthermore, 2-dimensional (nano-particles on surfaces or interfaces) and 3-dimensional (nano-particles in the bulk) nano-dielectrics have been found to provide very good charge-trapping properties that may not only be used for more stable electrets and ferroelectrets, but also for better HVDC electrical-insulation materials with the possibility to optimise charge-transport and field-gradient behaviour. In view of these and other recent developments, a first attempt will be made to review a small selection of electro-active (i.e. electret) and electro-passive (i.e. insulation) dielectrics in direct comparison. Such a comparative approach may lead to synergies in materials concepts and research methods that will benefit both areas. Furthermore, electrets may be very useful for sensing and monitoring applications in electrical-insulation systems, while high-voltage technology is essential for more efficient charging and poling of electret materials.

Biography

1978 Dipl.-Phys. at Technical University of Darmstadt, Germany.

1978 – 1979 Research fellow at the Department of Physics, Collège Militaire Royal, Saint-Jean, Québec, Canada (sponsored by Studienstiftung des Deutschen Volkes).

1981/82/83 Exchange visitor at AT&T Bell Laboratories, Murray Hill and Holmdel, NJ, 1984 Dr.-Ing. in Communications Engineering at Technical University of Darmstadt, 1985 – 1994 Research scientist and project manager at the Heinrich-Hertz Institute for Communications Engineering Berlin, Germany (now a Fraunhofer Institute).

1988 Award (ITG-Preis) by the Information Technology Society (ITG) in the VDE.

1989 Award of a silver medal by the Foundation Werner-von-Siemens-Ring, 1992 Dr.rer.nat.habil. in Applied Solid-State Physics at University of Potsdam, 1992 – 1994 Lecturer at the Technical University of Berlin, Germany, 1993. Fellow of the Institute of Electrical and Electronics Engineers (IEEE), 1994 Appointment as University Professor (C3) at University of Potsdam, 1997 Appointment as Full University Professor (C4) at University of Potsdam.

2004 – 2012 Chairman of the Joint Board for the Master-of-Science Program in Polymer.

Science of FU Berlin, HU Berlin, TU Berlin and U of Potsdam, 2008 – 2012 Dean of the Faculty of Science at the University of Potsdam, 2012 Fellow of the American Physical Society (APS), 2018 President of the IEEE Dielectrics and Electrical Insulation Society (DEIS).

Guest Editor for the IEEE TDEI (repeatedly), Chair of ISE 7 (1991) and of ICSD 10 (2010). Reviewer for APL, JAP, PRL, PRB, Science, IEEE TDEI, IEEE T-UFFC, Journal of Polymer. Science, Journal of Physics D: Applied Physics, Applied Physics A, Advanced Materials, etc.

INVITED SPEAKER



Study on Dielectric Recovery Characteristics of High Voltage SF₆ Circuit Breaker

Professor Xin Lin

Shenyang University of Technology, China

Synopsis

Recently, breaking failures caused by the re-strike happened frequently, with the increasing of voltage level and transmission capacity, especially for the capacitor bank circuit breaker in UHV project used to interrupt arc with small current and short arcing time. In above situation, the transient recovery voltage is higher and electric field intensity is larger because of short clearance between arcing contacts, therefore re-strike is easy to happen and the electrical lifetime of circuit breaker is badly limited. So several research directions become of large urgency, like the dielectric recovery characteristics after arcing and the influences of gas flow on SF₆ insulation strength in different breaking methods. In this speech, a two-temperature model about non-equilibrium SF₆ arc plasma is built according to Navier-Stokes Equation and gas equation of state, and the influence of turbulence on gas flow is taken into consideration as well, thus forming a numerical computing method for the whole breaking process in SF₆ circuit breaker. To prove this numerical computation method that calculate SF₆ breaking voltage in the whole breaking process in circuit breaker, a testing circuit of dynamic breaking voltage of between contacts in circuit breaker is executed. By combining the testing and computing results, this method is proved, and the dielectric recovery characteristics of SF₆ in circuit breaker for capacitor bank is analyzed meanwhile. The research results can provide reference for the selection and optimization of the breaking operation strategy of capacitor bank circuit breaker.

Biography

Xin Lin, received the M.S. degree and the Ph.D. degree in electrical engineering from Xi'an Jiaotong University in 1985 and 1989, respectively. Now she is a professor at Shenyang University of Technology in China. She is member of Chinese Society for Electrical Engineering (CSEE) and member of CIGRE A3 representing China, etc. During her career, she has published two books and authored more than 300 articles in the field of high voltage switchgear breaking. As the first inventor, she holds over 20 invention patents. Her researches include insulation characteristics of high voltage switchgear, discharge mechanism of SF₆ and its substitute gas, and the arc breaking performance in circuit breakers, etc. Most of her research results have been applied directly to the design, manufacture and operation of extra and ultra high voltage circuit breaker in China.

TECHNICAL PROGRAM

April 7th-10th, 2019

ICEMPE 2019 Program Schedule

Time	April 7 th 2019		April 8 th 2019	April 9 th 2019		April 10 th 2019			
8:00-8:30	Registration			Registration					
8:30-8:45				Session 4 Oral: Power Cable (International Convention Hall, 1 st F)		Session 5 Oral: Transformer and External Insulation (International Convention Hall, 1 st F)			
8:45-9:00								Opening Ceremony (International Convention Hall, 1 st F)	
9:00-9:30									
9:30-9:45									
9:45-10:00		CEIDP Technical Program Committee Meeting (Meeting Room 17, 7 th F)	Qingquan Lei Academician Seminar (Meeting Room 2, 7 th F)	Chen Jidan Award & Memorial Lecture (International Convention Hall, 1 st F)		Coffee Break			
10:00-10:15				Group Photo & Coffee Break					
10:15-10:25									
10:25-10:45				Session 1 Oral: New Issues & New Theories (International Convention Hall, 1 st F)		Coffee Break		Session 6 Oral: GIS and Electric Apparatus (International Convention Hall, 1 st F)	
10:45-11:00						Session 4 Poster: Power Cable (International Convention Hall, 1 st F)			
11:00-11:15									
11:15-11:30		Lunch (Soluxe Cafe, 2 nd F)	Lunch (Soluxe Cafe, 2 nd F)			Session 2 Oral: Performance of Insulating Materials (International Convention Hall, 1 st F)		Lunch (Soluxe Cafe, 2 nd F)	
12:00-12:15									
12:15-12:30				Lunch (Soluxe Cafe, 2 nd F)		ICEMPE Committee Meeting (VIP Room 3, 5 th F)			
12:30-13:00									
13:00-14:00				Session 2 Oral: Performance of Insulating Materials (International Convention Hall, 1 st F)		Technical Visit (Assembly Point: Hotel Lobby at 14:00)		Session 5 Poster: Transformer and External Insulation (International Convention Hall, 1 st F)	
14:00-14:30		Coffee Break							
14:30-15:00									
15:00-15:15									
15:15-15:30		CEIDP Technical Program Committee Meeting (Meeting Room 17, 7 th F)	China Engineering Dielectric Committee Meeting (Meeting Room 2, 7 th F)	Session 2 Poster: Performance of Insulating Materials (International Convention Hall, 1 st F)		Session 3 Poster: Nanodielec-trics and New Dielectrics (International Convention Hall, 1 st F)		Coffee Break	
15:30-15:45									
15:45-16:00									
16:00-16:15									
16:15-16:30	Welcome Reception (Meeting Room 1, 7 th F)			Dinner (Soluxe Cafe, 2 nd F)		Banquet (International Convention Hall, 1 st F)		Session 7 Oral: China Session (International Convention Hall, 1 st F)	
16:30-17:00			Excellent Student Paper Awards & Closing Ceremony (International Convention Hall, 1 st F)						
17:00-17:30									
17:30-17:45									
17:45-18:00							Dinner (Soluxe Cafe, 2 nd F)		
18:00-18:15									
18:15-18:30									
18:30-19:00									
19:00-20:00							Pearl River Cruise (Assembly Point: Hotel Lobby at 19:00)		
20:00-20:30									
20:30-21:00									
21:00-22:00									



Oral Sessions

Sunday, April 7th, 2019

- 8:00-18:00 Registration (Lobby of Soluxe Hotel Guangzhou)
18:00-21:00 Welcome Reception (Meeting Room 1, 7th F)

Monday, April 8th, 2019

Opening Ceremony

Chair: Yanpeng Hao (South China University of Technology, China)

Venue: International Convention Hall, 1st F

- 8:30-8:35 **Shengtao Li**
Chairman of ICEMPE 2019
8:35-8:40 **Yi Han**
Deputy Secretary General of CES
Reimund Gerhard
President of IEEE DEIS
8:40-8:45 **Davide Fabiani**
Meetings Chair of IEEE DEIS
8:45-8:50 **Yechun Wu**
Vice President of SCUT

Chen Jidan Award & Memorial Lecture

Chair: George Chen (University of Southampton, UK)

Venue: International Convention Hall, 1st F

- 8:50-9:15 Brief Introduction to Prof. Chen Jidan & Prospective in Dielectric Research
Shengtao Li (Xi'an Jiaotong University, China)
Chen Jidan Memorial Lecture
9:15-9:55 -- Studies on Space Charge Accumulation Properties in Dielectric Materials-
Measurement Methods and Quantum Chemical Calculation Analysis
Tatsuo Takada (Tokyo City University, Japan)
9:55-10:25 Group Photo and Coffee Break

Session 1 Oral: New Issues & New Theories

Chairs: Yasuhiro Tanaka, Mingli Fu

Venue: International Convention Hall, 1st F

- 10:25-10:50 Some Ideas about Engineering Dielectrics Researches
1-1-1 Invited **Shengtao Li** (Xi'an Jiaotong University, China)
10:50-11:15 Transformer Liquids Research: Transforming Industry
1-1-2 Invited **Zhongdong Wang** (The University of Manchester, UK)
11:15-11:40 Structure-Activity Relationship and Molecular design for Discovery of
Environmentally Sustainable Dielectric Gases
1-1-3 Invited **Keli Gao** (China Electric Power Research Institute, China)
11:40-12:05 Origins of Chemiluminescence in Polymeric Insulating Materials
1-1-4 Invited **Yoshimichi Ohki** (Waseda University, Japan)

12:05-12:30 Prospect of Computational High Voltage Engineering
1-1-5 Invited **Xuzhu Dong** (China Southern Power Grid, China)

Session 2 Oral: Performance of Insulating Materials

Chairs: Yoshimichi, George Chen

Venue: International Convention Hall, 1st F

14:00-14:25 Space Charge Accumulation Properties in Various Insulating Materials under
1-2-1 Invited DC High Electric Field at High Temperature
Yasuhiro Tanaka (Tokyo City University, Japan)

14:25-14:50 Measurement of Space Charge Distribution for a Real Long HV Cable and
1-2-2 Invited Uncertainties in Space Charge Measurement
Yewen Zhang (Tongji University, China)

14:50-15:10 Space Charge Behavior in LDPE/EBA Insulation Materials for HVDC Cables
1-2-3 **Junwei Zha** (University of Science and Technology Beijing, China)

15:10-15:30 Voltage Stabilizer Grafted Silica Nanoparticles for Significantly Enhanced
1-2-4 Breakdown Strength Potential Thermoplastic Polypropylene Insulation
Xingyi Huang (Shanghai Jiao Tong University, China)

15:30-15:50 Environmentally Friendly Insulating Gases as SF₆ Alternatives for Power
1-2-5 Utilities
Agnes Zhang (3M China Ltd., China)

16:00-16:15 Coffee Break

Session 2 Poster: Performance of Insulating Materials

Chairs: Zhimin Dang, Xingyi Huang

Session 3 Poster: Nanodielectrics and New Dielectrics

Chairs: Junwei Zha, Xiangrong Chen

Time: 16:15-18:30

Venue: International Convention Hall, 1st F

Tuesday, April 9th, 2019

Session 4 Oral: Power Cable

Chairs: Gilbert Teyssède, Jian Li

Venue: International Convention Hall, 1st F

8:30-8:55 Lessons from Three-Dimensional Imaging of Electrical Trees
1-4-1 Invited **Simon Rowland** (University of Manchester, UK)

8:55-9:20 Post-Irradiation Effect Analysis on XLPE-Insulated LV Cables Used in Nuclear
1-4-2 Invited Power Plants
Davide Fabiani (University of Bologna, Italy)

9:20-9:40 Evaluation of Aging Status of Flame-retardant Cross-Linked Polyethylene by
1-4-3 Measuring Indenter Modulus
Zhenyu Yang (Waseda University, Japan)

9:40-10:00 Effect of Thermal Ageing on Space Charge Behavior of HVDC XLPE
1-4-4 Materials
Xiangrong Chen (Zhejiang University, China)

10:00-10:20 Study on The Relation between Space Charge Accumulation at Cable Stress

1-4-5 Cone and Semi-Conducting Materials
Dongxin He (Shandong University, China)

10:30-10:45 Coffee Break

Session 4 Poster: Power Cable

Chairs: Kai Wu, Lin Yang

Session 5 Poster: Transformer and External Insulation

Chairs: Guanjun Zhang, Chuanyang Li

Time: 10:45-12:15

Venue: International Convention Hall, 1st F

14:00-18:00 Technical Visit (Assembly Point: Hotel Lobby at 14:00)

18:30-20:30 Banquet (International Convention Hall, 1st F)

Wednesday, April 10th, 2019

Session 5 Oral: Transformer and External Insulation

Chairs: Davide Fabiani, Zhongdong Wang

Venue: International Convention Hall, 1st F

8:30-8:55 Effect of Accelerated Thermal Aging on the Properties of Paper-Ester from
1-5-1 Invited Palm Oil Composite Insulation
Harjo Suwarno (Institut Teknologi Bandung, Indonesia)

8:55-9:15 Study of Low Frequency Domain Relaxation of Oil-Paper Insulation
1-5-2 **Ming Dong** (Xi'an Jiaotong University, China)

9:15-9:35 A Novel Three-Element Mixed Insulation Oil and Its Application in 10kV
1-5-3 Distribution Transformer
Jian Hao (Chongqing University, China)

9:35-9:55 Study on Contamination Characteristics of Roof Insulators under Artificial
1-5-4 Simulated Fog-Haze and Airflow Environment
Xueqin Zhang (Southwest Jiaotong University, China)

10:00-10:15 Coffee Break

Session 6 Oral: GIS and Electric Apparatus

Chairs: Simon Rowland, Yewen Zhang

Venue: International Convention Hall, 1st F

10:15-10:40 High Electric Field Behavior and Energetic Processes in Poly (ethylene
1-6-1 Invited naphthalate)
Gilbert Teyssède (Université de Toulouse, France)

10:40-11:05 Dielectric Materials for Electro-Active (electret) and/or Electro-Passive
1-6-2 Invited (insulation) Applications
Reimund Gerhard (University of Potsdam, Germany)

11:05-11:30 Study on Dielectric Recovery Characteristics of High Voltage SF₆ Circuit
1-6-3 Invited Breaker
Xin Lin (Shenyang University of Technology, China)

11:30-11:50 HFCT-Based Detection of Partial Discharge Currents on GIS Enclosures
1-6-4 **Luis Carlos Castro Heredia** (Delft University of Technology, The

Netherlands)

11:50-12:10
1-6-5

Review of Fluorination Modification of Epoxy Resin Insulators for Gas Insulated Transmission Pipeline
Jin Li (Tianjin University, China)

Session 5 Poster: Transformer and External Insulation

Chairs: Reimund Gerhard, Fuzeng Zhang

Session 6 Poster: GIS and Electric Apparatus

Chairs: Rongsheng Liu, Xin Lin

Time: 14:00-15:45

Venue: International Convention Hall, 1st F

15:45-16:00 Coffee Break

Session 7 Oral: China Session

Chairs: Ning Guo, Jin Li

Venue: International Convention Hall, 1st F

16:00-16:20
1-7-1

The Challenges and Opportunities of Nanofluids
Rongsheng Liu (ABB AB, Corporate Research, Sweden)

16:20-16:40
1-7-2

Analysis on Tripping Accident Caused by Improper Protection Measures of Transformer Neutral Point on 110kV Double Circuit Transmission Lines
Xiujuan Chen (China Electric Power Research Institute, China)

16:40-17:00
1-7-3

Aging Characteristics and Repairing Evaluation of Long-Term Operating LSR Bushings
Xiaoxing Wei (EHV power transmission company maintenance & test center, CSG, China)

17:00-17:20
1-7-4

The Detection of Hydrolyzable Fluoride in SF₆ Equipment by Ion Chromatography and Application in Fault Determination
Liangjun Dai (Wuhan University, China)

17:20-18:00

Excellent Student Paper Awards and Closing Ceremony
Shengtao Li (Xi'an Jiaotong University, China)

18:00-19:00

Dinner (Soluxe Cafe, 2nd F)

19:00-22:00

Guangzhou Pearl River Cruise (Assembly Point: Hotel Lobby at 19:00)

Poster Sessions

Session 2 Poster: Performance of Insulating Materials

Monday, April 8th, 2019, 16:15 – 18:30

Venue: International Convention Hall, 1st F

Session Chairs: Zhimin Dang, Xingyi Huang

- 2-2-1** Thermal and Electrical Properties of Room Temperature Curing Epoxy Resin Modified with Hydroxyl-Terminated Nitrile Rubber
Chuang Wang, Jing Jia, Qing Sun, Lang Zhao, Rong Jia (Xi'an University of Technology, China), Zongren Peng (Xi'an Jiaotong University, China)
- 2-2-2** Dielectric Strength and Space Charge of Ethylene Propylene Rubber under Different Pre-stress
R.X. Zhao, R.J. Men(Taiyuan University of Technology, China), Z.P. Lei(Taiyuan University of Technology, China) (University of Bologna, Italy), P. L. Geng, J.C. Song(Taiyuan University of Technology, China), C.Y. Li(University of Bologna, Italy)(Tsinghua University, China), X.X. Xu (State Grid Hebei Maintenance Branch of China, China)
- 2-2-3** Synthesis and Application of Ag₂O Doped ZnO Based Sensor for Detecting CH₄ Gas
Tingting Wang, Yifan Liao, Bing Luo (Electrical Power Research Institute of China Southern Power Grid, China), Zhaorui Lu(Southwest University, China), Qu Zhou(Southwest University, China) (Chongqing University, China), Zhijie Wei(Southwest University, China), Weigen Chen(Chongqing University, China)
- 2-2-4** Parametric Reconstruction of Permittivity Graded Materials Based on Electrical Capacitance Tomography
Chao WANG, Xiao-Ran LI, Wen-Dong LI, Li-Yuan ZHANG, Guan-Jun Zhang (Xi'an Jiaotong University, China)
- 2-2-5** Effect of Crystallization Conditions on Space Charge Characteristics of β -pp
S. L. Liu, J. M. Yang, X. Wang, H. Zhao, M. Z. Gao, H. He, B. Han (Harbin University of Science and Technology, China), M. Hu, S. H. Xie (Technology Submarine Cable Co., Ltd. China)
- 2-2-6** Effect of Surface Smoothness on Electrical Tree Characteristics at XLPE-SIR Interface
Yu Su, Ying Liu, Rui Lian, Xin Gao, Lisheng Zhong (Xi'an Jiaotong University, China)
- 2-2-7** Uncertainties Analysis in Space Charge Measurement
Z.B. Cao, Y.W. Zhang, F.H. Zheng, Z.L. An (Tongji University, China)
- 2-2-8** Study on electrical properties of superhydrophobic coating covered with moss
Tingting Wang(Power Grid Technology Research Center of China Southern Power Grid, China), Qianbo Xiao(Electric Power Research Institute of State Grid Chongqing Electric Power Company, China), Fuzeng Zhang(Power Grid Technology Research Center of China Southern Power Grid, China), Bangfei Deng(Electric Power Research Institute of State Grid Chongqing

Electric Power Company, China), Jian Li, Zhengyong Huang, Feipeng Wang (State Key Laboratory of Power Equipment & System Security and New Technology, China)

2-2-9 Effects of ZnO Sputtering Layer on Surface Charge and Surface Discharge of Oil-impregnated Paper

J.P. Jiang, B.X. Du, J. Li (Tianjin University, China), W.B. Zhu (Tianjin University, China) (Electric Power Research Institute, China), X.X. Kong (Tianjin University, China)

2-2-10 Influence of Electrode Material in Acoustic Attenuation Factors Calculation in Space Charge Measurements

G. A. Mier-Escurra, A. Rodrigo-Mor (Delft University of Technology, The Netherlands)

2-2-11 Temperature Dependent Surface Charge and DC Flashover Voltage of Fluorinated Polypropylene Film

R. R. Xu, B. X. Du, J. Li (Tianjin University, China), W. B. Zhu (China South Power Grid, China), H. L. Liu, C. L. Han, Z. H. Hou, M. Y. Wang (Tianjin University, China)

2-2-12 The Influence of an Air Gap at The Needle/Polymer Interface on Electrical Tree Growth

H. Zheng, S. Rowland, F. Liu, Z. Lv (University of Manchester, UK)

2-2-13 Study of Space Charge Accumulation Property in Polyethylene under Applied Voltage of Square Wave

Xia Wang, Zi-Hang Shu, Shen-jie Duan, Hua-nan Wang, Shuai Liu (Xi'an Jiaotong University, China)

2-2-14 Distinct Initiation Processes of Vacuum Flashover under Non-uniform Field a Multiphase Framework

G.Y. Sun, N. Yang, S. Zhang, B.H. Guo, R.D Zhou, C.H. Zhou, G.J. Zhang (Xi'an Jiaotong University, China)

2-2-15 The Influence of Pulse Repetition Rate on the Behavior of Nanosecond Pulsed Dielectric Barrier Discharges

Xin Yang, Kai Wu, Yongpeng Meng, Yan Du, Xinzhe Ma (Xi'an Jiaotong University, China)

2-2-16 Study on Development Process of White Marks on Pressboard Surface Layers in Needle-Plate Model under Different Curvature Radius

Rui. Yu, Bo. Gao, Liu Cheng, Zhuang Xin, Zhou Peng, G.N. Wu (Southwest Jiaotong University, China)

2-2-17 Partial Discharge Characteristic on Pressboard Surface under Different DC Polarity

Rui. Yu, Peng Zhou, Bo. Gao, G.N. Wu (Southwest Jiaotong University, China)

2-2-18 A Comparative Study on the Temperature Resistance of High Temperature Vulcanized Silicone Rubber and Liquid Silicone Rubber

Wenqing Lai (State Grid East Inner Mongolia Electric Power Company, China), Ying Lin (Graduate School at Shenzhen, Tsinghua University, China), Yonghong Wang (State Grid East Inner Mongolia Electric Power Company Research Institute, China), Yuhao Liu (Graduate School at Shenzhen, Tsinghua University, China), Xiujiang Zuo (State Grid East Inner Mongolia Electric Power Company Research Institute, China), Liming Wang (Graduate School at

Shenzhen, Tsinghua University, China), Tianqi Liu(State Grid East Inner Mongolia Electric Power Company Research Institute, China)

- 2-2-19** Numerical Simulation on Transition from Positive Glow Discharge to Streamer Discharge
Yong Yi(Tsinghua-Berkeley Shenzhen Institute, Tsinghua University, China), Wenxi Tang, Yingyue Sun, Liming Wang(Tsinghua-Berkeley Shenzhen Institute, Tsinghua University, China) (Graduate School at Shenzhen, Tsinghua University, China)
- 2-2-20** The Study of The Electrical Strength of Epoxy Resin Board in The High Altitude Area
Bing Luo (Electrical Power Research Institute of China South Grid, China) , Yufeng Shen, Hao Li, Liangwu Sun, Yichao Liang, Jichao Yang (Qinghai University, China) , Chao Gao, Yifan Liao (Electrical Power Research Institute of China South Grid, China)
- 2-2-21** Thermal Conductivity and Adhesion Strength of Epoxy Resin with Ferrite Filler
Sergej V. Serebryannikov, Anatoliy P. Cherkasov, Sergej S. Serebryannikov, Dolgov A. A., Khromov V.A. (National Research University, Russia)
- 2-2-22** Simulation of Space Charge Distribution in The Needle-Plate Electrode
Xi Zhu, Yi Yin, Meng Chen, Pengfei Su and Jiandong Wu (Shanghai Jiao Tong University, China)
- 2-2-23** Conductivity and Surface Charge Properties of HTV SiR/SiC Composites under Impulse Superimposed on DC Voltage at Different Temperatures
Chong Han, Zhonglei Li, Zhuoran Yang, Meng Xiao ,Boxue Du (Tianjin University, China)
- 2-2-24** Effect of Elastomer Content on Interface Discharge Behavior Between Polypropylene and Silicone Rubber under AC Voltage
L. Y. Chen, Y. F. Zhu, G. K. Xu, Y. X. Yun, X. Li, W. W. Zhang (State grid Shandong Electric Power Research Institute, China)
- 2-2-25** Study of DC Breakdown in Multilayered Insulation Systems
Miao Hao, Yunpeng Zhan, George Chen (University of Southampton, UK) , Lu Pu, Xuefeng Zhao, Wei Duan, Haofei Sun, Zeli Ju, Nan Wang (State Grid Shaanxi Electric Power Research Institute, China)

Session 3 Poster: Nanodielectrics and New Dielectrics

Monday, April 8th, 2019, 16:15 – 18:30

Venue: International Convention Hall, 1st F

Session Chairs: Junwei Zha, Xiangrong Chen

- 2-3-1** Study on Electrical Aging Properties of Polyethylene Based Nanocomposite
Zhang Xiaohong, Huang Lei, Shi Zexiang, Xia Chen, Guo Ning (Harbin University of Science and Technology, China)
- 2-3-2** Preparation of Polypyrrole Nanospheres and Their Effect on Space Charge Behavior of Polyethylene
C. M. Li, D. H. Cheng, C. C. Zhang(Harbin University of Science and Technology, China), D.

J. Gao(State Grid Beijing Maintenance Company, Beijing, China), B. Z. Han,(Shanghai Qifan Cable Co. Ltd., China)

2-3-3 Effect of Silica Modification on Charge Trapping Behavior of PP Blend/Silica Nanocomposites
Amirhossein Mahtabani, Xiaozhen He, Rafał Anyszka, Wilma Dierkes, Anke Blume (University of Twente, The Netherlands), Ilkka Rytöluoto, Kari Lahti (Tampere University of Technology, Finland), Mika Paajanen, Eetta Saarimäki (VTT Technical Research Centre of Finland Ltd, Finland)

2-3-4 Study on The Optical and Electrical Parameters of Porcelain Material Based on Terahertz Wave
Lanxin Li , Hongwei Mei, Wangsong Wu, Jiaxin Yang, Liming Wang (Tsinghua University, China), Chenjun Guo (Yunnan Power Grid Co., Ltd, China)

2-3-5 Dielectric and Mechanical Properties Evaluation of Polypropylene Containing Nitride-based Nanoparticles
Zheng Lian, Xinyu Wang, Thomas Andritsch(University of Southampton, UK)

2-3-6 Surface Modification of Fumed Silica by Dry Silanization for PP-based Dielectric Nanocomposites
Xiaozhen He, Amirhossein Mahtabani, Rafał Anyszka, Wilma Dierkes, Anke Blume (University of Twente, The Netherlands), Ilkka Rytöluoto, Kari Lahti (Tampere University of Technology, Finland), Eetta Saarimäki, Mika Paajanen (VTT Technical Research Centre of Finland Ltd, Finland)

2-3-7 Space Charge and Breakdown Strength Behavior of PP/POE/MgO Nanocomposites
Min Wei, Xinyu Wang, Thomas Andritsch (University of Southampton, UK)

2-3-8 Study on Surface Charge Characteristics of Polyethylene/SiO₂ Nano-composites Observed by Kelvin Probe Force Microscope
Jiixin Chang, Bai Han, Xuesong Lv, Jianyu Wang, Zhi Sun, Wei Song, Xuan Wang (Harbin University of Science and Technology, China)

2-3-9 Study on Nonlinear Conductivity and Breakdown Characteristics of Zinc Oxide Nano Sheets/EPDM Composites
Qingguo Chi, Mengjia Feng, Tiandong Zhang, Changhai Zhang, Xuan Wang, Qingquan Lei (Harbin University of Science and Technology, China)

2-3-10 Comparative Study of Aging and New-made LSR Materials Used for HVDC Converter Substation
Xiaoxing Wei, Wenhao Lu, Wanying Liu(China Southern Power Grid Co., Ltd., China), Chi Xu, Zhidong Jia (Tsinghua University, China)

2-3-11 Study on Thermal and Electrical Properties of BPAF Modified Epoxy/Al₂O₃ Composites
Yang Kerong, Zhao Yushun, Zhang Song, He Yuanhan, Wang Xuepei(Hefei University of Technology, China)

2-3-12 Influence of Low-temperature Characteristics on Accuracy of Full- Fiber ECT
Ye Fei, JiangBo Chen, Anlan Mao(China Electric Power Research Institute, China), Ye Fei,

JiangBo Chen, Anlan Mao(State Key Laboratory of Power Grid Environmental Protection, China), Chunlai Yu(Heilongjiang Electric Power Research Institute, China), Jingjing Wang(State Grid Electric Power Research Institute, China), Huan Zhao(North China Electric Power University, China)

- 2-3-13** Experimental Study on the Electrical Properties of Polypropylene Composite Insulation Material Mixed With Nano-Clay

Chuyan Zhang(China University of Geosciences, China)

- 2-3-14** Accumulation of Space Charges in Epoxy Resin Nanodielectrics Influenced by Poole-Frenkel Effect

Haozhe Cui, Chenyu Yan, Rui Mi, Daomin Min, Shengtao Li (Xi'an Jiaotong University, China), Zhaoliang Xing (Global Energy Interconnection Research Institute co. Ltd., China), Qingzhou Wu (China Academy of Engineering Physics , China)

- 2-3-15** Preparation and Properties of Nano-Cellulose Modified Natural Ester Liquids

Sijing He, Zhengyong Huang, Shubin Hou(Chongqing University, China), Li Han, Ling Liu, Jianwei Wang (Jinzhong Power Supply Company of State Grid Shanxi Electric Power Company, China)

- 2-3-16** Depth Profile and Transport of Positive and Negative Charge in Surface (2-D) and Bulk (3-D) Nanocomposite Films

Quyet D. Nguyen, Jingwen Wang, Dmitry Rychkov, Reimund Gerhard(University of Potsdam, Germany)

- 2-3-17** Study on Electric Tree of Nano-SiO₂ Polypropylene Composite Insulation Material

Mingze Gao, Jiaming Yang, Hong Zhao(Harbin University of Science and Technology, China), Ming Hu, Shuhong Xie (Zhongtian Technology Submarine Cables Co., Ltd, China)

- 2-3-18** Study on Polarization and Depolarization Characteristics of Epoxy / BaTiO₃ Nano-composites
- Jingyi Liu, Zhonghua Li, Yongsen Han, Yunlong Sun (Harbin University of Science and Technology, China)*

- 2-3-19** Investigation on Dry Band Arcing Induced Tracking Failure on Nanocomposites of EPDM Matrix

M. Tariq Nazir, B.T. Phung, Imrana Kabir, A. C. Y. Yuen, G. H. Yeoh (University of New South Wales, Australia), Yuanyuan Zhang, Shihu Yu, Shengtao Li (Xi'an Jiaotong University, China), Shihu Yu(Electric Power Research Institute of Guangdong Power Grid Co. Ltd., China)

- 2-3-20** The Effects of Nano-SiO₂ on the Electrical Treeing Resistance of XLPE

Chunyang Li, Jiaming Yang, Chengcheng Zhang, Ye Ai, Hong Zhao (Harbin University of Science and Technology, China), Baozhong Han (Shanghai Qifan Cable Co., Ltd., China)

- 2-3-21** Surface Corona Aging of Epoxy/SiO₂ Nanocomposites

Jiao Xiang, Chuang Zhang, Shihang Wang, Hang Fu, Jianying Li(Xi'an Jiaotong University, China), Zhaoliang Xing (Global Energy Interconnection Research Institute co. Ltd., China)

- 2-3-22** Study on Preparation and Thermal Conductivity of Liquid Crystal Epoxy Resin filled with Nanocellulose/ BNNSs

Feng Wang, Chenglong Ma (Jiayuguan power supply company of State grid Gansu electric power company, China), Li Han, Ling Liu, Jianwei Wang (Jinzhong power supply company of State grid Shanxi electric power company, China), Hanxiang Wang, Jian Li, Zhengyong Huang (Chongqing University, China)

2-3-23 Surface Discharge Behavior of PP/BN Nanocomposite considering HTS Device Application
B. X. Du, X. M. Pan, J. Li, M. Y. Wang, X. X. Kong, J. P. Jiang, M. Xiao (Tianjin University, China)

2-3-24 Effects of Irradiation on Surface and Space Charge Behavior of Polyimide Film for Superconducting Magnet Insulation
M.Y. Wang, B.X. Du, J. Li, H.C. Liang, Z.L. Li, C.L. Han, R.R. Xu, Z.H. Hou (Tianjin University, China)

2-3-25 Effect of Fullerene Nanoparticle on Tuning Trap Level Distribution of Fullerene/Polyethylene Nanocomposites
Chang Liu, Zhonglei Li, Boxue Du, Chenlei Han, Zhaohao Hou (Tianjin University, China)

Session 4 Poster: Power Cable

Tuesday, April 9th, 2019, 10:45 – 12:15

Venue: International Convention Hall, 1st F

Session Chairs: Kai Wu, Lin Yang

2-4-1 Modelling Charge Transport in a HVDC Cable using Different Softwares: from Fluid Models to Macroscopic Model
S. Le Roy (Laplace, CNRS and University of Toulouse, France), T.T.N. Vu (Electrical Engineering Department, Electric Power University, Hanoi, Vietnam), G. Teyssedre (Laplace, CNRS and University of Toulouse, France)

2-4-2 The Electrical Properties and Processing Characteristic of The Cross-linked Polyethylene based Insulation for High-voltage Direct Current Cables
Weikang Li, Hongda Yan, Wenpeng Li, Chong Zhang, Fan Yu, Xiaoning Shi, Weijia Zhao (State key Laboratory of Advanced Transmission Technology, Global Energy Interconnection Research Institute, China)

2-4-3 Low Density Polyethylene - Clay Nano Dielectric Prepared by Melt Extrusion Process: Dielectric and Thermal properties
Nageshwar Rao Burjupati, Kandiban R, Anju R.K, Ashwin Parthasarathy (Central Power Research Institute, India)

2-4-4 Conductivity of HVDC Cable Insulation Materials: Case Study between XLPE Nanocomposite and Polymer Filled XLPE
Liang Cao, Lisheng Zhong, Yingge Li, Jinghui Gao, Guanghui Chen, Wenpeng Li (Xi'an Jiaotong University, China), Weikang Li, Chong Zhang (Global Energy Interconnection Research Institute Co., Ltd, China)

- 2-4-5 Calculation and Restraining Method for Circulating Current of Single Core High Voltage Cable
Hongbao Zong, Qun Gao (Tianjin University, China), Rongliang Wang (State Grid Tianjin Electric Power Maintenance Company, China), Haoming Wang (Tianjin Electric Power Research Institute of State Grid Tianjin Electric Power Corporation, China), Yong Liu (Tianjin University, China)
- 2-4-6 A Novel Method for Management of Thermal Loads in The EV Cable Based on Improved Thermal Conductivity of Insulation and Sheathing Materials
B. X. Du, Q. Wang, X. X. Kong, J. Li, M. Xiao, X. M. Pan (Key Laboratory of Smart Grid of Education Ministry, School of Electrical and Information Engineering, Tianjin University, China), W. B. Zhu (Electric Power Research Institute, China Southern Power Grid, China) J. P. Jiang, J. G. Su (Key Laboratory of Smart Grid of Education Ministry, School of Electrical and Information Engineering, Tianjin University, China),
- 2-4-7 Mechanical Property Analysis, Simulation and Theoretical Calculation of Silicone Rubber Joint Assembled in HV Cable under Certain Circumstances
Jiangjing Cui, Wei Qiu, Shuntao Huang, Tingxi Sun, Zhihua Lu, Sheng Wang (Zhuhai Power Supply Bureau, Guangdong Power Grid Limited Liability Corporation, China), Feipeng Chen, Dong Yu, Xia Wang, Kai Wu (State Key Laboratory of Electric Insulation and Power Equipment, Xi'an Jiaotong University, China)
- 2-4-8 Thermal-oxidative Aging Effected on Dielectric Properties of Polyolefin Used for Nuclear Cables Insulation
Jianxi Li (CGN-DELTA Testing Technology CO., LTD., China), Xiaohong Chi, Wenfeng Liu, Daonin Min, Shengtao Li (State Key Laboratory of Electrical Insulation and Power Equipment, Xi'an Jiaotong University, China)
- 2-4-9 Study on Ablation between Metal Sheath and Buffer Layer of High Voltage XLPE Insulated Power Cable
Lei Jiang, Yue Xin, Wenbo Yan, Xiyuan Zhao, Ruifeng Yao, Zhuoyuan Shen, Jinghui Gao, Lisheng Zhong (State Key Laboratory of Electrical Insulation and Power Equipment, Xi'an Jiaotong University, China), Detlef F. Wald (Eifelkabel consultant Company, Switzerland), Zhigang Ren (State Grid Beijing Electric Power Research Institute, China)
- 2-4-10 A Novel Variable-frequency Resonant System for Partial Discharge Detection of XLPE Cables
Yuxin Lu (School of Electrical Engineering, Xi'an Jiaotong University, China), Lu Pu, Xuefeng Zhao (State Grid Shaanxi Electric Power Research Institute, China), Haochen Wang, Tian Li, Hangwei Zhang, Penglei Xu (School of Electrical Engineering, Xi'an Jiaotong University, China)
- 2-4-11 The Application of System Identification Method in Calculating The Transient Temperature Rise of Power Cables
Zhoufei Yao, Chenzhao Fu, Honglei Li (State Grid Shanghai Electrical Power Research Institute, China), Jiale Hu (Shanghai Jiaotong University, China)
- 2-4-12 Effects of Temperature on Space Charge and DC Conductivity Behaviors in PP/ULDPE/Graphene Nanocomposite for HVDC Cable Insulation
Z. H. Hou, B. X. Du, Z. L. Li, J. Li (Key Laboratory of Smart Grid of Education Ministry, School

of Electrical and Information Engineering, China), H. M. Wang, S.C. Fang (Tianjin Electric Power Research Institute of State Grid Tianjin Electric Power Company, China)

2-4-13 Integrated Detection of Temperature and Partial Discharge on Cables Based on FBG

Xutao Wu (Electric Power Research Institute of State Grid Ningxia Electric Power Company Limited, China), Ridong Li (State Key Laboratory of Alternate Electrical Power System with Renewable Energy Sources, North China Electric Power University, China), Hui Ni, Pei Ding, Xiuguang Li, Xiu Zhou (Electric Power Research Institute of State Grid Ningxia Electric Power Company Limited, China), Yangchun Cheng, Haibo Yu (State Key Laboratory of Alternate Electrical Power System with Renewable Energy Sources, North China Electric Power University, China)

2-4-14 Effect of ZnO on Morphology and Breakdown Characteristics of Polyethylene

Xiaohong Zhang, Dingping Zhang, Xia Li, Junguo Gao, Haitao Hu (Key Laboratory of Engineering Dielectrics and Its Application Ministry of Education, Harbin University of Science and Technology, China)

2-4-15 Analysis of Transient Characteristics in the 110kV Cable Joint System during Switch Closing

Huanan Wang, Xia Wang, Dong Yu, Zihang Shu, Kai Wu (State Key Laboratory of Electric Insulation and Power Equipment, Xi'an Jiaotong University, China)

2-4-16 Onshore Simulation Test Setup for Temperature and Strain Sensing of Submarine Cable based on BOTDA

Huang Xiaowei (Guangzhou Bureau, EHV Transmission Company of China Southern Power Grid Co., Ltd., China), Kai Yao, Guanshu Sun (School of Electrical Engineering, Xi'an Jiaotong University, China), Jing Zhou, Yikang Chen, Qiang Guo, Jun Chen (Guangzhou Bureau, EHV Transmission Company of China Southern Power Grid Co., Ltd., China), Yu Chen (School of Electrical Engineering, Xi'an Jiaotong University, China)

2-4-17 The Suitability Analyses of Sheath Voltage Limiters for HV Power Cable Transmission Lines

Dai Cao, Xuezhong Liu (State Key Laboratory of Electrical Insulation and Power Equipment, Xi'an Jiaotong University, China), Xianbo Deng (China Electric Power Research Institute, China)

2-4-18 Properties of Water Tree Growing in XLPE and Composites

Qingyue Yu, Xiufeng Li, Peng Zhang (Shandong University of Technology, China), Peijie Yang, Youfu Chen (Nanjing Zhongchao New Materials CO., LTD, China)

2-4-19 Influence of Voltage Stabilizer on DC Conductivity and Space Charge Characteristics in XLPE for HVDC Cable Application

C. L. Han, B. X. Du, J. Li, Z. H. Hou, R. R. Xu, M. Y. Wang (Tianjin University, China)

Session 5 Poster: Transformer and External Insulation

Tuesday, April 9th, 10:45 – 12:15 (Paper 2-5-1 to 2-5-21)

Venue: International Convention Hall, 1st F

Session Chairs: Guanjun Zhang, Chuanyang Li

Wednesday, April 10th, 14:00 – 15:45 (Paper 2-5-22 to 2-5-42)

Venue: International Convention Hall, 1st F

Session Chairs: Reimund Gerhard, Fuzeng Zhang

- 2-5-1** Influence of Non-Soluble Contamination Microscopic Properties on Hydrophobicity Transfer on Silicone Rubber Surface of Composite Insulator
Xinzhe Yu, Jun Zhou, Bo Liu, Yueneng Xu (China Electric Power Research Institute, China), Xiaolei Yang (State Grid Sichuan Electric Power Company, China), Qiaogen Zhang (Xi'an Jiaotong University, China)
- 2-5-2** Damage Feature Extraction and Parameter Characterization of Large Generator Stator Insulation Based on Lamb Waves Detection Method
Zhifeng She, Ruihua Li, Haojie Gu, Bo Hu, Zhongya Mao (Tongji University, China)
- 2-5-3** Experimental Study on Arcing Process of Vacuum Arc under Wan-Type Contacts
Bo Yuan, Li Zhao, Jiashuo Cui, Shixin Xiu, Quan Li (Xi'an Jiaotong University, China)
- 2-5-4** Image Characteristic Extraction of Surface Phenomena for Flashover Monitoring of Ice-Covered Outdoor Insulator
Qiran Li, B. X. Du (Tianjin University, China), Masoud Farzaneh (Université du Québec à Chicoutimi, Canada)
- 2-5-5** Characterization of the Fluorinated Surface Layer of the Alumina-filled Epoxy Insulator
Weijun Chen, Zhenlian An, Longkai Que, Wenjian Gao, Feihu Zheng, Yewen Zhang (Tongji University, China), Yong Yang, Xulei Liu, Fang Liu (Shandong Taikai Electric Insulation Co., Ltd., China), Zhuo zhang, Wei Yang, Zhaoliang Xing (Global Energy Interconnection Research Institute Co., Ltd., China)
- 2-5-6** Analysis of Conductor Sag Change after Bare Overhead Conductor is Covered with Insulation Material
Jintao Jiang, Zhidong Jia, Xilin Wang, Shihao Wang, Changjian Yang (Tsinghua University, China)
- 2-5-7** Simulation on Electrical Field Distribution of Polluted HVDC Wall Bushing
Shiyi Zhou, Ran Shi, Zehua W, Qingyu Wang, Zongren Peng (Xi'an Jiaotong University, China), Jianwei Cheng (Southern Electric Power Research Institute, China)
- 2-5-8** Study on the Discharge Characteristic and Detection Method on the Faulty of Distribution Insulators
Lijun Zhou (China Electric Power Research Institute Co., Ltd, China) (Hefei University of Technology, China), Nianwen Xiang (Hefei University of Technology, China), Ye Tian (Electric Power Research Institute of State Grid Liaoning Electric Power Co., Ltd, China), Weijiang Chen (State Grid Corporation of China, China), Song Ling, Kai He (State Grid Anhui Electric Power Co., Ltd., China), Zhong Fu (Electric Power Research Institute of State Grid Anhui Electric Power Supply Co., Ltd, China)

- 2-5-9 Measurement of Excess Current Accompanying Partial Discharge of Polymer Film in Tri-electrode system under Power Frequency Voltage
Ran Duan, Ming Ren, Tianxin Zhuang (Xi'an Jiaotong University, China)
- 2-5-10 Study on Detection Method of Composite Insulator Ageing Based on Hyperspectral Technology
Runming Gao, Xueqin Zhang, Yujun Guo, Chao Fan, Yan Qiu, Yuansheng Li, Guangning Wu (Southwest Jiaotong University, China)
- 2-5-11 Effect of Water Droplets on the Corona Discharge Characteristics of Composite Insulators in Arid Areas
Yu Li, Xueqin Zhang, Xinyu Tang, Peidong Li, Yuansheng Li, Yujun Guo, Guangning Wu (Southwest Jiaotong University, China), Song Gao (State Grid Jiangsu Electric Power Research Institute, China)
- 2-5-12 Elemental Analysis of Aged Composite Insulators Based on Laser Induced Breakdown Spectroscopy
Yuansheng Li, Xueqin Zhang, Yujun Guo, Runmin Gao, Xinyu Tang, Yu Li, Guangning W (Southwest Jiaotong University, China)
- 2-5-13 Development of Power Transmission Line Defects Diagnosis System for UAV Inspection Based on Binocular Depth Imaging Technology
Tianqi Mao, Xianwu Zeng, Shengfu Li (Guizhou Power Grid Corporation, China), Kai Huang, Lingran Ren, Chuance Wang, Yu Chen (Xi'an Jiaotong University, China), Min Zhang (Northwest University, China)
- 2-5-14 Monitoring Technology of Lighting Scattered Current of Transmission Tower
Aidong Xu, Peng Li, Zhiming Wang, Zhibing Wu, Zhe Ming, Bing Tian (China Southern Power Grid, China), Licheng Li (China Southern Power Grid, China)
- 2-5-15 Electric Field Distribution Calculation and Analysis of Composite Insulators Operating on Double Circuit Transposition Tower in 500kV Transmission Lines
Chenjun Guo, Hong Yu, Yi Ma (Yunnan Power Grid Co., Ltd. China), Lishuai Liu, Hongwei Mei, Liming Wang (Tsinghua University, Shenzhen, China)
- 2-5-16 Calculation and Analysis on Mechanical Strength of 500kV Hollow Composite Insulator with Different Types of Grooves on the Surface of End Fitting
Haofeng Zhang (Graduate School at Shenzhen, Tsinghua University, China), Xiaoxing Wei (China Southern Power Grid, China)
- 2-5-17 Dissolved Gas Analysis in Camellia Insulating Oil During Thermal Ageing Test
Lingyun Gu, Changkai Shi, Yan Wu, Xuefeng Bai (Beijing Key Laboratory of Distribution Transformer Energy-Saving Technology, China), Qiu Huang Han, Feipeng Wang, Kaizheng Wang, Chenmeng Xiang (Chongqing University, China)
- 2-5-18 Feasibility Study on Detecting Glaze Icing Load of Composite Insulators by Using Fiber Bragg Grating
Jie Wei, Yanpeng Hao, Yuan Fu, Lin Yang (South China University of Technology, China), Jiulin Gan, Zhongmin Yang (South China University of Technology, China)

- 2-5-19 Application of EP/SiC Coated Insulator in DC Gassolid Insulation System
H. C. Liang, B. X. Du, J. Li, C. Zhang, Z. H. Wang, Z. Y. Ran (Tianjin University, China), Z. Yin, Y. L. Cai (State Grid Tianjin Maintenance Company Hebei District, China)
- 2-5-20 Effects of Air Humidity and Hanging Angle on Accumulation Characteristics of Pollution Particles on Anti-icing Polymer Insulators
Xianghuan Kong, Yong Liu, T. Han, Yu Gao, B. X. Du (Tianjin University, China)
- 2-5-21 Study on Evaluation Method of Insulator Surface Contamination Level Based on LIBS Technology and PCA Algorithm
Yifan Liao, Fuzeng Zhang, Tingting Wang (China Southern Power Grid Co., Ltd, China), Yuansheng Li, Xueqin Zhang, Yujun Guo, Zhang Xiao, Yaozhen Wang (Southwest Jiaotong University, China)
- 2-5-22 Simulation Study on the Influence of Electric Field on Contamination Accumulation Characteristics of Insulator
Hongwei Mei, Jiaxin Yang, Lanxin Li, Liming Wang (Graduate School at Shenzhen, Tsinghua University, China), Tingting Wang, Fuzeng Zhang, Yifan Liao (Electric Power Research Institute, CSG, China)
- 2-5-23 Trap Distribution Dependent Charge Behavior of Fluorinated Oil-impregnated Paper under the Harmonic Superimposed DC Voltages
W.B. Zhu, B.X. Du, J.P. Jiang, J. Li, J.G. Su, X.X. Kong (Tianjin University, China)
- 2-5-24 Investigation on Lightning Impulse Breakdown and Dissolved Gas Characteristics of the Novel Three-element Mixed Insulation Oil
Xin Chen, Jian Hao, Lijun Yang, Ruijin Liao, Dawei Feng (Chongqing University, China), Xiong Liu, Qian Wang (Chongqing Electric Power Research Institute, China)
- 2-5-25 Effect of Frequency on Discharge Characteristics of Inter Layer Materials in HV-HF Transformers
Yikun Zhao, Guoqiang Zhang (Chinese Academy of Sciences, China)(University of Chinese Academy of Sciences, China), Runrui Guo, Kang Li (University of Chinese Academy of Sciences, China), Yu Han, Xuehai Gong (Global Energy Interconnection Research Institut , China)
- 2-5-26 Breakdown Characteristics of Oil-paper Interface in Converter Transformer
Zhi Li, Kai Wu, Chuanhui Cheng, Chong Li (Xi'an Jiaotong University, China)
- 2-5-27 Investigations of DC PD Characteristics Induced by Metal Particles in Flowing Transformer Oil
Xinyu Luo (Chongqing University, China), Ju Tang (Chongqing University, China)(Wuhan University, China), Cheng Pan (Wuhan University, China), Yongze Zhang (Chongqing University, China)
- 2-5-28 Transformer Familial Defect Detection Method Based on SVM Improved by Apriori Algorithm—
—Based on Analysis of Dissolved Gases in Oil
Shiyong Li, Lijuan Zhang, Yan Shi, Junqiu Yang (Guizhou Power Grid CO., LTD, China), Hongru Zhang, Yang Yao, Kai Wang, Qingquan Li (Shandong University, China)

- 2-5-29** A Conversion Method for Plate Distribution of AC Capacitor Bushing Core
Gengsheng Xie , Fuping Zhao , Qingyu Wang , Peng Liu , Zongren Peng (Xi'an Jiaotong University, China) , Lei Ke (NARI Group Corporation, China)
- 2-5-30** Research on Transformer Fault Diagnosis Based on BP Neural Network Improved by Association Rules
Long Jiang, Shiyong Li, Chao Yang, Dejun Wang (Guizhou Power Grid CO., LTD, China), Yang Yao, Kai Wang, Hongru Zhang, Qingquan Li (Shandong University, China)
- 2-5-31** The Imbalance-induced Resistive Heating Profiles Analysis for Low Voltage Transformers
Lurui Fang, Kang Ma (University of Bath, UK), Song Xiao (Southwest Communication University, China)
- 2-5-32** Research on the Effect of Different Connection Test Methods on Frequency Response of Transformer Windings
Zhiming Wang, Licheng Li, Peng Li, Zhe Ming, Yang Cao, Zhibing Wu (China Southern Power Grid, China) , Aidong Xu (China Southern Power Grid, China)
- 2-5-33** Test and Estimate Method for Moisture Content of Oil-immersed Transformer
Wenxiang Xue, Hui Wang, Shuyuan Wang (State Grid Jibei Electric Power Company, China), Jinghai Xie, Xiangyu Chen (Jibei Electric Power Economic Research Institute, China)
- 2-5-34** Comparison Study of Voltage Error Characteristics of Three-phase Three -element Combined Transformer with Traditional and New Structure
Gang Liu (State Grid Sichuan Electric Power Corporation Metering Center, China)(Chongqing University, China), Xiaofu Xiong, Cong Liu, Jian Hao (Chongqing University, China), Kun Liu (State Grid Sichuan Electric Power Corporation Metering Center , China)
- 2-5-35** Insulating and Aging Properties of Transformer Oil-based Nanofluids
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Session 6 Poster: GIS and Electric Apparatus

Wednesday, April 10th, 14:00 – 15:45

Venue: International Convention Hall, 1st F

Session Chairs: Rongsheng Liu, Xin Lin

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Shao Xianjun, Li Feiran, Chen Xiaoxin, Wang Ziling, Mei Bingxiao, He Wenlin (Electric Power Research Institute of State Grid Zhejiang Electric Power CO., LTD, China)

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2-6-3 Study on Measurement CF₄ Gas Concentration in High Voltage Electrical Equipment by NDIR

Zhang Shiling (Chongqing Electric Power Research Institute, China)

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Xuejing Liao, Xuhui Su, Chengjun Ren (State Grid Nanchong Power Supply Company, China),

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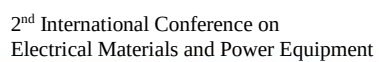
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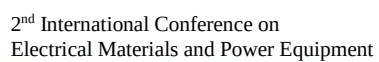
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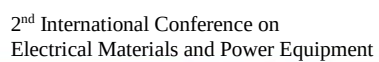
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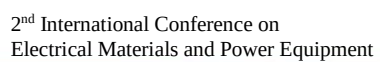
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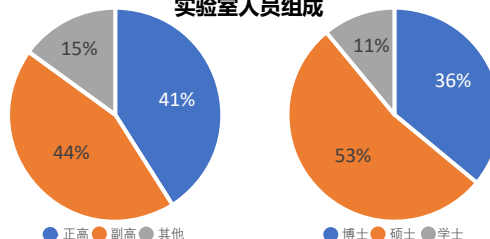
研究院简介

南网科研院是南方电网公司控股子公司，于2010年在原南网研究中心的基础上组建而成，是南方电网公司唯一的网级电网技术科研机构，作为“南方电网中央研究院”和创新型高科技企业，南网科研院以创新引领电网发展和解决安全生产重大技术难题为核心任务；积极拓展以高科技含量、高附加价值为突出特征的新兴业务。

实验室简介

直流输电技术国家重点实验室是以“国家能源大电网技术研发（实验）中心”为基础，整合南方电网优势科技资源而形成的研究机构。现任实验室主任为饶宏教授级高级工程师，学术委员会主任为李立浯院士。2014年9月实验室由国务院国资委推荐，2015年9月由国家科技部批准建设直流输电技术国家重点实验室。

实验室人员组成



实验室重点研究方向

- ◆ 先进直流输电技术集成相应应用
- ◆ 交直流复杂大电网优化与控制
- ◆ 多形态直流电网特性研究与构建



- 2011年±500kV直流输电技术自主化工程应用获国家科技进步一等奖
- 2017年特高压±800kV直流输电工程获国家科技进步特等奖
- 2017年特大型交直流电网技术创新及其在国家西电东送中的应用国家科技进步二等奖





山东泰开高压开关有限公司
SHANDONG TAIKAI HIGH VOLTAGE SWITCHGEAR CO.,LTD

走进泰开高压

ENTERPRISE INTRODUCTION



✧ **泰山**，雄踞齐鲁，昂首天外。

✧ **泰安**，紧邻济南，山东省中部中心城市之一。

✧ **高压输电技术**，代表未来的输变电技术，潜力极大的新兴市场。

✧ **山东泰开高压开关有限公司**，泰开集团的全资子公司，全国高压开关行业前三强，全国高压开关行业副理事长单位，注册资金10亿元，总资产36亿元，员工3300余人，是研制、生产1100kV及以下户外高压六氟化硫断路器、全封闭组合电器等六大系列产品的大型专业化企业，获“中国驰名商标”等荣誉，是国家电网、华能集团等企业的重要供应商。

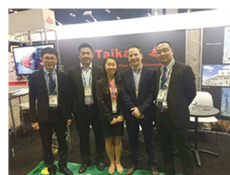
✧ 为助力“一带一路”倡议、“中国制造2025”、推进新旧动能转换、深度参与国际竞争，公司提出“全面提升公司品质，打造国际知名企业”的宏伟蓝图，在印度、美国、加拿大设有分公司，在质量强企、多元并进的道路上继续前进。

国际化战略

INTERNATIONALIZATION STRATEGY



印度分公司



美国、加拿大分公司



✧ 公司产品出口到俄罗斯、意大利、美国、加拿大、巴西、墨西哥、哈萨克斯坦、印度、尼泊尔、巴基斯坦、缅甸、伊朗、埃塞俄比亚、塞内加尔等二十多个国家和地区。

产品与设备

Enterprise Advantages



全封闭组合电器（GIS）



半封闭紧凑型组合电器（HGIS）



高压六氟化硫断路器



带电作业装备



预装式变电站



配网产品

我们的设备





长园电力技术有限公司

长园电力技术有限公司是长园集团全资控股的国家级高新技术企业。专业从事1kV-500kV电力电缆附件、 ± 160 -500kV直流电缆附件、恢复电缆本体连接技术MMJ/EMT（发明专利）、智能电网设备（高压柜、全密封全绝缘环网柜、柱上开关及一二次融合成套设备）的研发、制造和销售。

产品深得客户信赖，远销全球20多个国家，在北京奥运场馆、青藏铁路、杭州湾大桥、港珠澳大桥、俄罗斯海缆、陆缆项目等多个国家重点工程中被广泛采用。多项产品被列入国家重点新产品、国家火炬计划项目和科技进步奖。

拥有广东省级企业技术中心、工程中心，500kV高压试验大厅和1000kV特高压试验大厅。引进国际先进的全自动注橡胶成型系统、十万级无尘车间、AMADA激光切割机及数控机、德国真空氮质谱检漏仪、松下焊接机器人、全自动固体柜装配流水线、3000kV/300kJ冲击电压试验系统、瑞士哈弗莱集团800kV工频谐振试验装置及 ± 1000 kV直流电压发生器等生产和检测试验设备。



德国莱宝氨检漏充气系统



环网柜仓库



全电脑监测数据系统



全自动固体柜装配流水线



日本AMADA激光切割机



日本松下全自动气箱焊接机器人



十万级无尘车间



悬挂式开关流水生产线

打造更加绿色电网的解决方案



3M Novec™ 氟化液微信

关于3M

3M公司创建于1902年，全球总部位于美国明尼苏达州的圣保罗市。作为一家世界领先的多元化科技创新企业，3M的产品和技术早已深深地融入人们的生活。100多年以来，3M开发了近七万种产品，从家庭用品到医疗产品，从运输、建筑到商业、教育和电子、通信等各个领域。

3M公司于1984年11月在中国注册成立，是在深圳经济特区外成立的中国第一家外商独资企业。截止目前，3M公司在中国建立了11个生产基地、27个办事处、4个技术中心和2个研发中心，员工超过8200人。

作为最早进入中国的外商独资企业之一，3M中国在过去的30多年里始终密切把握中国经济的发展脉搏，秉承“扎根中国，服务中国”的本土化发展战略，凭借多元化的技术和解决方案，积极支持中国经济的建设和发展。从基础设施建设到制造业崛起，从中国制造到中国创造，从出口驱动到推动内需，3M将企业的发展战略与中国的发展步伐紧密相连，助力中国市场的快速发展。这也使得3M成为中国本土化最成功的企业之一。

关于Novec™

Novec™作为3M品牌家族中的一员，能够很好的兼顾性能、安全和环保方面的要求。这些产品是由对客户需求深入了解的专家在权衡各项利弊后专门设计而成，旨在帮助您达到技术要求，同时支持您完成项目并实现价值。

高效 世界各地的3M科学家和工程师与我们的客户和行业专家合作，提供可满足您需求的最佳Novec™产品。我们开发了多种多样的产品，可满足您最具挑战性的应用需求，对您的业务产生积极影响，并助您树立良好的质量口碑。

安全 职工的安全同样重要。我们致力于为各行业提供可靠的解决方案，绝不让客户因为工作而牺牲职工健康。我们设计的Novec™产品在指定用途情况下都具有高安全系数，低毒性和不可燃性。

环保 选择为实现可持续发展而专门开发的产品，可为子孙后代留下一笔环境财富。所有Novec™产品都具有零臭氧消耗潜能值(ODP)和低全球变暖潜能值(GWP)。这些产品为您提供了一个长久的解决方案，不会被监管要求逐步减少其使用量，帮助我们创造更绿色、更具可持续性的世界。

关于Novec™绝缘气体

作为强效温室气体六氟化硫(SF₆)的替代物，3M™ Novec™ 绝缘气体可广泛用于中压和高压输电和配电基础设施的绝缘与保护。

电网是保证和提高生活质量的重要基础设施，其可靠性至关重要，不允许出现差错。在电力设施运行和操作情况下，SF₆的泄漏或释放会产生显著的温室效应，从而影响环境。

3M科学家关注到电力行业对新型环保绝缘气体的需求，在经过大量研发和测试工作后，3M™ Novec™绝缘气体问世。这种绝缘气体通常与其他气体混合使用，其性能与SF₆相当或有所提升，同时可显著降低对环境的影响。我们期待与您携手建设更加环保的电力网络



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证券代码：002498



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500 kV及以下超高压电力电缆及附件
500 kV及以下光电复合海底电力电缆

汉河电缆——为您提供电缆系统一体化解决方案

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电话：0532-88817777 88817999 FAX：0532-88817558
<http://www.hanhe-cable.com> E-mail: hanhe2@hanhe-cable.com



Baiyun Power Group Introduction

Founded in 1979, Baiyun Power Group (BPG) started focusing on power equipment manufacturing in 1988. After 3 generations' efforts and 5 stages of development, BPG has now developed into a leading enterprise in the field of electric power equipment manufacturing in China.

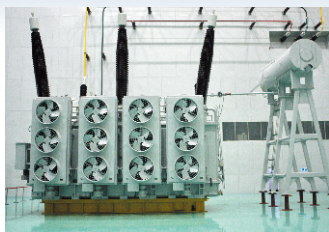
Headquartered in Guangzhou, China, BPG currently has more than 10,000 employees. Its product and service covers power generation, transmission, transformation, distribution, utilization and core components, power quality management, electric energy saving and secondary systems, with the voltage level ranging from 0.4kV to 1,100kV. It is one of the enterprises with the most complete product chain in China.

As the Top 100 Enterprises in China's Machinery Industry and the Pioneering Enterprise in China's Electric Industry, BPG has always dedicated itself to the manufacturing of power equipments. Facing the new trend of industry development, BPG is now transforming from product-driven to data-driven, upgrading itself from manufacturing to a service-oriented enterprise, and striving to become the world's leading integrated solution provider for power and energy.

BPG Equipment



Digital Factory



Transformer Workshop Laboratory



GIS Factory



HV Electric Porcelain Workshop



Glass Insulator Workshop



UHV Test Hall Laboratory