EVENTS
Visit and MOUs Signing

Visit by Business Development Department Manager of the Chemical Division of Lion Corporation, Japan


From L-R: Mr. Fujihiro Sato, Assoc. Prof. Dr. Zulkurnain Abdul-Malek, Dr. Yanuar Z. Arief

Mr. Fujihiro Sato during his presentation

On Monday, 25th of March, 2013, IVAT management received Mr. Fujihiro Sato who is the Manager, Business Development Department Manager of the Chemical Division of Lion Corporation, Japan. During his visit, he had a technical meeting with IVAT academic staff where he made a presentation highlighting the activities of Lion Corporation Chemical Division as well as his purpose of visit to IVAT and Malaysia at large. He pointed out that he was on a visit to Malaysia to promote an environmentally friendly Insulating Oil called Palm Fatty Acid Ester (PFAE) developed by the Chemical Division of Lion Corporation which has been in the Japanese market for over 5 years now. In addition, he hopes his visit will also kick-start R&D as well as experimental evaluations on PFAE in research institutions such as IVAT and transformer companies in Malaysia. At the end of his presentation, the IVAT Director, Assoc. Prof. Dr. Zulkurnain Abdul-Malek showed his appreciation to Mr. Sato for his visit to IVAT. He also pointed out to him that IVAT has a research group called Dielectric and Electrical Insulation Group (DEIG) and has been carrying out research on insulating oils. Dr. Zulkurnian further assured him that IVAT will seek collaborations with Lion Corporation in the form of MOUs in the area of insulating oils.

Ahli IVAT

Berdiri dari kiri :
Dr. Noor Azlinda Ahmad, Dr. Nor Asiah Muhamad, Dr. Zuraimy Adzis, Prof. Madya Dr. Zulkurnain Abdul Malek, Prof. Madya Dr. Zolkafle Buntat, Hanifuniza Abdul Hana, Norhidayu Bakrin.

Hadapan dari kiri :
Zamri Kassim, Dr. Muhammad Abu Bakar Sidik, Mohd Nazren Mohd Ghazali, Dr. Nouruddeen Bashir Umar, Hairoisyam Abd Rani, Dr. Yanuar Z. Arief.

Tiada di gambar:
Nor Elliyana Mazlan, Prof. Madya Dr. Mohamed Afendi Mohamed Piah, Prof. Madya Dr. Mohd Muhridza Yaacob, Anuar Kamaruddin

MOU with Pertubuhan Pengamal Perubatan Ozon Malaysia (PPPOM)

On the 12th of March, 2012, IVAT added yet another feather to its cap by signing an Memorandum of Understanding with Pertubuhan Pengamal Perubatan Ozon Malaysia (PPPOM), the Organization of Ozone Therapists of Malaysia. The signing of the MOU was spear-headed and signed by IVAT's Deputy Director (R&D), Assoc. Prof. Dr. Zolkafle Buntat on behalf of IVAT. Dr. Zolkafle is an expert in ozone research especially for food and medical applications. Ir. Nur Serfly Bin Alias, the President of PPPOM signed the MOU on behalf of PPPOM. With the signing of this MOU, IVAT and PPPOM have agreed to cooperate in the area of ozone research and short courses in relation to ozone in Medicine.

Technical Visit by BEHR BIRCHER CELLPACK BBC MALAYSIA SDN BHD

IVAT management on the 26th of February, 2013 received the Management of Behr Bircher Cellpack BBC Malaysia Sdn Bhd for a technical visit. The management team of Behr Bircher Cellpack (BBC) comprised of the Managing Director (BBC Malaysia), Mr. Hanspeter Ritzmann, Head of Technology and Development from BBC headquarters (in Germany), Dr. Markus Ganter, Head of Application Technology from Germany too, Mr. Matthias Gantert and Mr. Sapto Endar of BBC Singapore office. In the course of the meeting, presentations were made by both Dr. Zulkurnain and Mr. Ritzmann on IVAT and BBC Malaysia respectively. During the meeting, Mr. Ritzmann pointed out that the purpose of their technical visit was to ascertain IVAT's capability in carrying out product development testing as in the past, BBC Malaysia has intended to carry out AC withstand and Partial Discharge Tests on a new cable joint developed by BBC. Mr. Ritzmann pointed out that prior to this, all BBC's products were sent to Germany for product development testing with a lead time of 2 – 3 months for testing results to be ready. A tour of IVAT laboratory and Facilities was also conducted for them by IVAT's Deputy Director (Testing & Transfer Technology), Dr. Zuraimy Adzis. At the end of the meeting, Mr. Ritzmann confirmed that IVAT has the capability to conduct their product development test and as such plan to work with IVAT to cut short the lead time as well as train their key local personnel. In addition the BBC Malaysia Managing Director has agreed to establish an MOU with IVAT in this respect. In addition, with this development, BBC Malaysia will proceed with the tests here in IVAT in the near future.

Berita kelahiran

Nama staf/ibu	:	Norhidayu Bakrin
Nama anak	:	Nur Arisa Khaleeda Azman
Tarikh lahir	:	22/01/2013
Masa	:	1:30am
Tempat	:	Hospital Sultanah Aminah, JB

Contact IVAT

P06, Institute of High Voltage & High Current (IVAT),
Faculty of Electrical Engineering,
Universiti Teknologi Malaysia,
81310 Johor Bahru, Johor,
MALAYSIA

Tel: +607-5535615 Fax: +607-5578150
Email: ivat@fke.utm.my
Website: http://ivat.utm.my

Buletin H/Volt
Institut Voltan Dan Arus Tinggi (IVAT)
UTM UNIVERSITI TEKNOLOGI MALAYSIA | Institute of High Voltage & High Current | IVAT
MEI 2013
EDISI 1

Foreword from IVAT's Director

It is my pleasure to introduce the Institute of High Voltage and High Current in this edition of IVAT's bulletin.

Institute of High Voltage and High Current, or in Malay, Institut Voltan dan Arus Tinggi (IVAT) had been established since 1992.

Since its establishment, IVAT had been actively involved in high voltage related activities such as MS ISO IEC 17025 accredited testing and calibration services for more than 300 national and international customers; research and development in key areas such as lightning and protection, dielectric and electrical insulation, and electrical discharges; training and continuing education; consultancies as well as community services.

Since its inception, IVAT has collectively published more than 100 journal publications and it currently has more than 200 man-year experience in high voltage technology area. IVAT holds 2 national patents and its researchers had won many gold medals in prestigious international research product exhibitions. With excellent facilities, such as the largest high voltage laboratory in the country, and competent researchers, IVAT aims to position itself at par with other world key players in the high voltage and high current research and applications.

I hope you will find the bulletin interesting and beneficial.
Thank you.

A.P. Dr. Zulkurnain Abdul-Malek, MIEEE
Director IVAT

Sidang Redaksi IVAT

IVAT Background

The Institute of High Voltage and High Current (IVAT) of the Faculty of Electrical Engineering, Universiti Teknologi Malaysia was established in 1991. It was initially an educational laboratory which provides facilities for carrying out experiments, research and consultancy services in high voltage engineering beginning as early as the 1970s.

The establishment of IVAT stems out from the needs of the country for a center which carries out research and development, test and calibration works in high voltage areas, so that efficient technologies and power system apparatus can be effectively employed for the transmission and distribution to the consumer of electrical energy.

In 1992, the institute became the first institution in the country to be accredited to handle high voltage test and calibration works according to ISO/IEC Guide 25. In 2004, IVAT was accredited with the ISO/IEC 17025 in the field of high voltage electrical calibration. In certification, IVAT has also successfully migrated to MS ISO/IEC 17025 in July 2007.

Article:

LIGHTNING: A POWERFUL NATURAL PHENOMENA


Figure 1 Benjamin Franklin's kite experiment proved the electrical nature of lightning (Adapted from)

INTRODUCTION

Lightning is a fast transient, high current electric discharge whose path length is generally measured in kilometers . It normally occurs during thunderstorm but sometimes was observed during the volcanic eruption and dust storm . It is perhaps the most powerful display of electrostatics in nature and is inescapable from humankind's attention. They are never invited, never been planned for and have never gone unnoticed. The rage of a lightning strike will wake a person in the middle of the night. The fury of a lightning strike is capable of interrupting midday conversations and activities. People will crowd around windows to watch the lightning displays in the sky, standing in awe with the power of static discharges.

LIGHTNING FORMATION

The primary source of lightning is a cumulonimbus cloud or commonly referred to as thundercloud. A thundercloud generally contains two main charge centers, positive and negative and another small region of positive charges known as 'positive charge pocket' at the base of the cloud. Lightning is usually associated with convective cloud systems ranging from 3 to 20 km in vertical extend. When the electric field becomes strong enough, an electrical discharge occurs within clouds or between clouds and the ground. During the strike, successive portions of air become a conductive discharge channel as the electrons and positive ions of air molecules are pulled away from each other and forced to flow in opposite directions. The electrical discharge rapidly heating the discharge channel causing the air to expand rapidly and produce a shock wave heard as thunder .

TYPES OF LIGHTNING

Lightning can be divided mainly into two types namely, cloud to ground discharges (CGs) and cloud flashes (ICs). Rare forms of lightning such as blue jets, red sprites and elves have been also documented. When lightning strikes the ground or a grounded object, it is called a ground discharges (CGs). There are four types of CGs:

i) Upward negative lightning
ii) Upward positive lightning
iii) Downward negative lightning
iv) Downward positive lightning

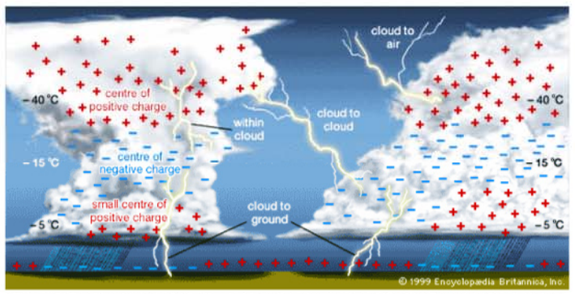


Figure 2 Electric charges distribution inside a thundercloud and the location of where lightning can occur (Adapted from Brittanica online).

The downward negative lightning transports negative charges from the main negative charge center to ground and account for 90 % of ground discharges . The other 10% of ground discharges are downward positive lightning which transport positive charges to ground from the main positive charge center. Even though positive CGs constitute only 10% of the discharges, they are always associated with the highest peak current (~300 kA) and largest charge transfers to ground (hundreds of Coulombs)[4]. Upward lightning, as opposed to the downward lightning typically occur due to the presence of tall objects or structures (more than 150 m) and hence can be considered to be initiated by the object itself. According to Berger, (1978, in Rakov and Uman[4]) this type of flashes has been observed to transport more often negative charges than positive charges to ground.

If the discharges happen inside a thundercloud or between thunderclouds, the terms intracloud flashes or cloud flashes (ICs) are typically used. Cloud discharge is the most common of all types of lightnings. Almost three quarters of lightning flashes do not involve ground strikes. They merely redistribute charges between charge centers within the cloud. In general, this type of lightning flashes is known as cloud flashes (ICs) and they can be divided into three categories:

(a Intracloud discharges – occurs within the confines of thunder clouds;
(b) Intercloud discharges – occurs between one thundercloud and another; and
(c) Air discharges – occurs between thundercloud and air.

However, the characteristics of these three types of lightning flashes cannot be distinguished. As a result, the above three types are commonly recognized as cloud flashes. ICs are most likely to be initiated near the upper and lower boundary of the main negative charge center and often in the former case bridge the main negative and main positive charge regions in the thundercloud. A classical work pertaining to cloud flashes was carried out by Kitagawa and Brook. By analyzing electric field variations from ICs, they concluded that ICs consist of three stages: initial, very active and junction. Later, studies conducted by numerous authors showed that ICs consist of only two stages: an early (active) stage and a later stage. The early stage takes place during the first 40-ms of the flash, while the remainder of the flash constitutes the later stage. As has been reported by Cooray, the typical duration of ICs may range from 200 ms to 500 ms. Examples of radiation fields from ICs are shown in Figures 3 and 4.

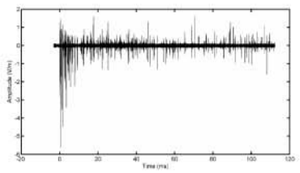


Figure 3 The electric field radiation from negative polarity cloud flashes

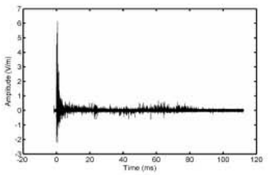


Figure 4 The electric field radiation from positive polarity cloud flashes

Unlike CGs, ICs were considered to be of no direct harm to the human beings and animals on ground or to other structures[5]. Nevertheless, even though they are of minimal danger to ground based objects and systems, ICs are of much concern for the avionic industries. The interference of HF and VHF radiation with ICs and other sophisticated solid state devices are also of great concern in lightning protection. Even though over 90% of lightnings account for ICs, they are not well-studied like their counterpart, CGs. Difficulty of visual observations, inability to measure the ground based current and difficulty in locating the flashes are several reasons as to why ICs are less studied. Considering this, remote measurements of electric field radiation serve as a good tool for studying ICs.

IVAT Activities

Event Organized by IVAT

The 16th Asian Conference on Electrical Discharge (ACED 2012).

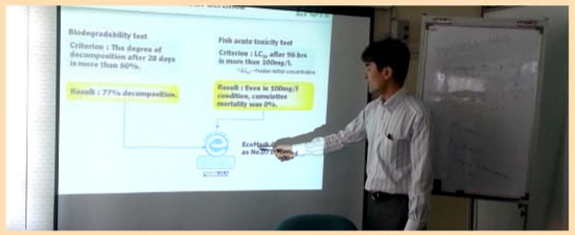
The 16th Asian Conference on Electrical Discharge (ACED 2012) was held at Johor Bahru, Johor, Malaysia, on December 10th - 12th, 2012. This is the 16th conference of a series that had its last venues in Xian, China, (2010), Bandung, Indonesia (2008), Hokkaido, Japan (2006), Shenzhen, China (2004), Seoul, Korea (2002), Kyoto, Japan (2000), Bandung, Indonesia (1998), Bangkok, Thailand (1996), Xian, China (1994), Oita, Japan (1993) and Singapore (1992). The purpose of this conference is to provide a forum for researchers, scientist and engineers to exchange ideas and discuss recent progress in properties, phenomena and applications of electrical discharges.

Pameran MTE 2013 - Pameran Antarabangsa yang disertai oleh penyelidik IVAT.

Penyelidik IVAT dan UTM bersama sijil kemenangan masing-masing di PWTC.

KUALA LUMPUR 23 Feb – Universiti Teknologi Malaysia (UTM) mencatat kemenangan besar apabila memenangi 11 pingat emas, 11 pingat perak dan 9 pingat gangsa di Ekspo Teknologi Malaysia (MTE) 2013. Kejayaan itu lebih bermakna apabila dua pensyarah UTM dipilih sebagai penerima anugerah Best of The Best selainsemua 31 produk yang dipertandingkan memenangi pingat. Dua orang penyelidik IVAT juga berjaya menggondol pingat iaitu Prof. Madya Dr. Zulkurnain Abd Malek memenangi satu pingat emas dan satu pingat perak, manakala Prof. Madya Dr. Zolkafle Buntat berjaya memenangi pingat gangsa.

International Visitor



Lawatan Lions Co. Japan dan Malaysia Palm Oil Berhad ke IVAT pada 25 dan 26 Mac bertempat di Bilik Mesyuarat IVAT.

Training and Workshop

UTM-SRI INTERNATIONAL 5 DISCIPLINES OF INNOVATION & BUSINESS TERMS WORKSHOP

SRI's Five Disciplines of Innovation & Business Terms Workshop (5DOI & BTW) which provides UTM personnel with a common language and framework for innovation, developed specifically for UTM to familiarise researchers with the terminology and models used in business. Two IVAT staffs (Dr. Nor Asiah Muhamad & Mohd Nazren Mohd Ghazali) attended this workshop at Pulai Desaru Beach Resort & Spa, Kota Tinggi, Johor on 6th – 8th February 2013.

Products Commercialisation, patent and copyright

Along with the development of IVAT as a high voltage research and innovation centre, IVAT staffs have successfully recorded several achievements in commercializing, patenting and obtaining copyrights of their research products. Those products are listed as follows:

Commercialisation

- Anti-Theft Grounding System for Industrial Application
- A New HAS Lightning Air Terminal and HAS Stand Support
- An Intelligent System for Age Estimation of Transmission Line Glass Insulator

Patents

- A Patent on 'Lightning Coordinating System' – Patent pending No. PI 2008 4902, 2008
- A Patent on 'Method for use in analysing degradation zinc oxide surge arrester', Patent pending No. PI2009 2779, 2009
- A Patent 'An Improved Tesla Coil', Patent pending No. PI2010 000392
- A Transmission Line Monitoring System, PI2010004142, UTM Patent pending (Malaysia)
- A Metal Particle Detection System and A Method Thereof 2012, PI2012700682

Copyrights

- Resistive Leakage Current Extraction Method © 2008, UTM Copyright (2008/166/256)
- Intelligent Transmission Line Diagnostic System (INTRALIDS) © 2012, UTM Copyright (Malaysia)
- Lightning Protection System Design Software © 2009, UTM Copyright
- Data Transmission and Data Base System of Rotating Electric Field Mill (REFM) Network Using Microcontroller and GSM Module © 2012, UTM Copyright (PC/2012/01425)
- Particle Detection for High Voltage Gas Insulated Switchgear Programming Code, © 2012, UTM Copyright (PC/2012/01249)
- Mineral Oil-Filled Transformer Hybrid-DGA Interpretation Software © 2012, UTM Copyright (PC/2012/01249)

Test & Calibration Services

IVAT offers wide range of test and calibration services. Our laboratory is accredited to MS ISO/IEC 17025 under SAMM no. 285 and is manned by competent and experienced personnel to produce reliable test and calibration results. IVAT has produced more than 500 test reports and calibration certificates. Among its customers are TNB, TNBR, Tenaga Switchgear, SIRIM, Malaysia Airport Berhad (MAB) and Telekom Malaysia.

Testing

Development of products in IVAT covering the following test:

- Power frequency withstand test
- Lightning impulse withstand test
- Partial Discharge test
- Tangent Delta and capacitance measurement
- Pollution test
- High current test

Calibration

Calibration service carried out by IVAT covering the following products:

- Oil test set
- Capacitance bridge
- Current injection test set
- Impulse generator
- HVAC/HVDC/Impulse Meter
- HVAC/HVDC/Impulse Divider