

IVAT Newsletter

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IVAT

is the abbreviated name for the Institute of High Voltage and High Current, or in Malay, Institut Voltan dan Arus Tinggi – a Centre of Excellence of Universiti Teknologi Malaysia (UTM).

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IVAT welcomes visitors

Malaysian High Voltage Network successfully established



Photo taken during MyHVnet Meeting. First row, 6th from the left is the Chairman of MyHVnet, Prof. Dr. Zulkurnain Abdul Malek, with the Co-chairman, Prof. Ir. Dr. Mohd Zainal Abidin Ab Kadir standing on his left.

JOHOR BAHRU, 26 January 2015 – The first meeting for Malaysian High Voltage Network (MyHVnet) was held at the Institute of High Voltage and High Current (IVAT), Universiti Teknologi Malaysia (UTM), signalling the first successful step towards establishing the long-awaited high voltage engineering related platform.

High voltage research and development activities continue to prosper in Malaysia due to rapid urbanisation across the country. This indirectly leads to an

increasing number of players, both at the university and industry levels. While this certainly brings positive impact to the field of high voltage engineering, it can, sometimes, be difficult for interested parties to approach the right experts or for interested players to communicate effectively in issues relevant to high voltage engineering. Consequently, more effective research and development activities related to high

(continued on page 2...)

IEEE DEIS Malaysia Chapter formed

JOHOR BAHRU, 1 April 2015 – The Institute of Electrical and Electronics Engineers (IEEE) Dielectrics and Electrical Insulation Society (DEIS) Malaysia Chapter was officially approved on 1st April 2015.

IEEE is the world's leading professional association for the advancement of technology. It is simply referred to by the letters I-E-E-E (pronounced eye-triple-E). IEEE is organised into 39 societies and 5 technical councils representing a wide range of technical interests. In IEEE Malaysia section, there are now a total of 21 society chapters including the power and energy, computer, signal processing,



Welcoming banner at IEEE Malaysia Section website to IEEE DEIS Malaysia Chapter.

circuits and systems, and photonics, with the IEEE DEIS Malaysia Chapter the latest to join the list.

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IVAT Director's remark



Prof. Dr. Zulkurnain Abdul Malek, Director, Institute of High Voltage and High Current, Universiti Teknologi Malaysia.

First of all, thank you to IVAT Newsletter Editorial Board for getting the second issue of IVAT Newsletter ready well in advance of the intended publication date. I would also like to take this opportunity to congratulate the whole IVAT team, especially the Quality Manager (Testing), Dr. Zuraimy Adzis, for successfully securing a new Malaysian Standards International Organisation for Standardisation / International Electrotechnical Commission's MS ISO/IEC 17025 accreditation scheme, i.e., Skim Akreditasi Makmal Malaysia (SAMM) Testing No. 709 for IVAT, in addition to IVAT's existing SAMM Calibration No. 285 accreditation scheme, after a long yet tedious 30-month period. This is indeed an achievement worth celebrating!

IVAT is committed to make remarkable progress for the year 2015. As of May 2015, IVAT had successfully produced its own - and I would say, "professionally filmed" - corporate video, had published numerous academic papers in high impact factor journals (with a cumulative impact factor of 30.9), and is on its way to sign a Letter of Collaboration (LOC) with Malaysian Association of Standards Users. In its effort to ensure more effective research and development activities relevant to high voltage engineering, IVAT, together with its university and industry partners, had also successfully organised the inaugural Malaysian High Voltage Network (MyHVnet) meeting and established the Institute of Electrical and Electronics Engineers (IEEE) Dielectrics and Electrical Insulation Society (DEIS) Malaysia Chapter.

IVAT has planned lots of activities in the near future and the coming years would definitely be challenging. Presently, IVAT is looking forward to organise the first MyHVnet Colloquium with its university and industry partners in early 2016. IVAT is also planning to establish a high voltage related journal in Malaysia and aims to expand the scopes of both calibration and testing in the next year. As the Director of IVAT, I sincerely urge all IVAT's staff to stay committed to IVAT's goals, not only to achieve individual excellence, but also to enliven the spirit of TEAM - Together Everyone Achieves More!



IVAT staff gathering during 2014 Hari Raya Aidilfitri.

(... continued from page 1)

voltage engineering are required, and this can be materialised via the recent establishment of MyHVnet.

The first MyHVnet meeting was attended by nearly 40 players in high voltage related research and development from various Malaysian organisations, including TNB Research Sdn. Bhd., AM SGB Sdn. Bhd., Universiti Sains Malaysia, Universiti Malaya, Universiti Putra Malaysia, Universiti Teknologi Malaysia, Universiti Malaysia Pahang, Universiti Malaysia Perlis, Universiti Malaysia Sabah, Universiti Teknikal Malaysia Melaka, Universiti Tun Hussein Onn Malaysia, Universiti Tenaga Nasional, and Universiti Kuala Lumpur. Several agendas that pave the direction of MyHVnet were discussed during the meeting. These included the selection of MyHVnet committee members, the organisation of a biennial colloquium for MyHVnet, the potential collaboration among member organisations, the participation of MyHVnet members in Malaysian National Committee of CIGRE (International Council on Large Electric Systems), the possible establishment of IEEE (Institute of Electrical and Electronics Engineers) DEIS

(Dielectrics and Electrical Insulation Society) Malaysia Chapter, and the possible establishment of a high voltage related journal in Malaysia. The active participation of MyHVnet members during the meeting is seen as a successful starting point in fulfilling MyHVnet's aspiration, i.e., to serve as a "one-stop" platform for members from various organisations (universities and industries) across Malaysia for the effective communication of high voltage related research and development, thus contributing to the country's development plan.

MyHVnet is currently chaired by Prof. Dr. Zulkurnain Abdul Malek (Universiti Teknologi Malaysia) and co-chaired by Prof. Ir. Dr. Mohd Zainal Abidin Ab Kadir (Universiti Putra Malaysia), with two Secretaries, a Treasurer, and a few Executive Committee Members from various organisations. MyHVnet is expanding its network and welcomes memberships from potential organisations. More details of MyHVnet are available at: <http://ivat.utm.my/myhvnet/>.

Dr. Lau Kwan Yiew, Institute of High Voltage and High Current, Universiti Teknologi Malaysia.

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IVAT's awards

JOHOR BAHRU, 7 May 2015 – Since June 2014, several members of IVAT's staff have shown their ability to provide the best out of their work. Throughout the second half of 2014 and the first half of 2015, there were altogether 5 members of IVAT's staff acknowledged for their achievements. 2 awards were received at international conferences, 3 awards were received from Universiti Teknologi Malaysia and one award was received at a national exposition.

In June 2014, Dr. Nouruddeen Bashir Umar was awarded the "Anugerah Perkhidmatan Cemerlang (Excellent Service Award)" by Universiti Teknologi Malaysia for his excellence in research and teaching in 2013 - having an impressive list of publication with high impact factors. Meanwhile, IVAT's two young senior lecturers, Dr. Lau Kwan Yiew and Dr. Zulkurnain Ahmad Noorden were also awarded the "Anugerah Perkhidmatan Cemerlang (Excellent Service Award)", but for their great achievements while pursuing their Ph.D. studies - they managed to complete their Ph.D. studies in 2013, on time.

In August 2014, Dr. Muhammad Abu Bakar Sidik won the "Best Paper Award" during the 2014 Electrical Engineering, Computer Science and Informatics Conference (EECSI), held between 20th and 21st of August in Yogyakarta, Indonesia. The title of the paper was "Ultra Wideband Noise Channel Measurements Using a Vector Network Analyser".

In October 2014, during the 32nd International Conference on Lightning Protection (ICLP) held in Shanghai China, Dr. Mona Riza Mohd Esa received the "Young Scientist Award" for her oral presentation entitled "Time-Frequency Profile of Discharge Processes Prior to the First Return Stroke". She was among the only 4 candidates who received the special award for their best oral and poster presentations. Dr. Mona received CNY1500 from the organising committee, along with the certificate of recognition.

The most recent award (a gold medal) was received by Prof. Dr. Zulkurnain Abdul Malek for his product entitled "Single Station Lightning Locating System" during Malaysia Technology Expo (MTE) held between 12th and 14th of February 2015 at Putra World Trade Centre (PWTC), Kuala Lumpur.

We congratulate all the winners for their great achievements!

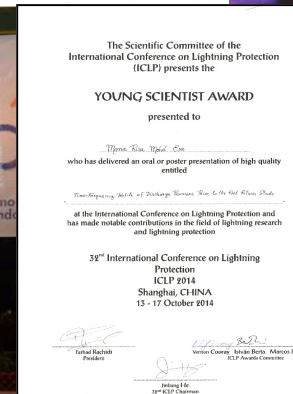
Dr. Mona Riza Mohd Esa, Institute of High Voltage and High Current, Universiti Teknologi Malaysia.



Prof. Dr. Zulkurnain (second from left) with his gold medal.



Dr. Muhammad Abu Bakar receiving his "Best Paper Award".



Dr. Mona's "Young Scientist Award".



Dr. Lau receiving his "Excellent Service Award".



Dr. Nouruddeen receiving his "Excellent Service Award".

IVAT organises Intellectual Property Workshop

JOHOR BAHRU, 7 April 2015 - An intellectual property (IP) workshop was organised by IVAT's Innovation task force to enrich IP knowledge among its academic staff. This is also part of the task force's effort to enhance the quality and quantity of IP application specifically for IVAT's staff and generally for Universiti Teknologi Malaysia's (UTM) staff. The workshop was held at IVAT's meeting room.

The workshop started with a welcoming speech by IVAT's Director, Prof. Dr. Zulkurnain Abdul Malek, followed by an introduction to IP lecture, delivered by the IP Manager of Innovation and Commercialisation Centre (ICC) UTM, Mr. Herme Yusman. The workshop then ended with an intense question and answer session regarding IP application.

For the year 2014, IVAT has filed 7 IP application; 2 industrial designs and 5 copyrights. So far, IVAT has been granted 2 patents, 46 copyrights and 2 industrial designs. 3 new patents are currently being filed.

Dr. Zulkurnain Ahmad Noorden, Institute of High Voltage and High Current, Universiti Teknologi Malaysia.



Prof. Dr. Zulkurnain awarding Mr. Herme a token of appreciation.

IVAT's staff awarded Ph.D.

JOHOR BAHRU, 31 December 2014 – Just before Christmas 2014, a member of IVAT's staff has reported back on duty at the Faculty of Electrical Engineering, Universiti Teknologi Malaysia (UTM), after successfully completed her Ph.D. studies at Uppsala University, Uppsala Sweden.

Founded in 1477, Uppsala University is the oldest university in Sweden and of all the Nordic countries. It ranks among the best universities in Northern Europe and in international rankings. For Ph.D. candidates at Uppsala University, it is the tradition for every student to defend their thesis to the public a week after nailing their thesis at the university hall. The same thing happened to Dr. Mona Riza Mohd Esa, where she successfully defended her thesis entitled "Temporal and Wavelet Characteristics of Initial Breakdown and Narrow

Bipolar Pulses of Lightning Flashes" to the public and received her Ph.D. degree on the same day.

Previously, Dr. Mona has done both her Bachelor and Master degrees at Universiti Teknologi Malaysia, majoring in Electrical-Telecommunication. She joined IVAT as a tutor in 2003 and was then appointed as a lecturer in 2005. Her initial research interest was on cross-disciplinary research between lightning effects and telecommunication systems, but now her research interest is more related to lightning features (lightning physics), atmospheric discharges, and electromagnetic compatibility (EMC), in continuation of her Ph.D. work. She wishes to contribute more the community. Best wishes to Dr. Mona!



Dr. Mona Riza Mohd Esa, Senior Lecturer, IVAT, UTM.

IVAT's staff, Institute of High Voltage and High Current, Universiti Teknologi Malaysia.

(... continued from page 1)

In IEEE, DEIS is a society whose field of interest includes the study and application of dielectrics from the molecular level, through nanostructured materials, to insulation systems in industrial, commercial, and power system equipment, to emerging applications such as those at high power levels and in biological and other small-scale systems. DEIS supports the entire scope of this field from advancing the basic science, to enhancing the ability of practising engineers to use emerging dielectric materials, to the development of standards for the prudent application of existing and new insulation systems.

The objectives of DEIS are technical, scientific, literary, and educational. DEIS strives for the advancement of the theory and practice of electrical and electronics engineering and the related arts and sciences, in consonance with the Constitution and Bylaws of the IEEE. DEIS provides special attention to the technical areas within its field of interest as follows:

The field of interest of the IEEE Dielectrics DEIS shall be the study and application of dielectric phenomena and behaviour and the development, characterisation and application of all gaseous, liquid and

solid electrical insulating materials and systems utilized in electrical and electronic equipment. DEIS is also involved in the creation of voluntary engineering standards and the recommended practices related thereto.

DEIS promotes the close cooperation and exchange of technical information among its members and regularly holds meetings for the presentation of papers and their discussion. Through committees DEIS stimulates research, develops appropriate studies and standards, and sponsor periodic and special publications in the field of dielectrics and electrical insulation.

IEEE DEIS Malaysia Chapter will soon hold its first meeting to plan for its organisational structure. Through the establishment of IEEE DEIS Malaysia Chapter, research activities relevant to dielectrics and electrical insulation among universities, related companies and industries could hopefully be strengthened, at both national and international levels.

Dr. Yanuar Zulardiansyah Arief, Institute of High Voltage and High Current, Universiti Teknologi Malaysia.

Initial breakdown pulses characteristics - a wavelet approach

Introduction

Lightning is a natural phenomenon that involves a sudden flow of electric charge from an ambiguous origin in the thundercloud, and is typically accompanied by a very bright light and loud thunder sound. Globally, lightning has been recorded to appear about few tens of flashes every second, 9 million flashes per day and more than a billion discharges annually. The study of lightning began more than a couple of centuries ago when the world famous scientist, Sir Benjamin Franklin started his first in-lab electricity experiment in 1746 and flew his legendary 'kite-and-key' during an outdoor experiment 6 years later.

Thunderclouds Formation

Thundercloud is the cloud where the lightning originates. Usually the type of thundercloud is cumulonimbus cloud, with anvil top shape and flat bottom, and the size is gigantic, as shown in Figure 1. Both the cloud top and the cloud base will determine the height of the thundercloud, where it can grow up vertically to as high as 20 km and, are significantly dependent on the pressure and tempera-



Figure 1. Cumulonimbus type of thundercloud (Photographs courtesy from Wikipedia and National Oceanic and Atmospheric Administration (NOAA), USA)

ture of the atmosphere. Therefore, the shape of the thundercloud in tropical regions (e.g. Malaysia) will have a different shape of thundercloud from temperate regions (e.g. Sweden). As summarised in his latest book entitled "Introduction to Lightning", Cooray (2014) stated that along the troposphere layer (15 – 18 km from the ground level), temperature and pressure as well as air density decrease with increasing altitude. As the pressure and air density keep on decreasing along the higher altitudes (up to 40 km from the ground or stratopause layer), the temperature starts to increase when reaching the stratosphere layer and remain unstable until it reaches the stratopause layer. That is the reason why the anvil shape is created at top of the cloud since it cannot grow further vertically, but horizontally. The height of tropopause layer is not constant around the globe and lightning activities mainly occur there.

Initial Breakdown Activities in the Thundercloud

Lightning initiation process in the thundercloud is still a mystery yet to be fully explored. Initial breakdown can be differentiated by return stroke or cloud-to-ground (CG) flash - the so-called preliminary breakdown process (PBP). Initial breakdown process does not necessarily end with return stroke; it may either ends after several microseconds with no further activity or continue for several tens of millisecond. The categorisation of lightning events has been summarized in detail by Sharma et al. (2008). The categorisation technique enables us to differentiate any type of lightning events by monitoring their electric field change recorded during lightning field measurement.

Due to its hot and fiery features, the strike from lightning is one of the main causes of building damages, animal death and forest fires. Therefore, research on reliable lightning event prediction

systems help in the development of lightning protection systems. In our recent work, we were able to differentiate or predict the type of lightning event by referring to the very first pulse of its initial breakdown pulse. The approach can be refer in terms of time and wavelet domains. The results in the time domain will be based on the pulse's polarity, duration (PD), and normalised amplitude. In the wavelet (or the so-called time-frequency) domain, the results focus on the energy spectrum, the spreading of frequency, and the spreading of time and bandwidth (BW). This finding is, however, preliminary and more data are currently being collected to improve the outcome.

Figure 2 shows an example of the first pulse of initial breakdown pulse, where the upper panel shows the pulse in time domain while the lower panel shows the result after being transformed using wavelet Mexican hat type of Derivative of Gaussian (DOG). The lower right panel represents the colour bar of the normalised power spectrum where the dark red region radiates the most intense

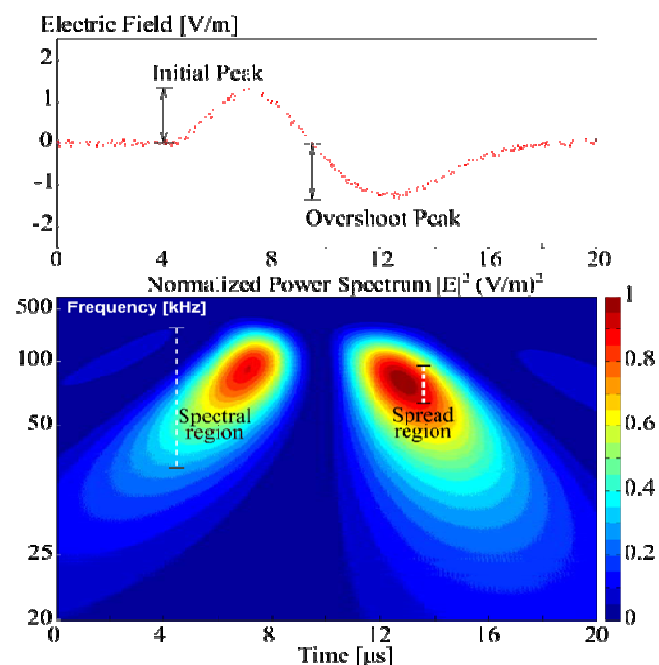


Figure 2. Top: Time domain of first electric field pulse for preliminary breakdown process (PBP) that followed by cloud-to-ground (CG) flash. Bottom: Wavelet domain of the pulse (top panel) after wavelet transformation. Bottom right: Colour bar representing the normalized power spectrum

energy spectrum while the dark blue region is the system noise. From the output after wavelet transformation, it can be observed that energy radiated from each pulse is represented in the spectral region (region bounded by light blue) and the most intense part of the energy radiated is in the spread region (dark red region). For In Figure 2, for example, the spectral region for the initial peak is between 35 kHz and 250 kHz and its most intense energy is at about 100 kHz. However, for overshoot peak, its energy radiates with wider bandwidth (BW) from 30 kHz to 200 kHz and the most intense energy radiates between 60 kHz and 90 kHz.

Conclusion

In conclusion, the wavelet approach is advantageous in analysing the electric field radiation from lightning since it is able to preserve additional information, i.e., time. The energy spectrum can be represented by a specific pulse or event when it occurs.

Dr. Mona Riza Mohd Esa, Institute of High Voltage and High Current, Universiti Teknologi Malaysia.

Testing services by IVAT

As a testing laboratory, IVAT wishes to be able to cater for the needs of electrical energy sectors.

Facilities

Our facilities define our services. Our facilities determine our capabilities and limits to our services.

The Laboratory

is about 5-storey high (25 metres), with a floor area of around 400 metre square (20 metres by 20 metres). The largest access to the laboratory is a 5-metre wide and a 10-metre high automatic vertically folded door. Within the floor area, a 20-tonne crane is available to move things around.

Testing Equipment

We are equipped mainly with a 280 kV AC/DC HV generation and measurement set (for withstand test and equipped with a wet testing modular), a 2 MV impulse generation and a partial discharge measurement system (equipped with oil filled termination for cables).

Accreditation

is also an advantage for us in ensuring a quality system that covers both the technical and managerial aspects of running a testing laboratory. We are in pursuit to be accredited to all available electrical tests and are at the moment seeking more product specific tests

to cater for the need for a third party evaluation.

Special Tests

will be considered upon request and technical reviews will be done prior to quotations. Requests for research purposes will be considered with possible cost exemption upon an agreement/understanding between the laboratory and potential universities.

Please do not hesitate to forward all your enquiries to zuraimy@utm.my



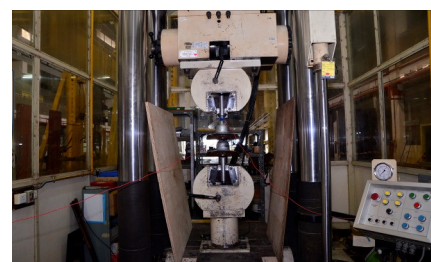
Dr. Zuraimy Adzis, Deputy Director of Testing and Technology Transfer, Institute of High Voltage and High Current, Universiti Teknologi Malaysia.



Power frequency withstand wet test.



250 kV HVAC test set.



Special test.



2 MV impulse generator.

Training and consultancy services by IVAT

IVAT regularly organises training workshops/seminars/short courses for students, engineers, technical managers, technical supervisors, technicians, personnel and researchers involved in electrical power industry. Some popular modules include:

- Electrical Safety Seminar
- Fundamentals of High Voltage Technology
- Three-day Short Course on High Voltage Testing Techniques and Safety
- Two-day Short Course on Grounding Systems
- Short Course on Lightning Protection for High and Low Voltage Systems
- Short Course on Partial Discharge Phenomena

IVAT also offers consultancy services for the following research areas:

- Lightning protection systems for buildings
- Protection systems for electrical power networks
- Grounding systems installations
- High voltage products development
- Low voltage and telecommunication surge protective devices

"Various courses for 2015 are currently on offer!"
Please contact Ms. Norhidayu / Ms. Elliyana NOW!
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Biodegradable oils as alternatives for future transformer oils

Power transformers are important apparatus in electrical power systems for the transmission and distribution of ac power supply from electrical sources (power plant) to end loads (customers). By utilising power transformers, the voltage or current can be easily increased or decreased during the transmission and distribution of electricity to customers.

There are two types of power transformers, namely, oil-type and dry-type. In Malaysia, oil-type power transformers are mainly used in transmission and distribution systems. Oil-type transformers use dielectric liquid for cooling and insulation purposes, whereas dry-type power transformers use cast resin (solid) as the insulation. For oil-type transformers, mineral oil has normally been used as the dielectric liquid for more than 150 years. The liquid, also called petroleum-based oil, is made from petroleum processes. Mineral oil has excellent properties as a liquid insulating material, such as having low viscosity and high flash points. However, using mineral oil will have adverse effects in certain circumstances. For example, poor biodegradable properties of mineral oils will endanger the environment when incidents that involve transformer leakages happen. Apart from that, mineral oils are considered as non-renewable sources because they are extracted from the slowly depleting crude petroleum.



Picture of 100kVA palm-based power transformer with load bank at IVAT, under research collaboration with MPOB and Tenaga Nasional Berhad Research.

Several researches have been conducted to determine new alternative oils for replacing mineral oils. With increasing awareness on environmental issues, alternative oils shall fulfill several criteria, including being environmental friendly - for this, most of the investigated oil samples are vegetable-based oils. So far, many types of vegetable oils from palm-based samples have been investigated, such as crude kernel palm oil (CKPO), crude palm oil (CPO), crude coconut oil (CCO) and refined, bleached and deodorized palm oil (RBDPO). The electrical property of RBDPO Oleum were studied and the results were compared to ASTM D-6871 standard. Experimental results showed that the properties of RBDPO Oleum were approximately the same as those outlined in the standard, but the remaining problems were to reduce the acid number which was slightly above the standard value. Vegetable oils generally have better characteristics for insulation purposes, but insulating materials in vegetable oil

immersed transformer are more prone to degradation since vegetable oils are less efficient in transferring heat due to large kinetic viscosity, when compared with mineral oils.

IVAT is keen to play an important role in developing biodegradable oils, particularly palm-based oils, as alternative power transformer oils for future applications. IVAT, through its High Voltage Condition Monitoring and Diagnostics Division (HVCMD), has been involving in the research and development of biodegradable oils as alternative power transformer oils. Under the memorandum of agreement signed in April 2013, IVAT has research collaboration with Malaysian Palm Oil Board (MPOB) in developing palm-based oil for power transformer oil applications. IVAT also has research collaboration with Lion Corporation, Japan in furthering research on palm-based oil as alternative power transformer oils - Lion Corporation has commercial experience in



Picture of 100kVA palm-based power transformer and mineral oil-based power transformers at IVAT laboratory, under research collaboration with MPOB.

producing palm-based oil for power transformer oil applications (e.g., Palm Oil Fatty Acid Ester (PFAE) oil). Other than that, IVAT has also secured several research grant related to biodegradable oils, such as Science Fund (Development of Hybrid DGA Interpretation System For Power Transformer Condition Monitoring), Fundamental Research Grant Scheme (Correlation Study Between Physicochemical Property Changes With Breakdown Voltage Level of Palm-Based Power Transformer Insulation Oils at Difference Moisture Levels; Correlation Study Between Physicochemical Property Changes With Breakdown Voltage Level of Palm-Based Power Transformer Insulation Oils at Difference Moisture Levels; Fundamental Analysis of Ageing Characteristics of Refined Bleached Deodorized Palm Oil (RBDPO) as Electrical Insulating Material), and Universiti Teknologi Malaysia Research University Grants (Moisture In Kraft-paper Characteristic Study For Palm Oil Based-paper Insulated Transformers). Meanwhile, under the newly established Malaysian Transformer Working Group (see page 9 for details), IVAT has research collaboration with Tenaga Nasional Berhad (TNB) Research and several universities in Malaysia concerning research on biodegradable oils.

Dr. Yanuar Zulardiansyah Arief, Institute of High Voltage and High Current, Universiti Teknologi Malaysia.

Congratulations: IVAT's accreditation for testing granted

JOHOR BAHRU, 18 May 2015 – The accreditation application and assessment process for IVAT Testing Laboratory has been going continuously since the submission of the application form and the Laboratory Quality Manual (LQM) to Standards Malaysia (SM) in March 2013. Since then, many stages of the assessment for the application kick-started, beginning with the Adequacy Audit done by the SM appointed Lead Assessor. It is a complete document screening process of the laboratory's written policy against the 15 Management and 10 Technical requirements laid out as in the International Organisation for Standardisation (ISO) 17025.

IVAT's LQM was approved by the Lead Assessor and hence a date for the Pre-Assessment Audit was set on 17th March 2013. In this stage, another two Quality documents, namely, IVAT's Laboratory Quality Procedure (LQP) and Laboratory Working Instructions (LWI) were screened on-site against the aforementioned 25 requirements. While conducting the audit at the laboratory, the Technical and Management Assessors were also looking into the evidential proof of conduct of the LQP and LWI. Having only a few testing job conducted during that period, the audit became a 100% sampling case and resulted in a few Non-Conformity Report (NCR) being issued.

Through the dedication and determination of all members of IVAT's staff, IVAT managed to close all the NCRs by September 2014. The bottleneck of the NCR closures is the requirement of a Proficiency Test (PT) for IVAT's measuring systems through an Inter Laboratory Comparison (ILC) exercise. IVAT managed to secure the PT exercise through an ILC exercise for both Tenaga Nasional Berhad (TNB) Research and IVAT for the Withstand Test on cable, securing a normalised error of less than 1.

The date for the Compliance Audit were then set on 13th and 14th of October 2014. In the audit, both the Technical and Management Assessors scrutinised the whole activities and documentation with special focus on Management Review and Continuous Improvement. The outcome was having a few NCRs being issued mainly on the document and policy changes IVAT made on September 2014 (not being informed to SM) which required a verification visit to close the respective NCR.

Upon the closure of those NCRs, a Verification Audit (specifically on the changes made on documents) was scheduled on 3rd March 2015. During the audit, IVAT decided to revert all the changes back

to the copy submitted for the Adequacy Audit on March 2013 with the inclusion of all the changes made to close the NCRs during the previous two audits. The main reason for the reversal is the method of distribution of copies of the LQM, LQP and LWI being made online has to be reassessed and the adequacy audit has to be redone. By doing so, IVAT will have to do hard-copy distributions of the quality documents back as before.



The logo is for illustration purposes only.

A re-verification visit was then scheduled on the 24th of March 2015. At the end of the session, IVAT were given recommendations by the Lead Assessor to be awarded the accreditation to SM. SM finally granted the accreditation of testing to IVAT, and IVAT's testing laboratory has now been issued its accredited laboratory number SAMP 709.

On behalf of the Director and management of IVAT, the Deputy Director of Testing and Technology Transfer, Dr. Zuraimy Adzis wishes to thank all IVAT's staff as well as SM and the appointed assessors for giving IVAT the opportunity to learn and grow along with the accreditation process. Lots of invaluable experience has been gained by IVAT's staff during the accreditation application process, and this will certainly be meaningful for IVAT in providing accredited testing services to the electrical power industry.

Dr. Zuraimy Adzis, Institute of High Voltage and High Current, Universiti Teknologi Malaysia.

Malaysian Transformer Working Group

JOHOR BAHRU, 1 March 2015 – Malaysian Transformer Working Group was established in early 2014 with its aims to establish a sharing platform regarding transformer manufacturing, maintenance, operation, and research among transformer practitioners in Malaysia. It was first initiated by Tenaga Nasional Berhad (TNB) Research and the members are from transformer manufacturers, insulation manufacturers, utilities, and researchers. The group will meet at least once in three months to share and discuss issues regarding transformers.

Dr. Nor Asiah Muhamad and Dr. Yanuar Zulardiansyah Arief are currently IVAT's representatives in the group. Dr Nor Asiah was elected as the group's chairman for a 2-year term beginning February 2015.

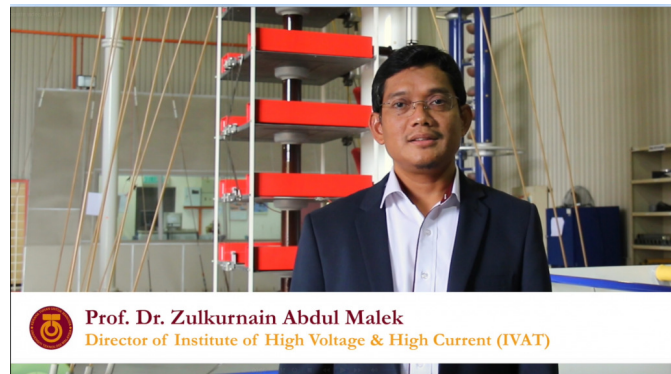
Dr. Nor Asiah Muhamad, Institute of High Voltage and High Current, Universiti Teknologi Malaysia.

IVAT's corporate video

JOHOR BAHRU, 31 January 2015 – IVAT successfully produced its corporate video on its own, headed by its members Dr. Mohd Hafizi Ahmad and Dr. Zulkarnain Ahmad Noorden. The main objective of producing the video is to let the video serving as a brief introduction to IVAT's organisational structures and research activities to the public, such that the public, nationally and internationally, is aware of the presence and the importance of IVAT.

IVAT, as one of the premier high voltage institutes in Malaysia, performs research, teaching, training, calibration, and testing services. IVAT comprises four main divisions, i.e., Lightning Research and Safety Division (LRSD), High Voltage Condition Monitoring and Diagnostics Division (HVCMD), Dielectric and Electrical Insulation Division (DEID), and High Voltage Services, Consultancy and Training Division (HVSCTD). Based on these divisions, the sequence of IVAT's corporate video were filmed accordingly.

IVAT's corporate video starts by a brief introduction to IVAT, delivered by the Director of IVAT, Prof. Dr. Zulkurnain Abdul Malek. The history and contribution of IVAT to the nation was highlighted. IVAT was established in 1991 as one of the centres of excellent at the Faculty of Electrical Engineering, Universiti Teknologi Malaysia, and acts solely as a high voltage laboratory in Malaysia. IVAT also carries out consultancy and training services for many companies around the country.



Prof. Dr. Zulkurnain Abdul Malek
Director of Institute of High Voltage & High Current (IVAT)

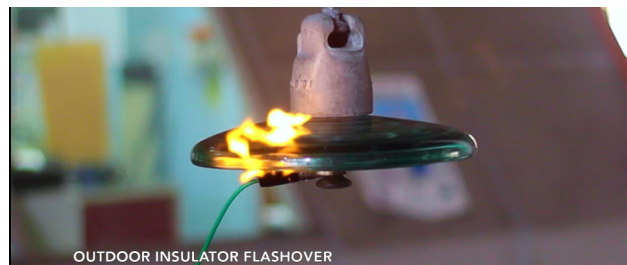
The video continues by the Head of LRSD, Dr. Muhammad Abu Bakar Sidik elucidating the LRSD division. The LRSD division focuses on lightning monitoring, detection, characteristics, and protection systems. Also, intensive research on grounding, improvement and measurement methods are conducted by the division.



LIGHTNING DETECTION PARALLEL ANTENNA

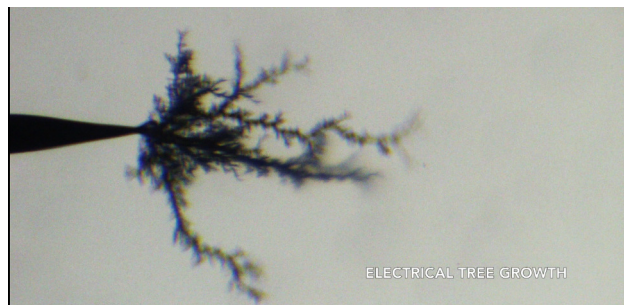
An explanation on the HVCMD division was then delivered by the Head of HVCMD, Dr. Nor Asiah Muhamad. This research divi-

sion focuses on condition monitoring and diagnostic of high voltage equipment such as transformers, switchgears, cables, and oil tap changers. In addition, the division is currently doing research on high voltage condition monitoring and diagnostic, fault analysis, forensic investigation, and insulation material assessment.



OUTDOOR INSULATOR FLASHOVER

The video then showcases that the DEID research group works on fundamental and advanced research concerning partial discharges, surface tracking, water and electrical treeing, ozone and plasma discharges as well as solid and liquid insulation for high voltage equipment. The Head of DEID, Assoc. Prof. Dr. Mohamed Afendi Mohamed Piah describes, "It is crucial for up-grading and repairing damages resulting from the use of existing insulating materials... production of new insulating materials that are more resistant to damages caused by ageing and electric discharges can extend the life span of the equipment..."



ELECTRICAL TREE GROWTH

The video continues with the Head of HVSCTD, Assoc. Prof. Dr. Zolkafle Buntat explaining on in-house and onsite calibrations, testing, consultancy, and training services, which are offered to many local and international companies.



PARTIAL DISCHARGE TEST EQUIPMENT

The video ends with highlights of IVAT's achievements. For more information, the full video can be accessed on IVAT's website: ivat.utm.my.

Dr. Mohd Hafizi Ahmad, Institute of High Voltage and High Current, Universiti Teknologi Malaysia.

Kelahiran cahaya mata staf IVAT

Dikongsikan bersama berita baik berkenaan kelahiran cahaya mata staf IVAT dan gambar-gambar berkaitan. Tahniah!

Dr. Noor Azlinda Ahmad, Institute of High Voltage and High Current, Universiti Teknologi Malaysia.

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 Tarikh lahir : 31 /1/ 2014
 Tempat lahir : Hospital Enche' Besar Hajjah Khalsom, Kluang, Johor



Nama staf : Pn. Nor Elliyana Mazlan
 Nama anak : Syaurah binti Norisham
 Tarikh lahir : 24 /1/ 2015
 Tempat lahir : Hospital Sultanah Aminah Johor Bahru



Nama staf : Dr. Zulkarnain Ahmad Noorden
 Nama anak : Alya binti Zulkarnain
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 Tempat lahir : Hospital Sultan Ismail Johor Bahru



Nama staf : Dr. Nouruddeen Bashir Umar
 Nama anak : Abdulhakeem
 Tarikh lahir : 23/2/ 2015
 Tempat lahir : Hospital Columbia Asia Johor Bahru



Nama staf : Dr. Noor Azlinda Ahmad
 Nama anak : Adra Khadeeja binti Rahim
 Tarikh lahir : 19/11/2014
 Tempat lahir : Hospital Sultan Ismail Johor Bahru



TAHNIAH!

Welcome to IVAT

IVAT is committed to entertain visits by delegates from not only its own university, but also as far as overseas. The main aim for IVAT organising visits is to share their research, services and consultancy experience to as many people as they could, especially in areas relevant to high voltage engineering.

For interested students from schools or higher learning institutions, the focus of visit would be on IVAT's role in building the nation through their technical support to electrical energy industries to achieve reliable and efficient operations. This is inculcated through their fascinating demonstration on high voltage air discharges (either impulsive or sustainable low current arcs).

For representatives from private companies, IVAT showcases their services and consultancy capabilities, as well as their research achievements, in attempts to increase the return of investments to the university. As for executives of ministerial bodies and government parastatals, IVAT extends their

knowledge and experience to open possible collaborations on research works.

A routine visit to IVAT would include a 5-minute video presentation on IVAT, followed by a 10-minute briefing by an IVAT's academician, then a question-and-answer session on any topic relevant to the visit. Interested parties are most welcome to visit IVAT.



Photos taken during various visits to IVAT.



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**Institute of High Voltage and High Current
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The Institute of High Voltage and High Current, or in Malay, Institut Voltan dan Arus Tinggi (IVAT), was established in Universiti Teknologi Malaysia in 1991. It was initially an educational laboratory which provides facilities for carrying out experiments, research and consultancy services in high voltage engineering, as early as the 1970s.

The establishment of IVAT stems out from the needs of the country for a centre 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 since July 2007 till date. Recently in 2013, IVAT was accredited with the on-site calibration and the scope of calibration had been extended up to 180 kV AC (alternating current), 180 kV DC (direct current) and 140 kV impulse.