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MATERIALS MIND

Issue 25
July 2019

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Institute of Materials, Malaysia

HIGHLIGHTS

- The Challenges of Thermal Insulation
- Development of Mobile Press Welding Machine with Magnetically Controlled Arc for Small Diameter Pipes
- IMM Course and Certification News
- Nanotechnology in Treatment of Cancer: Gold Nanoparticles

INSULATION & WELDING

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CONTENT

JULY 2019 Issue 25

INSTITUTE OF MATERIALS, MALAYSIA
Suite 515, Level 5, Block A, Kelana Centre Point (Lobby B), No. 3 Jalan SS 7/19, Kelana Jaya, 47301 Petaling Jaya, Selangor
Tel: +603-7880 1753

secretariat@iomm.org.my
www.iomm.org.my
+60 18-911 3480
Institute of Materials, Malaysia

Electronic copy of Materials Mind can be accessed via www.iomm.org.my under Materials Mind Webpage

Materials Mind

NOTICE FOR RENEWAL OF ANNUAL MEMBERSHIP SUBSCRIPTION FEES 2019

Dear members,

Notice is hereby given for the renewal of your annual subscription for 2019. Please ignore this notice if you have already paid your subscription in advance, or if you are eligible for exemption. Kindly refer to the table below for IMM Annual Subscription Fees.

If you have moved residence or employment or changed your contact numbers / email address, we would appreciate if you can take some time to update your records.

As for student members, please notify us if you have graduated in order for us to update your membership status to the contact mentioned above.

Thank you and on behalf of IMM,

Dr. Zulkarnain Kedah (secretariat@iomm.org.my)
Honorary Treasurer
(This is an electronically generated document. No signature is required)

30th September 2018

IMM MEMBERSHIP FEES

Description	Amount (RM)						
	Fellow (F.I.M.M.)	**Professional** (M.I.M.M.)	**Associate** (A.M.I.M.M.)	**Company**	**Ordinary**	**Student**	**Ordinary/ Company for affiliates**
Entrance Fee	-	-	-	50.00	20.00	10.00	40.00 / 50.00
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Annual Subscription	150.00	100.00	80.00	200.00	40.00	10.00	Nil

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Title : Prof / Dato' / Dr / Mr. / other,					
Name	:				
Membership No.	:				
Correspondence Address	:				
Office No.	:		**Mobile phone No.**	:	
Email Address	:				

UPDATE OF STUDENTS MEMBER

Kindly tick the appropriate box below (& put the year):

☐ Graduated & year: _____

☐ Still Studying & anticipated graduation year: _____

PAYMENT MODE

1) Payment can be made by cheque, telegraphic transfer & bank draft as follows:

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Account No : 8009055156
Swift Code : CIMBMYKL
Bank Name : CIMB BANK
Country: Malaysia

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Please contact the IMM Secretariat office (secretariat@iomm.org.my) if you do not receive the notification of your renewal (in electronic form via email) AFTER 2 weeks of your submission of this form & payment.

THE CHALLENGES OF THERMAL INSULATION

Danny Tan, Abadi Oil & Gas Services Sdn Bhd

History of Industrial Insulation

Industrial insulation started during the Industrial Revolution. The beginning of the commercialisation of man-made insulation materials happened at the end of 19th century. During the old days, insulation was mainly used to insulate steam powered related applications. Today, insulation has been extensively applied in all energy sectors for various reasons and purposes.

Purposes of Insulation

Insulation has always been an easy and right choice when it comes to energy conservation as it's one of the most effective ways. Below are the main purposes of insulation:

- Energy Conservation (Heat Loss/Gain Control)
- Process Control
- Condensation Control
- Personnel Protection
- Winterization Protection
- Noise and Vibration Control
- Passive Fire Protection

Corrosion Under Insulation (CUI)

In recent years, the awareness about energy efficiency, improvement of work environment, environment sustainability has driven the needs of insulation especially in Oil & Gas and other industrial segments. However, insulated piping and pressure systems in onshore/offshore installation and processing plants faced serious threat to the integrity of their piping and pressure systems due to CUI.

Deterioration and failures are different for Carbon Steel (CS) and Stainless Steel (SS).

Carbon Steel (CS) is mainly associated with pitting at nitride containing environment of Insulation Materials. Meanwhile, stainless Steel (SS) - Stress Corrosion Cracking (SCC) is mainly associated when chloride is present in the environment of the SS at temperature above 60°C.

CUI is responsible for a highly occurring incidents of leaking pipes in the Industries and particularly in the refinery and processing plants.

Lack of Best Insulation Practices and Insulation Certification Standards

A good insulation system should start with a well-defined insulation purpose(s), understanding of the application, insulation material and accessories selection, design of insulation from technical to installation aspects, use of well-trained contractor, proper installation execution with the right quality inspection by right personnel followed by a good maintenance practice.

Over the years, insulation technologies have advanced with new insulation products such as Aerogel Blankets which bring new benefits, characteristic features and its ability to repel water. However, the industry is still adopting the old generation insulation products and bad practices, thus the industries are facing even more problems with insulation related issues or damages such as excessive heat loss, condensation, icing, poor insulation design, instability of process temperatures and CUI.

Some of the bad practices and trends observed in the industries in regard to insulation are as follows;

1. Less Priority on Insulation Installation and Maintenance

For many industries such as oil and gas, petrochemical, chemical and other processing industries, insulation has always been one of the least of the priorities or attention of the owners irrespective if it is a capital expenditure (CAPEX) or ongoing operating expenditure (OPEX) project.

It is common to see insulation being treated as a sacrificial task to be executed as the last part of the project in a rush and squeezed tight schedule without a proper installation and inspection due to delays caused by other jobs before it.

Without adequate time, installation of the insulation could not be carried out as per plan and quality of the installation is definitely poor. Interestingly, this serious problem is neglected by the owners themselves as the project deadline seems to be their top priority and lack of experienced insulators to supervise the project execution.

Figure 1: Poorly executed insulation installation at the support of the pipe.

2. Lack of Insulation knowledge

Since insulation is not the focus of the industries, plants personnel without adequate knowledge and understanding of industrial insulation is quite common. Consequently, it is almost impossible for the plant to proactively think and find better ways to improve the insulation systems in the plant and ultimately increase the efficiency, improve health, safety and environment (HSE) and reduce energy loss. It's understood that those improvements could be achieved with the help from contractors or other suppliers but ideally the initiatives should come from the plant itself and involvement of the plant personnel from the stage of defining the objectives of insulation to the completion of the installation should be encouraged. With the full knowledge of the insulation systems installed in the plant, it helps in maintaining it well in the long run.

Figure 2: Carefully designed and installed insulation ensure the integrity of the system to deliver its functions.

3. No Certification of Insulation Installers

Good installation has always been the key of the success of insulation systems. While many technical aspects of insulation such as design requirements, materials and accessories selection, insulation thickness, systems specifications are well covered in project insulation specification document, it is not common to find any specified requirements such as level of the skills and installation training certification of the installers and workers. Insulation contractors could send in any general workers who may have absolutely zero knowledge about insulation for the job and expect them to complete the insulation work within the squeezed schedule. The fact is that a poor installation will definitely result in insulation systems failure eventhough the most expensive insulation material available in the market is used for the project. As an example for hot application, a poorly installed insulation system may have excessive heat loss due to gaps in between insulation, causing hot cladding surface; water ingress (lead to CUI and material damage) into insulation due to poorly installed cladding system.

Figure 3: Badly installed and maintained insulation system with serious CUI

The above are just a few of the trends or bad practices observed in the insulation industry and of course there are many more issues related to this. The key message is that the industry should be more attentive to the insulation and help to bring the insulation standards and best practices to the next level. The asset owners are encouraged to also focus on insulation and higher stringent requirements from design to practical installation stage.

Industry technical committees could play important roles in educating the owners, design houses and contractors, assisting in designing the insulation, setting good practices, providing training or training certification to the said parties and providing site supports to ensure proper implementation of the installation. It is highly emphasized that a carefully designed and properly installed insulation system will help the asset owners to save energy and money as well as to reduce carbon dioxide (CO_2) footprint.

IINSTITUTE OF MATERIALS, MALAYSIA

IMM Introduction to Thermal Insulation

The Introduction to Thermal Insulation Course is an two days awareness course which focus on overview of the industrial Insulation and designed to help supervisors, engineers, and managers to briefly understand the insulation works.

This course is designed to train participants on the understanding of thermal insulation design, installation, QA/QC, HSE, repair and maintenance.

Course Content

1. Insulation Specifications
2. Insulation Materials
3. Hot & Cold Insulation
4. Corrosion Under Insulation (CUI)
5. Measurement
6. QA/QC & Inspection
7. Insulation Installation
8. Claddingsr (Metal & Non-Metal)
9. Health, Safety & Environment

Course Duration

2 days

Pre-Requisite

No pre-requisite

Who Should Attend

This course is suitable for those who wish to understand the thermal insulation for industries, prevention of corrosion under insulation (CUI), QA/QC & inspection, theoretical background and developments.

Certificate

Certificate of Attendance

HRDF CLAIMABLE

Course Organiser:

MTE

Materials Technology Education Sdn Bhd
Unit 3A09, Block A Kelana Centre Point, No 3, Jalan SS 7/19, 47301 Petaling Jaya Selangor.
Website : www.mte.com.my
Email: info@mte.com.my | ikmal@mte.com.my | azlizul@mte.com.my | amirah@mte.com.my

IINSTITUTE OF MATERIALS, MALAYSIA

IMM Certified Thermal Insulation Installer Certification Scheme [TII]

The IMM Certified Thermal Insulation Installer course is to train and upgrade individuals in thermal insulation materials application as well as the trade of sheet metal shop fabrication plus field installations. It aims to provide participant with the knowledge and skills to carry out insulation works efficiently and effectively with the clear understanding of the following:

- Types of thermal insulation and sheet metal materials specified by the vendors and clients in insulation specifications.
- Equipment and piping systems components commonly seen in the oil and gas industry.
- Tools and aids usage during the preparation and field installation of thermal insulation materials.
- Sheet metal equipment and tools used during the layouts, cutting, fabrication and field installation works.
- Standard insulation calculation.

Course Contents

- Introduction to insulating and sheet metal trade
- Equipment and piping system components in the petrochemical, Oil & Gas and Energy industries.
- Types of thermal insulation materials for hot, cold and dual temperature services.
- Type of sheet metal materials.
- Equipment and tools used in the insulating and sheet metal trade.
- Basic safety for insulating and sheet metal trade.
- Plan and isometric piping drawings.
- Pattern Layout / Fabrication / Field Installation.

o Pipe
o Elbow
o Equal and unequal branch and header
o Concentric and eccentric reducer
o Valve
o Flange
o Strainer
o Elbow Trunnion

Duration

6 Days

Who Should Attend

Any personnel who wish to begin a career in the insulation installation field but have little or no experience. Its also suitable for Engineers, Specifier, Technicians, Supervisors and Inspectors who desire to broaden their knowledge in the usage and technique of thermal insulation and sheet metal application.

Pre-Requisites

No pre-requisite

Certificate

IMM Certified Thermal Insulation Installer

Language

English / Bahasa Malaysia

Materials Technology Education Sdn Bhd
Unit 3A09, Block A Kelana Centre Point, No 3, Jalan SS 7/19, 47301 Petaling Jaya Selangor.
Website : www.mte.com.my
Email: info@mte.com.my | ikmal@mte.com.my | azlizul@mte.com.my | amirah@mte.com.my

Technical article 1

Development of Mobile Press Welding Machine with Magnetically Controlled Arc for Small Diameter Pipes

Mohamed Ackiel Mohamed[1], Yupiter HP Manurung[2], Sergey Kuchuk-Yatsenko[3], Vladimir Kachynskyi[3] and Thoufeili Taufek[4]
[1]Serba Dinamik Group Berhad, Shah Alam
[2]Faculty of Mechanical Engineering, UiTM Shah Alam
[3]The E.O. Paton Electric Welding Institute, Ukraine
[4]Technogerma Engineering & Consulting Sdn. Bhd.
Corresponding e-Mail: ackiel@e-serbadk.com or yupiter.manurung@uitm.edu.my

Currently, the selection of high strength material for pipe application is increasingly demanded by many industries due to cost factor for long term benefit. Therefore, the main objective of this present study is to investigate the weldability of pipe API 5L X70 using MagnetSpinArc Pressure Welding (MSA-PW) process which was formerly known as MIAB-PW or MIAB. The pipes with outer diameter (OD) of 6 inches and wall thickness (WT) of 7 mm are to be joined and analyzed. Table 1 shows the chemical composition of the investigated pipe material X70 which can be referred as low carbon steel micro-alloyed with vanadium, V and niobium, Nb. Main technological parameters are given in Table 2. Figure 1 exhibits the welded joint as well as possible external and internal flash produced by MSA-PW.

Table 1: *Chemical composition of X70*

Element [mass in %]													
C	Si	Mn	S	P	Cr	Ni	Mo	V	Cu	Al	Ti	Nb	As
0.030	0.156	1.45	0.004	0.004	0.07	0.14	0.20	0.02	0.30	0.033	0.022	0.062	0.012

Table 2: *Main technological parameters of MSA-PW for OD 6" × WT 7 mm*

Welding Time [s]	Upsetting Force [kN]	Shortening of Pipe [mm]	Power Consumption [kW]
34.7	247	7.5…7.9	28.7

Figure 1: *Pipe welded joint of OD168 × 7mm pipes of steel X70 and flash formation*

Results of mechanical tests show that strength and ductility properties of welded joint are at the characteristic level of the parent metal (Table 3 and Figure 4), typically also obtained using solid state welding process such as flash butt welding.

Table 3: *Mechanical properties of parent metal and welded joint of steel pipes X70*

	s_Y [MPa] -Average-	s_{UTS} [MPa] -Average-	KCV [J/cm^2] -Average-	
			+20°	-20°
Parent metal	≈460.6	≈551.0	≈256.5	≈256.5
Welded joint	≈425.5	≈533.5	≈204.1	≈206.5

Figure 2: *Bend test results*

Further, metallographic examinations were conducted on X70 welded joint. Microhardness was performed using Leco M-400 with load of 1N and pitch distance of 100 µm after etching the sample in solution consisting of 4% nitric acid, HNO_3. The hardness distribution is presented in Figure 3, whereby it can be seen that there is only a slight negligible increase in hardness on Ferrite band compared to parent metal.

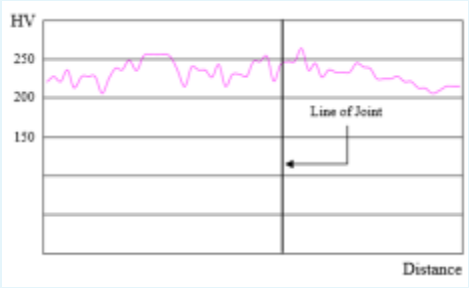

Figure 3: *Hardness distribution on welded joint zone*

The joint line represents an intermittent white band with the thickness of up to 10 mm in a central section of the welded joint and it is widened up to 30 mm to the edges of sample (Figures 4a and 4b). The hardness of band of the joint line is HV 209 - 250. Structure of area in a central part of sample is fine-grained (No. 8-9) ferrite-pearlite with hardness of HV 252 – 270 (Figures 4c and 4d). At the edge of sample, the structure of this area is coarser (No. 7) with domination of a ferrite component and hardness of HV 223 – 240 (Figure 4a). At the area of a fine grain the structure is fine-grained ferrite-pearlite (No. 10-11) and hardness of HV 232-245 (Figure 4d). At the area of a coarse grain, the amount of a pearlite component is increased as compared with parent metal and other HAZ regions. This leads to a slight increase in hardness at this region. Defects in welded joint were not revealed. The parent metal is fine-grained with domination of a ferrite component (No. 10), hardness is HV 217-240 (Figure 5).

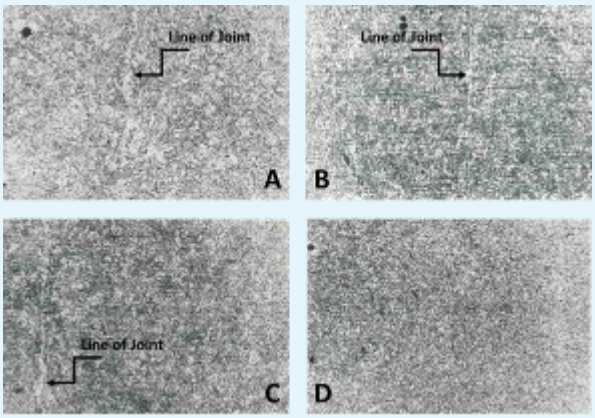

Figure 4: *Welded joint at external edge (A) and central area (B) of sample as well as fine grain HAZ area near joint line (C) and close to parent metal (D). All macrographs are magnified to 150x.*

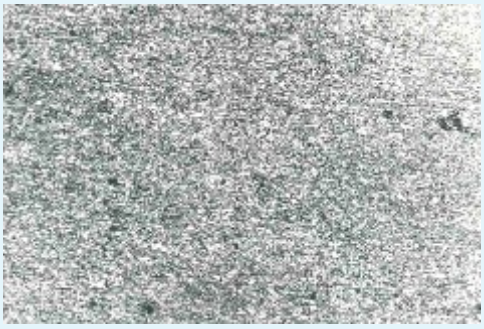

Figure 5: Parent metal with magnification of 150x

A machine had been developed for MSA-PW welding of pipes and pipelines that provides welding in the field and stationary conditions (Table 4). Machine MD-205 is designed consisting of welding head, hydraulic pump station and control cabinet with a remote control panel as well DC arc power source. The suspended head MD-205 (Figure 6) is of a tongs type, the characteristic feature of which is a separate clamping of pipes being welded. Machine by its design has a possibility of loading and unloading pipes being welded aside.

Table 2: Technical specification of MSA welding machine MD 205

Diameter [mm]	WT [mm]	Number of Weld [welds/h]	Power consumption [kVA]	Total weight [kg]
57-219	2.5-8	60	90	1800

Figure 6: MSA-PW Machine of MD205 (K-872)

Throughout the research, it can be concluded that the main conditions for formation of welded joints of steel X70 are defined and the technology of MSA-PW to weld pipes of X70 steel had been successfully developed. Welding equipment for pipes and pipelines welding of this range has been designed and built. Results of investigations showed the feasibility of practical application of MagnetSpinArc Pressure Welding (MSA-PW) for welding pipes and pipelines. This welding process is characterized by a high efficiency (welding time: 20-50s) and, moreover, the additional welding consumables and shielding gas are not required. Since 2015, Faculty of Mechanical Engineering at UiTM Shah Alam and Serba Dinamik Group are collaborating with E.O. Paton Electric Welding Institute (PWI) of NAS in Ukraine for research and development as well as application of this advanced welding technology. In 2019, a new collaborated research topic is to be conducted in Malaysia and Ukraine on pipe welding of high strength material X100 with outer diameter of 8 inches and wall thickness of 8 mm. Involvement of industrial collaboration is highly appreciated.

Asia Weld Tech 2019 and Asian Welding Federation Council Meeting

Reported by: Dr. Mohamed Ackiel Mohamed, Serba Dinamik Group Bhd, IMM Council Member

Date: 24th April 2019
Venue: German-Malaysian Institute, Bangi

Asia Weld Tech Malaysia was held at the German-Malaysian Institute (GMI), Bangi on 24th April 2019, carrying the theme, Challenges and Solutions for IR4.0 Era. Keynote speakers, Mr. Wataru Mizunuma shared on the strategy to Secure Human Resources to Inherit the Welding Technology in Japan, while Dr. Zhenying Liu presented on Welding Products, Skills Competitions and Alliance of the China Welding Community. A special talk was given by Shoichi Nomura and Toru Ijima on the JWES Welding Coordinators Certification System, Japan Welding Engineering Society. The conference included a tour of the GMI training and research facilities.

The event was followed by the Asian Welding Federation (AWF) Council Meeting on 25th – 26th April at Bangi Resort, where Mr. Sze Thiam Siong of Singapore Welding Society made his inaugural speech, commencing his role as the AWF president for the term 2019-2020. During the meeting, the Indonesia Welding Society was congratulated upon for successfully completing the setup of the Common Welder Certification Scheme (CWCS) system in their country. The Workshop and Examination for Accredited Certification Body (ies) (ACB) and AWF Auditors and Examiners was held on 27th April at the same location, for the qualification of supporting personnel for the CWCS.

The next AWF meeting will be hosted by the Korean Welding and Joining Society (KWJS) in October 2019 in conjunction with the 8th East Asia Symposium on Technology of Welding and Joining at Daegu, Korea.

Figure 1: Asian Welding Federation, Council Meeting

INSTITUTE OF MATERIALS, MALAYSIA

IMM Welding & Joining Technology for Non Welding Personnel

This is a one day welding technology course for engineering Management Personnel. This course is specially designed for both practicing engineers and technical managers as well as those specifically interested in keep abreast with the current welding technology and wishing to gain some knowledge on how a welding procedure specification (WPS) and a welder through welder qualification test (WQT) being qualified and certified accordingly in the Oil and Gas Industry. Furthermore, using the current effective non-destructive / inspection techniques as quality control tools can be applied to ascertain that quality welds are consistently produced/ maintained.

Through this course, managers and engineers who intend to gain a appreciation on managing WPS/WQT can be realized, and thus to broaden their technical Knowledge on welding technology relating to maintenance, inspection, alteration and repair of in service metallic systems in order to avoid unplanned shutdown and reduce expenses. Essentially they can make a sound decision on the acceptance of WPS/WQT during welding production and metallic fabrication work.

OBJECTIVES

- Identify & select correct steel materials for building components for specific tasks based on the requirements, constraints and material properties
- Interpret materials data (specification sheets) to determine their suitability
- Identify the properties of materials for specific tasks within given parameters

COURSE CONTENT

- Introduction
- Welding Quality
- Welding Procedure Qualification
- Welding Processes
- Materials and Weldability
- Welder Qualification
- Welding Inspection

COURSE DURATION

1 day

WHO SHOULD ATTEND

This course is most beneficial to administrative staff, technical management personnel of all levels including junior and senior engineers, inspectors, designers, manufacturers, fabricators, technical managers and practicing engineers who are involve in the management and planning of welding and inspection related activities as well as maintenance activities in upstream oil and gas.

HRDF CLAIMABLE

Materials Technology Education Sdn Bhd
Unit 3A09, Block A Kelana Centre Point, No 3, Jalan SS 7/19, 47301 Petaling Jaya Selangor.
Tel : 03-78867066/7166 | Website : www.mte.com.my
Email: info@mte.com.my | ikmal@mte.com.my | azlizul@mte.com.my | amirah@mte.com.my

INSTITUTE OF MATERIALS, MALAYSIA

IMM - JWES CERTIFICATION PROGRAM

Welding Engineer Courses

Associate Welding Engineer (AWE) / Welding Engineer (WE) / Senior Welding Engineer (SWE)

IMM in collaboration with the Japan Welding Engineering Society (JWES) will conduct certification courses and examinations leading to the status of certified ASSOCIATE WELDING ENGINEER (AWE), WELDING ENGINEER (WE) & SENIOR WELDING ENGINEER (SWE). JWES is an organization accredited by Japan National Accreditation Board (JNAB) to certify personnel according to the requirement of ISO 17024.

OBJECTIVES

- To provide training, knowledge and examination leading to the Welding Engineer Certification in accordance to JWE5-WES 8013:2008 Standard of Certification of Welding Coordination Personnel and ISO 14731 Welding Coordination Tasks and Responsibilities.
- To provide participants with advanced level of certificate "ASSOCIATE WELDING ENGINEER (AWE), WELDING ENGINEER (WE) & SENIOR WELDING ENGINEER (SWE)" to be leaders Instructors to produce skilled welding engineers in the future.
- To enhance the participants' flexibility through exercises in this training course.

COURSE CONTENT

> Associate Welding Engineer (AWE)

1. Welding Processes and Equipment
2. Materials and Their Behaviour during Welding
3. Design and Construction
4. Fabrication and Application Engineering

> Welding Enginer (WE)

1. Advanced Welding Processes and Equipment
2. Advanced Materials and Their Behaviour During Welding
3. Advanced Design and Construction
4. Advanced Fabrication and Application Engineering

> Senior Welding Engineer (SWE)

1. Welding Processes and Equipment
2. Materials and Their Behaviour During Welding
3. Design and Construction
4. Welding Design & Fabrication of Frame Structures
5. Welding Design & Fabrication of Vessels

COURSE DURATION

AWE : 6 Days Theory Class + 1 Day Written Exam
WE : 6 Days Theory Class + 1 Day Written Exam
SWE : 6 Days Theory Class + 1 Day Written Exam + Oral Exam

PRE-REQUISITES

AWE : Welding Engineers who are in charge of welding engineering / teaching welding engineering / inspecting welded products
WE : Passed AWE Examination and have experience in attending a past AWE training.
SWE : Passed WE Examination and have experience in attending a past WE training course

CERTIFICATE

IMM-JWES Associate Welding Engineer
IMM-JWES Welding Engineer
IMM-JWES Senior Welding Engineer

HRDF CLAIMABLE

Materials Technology Education Sdn Bhd
Unit 3A09, Block A Kelana Centre Point, No 3, Jalan SS 7/19, 47301 Petaling Jaya Selangor.
Tel : 03-78867066/7166 | Website : www.mte.com.my
Email: info@mte.com.my | ikmal@mte.com.my | azlizul@mte.com.my | amirah@mte.com.my

IMM Course and Certification News

A new IMM Certification Program for Mechanical joint Integrity (MJI) developed in conjunction with PETRONAS and the upstream oil & gas industry

Background

Most major leaks and minor leaks are classified as loss of primary containment (LOPC). Numerous LOPCs had occurred in the Malaysian upstream oil & gas industry which had caused safety and environmental incidences such as spills into the sea, fires, explosions, equipment damage and loss of production.

(a) (b)

Figure 1: (a) Leaking flange (b) smallbore tubing leaks

PETRONAS Malaysian Petroleum Management (MPM) together with the Production –Asset Contractors (PACs) in a taskforce had set up a framework to manage and reduce LOPCs by specifically tackling flange bolted connections, smallbore piping, tubing and valves joint integrity, depicted in a diagram in Figure 2.

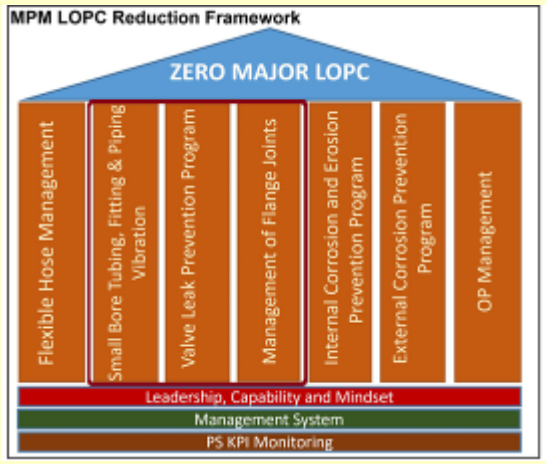

Figure 2 : Mechanical Joint Integrity for 3 LOPC workstreams

Therefore MPM had commissioned The Institute of Materials, Malaysia (IMM) to conduct a study on various LOPC incidences, determine the competency gaps which caused these LOPCs and propose a set of minimum competency requirements (MCR) to assure the competency of frontline workers in preventing and eliminating LOPCs.

LOPC Competency Study on Mechanical Joint Integrity (MJI)

The LOPC study commissioned by MPM to be conducted by IMM looked at three workstreams, namely, flange management, valves and smallbore piping/tubings. It concluded that, in order to prevent LOPC, the integrity of mechanical joints such as flanged bolted connections, valve packings and smallbore piping/tubings, need to be assured and carried out by competent frontline workers.

The study looked at best practices from industries, input from oil producers in Malaysia as well as specialist flange and smallbore vendors. IMM then conducted 3 workshops by engaging industry players and specialist vendors to come up with the detailed competency elements, rigorously reviewed and confirmed the competency elements required, reviewed them and approved them to be written into a competency assessment guide document. Upon approval by the participants of the 3rd workshop, a MJI-MCR document for flange management and for smallbore were drawn up by IMM and approved by MPM.

A test rig concept (Figure 3) was also proposed and was approved by the workshops, which comprised MPM members, PETRONAS Group Technical Services (GTS) and Centre of Excellence (COE) departments, PACs, industry players, specialist vendors as well as IMM subject matter experts. This test rig is to be used for MJI training and for MJI assessment of the frontline flange and smallbore worker. As far as possible, corroded used materials and components are to be used for constructing the test rig in order to make the training more realistic to site conditions.
The study concluded that, in order to assure the quality and integrity of mechanical joints, the frontline worker need to be assessed and certified competent in mechanical joint integrity (MJI) for flanges or for smallbore.

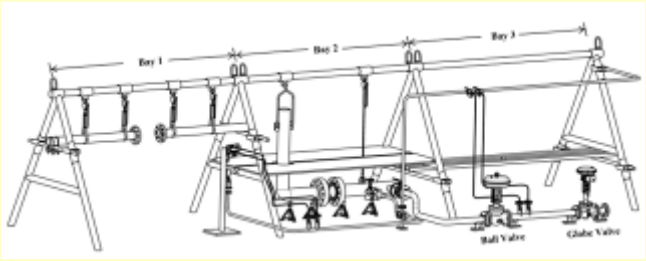

Figure 3 : The concept of the test rig set-up for MJI training and assessment

Minimum Competency Requirements (MCR) - Training and Assessment Approach

The study proposed 2 sets of MCR, namely, for flange bolted connections and for smallbore piping/

tubings and valves. Hence, 2 competency development & certification programs were proposed and adopted;

MJI-FL : flange bolted connections
MJI-SBV : smallbore piping, tubings and valves

Also, the study proposed a guide for competency assessment document (CAG) which is to be used for assessing a candidate in either the flange competency or the smallbore competency.

In addition, the study also produced a competency self-assessment guide (CSS) document which should enable the candidate to assess himself or herself if he/she feels confident enough to go for the MJI competency assessment without going through the MJI competency development program or training.

In order to formalise the assessment for the industry, MPM had appointed IMM as the national certifying body for MJI competency assessment for the upstream oil & gas industry in Malaysia. IMM was also tasked to come up with the competency development and certification (CDC) program for MJI in 2019 and implement it to upgrade all flange and smallbore frontline workers to be trained and certified competent for MJI. The MCR syllabus is meant to be fit-for-purpose and cost-effective in order to prevent major LOPCs as well as assuring the quality of the mechanical joint integrity. It focusses on the basic hands-on skills of the frontline worker, the required supporting knowledge required to do the job well, how to plan the work before execution, execution (which involved dis-assembly and assembly), post-execution (which includes test and inspection after assembly), and finally periodic inspection (which is to be carried out typically by maintenance personnel in order to assure mechanical joint integrity).

Since April 2019, IMM had started the training and assessment (CDC) campaign of frontline workers, with the aim to train and formally certify about 8,000 workers (for flange and smallbore) in total over 5 years. Several training providers as well as assessment centres has been identified and appointed by IMM to implement this MJI-CDC program.

Figure 4 : Flange Hydraulic Torque Wrench (HTW) in use

Figure 5 : Tubing/fitting smallbore connection

During the set-up and pilot training, feedback from trainers, assessors and observers were used as input to improve the test rig, the MCR syllabus and the content of the 2 MJI programs as well as the practicals (hands-on skills) assessment methodology.

Conclusion and Way Forward

This IMM CDC program was designed to be fit-for-purpose, as realistic as possible thus utilising corroded and used piping, flanges and smallbore fitting components of the test rig for training and assessment. The program will thus assess, assure and formalise the competency skills of frontline workers in the area of flange bolted connections assembly as well as for smallbore piping, tubings and valves.

PETRONAS MPM recognised that it will take a carefully-planned and phased approach to implement the CDC program over 5 years covering all the PACs as well as all offshore key contractors. The MJI-MCR will be included in the September 2019 update of the PETRONAS Procedures and Guideline for Upstream Activities (PPGUA) document. It is expected to be launched throughout the upstream oil & gas industry in Q3 2019 in a phased approach.

Potentially, this competency requirements may also be adopted by the downstream (onshore) industry to also assure the competency of their own frontline flange and smallbore workers which will cover their plant staff/personnel as well as their key contractor personnel.

Written by:
Ir. Dr. Dasline Sinta (Program Custodian, Asset Integrity Committee) and
F. Mirghaderi (IMMR)

INSTITUTE OF MATERIALS, MALAYSIA

Updated on 30th December 2018

Institute of Materials, Malaysia (IMM) is a non-profit professional society that promotes honourable practice, professional ethics and encourages education in materials science, technology and engineering. Engineers, academicians, technicians, skilled workers and professionals are amongst its members exceeding 6800.

Registered with the Registrar of Societies on 6th November 1987, the Malaysian Materials Science & Technology Society (MMS) changed its name to the Institute of Materials, Malaysia (IMM) on 16th June 1997. The objectives of the IMM include the training and development of individuals and companies in Malaysia to attain professional recognition in various fields of materials science, technology and engineering.

IMM is administered by a council of 30 members, with volunteers leading 18 materials committees, and 5 regional chapters, and supported by a secretariat with full time staffs.

IMM Vision
To be internationally recognised leading institution in Materials Science and Technology.

IMM Mission
(1) To be the technical authority on material science and technology
(2) To develop an enhance competency and skills for all categories and practitioner
(3) To become an internationally recognized certifying body
(4) To be the forum for industry and academia collaboration
(5) To positively contribute to society and quality of life

The IMM membership is categorised into 6 different grades and open to anyone above the age of 17 years - individuals and companies keen in developing and contributing towards the growth of materials science, technology and engineering in Malaysia.

Over the years, IMM have conducted courses on coatings, coatings fingerprinting, corrosion, welding, vibration etc in support of the oil and gas industry in Malaysia. Over 600 Coatings Inspectors have been trained and certified as well as 2500 Blasters & Painters, Supervisors, Corrosion Technician and Vibration Practitioners. Its certification programmes are recognized by PETRONAS and all oil & gas operators. Since January 2011, 72 Associate Welding Engineers, 80 Welding Engineers, 20 Senior Welding Engineers and 24 Coating Fingerprint Quality Controllers were trained and certified.

IMM has also organised 10 International Materials Technology conferences (IMTCE) on a biennial basis, and numerous technical seminars, educational programmes, technical visits, and materials awareness programmes since 1988.

Public courses, such as Microbiologically Influenced Corrosion (MIC) and Welding Technology for Non-Welding Personnel, are being offered occasionally. Training on materials awareness has also been conducted in public listed companies.

The courses and programmes are being organised by Authorized Training Body/Bodies and Authorized Event Organizer/Organizers.

Collaborations with the Asian Welding Federation, The Society for Protective Coatings, US (SSPC), Sabah Skills Technology Centre (SSTC), and local universities continue to be part of IMM's vision and long term mission to educate, train and serve the materials fraternity.

GENERAL INFORMATION ON MEMBERSHIP

The IMM Membership is opened to all individuals and companies in developing the contribution of Materials science, technology and engineering towards industrial growth in Malaysia. The technology of materials is advancing day-to-day throughout the world. Membership to the IMM will enable networking and exchange of knowledge from a very wide variety of specialised areas of expertise. Please feel free to download or print a copy of the application form together with the IMM regulations. If you have any doubt, please do not hesitate to contact our secretariat through the phone; +603-4256-2286 or email to secretariat@iomm.org.my

Annual subscriptions shall be payable in advance on 1st January of each year. Those admitted into the IMM between 1st July and 31st December in any year shall pay only half the annual subscription. Seniors (above 55 years old) get 50% discount off their annual subscriptions.

We have an online application for membership for selected grades. Membership application forms in document format can be accessed from www.iomm.org.my.

Kindly fill the form and email to secretariat@iomm.org.my or fax it to: +603-7880 1753 or send it to :

IMM SECRETARIAT

Suite 515, Level 5, Block A, Kelana Centre Point (Lobby B),
No. 3 Jalan SS 7/19, Kelana Jaya,
47301 Petaling Jaya, Selangor

IMM MEMBERSHIP BENEFITS

(1) IMM activities offer members to interact and network with representative from the industry, academia and government related to the Materials profession.

(2) Members will gain knowledge on career opportunities for their children, friends etc as IMM offers certification courses in skilled trades e.g. Welding, Painting, Inspection, Corrosion etc.

(3) IMM-JWES Welding Engineer Certification program leading to a Welding Engineer Certification which offers great employment opportunities in the oil & gas, heavy industry, marine and energy sectors.

(4) IMM publications – quarterly magazine plus annual conferences offer presenters an opportunity for their technical research or industry-academia papers to be published in ISI- and Scopus-index journals.

(5) IMM organizes many free technical events for members to acquire new knowledge and networking opportunities. Participants to these events will also receive Certificate of Attendance for their Continuing Professional Development records.

IMM MEMBERSHIP FEES SCHEDULE AS PER BELOW:

Description	Amount			
	Entrance Fee	Processing Fee	Transfer Fee	Annual Subscription
Fellow (F.I.M.M)	-	RM 300.00	RM 10.00	RM 150.00
Professional (M.I.M.M)	-	RM 150.00	RM 10.00	RM 100.00
Associate (A.M.I.M.M)	-	RM 150.00	RM 10.00	RM 80.00
Company	RM 50.00	-	-	RM 200.00
Ordinary	RM 20.00	-	-	RM 40.00
Student	RM 10.00	-	-	RM 10.00
Ordinary/ Company for affiliates	RM 40.00/ RM 50.00	-	-	NIL

INSTITUTE OF MATERIALS, MALAYSIA

Updated on 30th December 2018

REGULATIONS GOVERNING ADMISSION AND TRANSFER OF MEMBER GRADES

The Council shall establish a Memberships Committee which will be responsible for review of applications for transfer of membership grades. The Memberships Committee shall recommend transfers for Council approval at Council Meetings. All grades of memberships are awarded at the discretion of the Council and may be withheld or withdrawn in the event of conduct likely to prejudice the standing of the Institute. Every member shall receive a membership certificate.

The Memberships Committee shall be responsible for drafting the "Regulations Governing Admission and Transfer of Member Grades" for Council approval. These regulations may be changed from time to time subject to Council approval.

Every application for membership shall be proposed and seconded according to these regulations and shall be forwarded to the Honorary Secretary who shall, at the first convenient opportunity, submit it to the Council for approval the Council may at its discretion reject any application without assigning any reason thereof.

Each company on admission shall be entitled to nominate one representative to exercise all rights of membership. Only representatives of Company membership, Fellows (F.I.M.M.). Professional Members (M.I.M.M.) and Ordinary members shall have the right to vote and to hold office in IMM.

Only Malaysian Citizens, and Blue Identity Card Holders can become Ordinary Members, Associate Members (A.M.I.M.M.), Professional Members (M.I.M.M.) and Fellow Members (F.I.M.M.) with voting rights. Foreigners can join similar grades but shall have no voting rights.

MEMBERSHIP GRADE & REQUIREMENT

Honorary Fellow (Hon. F.I.M.M.)
The Council shall have the power to elect Honorary Fellows who shall be persons of eminence in science or industry. The election shall be based on a majority vote within the Council. Honorary fellows shall enjoy such privileges as may from time to time be determined by the Council.

Fellow (F.I.M.M.)
A person at least 35 years of age with approved academic qualifications, training and 8 years relevant responsible experience who has made significant contributions to the science and practice of profession of Materials Science and Engineering or has given distinguished service to industry or education.

Professional Member (M.I.M.M.)
A person at least 25 years of age, with approved academic qualifications and training, having at least 3 years responsible experience in Materials Science and Engineering, or a person at least 40 years of age, with at least 15 years of experience with practical responsibility, as demonstrated by thesis/dissertation or report and interview.

Associate Member (A.M.I.M.M.)
A person at least 25 years of age, who possesses an interest in Materials Science and Engineering but have not acquired the necessary experience or obtained the qualification, governing entry to Member grade. An Associate Member, on obtaining the necessary qualifications, may apply for transfer to Member grade.

Company Member
Any company that is involved or has interest in Materials Science and Engineering will be qualified to join as a company member.

Ordinary Member
Any Malaysian Citizen and above the age of 18 years engaged in activities related to research, development and applications in Materials Science and Engineering shall qualify for Ordinary Membership. Only Ordinary Members who meet the necessary minimum requirements may apply for transfer to membership grades of Fellow, Member and Associate Member and may use the abbreviated titles upon transfer.

Student Member
A student member shall be a person not under 17 years of age who at the time of application satisfies the Council that he has received a good general education and is studying subjects related to Materials Science or Engineering. A student member shall transfer to the grade of Ordinary Member after graduation provided he or she is suitably qualified and as soon as he or she is earning a full-time salary. A Student shall not become member of the IMM without the prior approval of the Vice-Chancellor or Head of Department of the university or relevant authority concerned.

Coating Fingerprinting Workshop

IMM Vibration Conference 2018

MOGSEC 2018

MLC 2018

FREE Ordinary Membership for Affiliates:

The Institute of Materials, Malaysia will recognize various professional institutions and societies for **free membership** at "Ordinary Grade". Members of the recognized professional institutions and societies can become Ordinary Members of the IMM without any annual subscriptions. The Council of the IMM approved the proposal in accordance to IMM Rules clause no. 3.2.3 and the members at its 21st Annual General Meeting unanimously approved the proposal on 19th March 2011.

Members of following institutions and societies are welcome to apply.

(1) American Welding Society
(2) Asian Welding Federation
(3) Board of Architects Malaysia
(4) Board of Engineers, Malaysia
(5) Engineering Institutes under the Engineering Council of UK
(6) Geological Society of Malaysia
(7) Institut Kimia Malaysia
(8) Institute of Corrosion UK
(9) Institute of Materials Singapore
(10) Institute of Physics Malaysia
(11) Institution of Engineers, Malaysia
(12) Jabatan Minerals & Geoscience
(13) Malaysian Medical Association
(14) Malaysian Nurses Association
(15) Malaysian Society for Non-Destructive Testing
(16) Malaysian Welding & Joining Society
(17) National Association of Corrosion Engineers USA
(18) Persatuan Arkitek Malaysia
(19) Plastics & Rubber Institute of Malaysia
(20) Singapore Welding Society
(21) Society of Petroleum Engineers
(22) Steel Structures Painting Council USA
(23) The Welding Institute UK

FREE Company Membership for Affiliates:

The Institute of Materials, Malaysia will recognize various professional institutions and societies for free membership at "Company Grade". Company Members of the recognized professional institutions, societies & associations can become Company Members of the IMM without any annual subscriptions. The Council of the IMM approved the proposal in accordance to IMM Rules clause no. 3.2.3 at its Penultimate Council Meeting on 10th January 2014 which was endorsed at the 24th Annual General Meeting held on 21st March 2014.

List of Free Company Memberships for Trade Associations:-

(1) Federation of Malaysian Manufacturers (FMM)
(2) Malaysian Offshore Contractors Association (MOCA)
(3) Malaysian Oil & Gas Engineering Council (MOGEC)
(4) Malaysian Oil & Gas Services Council (MOGSC)

Email : secretariat@iomm.org.my Website : www.iomm.org.my

Materials Lecture Competition 2019


Reported by: Assoc. Prof. Dr. Jariah Mohamad Juoi, Universiti Teknikal Malaysia Melaka, Chairperson of MLC 2019
Edited by: Prof. Dr. Esah Hamzah, Universiti Teknologi Malaysia, Chairperson of MLC Committee

Date: 4th April 2019 (Semi-final), 30th April 2019 (Final)
Venue: Centre of Graduate Studies, UTeM main campus, Durian Tunggal, Melaka

Universiti Teknikal Malaysia Melaka (UTeM) has been selected to host and co-organize this year's Materials Lecture Competition (MLC 2019) and the Chairperson for MLC 2019 was Assoc. Prof. Dr. Jariah Mohamad Juoi. The MLC 2019 was successfully organized by UTeM together with the Institute of Materials, Malaysia (IMM) and the Institute of Materials, Minerals and Mining (IOM3) UK. The aim of the event was to provide a platform for young talents (below the age of 28 years old) to exhibit effective and impressive presentation skills in delivering topics in the field of material science and engineering. The MLC 2019 semi-final was held on 4th April 2019 to select the top five finalists who competed in the MLC 2019 final on 30th April 2019. Both competitions were held at the Centre of Graduate Studies, UTeM main campus, Durian Tunggal, Melaka. The MLC 2019 was sponsored by IMM, UTeM, DKSH Technology Sdn Bhd, Taat Bestari Sdn Bhd, HML Auto Industries Sdn Bhd and Zeta Scientific Sdn Bhd.

MLC 2019 SEMI-FINAL COMPETITION

The semi-final competition received an overwhelming response from institutions of higher learning in Malaysia with twenty universities participating in the event as shown in Table 1. The event was officiated by Assoc. Prof. Dr. Zamberi Jamaludin, the Dean of Faculty of Manufacturing Engineering UTeM. The panel of judges, selected among the academia and industry practitioners, were Prof. Dr. Che Husna Azhari (Director of Kolej Permata Insan, USIM), Dr. Kuan Seng How (Assist. Prof., Faculty of Engineering and Science, Universiti Tuanku Abdul Rahman), Mr. Kang Kim Ang (Managing Director of CORRTROL Group of Companies), Ir. Sallehuddin Adenan (Project Director, Mudahan Berjaya Engineering Sdn Bhd and Resident Engineer, Mechanical & Electrical at PR1MA Melaka Tengah II). The top five finalists who won the semi-final competition are shown in Table 2.

Table 1: Participants of MLC 2019 Semi-Final

No.	Participant/Student	University
1	Nur'aishah Ahmad Shahrim	International Islamic University Malaysia (IIUM)
2	Nurul Amiera Azmi	Universiti Teknikal Malaysia Melaka (UTeM)
3	Chow Yuen Leong	University of Nottingham Malaysia (UNM)
4	Lam Jia Yong	Universiti Putra Malaysia (UPM)
5	Leong Khok Lun	Tunku Abdul Rahman University College (TARC)
6	Cheeranan Krutsuwan a/p Nuphairode	Universiti Kebangsaan Malaysia (UKM)
7	Brian Mooy Chi Ho	Asia Pacific University of Technology and Innovation (APU)
8	Sarasijah a/p Arivalakan	University Science Malaysia (USM)
9	Siti Hajar Zaid Amri	Universiti Malaysia Kelantan (UMK)
10	Sarmila d/o Narayansamy Naidu	Universiti Selangor (UNISEL)
11	**Tan Yong Chee**	**Universiti Teknologi Malaysia (UTM)**
12	Sashindran a/l Palani Veloo	University Tenaga Nasional (UNITEN)
13	Ng Kok Bin	University of Malaya (UM)
14	Siti Khadijah Dermawan	Universiti Tun Hussein Onn Malaysia (UTHM)
15	Shine Htet Lin	Universiti Teknologi PETRONAS (UTP)
16	Mohammad Aidil Ali	Universiti Teknologi MARA (UiTM)
17	Sufian Firdaus Nazri	Universiti Malaysia Perlis (UNiMAP)
18	Yap Yean Weiy	Curtin University Malaysia (CUM)
19	Koh Bao Xin	Multimedia University (MMU)
20	Siti Zubaidah Patuwan	Universiti Malaysia Sabah (UMS)

Table 2: Top five finalists of MLC 2019

1	**Lam Jia Yong**	**Universiti Putra Malaysia (UPM)**
2	Siti Hajar Zaid Amri	Universiti Malaysia Kelantan (UMK)
3	Tan Yong Chee	Universiti Teknologi Malaysia (UTM)
4	Ng Kok Bin	University of Malaya (UM)
5	Siti Zubaidah Patuwan	Universiti Malaysia Sabah (UMS)

Figure 1: MLC 2019 Semi-Final participants, judges and invited guests in UTeM Melaka

Figure 2: The twenty MLC 2019 Semi-Finalists

Figure 3: MLC 2019 Final panel of judges
From Left: Ir. William Ho, Assoc. Prof. Dr. Puvanasvaran A/L A. Perumal,Ir. Fairullizam Isahak and Prof. Dato' Ir. Dr. Abdul Wahab Mohammad

MLC 2019 FINAL COMPETITION

The MLC 2019 final event was officiated by the Deputy Vice Chancellor (Academic & International) UTeM, Prof. Datuk Ts. Dr. Mohd Razali Muhamad. The panel of judges for the final competition were Prof. Dato' Ir. Dr. Abdul Wahab Mohammad (UKM), Assoc. Prof. Ir. Dr. Puvanasvaran A/L A. Perumal (UTeM), Ir. Fairullizam Isahak (Engineering Manager, Syarikat Air Melaka Bhd) and Ir. Willian Ho (Senior Project Manager Ultra Green Sdn Bhd). Mr. Lam Jia Yong from UPM won the first prize, while Mr. Tan Yong Chee from UTM and Ms. Siti Zubaidah Patuwan from UMS came in as the second and third prize winners respectively. The winners walked away with a cash prize of RM 3000, RM 2000 and RM 1000 together with plaques and souvenirs awarded by the Chairperson of MLC Committee, Prof. Dr. Esah Hamzah (on behalf of the President of IMM). Consolation and cash prizes of RM 500 were also given to the last two finalists. The first prize winner will represent Malaysia in the Young Persons' World Lecture Competition 2019 (YPWLC 2019) which will be held in London, United Kingdom in October 2019. The half-day competition ended with closing remarks given by Prof. Dr. Esah Hamzah, who had also announced that Universiti Putra Malaysia (UPM) will be the Host and Co-Organiser for the MLC 2020 and the new MLC 2020 Chairperson is Dr. Norkhairunnisa Mazlan from Faculty of Engineering, UPM.

Figure 4: The top five finalists and winners of MLC 2019
From left: Consolation Prize - Ms. Siti Hajar Zaid Amri (UMK), Second Winner - Mr. Tan Yong Chee (UTM), First Winner - Mr. Lam Jia Yong (UPM), Third Winner - Ms. Siti Zubaidah Patuwan (UMS), Consolation Prize - Mr. Ng Kok Bin (UM)

Participation of IMM Malaysia in the Sarawak Oil & Gas Seminar and Exhibition (SOGSE) 2019


Reported by: Thomas Ting Siew Kui, AKAL Solutions Sdn Bhd, IMM Miri Chapter, Committee Member
Edited by: Ir. Assoc. Prof. Dr. Edwin Jong Nyon Tchan, Advanced Metallurgy & Welding Technology Sdn. Bhd., IMM Miri Chapter, Committee Chairman

Date: 13th – 14th April 2019
Venue: Imperial Mall Hotel, Miri, Sarawak

Dewan Usahawan Bumiputera Sarawak (DUBS) has successfully organized the two-day Oil & Gas seminar and exhibition event, i.e., the Sarawak Oil & Gas Seminar and Exhibition (SOGSE) 2019 from 13th – 14th April 2019 at Imperial Mall Hotel, Miri, Sarawak. This event was fully supported by Sarawak Government and in collaboration with Malaysian Oil & Gas Services Council (MOGSC) and Suarah Petroleum Group (SPG). The objective of this unique event is primarily to provide the opportunity for Oil & Gas participants to network and exchange their understanding with highly influential decision-makers and thought-leaders shaping Sarawak's Oil & Gas Development. For the two-day event, international and domestic participants were mainly from the Oil & Gas sector and have actively participated in the two-day technical seminar discussing and exchanging ideas from a wide range of interesting Oil & Gas topics ranging from offshore exploration, production up to the final stage involving commissioning and abandonment.

In addition, the two-day unique event in Miri has also attracted a total of 25 exhibition booths. Institute of Materials, Malaysia (IMM) with the full support from IMM-Miri Chapter, IMM-Curtin Student Chapter, Materials Technology Education Sdn Bhd (MTE) and IMM Resources Sdn Bhd (IMMR) had also successfully participated in this event. IMM had set up a booth at the event to promote collaboration with the industry and introduce IMM courses to the public.

Figure 1: IMM Exhibition Booth No. 14 during the SOGSE Event

The Guest of Honor of this event was Y.A.B. Datuk Patinggi (Dr.) Abang Abdul Rahman Zohari Tun Datuk Abang Haji Openg, Chief Minister of Sarawak who arrived on the second day of this event to officiate the closing ceremony of SOGSE 2019. After his keynote address, he visited each of the booths to see first hand their respective expert capabilities and advanced products/equipment/tools.

The event organizer had also included many networking breaks for participants to share their working experiences and Oil & Gas knowledge amongst all interested parties. In reality, this was a great opportunity for Oil & Gas companies, contractors and industry players to understand the overall Sarawak Oil & Gas economy status, improve/enhance their strengths and rectify their weaknesses too. All IMM members who were present at the two-day event had also witnessed the submission of seminar resolutions and the recommended action plans by Sarawak Bumiputera Chamber of Entrepreneurs (DUBS) to Y.A.B. Chief Minister during the closing ceremony.

Figure 2: A series of group photos with IMM Deputy President, Datuk Karim and some IMM members and helpers

Making Inroads into the Land Transport Industry: Memorandum of Understanding between IMM and Prasarana Malaysia Berhad

Reported by: N. Hithaya Jeevan, IMM Secretariat

Date: 19th April 2019
Venue: Alila Bangsar, Kuala Lumpur

Institute of Materials, Malaysia (IMM) and Prasarana Malaysia Bhd formalized a landmark collaboration to develop and conduct academic and professional training programs leading to certification of skilled workers by signing a Memorandum of Understanding (MOU) on 19th April 2019 at the Alila Hotel in Bangsar, Kuala Lumpur. The MOU signing ceremony was attended by the senior management and staff of both organisations as well as members of the media.

Signed by IMM President, Mr. Mohd Azmi Mohd. Noor and Group Chief Executive Officer of Prasarana Malaysia Bhd, Dato' Mohamed Hazlan Mohamed Hussain, and witnessed by IMM Deputy President, Dato' Dr. Ir. Mohd Abdul Karim Abdullah and Mr. Muhammad Nizam Alias, Prasarana's Group Operating Officer (Operations), the MOU marks an achievement for both IMM and Prasarana as it paves the way for the immediate collaboration of according certification for workers in 'thermit welding', which is a specialized field in rail engineering. It is believed that this is the first thermit welding certification program in the ASEAN region.

For Prasarana, which is the umbrella company for Rapid Rail – operator of the LRT, MRT and monorail services in Malaysia, the programme will allow certification of its current highly experienced staff specializing in thermit welding. The MOU recognizes Prasarana Centre of Excellence (PACE) as an Authorized Training Body (ATB) of IMM for this purpose. Under the MOU, which is signed for an initial three-year period, PACE will conduct four certification programmes for thermit welding - Thermit Welding Practitioner, Thermit Welding Supervisor, Thermit Welding Inspector and Thermit Welding Specialist programmes.

Speaking at the ceremony, its Group CEO mentioned that Prasarana has high expectations of PACE, which was established last year to provide and develop a comprehensive and holistic consultancy, training and human capital development towards maximizing people potential for industry excellence. He said that the capabilities of Prasarana to conduct training for local and international needs have been proven and recognized and its trainees have come from as far as Nigeria, Saudi Arabia and Indonesia.
Subsequently, the IMM President in his speech said the MOU outlined the general framework of collaboration between the two parties; IMM will be the Certification body and Prasarana appointed as the Accredited Training Body under the ISO 17024 certification process. He added that the IMM Welding Committee and Prasarana will work hand in hand to develop a certification scheme for thermite welding practitioners and inspectors to satisfy the current railway workforce needs, co-develop a national standard of practice on thermit welding for railways and will also embark on joint research activities together with researchers from Universiti Tun Hussein Onn Malaysia.

IMM's certification courses are well recognized and endorsed in the oil and gas, shipbuilding and construction industries and this new effort in collaboration with the land transport industry is in-line with the aspirations of IMM to continuously support, uplift and enhance the engineering capabilities of our nation.

Figure 2: Signing of the MOU by the President of IMM and the Group CEO of Prasarana

Figure 1: The VIPs at the MOU Signing Ceremony

Forum on "Towards Polymeric Coating Fingerprinting" V: Big Wave



Reported by: Nurul Fatahah Asyqin Zainal, Universiti Teknologi MARA, Committee member of Task Force on Coating Fingerprinting
Edited by: Asst. Prof. Dr. Yu Lih Jiun, UCSI University, Organizing Chairperson of Forum on "Towards Polymeric Coating Fingerprinting" V
Prof. Dr. Melissa Chan Chin Han, Universiti Teknologi MARA, Honorary Secretary of IMM

Date: 4nd April 2019
Venue: Dewan Presiden, Kelab Golf Negara Subang (KGNS), Selangor, Malaysia

The 5th Forum on "Towards Polymeric Coating Fingerprinting" V: Big Wave, the signature event of Institute of Materials Malaysia (IMM) was organized by IMM Task Force on Coating Fingerprinting and jointly organized by IMM Polymer Committee, IMM Student Chapter and IMM Corrosion Committee. The forum gathered more than 100 participants and 9 exhibitors from the paint industries, oil and gas companies, instrument suppliers as well as academicians as listed in Table 1. The collaborating partners of this forum were Institut Kimia Malaysia (IKM), Universiti Teknologi MARA (UiTM), Plastic Rubber Institute Malaysia (PRIM) and PETRONAS. This forum was made possible with the sponsorship and support from Serba Dinamik Holdings Bhd, IMM Resources Sdn. Bhd. and Universal Corrosion Engineering Sdn. Bhd.

Table 1: Participants of 5th Forum on "Towards Polymeric Coating Fingerprinting" V: Big Wave

No	Organization/University	No of Participant
1	Bruker (M) Sdn Bhd	1
2	Buchi Malaysia Sdn Bhd	2
3	Bureau Veritas (M) Sdn Bhd	2
4	Dialog Group Berhad	2
5	Eurofins NM Laboratory Sdn Bhd	2
6	Firm Motion Sdn Bhd	6
7	Gaia Service (M) Sdn Bhd	2
8	Geopolitan Sdn Bhd	2
9	Hempel (M) Sdn Bhd	4
10	Institut Kimia Malaysia	2
11	Institute of Materials, Malaysia	6
12	Interscience Sdn Bhd	3
13	Jotac Academy Sdn Bhd	2
14	Jotun (M) Sdn Bhd	1
15	Kossan Paint (M) Sdn Bhd	2
16	LCC Group Management	5
17	Malaysian Rubber Board	1
18	Materials Technology Education Sdn Bhd	5
19	Nazca Scientific Sdn Bhd	2
20	Nexus Analytics Sdn Bhd	3
21	Norimax Sdn Bhd	3
22	Ominent	1
23	PETRONAS	2
24	Sarawak Shell Bhd	3
25	Sinopec Fourth Construction	1
26	Sirim QAS International Sdn Bhd	2
27	TA Instrument	1
28	Tunku Abdul Rahman University College (TAR-UC)	12
29	UCSI University	2
30	Universiti Malaysia Kelantan (UMK)	1
31	Universiti Teknologi MARA (UiTM)	20
32	Zinga Metal	1
Total		104

The forum was officiated by Mr. Kamal Azam Ibrahim, the Manager of Material Corrosion and Inspection, PETRONAS Group Technical Solution (GTS). With his informative welcoming speech 'Coating System – Challenges and Forward Looking Solutions', he highlighted the importance of coating especially in oil and gas industries. Failure of the coatings from the pipelines at offshore causes fatality world wide, imposes very high cost (up to billions) and exposes damage and danger to the environment and humanity. Currently, innovation on nanocoating has been used to solve the failure of coatings. However, this technology is yet to be fully developed. Fourier-transform infrared (FTIR) may be one of the quality assurance and quality control (QA & QC) tool that could shed some light by checking the consistency on batch-to-batch of the paint and coating.

Prof. Dr. Melissa Chan, the co-chairperson of the Task Force on Coating Fingerprinting Phase 3, who is also the co-chairman of IMM Task Force on Coating Fingerprinting, gave a short briefing on the background of Coating Fingerprinting. She highlighted that the oil and gas companies are suffering from failure of polymeric coating on steel structures, in some cases, may be due to low quality of adulterated products and consequently contribute to high cost of repainting the structures. This situation leads to the urge of quality control certification for polymeric coatings. IMM plays a role in assisting in the interpretation of the FTIR results for epoxy paints. Fingerprinting of Polymeric Coating initiative had started its Phase 1 in 2013-2014, where it focused on the viability of using FTIR to produce repeatable results on epoxy resins and their hardener. It continued with Phase 2 in 2015-2016 with the aim to confirm the viability of using FTIR to produce coating fingerprint certificate with cooperation from paint manufacturers and recognition by PETRONAS. Now, it has reached to Phase 3 where FTIR tests on more different protective paint systems will be conducted.

This forum had a special ceremony where the first IMM Standard – Coating Fingerprinting Overall Procedures for Paint Systems Using FTIR and other related methods (IMM FP01:2019) was successfully launched. This ceremony was launched by Prof. Dr. Melissa Chan Chin Han and Prof. Ts. Dr. Mohamad Kamal Harun, witnessed by Mr. Ir. Max Ong Chong Hup (Co-chairman of Education Committee), Dato' Dr. Ong Eng Long (Past President), Mr. Ir. Ong Hock Guan (Chairman of Corrosion Committee), Mr. Kamal Azam Ibrahim (PETRONAS GTS) and Dato' Nagamoorthy. This IMM Standard was opened for public comment starting from 25th April 2019 until 23rd June 2019.

Figure 1: Opening speech by Mr. Kamal Azam Ibrahim, PETRONAS GTS

Figure 2: IMM Standard Launching Ceremony. (from left to right) Mr. Ir. Max Ong Chong Hup, Dato' Dr. Ong Eng Long, Mr. Ir. Ong Hock Guan, Prof. Dr. Melissa Chan Chin Han, Prof. Ts. Dr. Mohamad Kamal Harun, Mr. Kamal Azam Ibrahim and Dato' Nagamoorthy

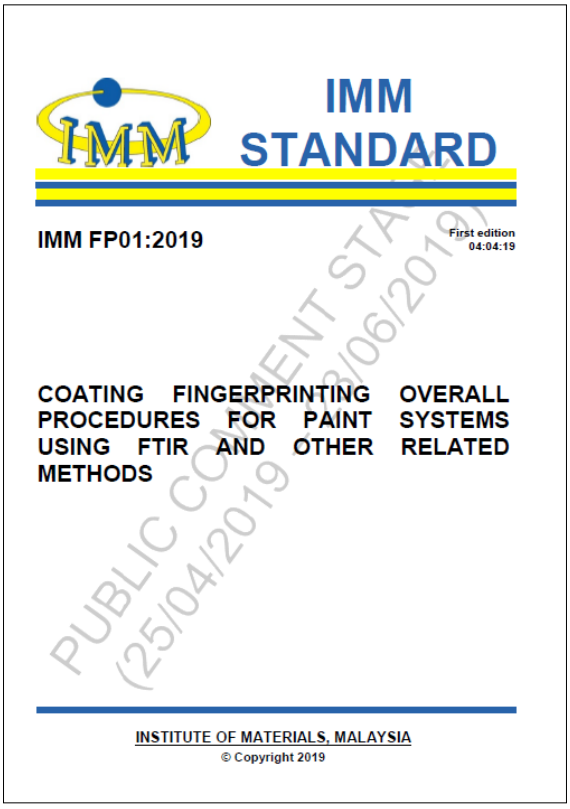

Figure 3: First IMM Standard

Four speakers who are highly experienced in paint and coatings were invited to share their thoughts in this forum. First speaker was Mr. Muhd. Hawari Hasan from PETRONAS GTS who shared the "Owner's Perspective and Commitment". He stated that digital solutions will assist in managing a lot of issues for example in corrosion. With digital solutions, it increases the real-time alert and update for an issue. Besides, it is helpful for the prediction of the upcoming alert for example corrosion rate that is beneficial for further optimization of the maintenance strategy. The second speaker, Mr. Mohammad Ariff Sukur from Shell, Malaysia, has highlighted that Shell is very committed in coating fingerprinting technique to confirm the quality and consistency of supplied paints. Shell has also employed an in-house standard (DEP 30.48.00.31) which covers most of the physical tests for vendors to comply. Ms. Renee Teo Yong Yin from Bruker Sdn. Bhd. presented the latest FTIR technology from Bruker which allows the FTIR measurement from Mid to Far IR spectrum that could be very useful in coating fingerprinting analysis for organic and inorganic components. The last speaker, Mr. Prakash Nayak from Hempel (M) Sdn. Bhd., presented a study based on the degradation of alkyds and epoxy binder system that is visible in the IR spectra. Many questions have been raised to all the speakers by the audiences who are highly interested and would like to know more from the speakers.

Figure 4: The four distinguished speakers; Mr. Muhd. Hawari Hasan (top left), Mr. Mohamad Ariff Sukur (top right), Ms. Renee (bottom left) and Mr. Prakash Nayak (bottom right).

The session continued with panel discussion session which was moderated by Dr. Chew Khoon Hee (Chairman of Polymer Committee) from Tunku Abdul Rahman University College (TAR-UC). The panel members for this session were Prof. Ts. Dr. Mohamad Kamal Harun from UiTM, Mr. Ir. Ong Hock Guan from Sarawak Shell Berhad and Prof. Dr. Melissa Chan Chin Han from UiTM. Important points were brought up by the audiences and addressed by the panels which resulted a stimulating and productive exchange between panels and audiences. This panel discussion ended with a lively Q&A session.

Closing remarks were done by the Chairperson of this forum; Asst. Prof. Dr. Yu Lih Jiun from UCSI University. She expressed her deepest appreciation for the efforts, commitment and cooperation from all Task Force Committee members, co-organizers, collaborators, sponsors, speakers, participants and event organizer of this forum (Firm Motion Sdn. Bhd.) for making this forum a big success and a fruitful affair.

Figure 5: Panel discussion session (from left) Mr. Ir. Ong Hock Guan, Prof. Ts. Dr. Mohamad Kamal, Dr. Chew Khoon Hee and Prof. Dr. Melissa Chan.

Figure 5: Group photo of IMM Task Force Committee Members with the speakers

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www.e-serbadk.com

Forum on "Using Technology to Address Global Plastic and Environmental Issue"

Reported by: Ts. Dr. Chew Khoon Hee, Chairman of Polymer Working Committee

Date: 22nd March 2019
Venue : Kelab Golf Negara Subang

In our daily live, plastic is no stranger to us. Once we wake up, we have to use tooth brush that is made of plastic, wear a shirt made of polyester, bring a water bottle made of polycarbonate to work. The list can go on and on, it seems never ending. In fact, we can not deny that the invention of plastic material has changed our lifestyle.

Plastic material has made our life easier and convenient, unfortunately, it is discovered that plastic material has also become one of the major pollutants, especially to the aquatic life. As a result, various local authorities have started to ban the use of food containers made of polystyrene, followed by plastic bags, and now plastic straw. The question is, will the pollution problem be solved just by banning the use of plastic materials? Or, will the substitutes of plastic material create another type of problem in future?

As pointed out correctly by the President of IMM, Mr. Mohd. Azmi during his opening speech that vehicles are dangerous while on the road and accident may happen anytime and causing casualties, but why we do not ban the vehicles from going on the road? Instead, we organize more safety campaigns to create awareness among the users. Can the same be done for plastic material?

With the purpose of creating the awareness of the general public on the pollution issue of plastic material, the Polymer Working Committee of IMM organized a half day Forum on "Using Technology to Address Global Plastic and Environmental Issue" on 22nd March 2019 at Kelab Golf Negara Subang.

With the purpose of looking at the plastic pollution issue from different perspectives, the Committee had invited speakers from different backgrounds, they are from scientific instrument supplier to NGO to green plastic manufacturers.

When we talk about plastic pollution in Malaysia, the first thing that comes to our mind could be plastic bags or plastic bottle. The first speaker, Dr. Ooi Yee Khai of Perkin Elmer Sdn Bhd had surprised the audience by highlighting the pollution caused by another type of plastic material which we could have paid minimum attention to it, i.e. microplastics which is generated from film, fibres, micro-beads and there are 4.8 to 12.7 million tons of microplastics entering the marine environment annually! This has caught the attention of scientists and various studies have been conducted on the impact of microplastics, for instance, "Understanding the Effects of Microplastics in the Great Barrier Reef".

From the Society perspective, Ms. Wan Amiza of Recycle Community Malaysia Lestari (RCOMM Lestari) shared the initiative taken by her organization on how to educate the general public such as organizing recycling campaign not only for plastic material, but also for e-waste. RCOMM Lestari supports the government initiative that traders in Kuala Lumpur and the Federal States should use biodegradable plastic bags and food containers as a replacement for those made of polystyrene or other non-degradable plastic material.

Mr. Sugianto Tandio from Indonesia shared his experience and the technologies used to combat the plastic pollution issue in his home country. According to Mr. Sugianto, selection of sustainable materials has to be done in a holistic way by considering various factors such as source and energy efficient conversion (typically reflected in price). Furthermore, there are pros and cons on every currently available technology for producing biodegradable plastics.

To promote the use of green products to the general public is no easy task. The last speaker, Mr. Leonard Ho shared the challenges faced by him in his journey towards green technology.

During the Q & A session, all speakers had answered the various questions and concerns raised by participants, but one can conclude that the impact of plastic pollution could be bigger than what we can imagine as there are still some more threats which we may not be well aware such as threat from microplastics. We are just at the beginning of our journey to combat the plastic pollution issue and currently different parties are using different methods to overcome the problem.

In view of this, in his closing remark, the Chairman of the Polymer Working Committee, Ts. Dr. Chew urged the various organizations to join forces to form a taskforce to work together so that we can make use of the expertise and resources of each organization to address the plastic pollution issue in a more effective and efficient way.

Figure 1: Mr. Mohd. Azmi, President of IMM delivering his opening speech

Figure 2: The organizing committee and the speakers

Figure 3: The Forum had attracted a big crowd of participants

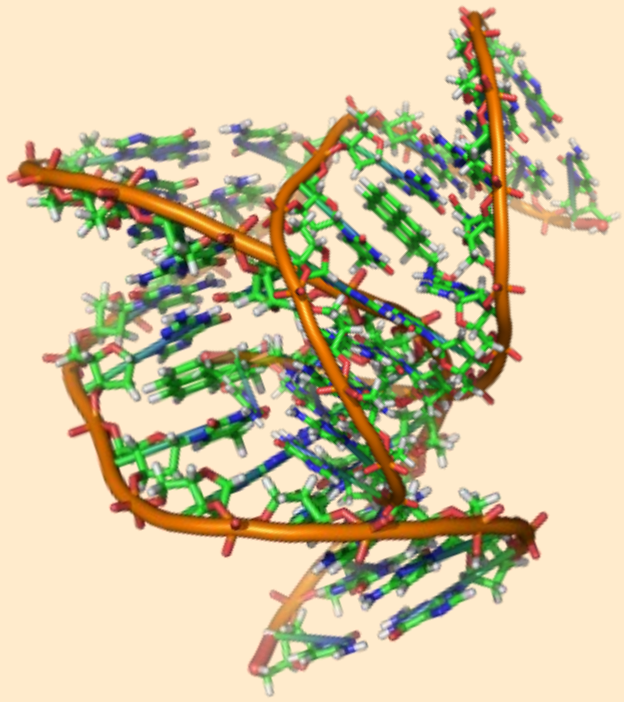
Student Editorial Board from Universiti Teknologi MARA

Nanotechnology in Treatment of Cancer: Gold Nanoparticles

Nanotechnology is a branch of technology that involves devices, materials and system that deal with matter dimensions less than 100 nanometres. The flexibility of nanotechnology has potential to be developed in many applications such as electronics, medicine, consumer products and biomaterials energy production. Recently, scientists have created vast of variety of nanodevices that can be developed for medical treatment especially cancer detection, diagnosis and treatment.

Cancer is characterized as a class of disease that can cause cell growth uncontrollably and disorderly. Nowadays, over 100 types of cancer are detected and categorised according to the type of cells located in the body. Cancer causes damaging effects to the body when harmful cells reproduce unmanageably to form blocks or masses of tissue namely tumor. The tumor cell is part of a tissue that is abnormally grown. It may be either malignant or benign in nature.

Any material that causes cancer is known as carcinogen and can be affected by infection, chemicals, heredity, hormone and physical agent. Generally, there are over 100 different types of cancer all over in the body, but the usual cases are lung cancer, breast cancer, colon cancer and prostate cancer. Generally, there are four stages of cancer. The first stage of cancer is localized at one part of the body, usually curable and not harmful. At stage two, there are locally advanced and abnormal growing of cells. When entering stage three, the body's system is disturbed and usually patient is in pain. Finally, stage four often it has metastasized or spread to other organs or throughout the body.



Gold nanoparticle (AuNPs) is a cluster of gold atoms up to 100 nm in diameter. It is produced in a liquid (liquid chemical method) by reduction of chloroauric acid. AuNPs is in liquid form to maximise high biocompatibility to body.

How AuNPs treat cancer?

Injecting liquid AuNPs into human body will make them bind to the cancer cell. Then, a laser ablation with near-infrared light will form and penetrate into human tissue. Using principle of photo thermal ablation, this penetration through heat at 42^{o}C would kill and burst the cancer cells.

Quantum dots are nanoparticles made of any semiconductor materials usually containing the silicon selenite and cadmium sulphite. The size ranged from 2 to 10 nanometre. Short wave light source quantum dots absorb some of energy and remit light of a longer wavelength. Quantum dots injected into the blood would cause the cancer cells taking up the molecule to be visualized easily.

Current research states numerous advantages of AuNPs which functions for different purposes. Highly optimized protocols for production of AuNPs of various shapes and sizes and characteristics with unique properties are research highlights. In biomedical applications mainly in cancer treatment, there is potential of AuNPs to be applied by adjusting the surface of nanoparticles with different functional compounds. A good biocompatibility and controllable biodistribution patterns make AuNPs as excellent materials for the basis of innovative therapies. Considering the scientific data on various application of nanogold, AuNPs are used broadly in the field of medical applications, especially for the cancer therapy.


Muhammad Asyrap Kamarudin, Universiti Teknologi MARA
Nur Syazwani Abdul Malek, Universiti Teknologi MARA

Rapporteurs' Report of Forum on "Towards Fingerprinting of Polymeric Coatings" V: Big Wave

Prepared by:
Suhaila Idayu Abdul Halim & Hairunnisa Ramli,
Universiti Teknologi MARA,
Committee members of Task Force on Coating Fingerprinting

Edited by:
Dr. Yu Lih Jiun, UCSI University, Organizing Chairperson of Forum on "Towards Polymeric Coating Fingerprinting" V
Prof. Ts. Dr. Melissa Chan Chin Han, Universiti Teknologi MARA, Co-chairperson of Task Force on Coating Fingerprinting
Ir. Max Ong Chong Hup, Norimax Sdn Bhd, Committee members of Task Force on Coating Fingerprinting

Date	:	4th April 2019
Time	:	1.00 am – 5.30 pm
Venue	:	Dewan Presiden, Kelab Golf Negara Subang, Selangor
Jointly organised by	:	IMM Polymer Committee IMM Student Chapters IMM Corrosion Committee
Participants	:	104 representatives from Bruker (M) Sdn Bhd, Buchi (M) Sdn Bhd, Bureau Veritas (M) Sdn Bhd, Dialog Group Bhd, Eurofins NM Laboratory Sdn Bhd, Firm Motion Sdn Bhd, Gaia Service (M) Sdn Bhd, Geopolitan Sdn Bhd, Hempel (M) Sdn Bhd, Institut Kimia Malaysia, Institute of Materials, Malaysia, Interscience Sdn Bhd, Jotac Academy Sdn Bhd, Jotun (M) Sdn Bhd, Kossan Paint (M) Sdn Bhd, LCC Group Management, Malaysian Rubber Board, Materials Technology Education Sdn Bhd, Nazca Scientific Sdn Bhd, Nexus Analytics Sdn Bhd, Norimax Sdn Bhd, Ominent, PETRONAS, Sarawak Shell Bhd, Sinopec Fourth Construction, Sirim QAS International Sdn Bhd, TA Instrument, Tunku Abdul Rahman University College (TAR-UC), UCSI University, Universiti Malaysia Kelantan, Universiti Teknologi MARA, Zinga Metal.

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Introduction:

The Forum on "Towards Fingerprinting of Polymeric Coating" V: Big Wave was conducted on 4th April 2019 in Kelab Golf Negara Subang, Selangor. It served as a follow-up and showcase the progression of coating fingerprinting Phase 3 on the mock execution of coating fingerprinting especially on Fourier-transform infrared (FTIR) analysis. First IMM standard associated to coating fingerprinting was launched at this forum.

The fifth forum was attended by 104 participants and 9 exhibitors from numerous fields such as oil and gas companies, paint manufacturers, contractors, fabricators, instruments specialists, researchers, academicians and university students from both public and private sectors.

Summary of the presentation sessions: -

Speaker 1 : **Mr. Muhd Hawari Hassan, PETRONAS Group Technical Solution (GTS)**

Topic : Owner's Perspective and Commitment

Mr. Muhd Hawari Hasan shared the "Owner's Perspective & Commitment". Instead of the traditional time-based, condition-based, and risk-based inspection methods of inspection, he proposed "Cognitive-Based Inspection", which embraces the consciousness of intellectual activities (such as thinking, reasoning, remembering) using current and new technologies to overcome shortcomings leading to coating failures. Digitalization such as Big Data etc can provide real-time alerts and updates to assist operators to manage corrosion. PETRONAS is committed to continuous improvement in managing corrosion and the Coating Fingerprinting initiative is a step in the right direction.

Q&A Session

Question

Ir. Max Ong Chong Hup, Norimax Sdn Bhd

Very often, premature coating failure can be observed and in a lot of circumstances, the blame was pointed to blasters and painters and seldom touched on the quality or the consistency of the paint itself. What is the owner's perspective or commitment on introducing coating fingerprinting for batch-to-batch consistency of the paints for quality assurance?

Answer
Mr. Muhd Hawari Hassan, PETRONAS GTS

We are committed, and relevant technical standards are to be followed. We are confident that incorporation of Coating Fingerprint Certificate in the PETRONAS Technical Specification (PTS) will promote batch-to-batch consistency of the paints, which may lead to reduction in premature coating failure. Of course, implementation of coating fingerprinting at this stage, there will be challenges as not all the technical issues are fully addressed. However, in the course of time, solutions will be offered progressively. One of the identified challenges is the management of huge volume of data collected accompanied by the submitted Coating Fingerprint Certificate, which requires the attention and strategy to be proposed by industry practitioners as well as the researchers.

Speaker 2 : **Mr. Mohammad Ariff Sukur, Sarawak Shell Bhd**

Topic : How Fingerprinting Complement Quality Assurance and Quality Control of Industrial Coatings

Mr. Ariff presented that coating is employed as the maintenance integrity of the external condition on the equipment concomitantly with QA and QC check to ensure the coating performance. Three factors must be taken into an account for a successful coating application i.e. applicator, design and product. However, the coating failures still carry devastating impact to the oil and gas industry. Hence, many approaches have been taken into the consideration to reduce premature coating failure. Shell tries to minimize the incidents by offering some preventions and solutions especially on the applicator and design. We have adopted the in-house standard (DEP 30.48.00.31) which covers most of the physical tests for vendors to comply. Mr. Ariff also provides the research findings on the factors associated to the premature coating failures such as incorrect specifications. He also highlighted that many options are available in analyzing the root cause of coating failures, for example by using FTIR spectroscopy. Lastly, he concluded that coating fingerprinting is now part of the requirement in Shell as a way of confirming the consistency of paints supplied.

Q&A Session

Prof. Dr. Melissa Chan Chin Han, Universiti Teknologi MARA

On the compliance to Shell's requirement (DEP 30.48.00.31), what are the feedbacks or responses received on the implementation of coating fingerprinting to the of batch-to-batch reproducibility of paint?

Mr. Mohammad Ariff Sukur, Sarawak Shell Bhd

We received feedbacks on the urge to have proper data management supplemented from Coating Fingerprint Certificate, which required Shell to have further deliberation and needs proposition from both industry experts and researchers.

Dato' Nagamoorthy, LCC group management

In this digital world, how is the data transformation in Shell Malaysia associated with digitalization?

Ir. Ong Hock Guan, Sarawak Shell Bhd

Globally, most of Oil and Gas companies find digitalization is one of the effective ways to oppress current or incoming issues. For instance, effectiveness of e-database is acknowledged by most global companies due to their stability, simplicity, full of information, etc. Hence, the full utilization of digital database e.g. e-inspection, e-maintenance, are strongly supported by Shell.

Prof. Ts. Dr. Mohamad Kamal Harun, Universiti Teknologi MARA

Does Shell have any specific parameter required for verification of aged coating?

Mr. Mohammad Ariff Sukur, Sarawak Shell Bhd

Often, ISO standards and in-house standards are referred and followed.

Dr. Chew Khoon Hee, TAR University College

With the recent launch of IMM Standard on Coating Fingerprinting, what is the disparity of IMM (FP01) and Shell in-house (DEP 30.48.00.31) standards?

Mr. Mohammad Ariff Sukur, Sarawak Shell Bhd

DEP 30.48.00.31 covers a broad range of coatings for offshore with emphasis on application, qualification and routine check. It does mention on FTIR coating fingerprinting by adoption to an ISO standard. However, there is still a gap for the practicality to fingerprinting paint by referring to the ISO standard. The IMM Standard on Coating Fingerprinting with the aim to close the gap between the DEP 30.48.00.31 on coating fingerprinting is more relevant to Shell. Therefore, both in-house Shell and IMM Standards should be referred concurrently for the improvement in regulating and standardizing the good practices of related parties.

Ir. Max Ong Chong Hup, Norimax Sdn. Bhd

Referring to the slide on data collection of premature coating failure, how was the statistic of 2% of coating failure owing to faulty product collected?

Mr. Mohammad Ariff Sukur, Sarawak Shell Bhd

Many reasons are contributing to the coating failures, e.g. weathering, wrong specifications, bad application as well as faulty paints. The 2% is an internal reference of the company.

Mr. Kamal Azman, PETRONAS GTS added that, the % of different attributing factors correlated to premature coatings has never been properly quantified with systematic data analyses in Malaysia as a lot of information needed have been always unattainable. However, an attempt should be made for having more realistic % of different attributing factors correlated to premature coatings in Malaysia in order to suitable measures can be planned accordingly.

Speaker 3 : Ms. Renee Teo Yong Yin, Bruker (M) Sdn Bhd

Topic : Paint Identification from MIR to THz Spectral Range Using FT Spectroscopy with BRUKER FM Technology

The objective of this presentation is to highlight to the participants that now it is possible to identify the inorganic compound in paint using FTIR spectroscopy with wider spectral range. Previously, most of the commercial FTIR only covers the mid IR range, which are more useful for organic compounds. The new FTIR with both mid and far IR ranges enable the users to analyze systems with both organic and inorganic components in one single experiment

without the hassle of exchanging the optical components as for previous models of FTIR. She presented the results of several measurements done on the inorganic compounds that show good reproducibility using this FM technology

Q&A Session

Dr. Chew Khoon Hee, TAR University College

Does this new FTIR needs to be equipped with five detectors in order to scan a sample with both organic and inorganic components in one single experiment without the hassle of exchanging the optical components?

Ms. Renee Teo Yong Yin, Bruker Malaysia

NO, FTIR INVENIO needs only one detector, one source, and one beam-splitter in order to scan a sample with both organic and inorganic components in one single experiment without the hassle of exchanging the optical components.

Ir. Max Ong Chong Hup, Norimax Sdn Bhd

Is it possible to differentiate inorganic zinc with different % of purity using this new FTIR with both mid and far IR ranges?

Ms. Renee Teo Yong Yin, Bruker Malaysia

Yes, different absorbance values will be shown at specific wave numbers for different % of purity of inorganic zinc.

Prof. Dr. Melissa Chan Chin Han, Universiti Teknologi MARA

Titanium dioxide, which is commonly used for protective coatings, has different phases e.g. rutile, anatase etc. Will different types (or phases) of titanium dioxide show different FTIR spectra in the far IR region?

Ms. Renee Teo Yong Yin, Bruker Malaysia

In principle, different types of titanium dioxide will show different FTIR spectra in the far IR region. We welcome samples of different types of titanium dioxide and provide the FTIR results.

Speaker 4 : Mr. Prakash Nayak, Hempel, Singapore

Topic:Infrared Spectroscopy of Cured Paint Films

Mr. Prakash Nayak presented that possible degraded components in the coating systems, which can be identified using FTIR on degraded alkyd and epoxy coatings (dried paints). He compared FTIR spectra on coatings with & without failures and with result interpretation. Failure analysis on coatings using FTIR requires understanding on basic chemistry and he also shared some challenges on fingerprinting the coatings (i.e. dried paints).

Q&A Session

Mr. Kamal Azam Ibrahim, PETRONAS GTS

For the failed epoxy coating, any reason for the absorbance bands of the binder were not observed for the FTIR spectrum?

Mr. Prakash Nayak, Hempel Singapore

Epoxy coating is known to have poor UV-resistance and hence prone to have “chalking” problem. Consequently, the absorbance bands of the binder were not observed for the FTIR spectrum after the failure of the coatings.

Mr. Muhd. Hawari Hasan, PETRONAS GTS

How should we obtain the Reference FTIR spectrum for the comparison to the FTIR spectrum of failed coating for failure investigation?

Mr. Prakash Nayak, Hempel Singapore

The FTIR Reference spectra can be obtained from the coating system applied on the coupon in the laboratory, where each layer will have one Reference spectrum. The unmixed paints from the same batch for the coating system on the coupon or the coating system on actual structure are preferred but it is not mandatory. However, the mixing and application procedures of the coating system in the laboratory or on-site should be identical.

Ir. Max Ong Chong Hup, Norimax Sdn Bhd

For a retained paint kept in the in-house store of a paint manufacturer after a couple of months but within the shelf-life, will the FTIR spectrum for this retained paint be similar to the Reference spectrum sent for qualification?

Mr. Prakash Nayak, Hempel Singapore

The FTIR spectrum for a retained paint should have high degree of similarity to its Reference spectrum if the retained paint is kept accordingly to the adopted storage standard within its shelf-life.

Prof. Dr. Melissa Chan Chin Han, Universiti Teknologi MARA

Would the weathering effect (exposure of the coating to sunlight, rain etc) lead to low degree of similarity of the FTIR spectrum of the "aged" coating on-site as compared to the Reference spectrum of the Reference coating in the laboratory?

Mr. Prakash Nayak, Hempel Singapore

For a UV-resistance protective coating, we expect to have high degree of similarity for FTIR spectrum of the on-site coating as compared to the Reference spectrum of Reference coating in the laboratory if the "aging time" is within one year. We expect to observe lower degree of similarity when the aging time is couple of years. However, we still need to have more studies in order to provide more solid discussion on this matter.

Mr. Muhd. Hawari Hasan, PETRONAS GTS

Is FTIR useful for premature coating failure analysis?

Mr. Prakash Nayak, Hempel Singapore

Yes, FIIR is indeed useful for coating failure analysis however deeper knowledge on the system, the chemistry and physics on the analysis etc are needed for result interpretation. Of course, additional chemical and physical analyses are often required in order to have better understanding on the attributing factor(s) on the failure.

Panel Discussion:

List of panels:

Prof. Ts. Dr. Mohamad Kamal Harun, Universiti Teknologi MARA

Ir. Ong Hock Guan, Sarawak Shell Bhd

Prof. Dr. Melissa Chan Chin Han, Universiti Teknologi MARA

Moderator:

Dr. Chew Khoon Hee, TAR University College

Mr. Kamal Azam Ibrahim, PETRONAS GTS

Is there any study from other countries on the inspection of a paint in meeting the specification as it was qualified?

Prof. Ts. Dr. Mohamad Kamal Harun, Universiti Teknologi MARA

There should be some attempts on this aspect. In general, the batch-to-batch paint shall conform to the specification as it was qualified. The IMM's initiative of coating fingerprinting is an attempt to verify that the batch-to-batch paint meets the specification.

Ir. Ong Hock Guan, Sarawak Shell Bhd

In Shell, in order to have the on-spec paint, the contractor should follow a coating system qualification testing via Technically Accepted Manufacturers & Products (TAMAP) system. So, we control the approved paints through this system.

Prof. Dr. Melissa Chan Chin Han, Universiti Teknologi MARA

From the extensive literature search, a significant number of published articles on paint failures are either authored or co-authored by paint manufacturers' representatives (e.g. chemists/technical specialists/PhDs etc) and they generally attribute the possible causes for the failures on surface preparation and application and workers' faults. Normally, those articles do not touch on the reformulation of the paints by paint manufacturers, which could have led to failures! The Blaster & Painter companies employ mainly lowly-educated workers (with academic qualification of O or A level), who don't know how to defend themselves by presenting adequate technical reports. The assumption on a paint meets the specification without any verification tests may not reflect the reality.

Dr. Chew Khoon Hee, TAR University College

As the new technology where the new FTIR FM technology (combination of mid & far-IR) coming in, what will be the additional cost incurred to the paint manufacturer if they want to do FTIR fingerprinting on paint?

Prof. Dr. Melissa Chan Chin Han, Universiti Teknologi MARA

When an instrument with new technology is introduced in the market, normally the price will be at the high side. Normally in the course of time, when there are other suppliers also provide equivalent solutions to the users, the price of an instrument will be relatively reasonable and competitive.

Dato' Dr. Ong Eng Long, Institut Kimia Malaysia

Integrity of the paint can be examined using the FTIR and when we talk about integrity, we are dealing mainly with paint degradation. Degradation always happens to mainly on functional groups of the materials. And that is why I think the mid-IR will already be sufficient to analyze the sample.

Prof. Ts. Dr. Mohamad Kamal Harun, Universiti Teknologi MARA

Thank you for the inputs. The correlation between the degradation and performance of a coating system is something that we must establish as well. The first step is to ensure a paint meets the specification and then, blasting and painting works are in accord to the recommended procedures. After application, the coating system is subjected to weathering and the degradation, which is very likely to occur in the course of time. It is indeed important to study on the correlation of time-dependent degradation vs performance on a coating system.

Dato' Dr. Ong Eng Long, Institut Kimia Malaysia

Can the FTIR spectrum indicating the coating failure be substantiated in court or trade dispute in this field?

Prof. Dr. Melissa Chan Chin Han, Universiti Teknologi MARA

For coating failure investigation, substantial knowledge on coatings and; chemistry & physics of FTIR analysis is indeed required. FTIR may not be able to serve as primary evidence and other testings on failure analyses should be attempted. However, FTIR results will stand as a strong supplementary evidence.

Dato' Dr. Ong Eng Long, Institut Kimia Malaysia

Will IMM seek Standards Malaysia to adopt or adapt the IMM Standard on Coating Fingerprinting as one of the Malaysian Standards?

Prof. Ts. Dr. Mohamad Kamal Harun, Universiti Teknologi MARA

Yes, we are moving to that direction. We emphasize on validation, correlation and structural performances and the next step is acceptance through a regulated standard framework.

Prof. Dr. Melissa Chan Chin Han, Universiti Teknologi MARA

IMM just launched the IMM Standard on Coating Fingerprinting today, and we have already engaged with SIRIM on the possible collaboration to adopt or adapt this IMM Standard as Industry Standard. Moving forward, to migrate IMM Standard on Coating Fingerprinting as Malaysian Standard will be our aim. However, at this stage, the IMM Standard on Coating Fingerprinting will be referred by PTS 15.20.30 (for PETRONAS) and DEP 30.48.00.31 (for Shell).

Mr. Lim Chuan Gee, SIRIM

In my opinion, we don't really need FTIR spectral interpretation because knowing the ingredients of a paint is more important.

Prof. Dr. Melissa Chan Chin Han, Universiti Teknologi MARA

Normally, customers are not aware of (or not keen to know) the common or specific ingredients for a paint. The ingredients and the compositions of the ingredients of a paint is always a "trade secret" for paint manufactures. The common industrial practice is, Material Safety Data Sheet (MSDS) is provided for a paint instead of the ingredients of it. Hence, batch-to-batch consistency of paint can be assured by coating fingerprinting with reference to IMM FP01 without the need of knowing the ingredients of a paint is relevant.

Mr. Leslie Liew, HEMPEL Malaysia Sdn Bhd

Ir. Ong from Shell did mention that the industry is shifting towards the moisture-cure urethane (MCU) systems. Can you enlighten us a little bit about the drive of this change? And perhaps we can have the opinion on the MCU systems from PETRONAS's perspective too?

Ir. Ong Hock Guan, Sarawak Shell Bhd

For the upstream oil and gas industry, Shell has been using the epoxy systems for the last 20-25 years. There are many issues associated with these coatings and the blasting & painting works. Despite of the training on skilled personnel coupled with inspections, coating failure is a norm. In fact, the MCU system has been used by marine industries. The MCU paint can be applied in damp conditions with cost & time saving. Of course, additional cost incurred on new equipment settings and additional training for the blasters and painters for MCU systems is required. However, in terms of life-cycle cost, MCU systems might be cheaper than epoxy systems. Hence, Shell Malaysia is going towards this technology.

Mr. Muhd. Hawari Hasan, PETRONAS GTS

Referring to PETRONAS Technical Standard (PTS) 15.20.30, (1) users can decide on the preferred coating systems to be used from the pool of the recommended systems in PTS and (2) contractors/ vendors can propose suitable coating systems based on the preference of the users. The cognition will be simulated based on the requirement of the users and the experience of the vendors. A lot of testings are to be made in order to check on the performance of the proposed paint systems by the vendors. These inputs will be transferred to the users in assisting them on the selection of suitable coating systems for their projects.

Figure 1: Group photo of IMM Task Force on Coating Fingerprinting Committee Members (Phase 3)

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Compiled by: IMM Secretariat,
The information was updated as of 28th June 2019

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Beyond Paradigm Summit by Serba Dinamik aims to be the main platform of propelling the nations digital initiative and turning the national digital policies and ambitions into reality by bringing in key stakeholders from government and private sector. In shifting the paradigm of the masses, ground-breaking solutions with applicable business cases, novel business models and precise channels for accelerating digital transformation will be showcased and discussed to address current and future industrial pain points. Engage with the industries experts, globally and locally, and hear from renowned international academicians and industrial champions on the adoption of Industrial Revolution 4.0 values and technologies in the current industrial landscape. Differentiate yourself from being another digital "Fashionista" and prepare to participate in the applicable digital paradigm shift to enhance efficiency and productivity while future-proofing your business.

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What are coming.....

Issue	Month	Theme
24	April 2019	IMM outreach program
25	July 2019	Insulation & Welding
26	October 2019	Corrosion
27	Jan 2020	IMM Yearbook, Polymer & Coating Fingerprinting
28	April 2020	IMM Courses & Certification Scheme

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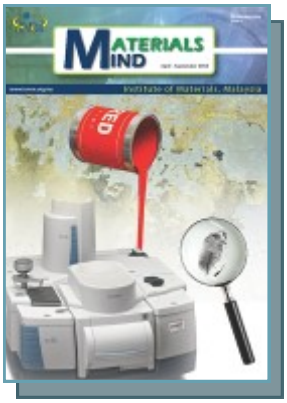

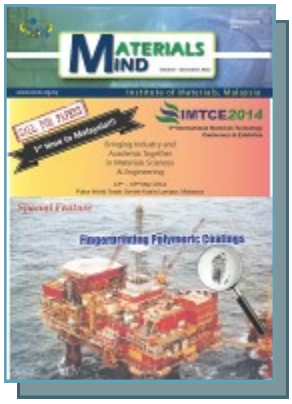

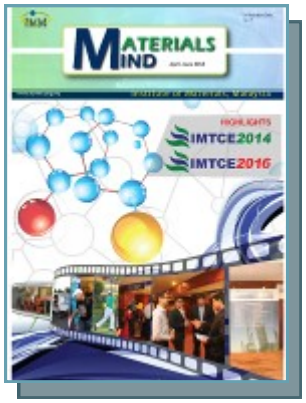

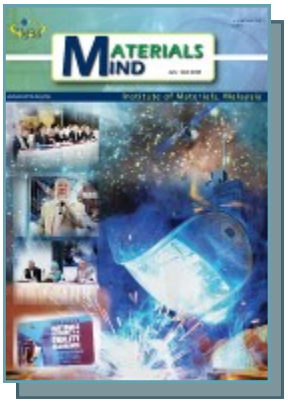

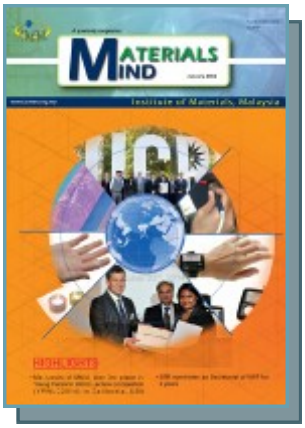
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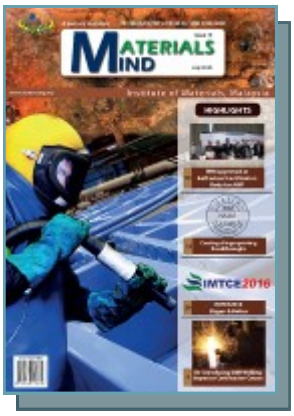
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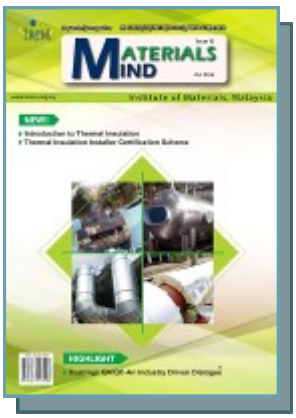
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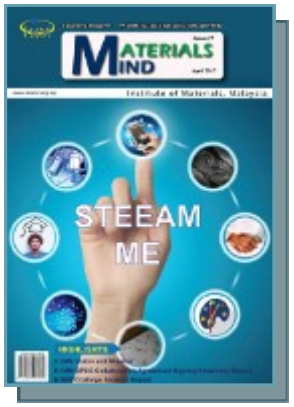
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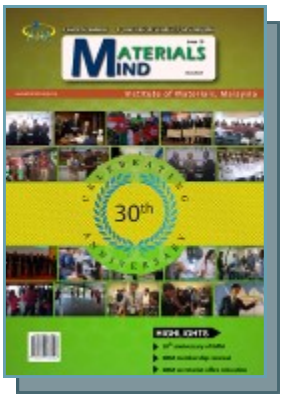
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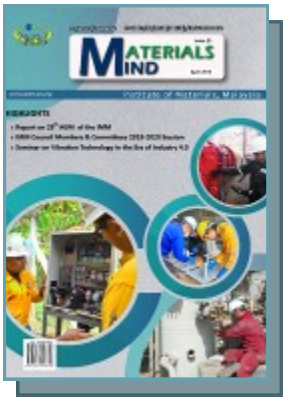
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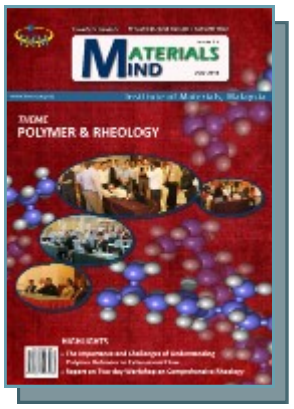
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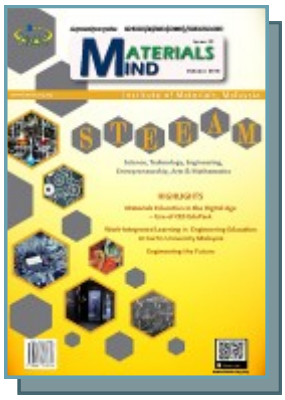
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