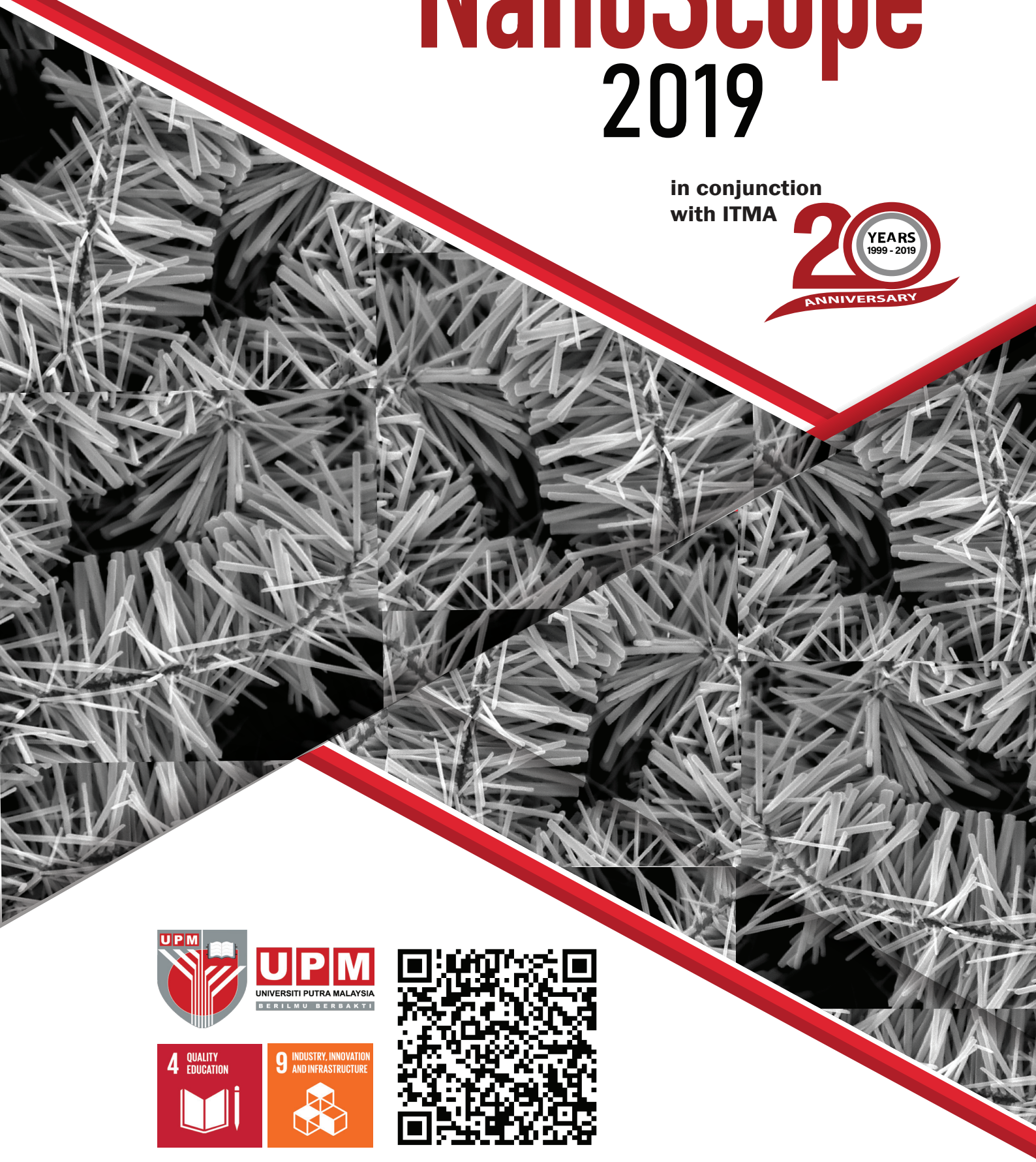
INSTITUTE OF ADVANCED TECHNOLOGY

NanoScope 2019

in conjunction with ITMA

20 YEARS 1999 - 2019 ANNIVERSARY



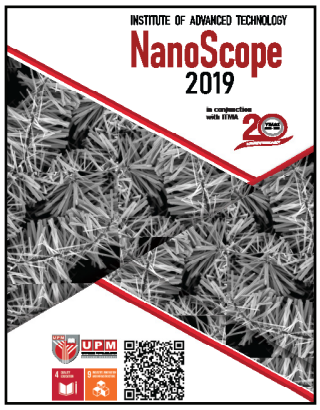
UPM

UNIVERSITI PUTRA MALAYSIA

BERILMU BERBAKTI

4 QUALITY EDUCATION

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



COVER:
Image obtained using Ultra High Resolution Scanning Electron Microscope (FESEM).

SAMPLE:
Zinc Oxide nanorods on CNT Cotton
By Juraina Md Yusof, Ismayadi Ismail, Rahimi M Yusop, and Md Ali Rani, Suraya Abdul Rashid, and Sarinawani Abdul Ghani

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Contents

DIRECTOR'S FOREWORD

Prof. Dr. Mohd. Nizar Hamidon
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It is my sincere pleasure to welcome you again to Nanoscope 2019, our annual magazine of achievement and activities by our outstanding researchers, staffs, and postgraduate students in ITMA throughout 2019. This is our sixth edition of the magazine, which the first edition was printed in 2014.

2019 is a meaningful year for ITMA since being established in 1999 as it celebrated its twentieth anniversary. ITMA successfully organized a memorable event, ITMA Open Day, in conjunction with its twentieth anniversary. The presence of all former directors, and most of the former employees and students on the Open Day was indeed a great pleasure.

Establishment of ITMA originated with multidisciplinary research areas before experiencing a few stages of restructuring and finally focussing in the developments and applications of nanotechnology and advanced materials. ITMA has gone through many obstacles and challenges. Still, it manages to continually progress in line with the vision to become a research institute of international repute in the field of nanotechnology and advanced materials.

Besides conducting world-class research, ITMA also encouraged research sharing by organizing its annual knowledge-sharing platform, iSAMN2019. Collaboration between research groups also has been seen as a stepping stone to move forward. Therefore a few programs such as mobility programs, students exchange, and industrial partnerships were established. Besides sharing and gaining knowledge, those activities are also platforms to strengthen our networking and increase the visibility of ITMA and UPM at the national and international level.

I want to extend my gratitude to all research associates and ITMA's staffs for supporting and contributing to our overall development and achievement in 2019. I hope we will all continue to excel in our roles in steering ITMA's research to a higher level to ensure our competitiveness in the years to come.

OVERVIEW

The Institute of Advaced Technology (ITMA) is a multidisciplinary research institute in the field of Advanced Materials and Nanotechnology. ITMA focuses on areas such as materials synthesis and characterization, materials processing and technology, and materials applications in sesors and functional devices. It supports over 50 researchers and fellows, and over 100 post-graduate students.

ITMA has three main research laboratories, all within close proximity to ITMA's distinguished technology facilities. We make every effort to provide cutting-edge equipment to help our researchers carry out research of the highest standard.

VISION

To become a research institute of international repute in the field of nanotechnology and advanced materials.

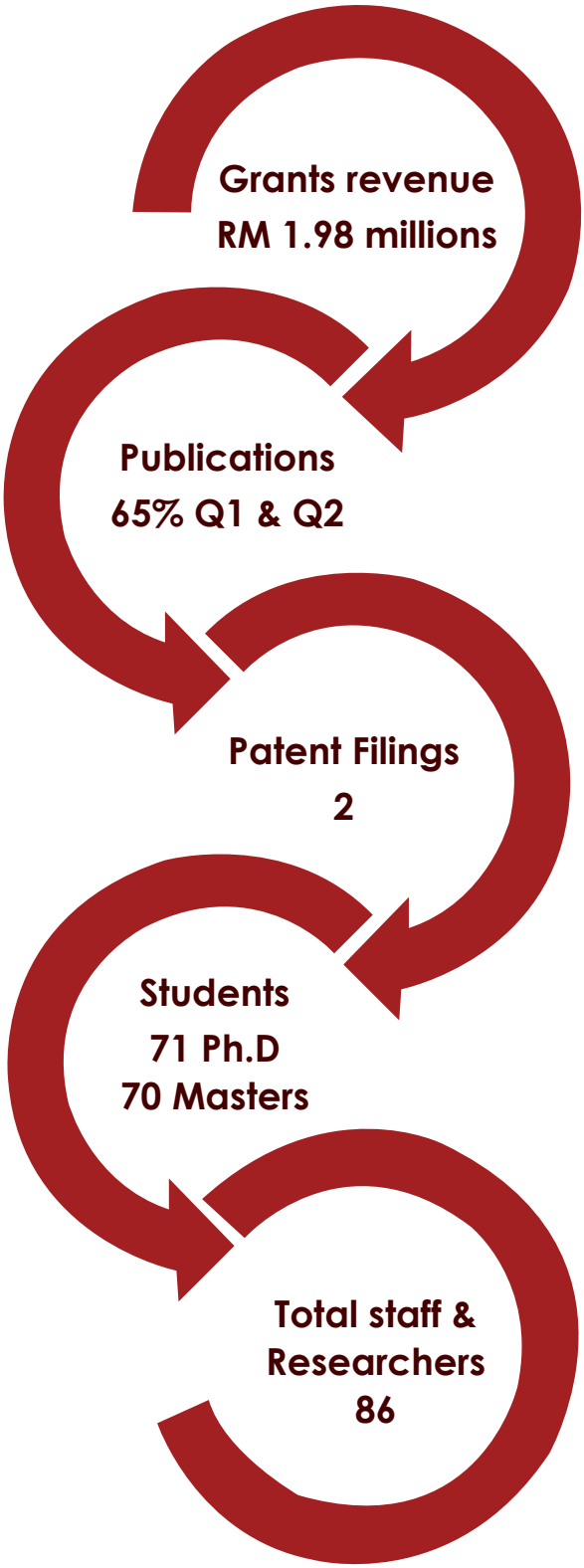
MISSION

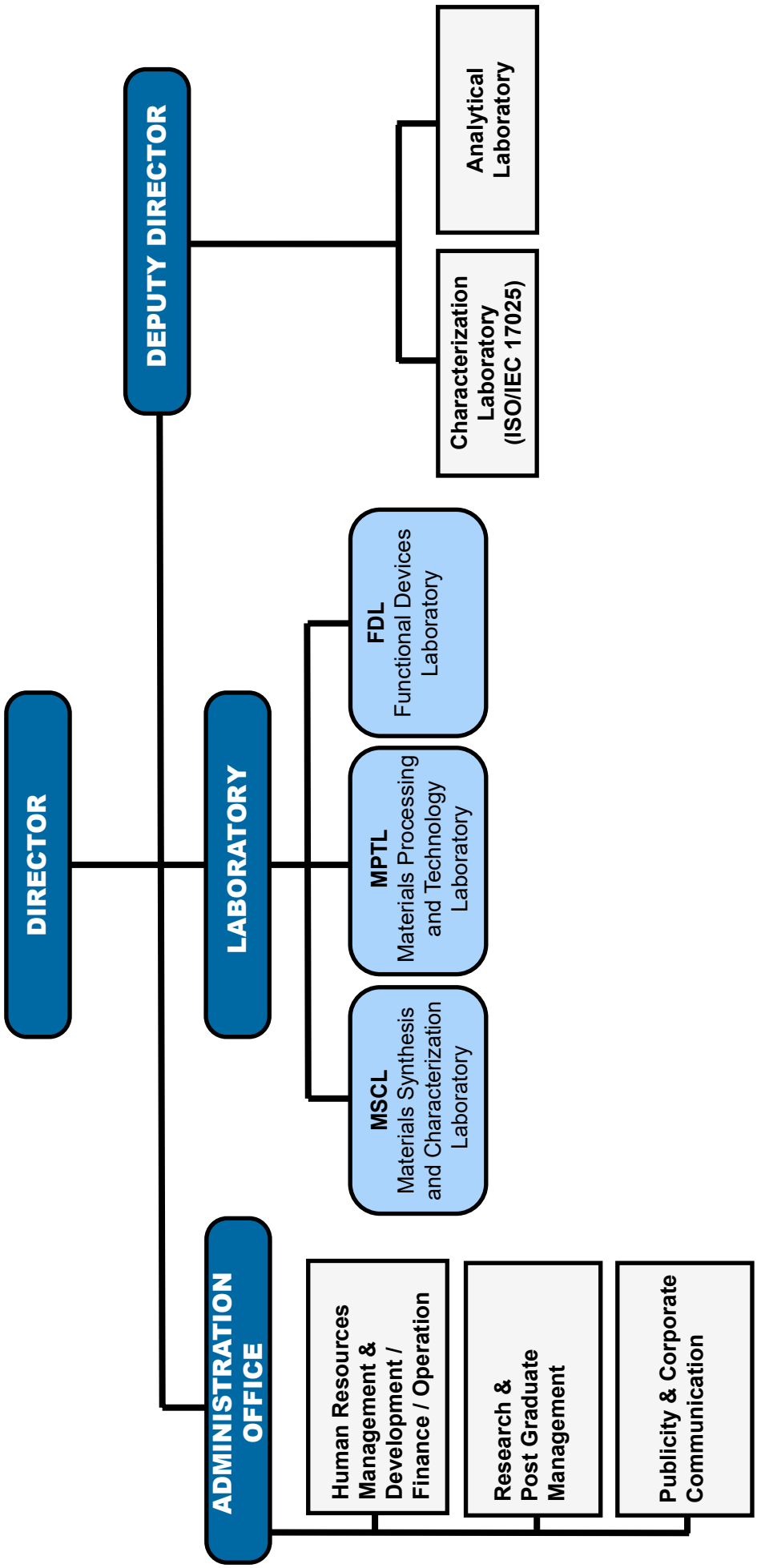
To contribute significantly towards wealth creation, nation building and universal human development through high impact research in nanotechnology and advanced materials.

GOALS

1. To empower ITMA as a premier center of excellence by providing the best research infrastructures.
2. To elevate achievements in research and innovation to international levels.
3. To produce knowledgeable and competitive graduates.
4. To strengthen the involvement of industry and community to wealth creation and sharing of knowledge.

ITMA AT A GLANCE




ORGANIZATIONAL STRUCTURE
DIRECTOR
DEPUTY DIRECTOR
Analytical Laboratory
Characterization Laboratory (ISO/IEC 17025)
LABORATORY
FDL Functional Devices Laboratory
MPTL Materials Processing and Technology Laboratory
MSCL Materials Synthesis and Characterization Laboratory
ADMINISTRATION OFFICE
Human Resources Management & Development / Finance / Operation
Research & Post Graduate Management
Publicity & Corporate Communication

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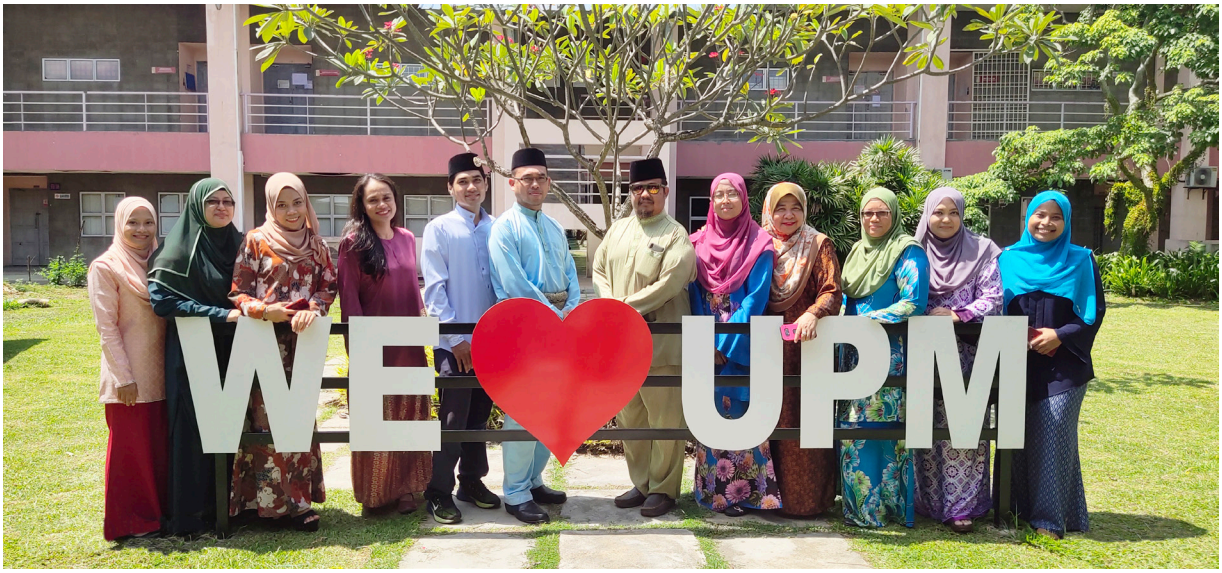
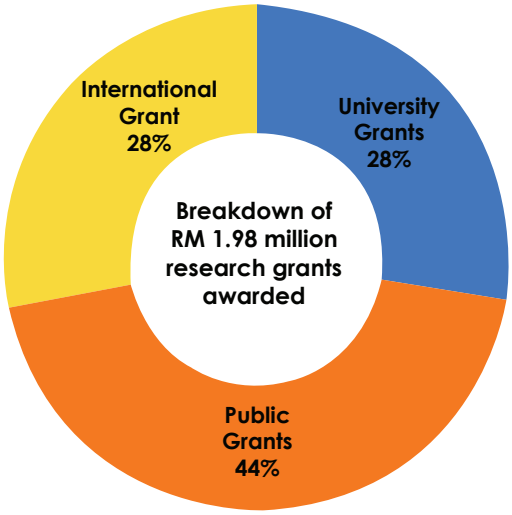
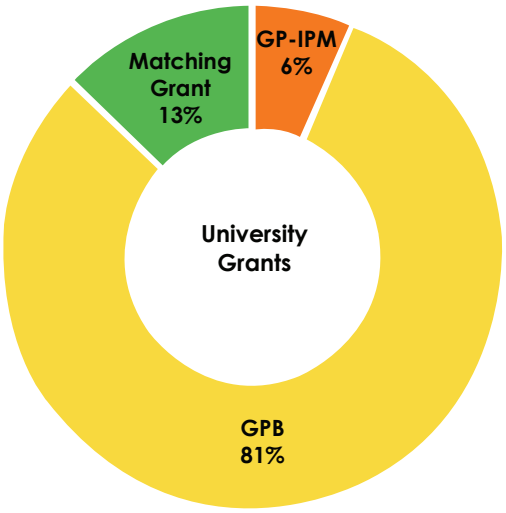


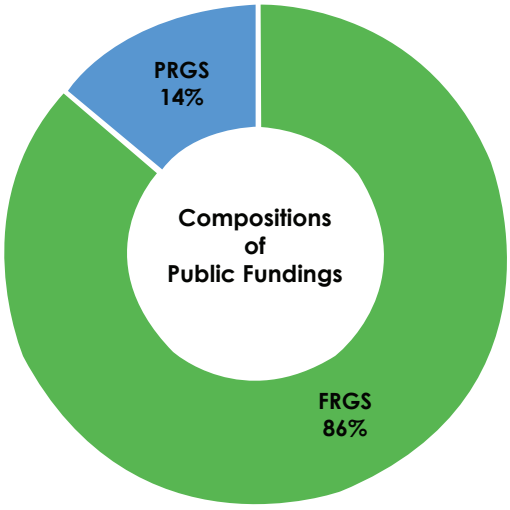
RESEARCH: Achievements

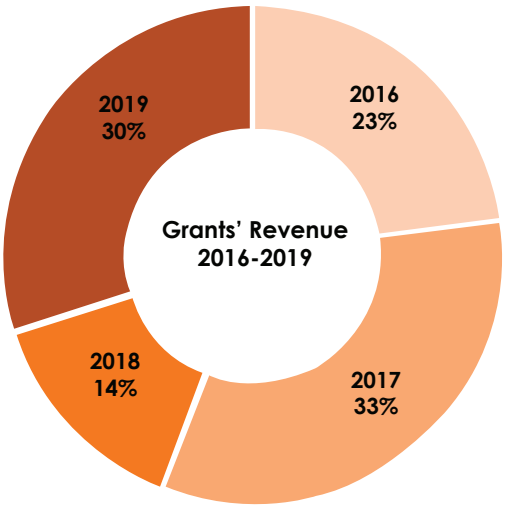
Research Grants

ITMA received RM 1 981 601 to fund 16 projects in 2019. The largest grant revenues were from public grants corresponding to 44% followed by an international grant and university grants. The international grant was secured from TUBITAK (The Scientific and Research Council of Turkey) which was also the largest individual grant.



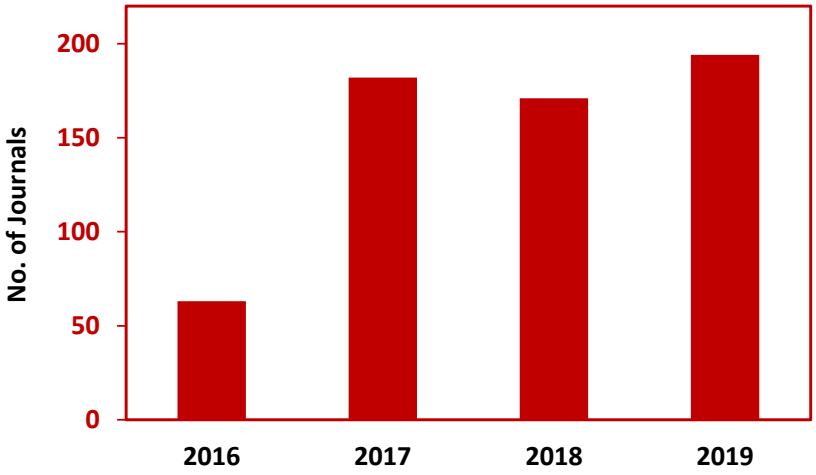






Scientific Contributions

Research dissemination relatively increased based on the number of research articles by 13.5% compared to 2018, with 65% of them were Q1 and Q2 journals. The growing number of journal publications demonstrates an increase of research activities, received grants as well as collaborations with other local and international universities.



2019 Key Performance Indicator (KPI) Achievements	Achievements
Journal	194
Conference Proceedings	19
Publication in Q1 & Q2	65%
Patent filing	2

Patents

NO.	APPLICATION NO.	INVENTOR(S)	TITLE	COUNTRY	STATUS
1	P00201908020	Mohd Zobir Hussein (ITMA) Sharida Fakurazi (FPSK) Idris Abu Seman (MPOB) Farhanatun Najat (ITMA)	Process for Producing Fungicide / Fumigant Nano-Delivery System for Controlling Gano-derma Disease and Composition Thereof	Indonesia	Patent filing
2	20191403669	Mohd Zobir Hussein Sharida Fakurazi (FPSK) Idris Abu Seman (MPOB) Farhanatun Najat (ITMA)	Process for Producing Fungicide/ Fumigant Nano-Delivery System for Controlling Gano-derma Disease and Composition Thereof	India	Patent filing

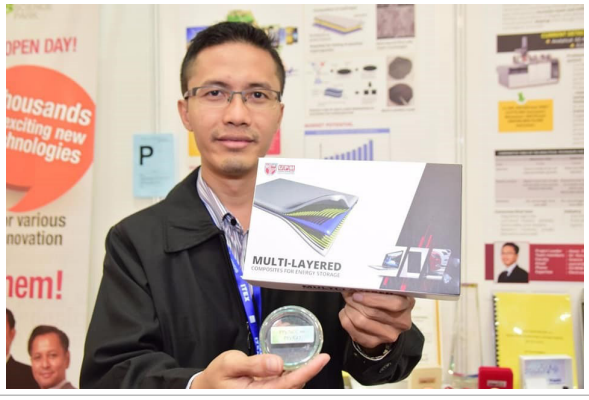
NanoScope 2019 ITMA

ITMA Researchers Received Awards at Itex 2019

Three ITMA researchers received awards at the 30th International Invention & Innovation Exhibition 2019 (ITEX 2019). ITEX 2019 was held at the Kuala Lumpur Convention Center (KLCC) from 2 to 4 May 2019.

Assoc. Prof. Dr. Yusran Sulaiman, ITMA associate researcher from MSCL (lecturer of Faculty of Science) won a gold medal for the "Biosensor for Rapid Clenbuterol Detection" product. Prof. Dr Mohd Zobir Hussein (ITMA fellow researcher) and Assoc. Prof. Dr. Janet Lim Hong Ngee (Head of MSCL) received silver medals through their respective products. The products are NANODERMA: A Potent Antifungal Nanodelivery System for Ganoderma Disease Treatment for Oil Palm and External Water Filter Filter with Dual-Functional Photoelectrochemical Sensor-Adsorbent of Copper (II) Ions.

Assoc. Prof. Dr. Janet Lim Hong Ngee also received the HOMEDEC Special Award. The awards were presented at the "Malam Budaya Cipta". Heartiest congratulations to all the winners for the great achievements. May there be more innovations in the future.



ITMA Won Golds and Silver in PECIPTA2019

Three ITMA researchers won gold medals and one for a silver medal against 459 innovations from public and private institutions in PECIPTA2019. PECIPTA2019 is a bi-annual R&D competition jointly organized by Ministry of Education and Universiti Tun Hussein Onn (UTHM). The competition was held on 22-23 September 2019 in UTHM, Johor.

ITMA was presented by Prof. Dr. Mohd Zobir Hussein (NANODERMA: A Potent Antifungal Nanodelivery System for Ganoderma Disease Treatment), Assoc. Prof. Dr. Ts. Suraya Abdul Rashid (HarvastTM Photosynthesis Enhancer), Assoc. Prof. Dr. Janet Lim Hong Ngee (Outdoor Water Filter with SMART BEADS for Dual-Functionality of Filter-Photosensor of Contaminants) and Assoc. Prof Dr. Yusran Sulaiman (Layer-by-layer assembled composite materials for energy storage).

Besides ITMA, UPM also submitted another eighteen participations which were also won nine golds and nine silvers.

There were five main research categories including fundamental, innovation, commercialization, STEM and special need. All participation form UPM falls under various categories under Agriculture & Aquaculture, Building & Construction, Digital Era, Data Analytics & Automation Revolution, Education, Community Development & Social Innovation, Environmental & Renewable Energy and Health, Medical, Pharmaceutical, Food & Supplement clusters.

ITMA, UPM Student Represents Malaysian Youth at the ASEAN-Russia Youth Summit

A Master of Science student from the Institute of Advanced Technology (ITMA), Universiti Putra Malaysia (UPM), Alya Hananin, 24, represented Malaysia at the Fifth ASEAN-Russia Youth Summit in Manila, Philippines. The summit was held in 26 November 2019.

Alya, under supervision of Assoc. Prof. Dr. Halim Abdullah was one of four Malaysian youth delegates to the international conference which was also attended by representatives from each ASEAN country and Russia.

She was selected to represent Malaysia after participating in a series of selection programs which included essay writing, psychometric test, group assignment, public speaking and interview session conducted by the Ministry of Youth and Sports involving 5,000 candidates from all over Malaysia aged between 18 and 34 years old.

The youth summit, themed "Enhancing People to-People Connectivity between ASEAN and Russia" aimed at encouraging mutual understanding between ASEAN countries and Russia through discussions and cultural activities.

The summit successfully drafted the Declaration of "Young People's Contribution to ASEAN-Russia Relations: Enhancing People-to-People Connectivity" that focused on three core areas i.e. education, cultural exchange, and economic and trade exchange.

Since its inception, the youth summit provided opportunities for youth from various institutions and organisations in the ASEAN countries and Russia to share their thoughts and ideas on ways to enhance ASEAN-Russia regional cooperation.

Participants of the youth summit also held a courtesy call on the President of the Philippines, Rodrigo Duterte, at his official residence, Malacañang Palace.

Two ITMA's Associates Amongst the Receivers For MGAP 2018 Awards

Majlis Gemilang Akademia Putra (MGAP) is the university's acknowledgment and recognition of its staff who have showcased excellence in the exploration and development of knowledge and education services in uplifting the culture of knowledge.

Congratulation to Assoc. Prof. Dr. Yap Wing for the Vice-Chancellor's Fellowship Research and Innovation Award (Young Researcher Category) and Assoc. Prof. Dr. Suriati Paiman for the Vice-Chancellor's Fellowship Research and Innovation Award (Art and Creativity category). Both are research associates of Functional Devices Laboratory.

The awards are for UPM staff who have delivered excellent service and raised the university's reputation at the national and global level.

ITMA Won the Best Website Management Award under Institute Category

Congratulation to ITMA's Website Committee for receiving the best website management award (institute category) in conjunction with 'Hari Kualiti dan Inovasi Perkhidmatan (HKIP)' UPM in November 2019.

ITMA's Excellent Researchers and Students Award 2018

Four research associates received Excellent Researchers 2018 as a recognition of ITMA researchers who delivered an astounding performance in the year of 2018. Award recipients represented each of their respective laboratories.

Assoc. Prof. Dr. Rabaah Syahidah Azis from MSCL (Faculty of Science), Assoc. Prof. Dr. Mohamad Amran Mohd Salleh from MPTL (Faculty of Engineering) and Prof. Dr. Nor Azah Yusof from FDL (Faculty of Science). Meanwhile, Dr. Norhafiz Azis from FDL (Faculty of Engineering) was selected as an Excellent New Researcher. Each winner received a certificate and some allocation of short term grants.

One Master and one Ph.D. students also received Best Student of ITMA 2018 awards. They were Tharani Kulandaivalu, a Master student under the supervision of Assoc. Prof. Dr. Ts. Suraya Abdul Rashid and Meysam Toozandehjani, a Ph.D. student under supervision of Assoc. Prof. Dr. Khamirul

Best Paper Award

Dr. Intan Helina Hasan won best paper award in 2019 IEEE Regional Symposium on Micro and Nanoelectronics (RSM2019). The other team members were Prof. Dr. Mohd Nizar Hamidon, Dr. Ismayadi Ismail, Muhammad Asnawi Mohd Kusaimi, Saman Azhari and Farah Nabilah Shafiee. The paper entitled 'Rheology Properties of Carbon Nanotube Thick Film Paste for Potential Application in Patch Antenna'.

RESEARCH HIGHLIGHTS

Innovation: A Water Filter for Copper Ions Removal

Assoc. prof. Dr. Lim Hong Ngee
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Water filter with dual-functionality of filter sensor of copper in drinking water. The water filtration system, known as 'Outdoor Water Filter with SMART BEADS', is also able to monitor the amount of heavy metal in the water and simultaneously detect the amount of chemical contamination in it.

The innovation is to address the concern of excessive copper content in the body. Excessive copper ions in the body can affect human health and cause many diseases such as Alzheimer's and human inflammatory disorders. Although copper is an important chemical element in the environment and the human body because it forms red blood cells and nourishes nerve cells and promotes healthy immune, an excessive amount can result in adverse effects to the body. This innovation was made after realizing that the public may be concern about the level of copper ion in drinking water not meeting the safety standard of the World Health Organization (WHO).

The innovation of dual-functional water filter is beneficial to consumers, especially for those facing the water pollution dilemma. The prototype includes filtration and sensing of copper ions in drinking water which could be done by using a single water filtration system that simultaneously detects the toxic level in the water.

This dual-functional device uses a nano material known as 'Versatile Graphene', which is produced through a simple, economical and environmental friendly approach. The findings of this innovation in utilizing 3D printing for device fabrication can be a building block for the next generation of energy architecture.

The product Versatile Graphene bagged the top Researcher Entrepreneur Award at the Malaysian Commercialization Year (MCY) 2018 in conjunction with the International Greentech & Eco Products Exhibition & Conference Malaysia (IGEM 2018). The innovation, on the other hand, won the Best Invention for Household Product Category at the International Invention, Innovation & Technology Exhibition (ITEX) 2019.

Development of Broadband Microwave Absorbers

Dr. Idza Riati Ibrahim
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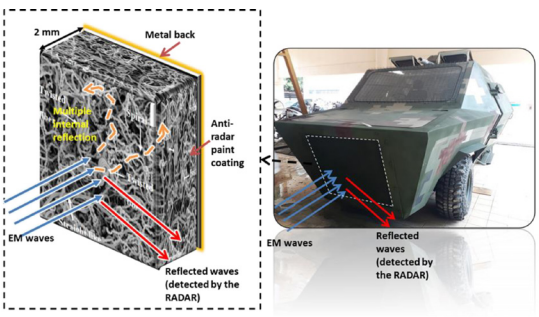
Microwaves are well-known in our daily life application, mainly because of its use in our household as a microwave oven. However, did you know that microwaves technology and applications can actually work beyond that? Microwaves, a type of electromagnetic radiation work in frequencies between 300 MHz to 300 GHz. Therefore, microwaves have a wide range of applications, including communications and radar system. However, with the continuous exposure to this electromagnetic radiation, the electromagnetic interference pollution can cause disturbances on various systems and equipment for civil and military applications. Besides, microwave radiation is also potentially harmful to biological systems with continuous exposure to microwave for a considerable period. Therefore, microwave absorbing materials have become one of the most vital high-tech materials in recent years due to its capability of absorbing unwanted electromagnetic signals. Hence, applications working in higher frequencies are commonly manufactured with effective shielding to reduce the leakage of the radiation from these applications to barel detectable levels.

Principally, when electromagnetic (EM) waves are incident on a surface of a material, part of the EM waves would be reflected out from the surface or enter the surface and get absorbed by the material or transmitted through the material. Therefore, for a good microwave absorber, two essential conditions should be: i) the intrinsic impedance of the material is made equal to the impedance of the free space and ii) the incident electromagnetic waves must enter and get rapidly attenuated in the material.



In Materials Synthesis and Characterization Laboratory (MSCL), Institute of Advanced Technology (ITMA), we are extensively exploring the research on synthesizing optimized microwave absorbers composites, particularly for radar absorption. Different types of microwave absorbers, including, steel-waste, biomass, carbon-based and magnetic materials, are the leading group of materials synthesized and tested in our lab in searching for microwave absorbers with strong absorption performance in a broad bandwidth.

This coating would make a body of the vehicle, say the armoured vehicle, to be less reflective or invisible by radar detection. The performance of microwave absorption properties is characterized using a Vector Network Analyzer within the frequency range from 8 GHz to 18 GHz. Some of the main achievements of our study are low-cost production by reutilizing waste mill scale for radar absorbing material (RAM) fabrication. Through some modifications, only 6 to 8 weight per cent RAM from the total amount of material and paint are needed for excellent absorption, thus producing lightweight RAM. This RAM consisted of simple thin layer structure with a thickness of only around 2 to 3 mm with broadband absorption bandwidth of 6 GHz for at least >90% absorbed energy. Interestingly, the absorption of the RAM coating paint can achieve high attenuation of at least >99.9% absorbed energy.

Application of Carbon-based Nanomaterials in Environmental Friendly Drilling Fluid

Dr. Siti Zulaika Razali
Research Officer
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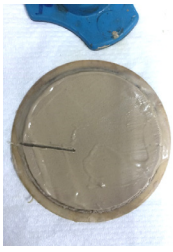
Drilling fluid is one of the important components in oil and gas exploration. It serves essential functions including the removal of cuttings; lubricating and cooling the drill bit; sealing permeable formations; suspending solids and controlling subsurface pressure to prevent formation damage. Due to rising energy demand, exploration has extended into the delicate marine region. Esters have been introduced as a substitution to diesel to reduce the environmental impact. Findings show that degradation of esters is fast in both aerobic and anaerobic conditions. Furthermore, it is non-toxic due to the absence of aromatic compounds. Although ester-based drilling fluid (EBDF) is least toxic to marine life compared to hydrocarbon-based low toxicity drilling fluid, it has some critical drawbacks such as high kinematic viscosity, high pour point, low thermal stability and poor hydrolytic stability. These properties are close-related to the compositions and structures of the ester. Modification of esters or incorporating additives into the EBDF help to reduce the risks of failure. Application of nanosilica, ferum oxides, multiwall carbon nanotubes are widely used as additives in water-based drilling fluids. However, not much works have been reported in the ester-based drilling fluid.

In this work, methyl caprylate/caprate has been converted into 2-Ethylhexyl caprylate/caprate after reacting it with branch alcohol, 2-Ethylhexyl ester. The properties of the newly synthesized ester are much better compared to methyl ester in term of temperature and hydrolytic stability. Experimental works showed that 2-Ethylhexyl caprylate/caprate ester was able to withstand temperature ranging from 275 to 360 °F with acceptable rheologies and HPHT filtration properties. On the other hand, current commercial ester-based drilling fluid is only able to drill up to 300 °F. This study also investigated the effects of carbon nanomaterials in ester-based drilling fluids.

It showed that different properties of carbon nanomaterials resulted in different rheology and filtration properties. Graphene oxide (GO) which has high affinity towards the water molecules resulted in poorer rheologies and filtration properties compared to the control sample. Poorer rheologies and filtration properties lead to bigger drilling problems such as loss of circulation, blow out, pipe sticking and etc. Besides GO, graphene-derived nanomaterials such as graphene nanopowder and graphene nanoplatelets also produced different results. Graphene nanopowder enhanced the rheology of EBDF and able to reduce filtrate amount. In contrast, graphene nanoplatelets were unable to improve the filtration properties of the drilling fluid. Meanwhile, fibrous characteristic of carbon nanotubes (CNTs) cotton enhanced the filter cake network structure, thus decreased the filtrate amount. The shape, size and true density are behind the reason for different rheologies and filtration properties of EBDF.

These findings indicate that 2-Ethylhexyl caprylate/caprate is able to produce drilling fluid that can withstand a wide range temperature up to 360^0 F. Addition of carbon nanomaterials gave different properties of EBDFs. Graphene nanopowder has the most beneficial impacts on EBDFs.



Materials Synthesis and Characterization Laboratory (MSCL)

BACKGROUND

Materials Synthesis and Characterization Laboratory (MSCL) was established on 1st November 1999. It was formerly known as Advanced Materials Research Center (AMRC) and later was changed to Advanced Material Laboratory (AML). In line with university's restructuring, its name was changed to Advanced Materials and Nanotechnology Laboratory (AMNL) in 2006. Recent restructuring in 2012 has seen AMNL evolving to Materials Synthesis and Characterization Laboratory (MSCL) to be in tune with advanced materials and nanotechnology research focus. This laboratory is one of the three research laboratories under the Institute of Advanced Technology (ITMA). MSCL focuses in three main activities;

1. Interdisciplinary research and development work in advanced materials and nanotechnology.
2. Postgraduate research programs.
3. Dissemination of innovative knowledge and technologies in advanced materials and nanotechnology.

OBJECTIVES

1. To be a leading research centre in advanced materials and nanotechnology.
2. To develop world class research laboratory in advanced materials and nanotechnology.
3. To disseminate knowledge and innovative technologies through publications, seminars and conferences.

MSCL Research Group

Nanomaterials

This program focuses on the synthesis and characterization of nanomaterials and their building blocks which involves the use of nanosized materials. The study of these materials covers the fundamental aspects towards their potential application. The research on nanocomposite materials and nanostructured materials includes but is not limited to nanometals, nanoalloys, nanoceramics, carbon nanotubes and layered double hydroxides.

Functional and Structural Materials

This program focuses on synthesis and characterization of advanced functional materials and also structural materials. The study of these materials covers the field of advanced materials such as electronic materials, magnetic and supperconducting materials, dielectric ceramic materials, semiconducting materials, photonic materials, thin film materials and smart materials. It also focuses on advanced polymer-matrix composite, structural metallic alloy and ceramic double hydroxides.

Foundry of Recticular Materials for Sustainability (FORMS)

The Foundry of Reticular Materials for Sustainability (FORMS) is a long-term collaborative programme between Universiti Putra Malaysia and the University of California, Berkeley, America. This programme focuses on research involving the synthesis and applications of metal-organic frameworks (MOFs). The applications of MOFs include, but are not limited to materials science and technology, biosystems and biotechnology, agriculture, water, veterinary and animal science, energy, and health and medicine yield. It is a green technology.

MSCL Laboratory Members

Assoc. Prof. Dr. Lim Hong Ngee
Head of Laboratory
Expertise:
Analytical Chemistry, Materials Chemistry

Prof. Dr. Mohd Zobir Hussein
Research Fellow
Expertise:
Nano Materials and Materials Chemistry

Assoc. Prof. Dr. Abdul Halim Abdullah
Research Associate
Expertise:
Analytical Chemistry, Catalysis, Environmental Chemistry, Materials Chemistry

Assoc. Prof. Dr. Khamirul Amin Matori
Research Associate
Expertise:
Glass, Glass Ceramic

Assoc. Prof. Dr. Raba'ah Syahidah Aziz
Research Associate
Expertise:
Electrochemistry, Materials Chemistry

Assoc. Prof. Dr. Chen Soo Kien
Research Associate
Expertise:
Superconducting Materials

Assoc. Prof. Dr. Thahira Begum
Research Associate
Expertise:
Synthesis Metal-organic Frameworks(MOFs)

Dr. Nurul Huda Osman
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Expertise:
Microwave Planar Components, Material Characterization, Sensor Design

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Expertise:
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Magnetics Materials

Dr. Farid Ismail
Research Associate
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Computational Chemistry

Dr. Josephine Liew Ying Chyi
Research Associate
Expertise:
Semiconductor Materials Characterization, Syntesization, & Utilzation

Prof. Dr. Mohd Basyaruddin Abdul Rahman
Research Associate
Expertise:
Theoritical and Computational Chemistry, Catalysis, Synthesis, Oleochemistry

Prof. Dr. Sidek Ab Aziz
Research Associate
Experties:
Glass, Ceramics, Oxide Glasses, Glass Ceramics, Acoustic

Prof. Dr. Taufiq Yap Yun Hin
Research Associate
Expertise:
Natural Product Chemistry, Catalysis

Dr. Ismayadi Ismail
Research Officer
Expertise:
Magnetic Materials, EM-wave Absorbing Materials, Carbon Nanostructures

Rosnah Nawang
Research Officer
Expertise:
Bioceramics, Bone Regeneration

Dr. Idza Riati Ibrahim
Post-Doctoral
Expertise:
Nanomaterials and Nanotechnology, Magneticmaterials

Sarinawani Abdul Ghani
Science Officer
Expertis:
Nano Materials

Nazrul Abdullah
Assistant Engineer
Expertise:
Specialize in BET and 3D modelling Software (Autodesk Inventor, CATIA)

Mohd Kadri Masaud
Assistant Engineer
Expertise:
Radiation Officer (XRD)

Noor Lina Shamsuddin
Assistant Engineer
Expertise:
Specialize in TGA/DSC

Materials Processing and Technology Laboratory (MPTL)

BACKGROUND

Materials Processing and Technology Laboratory (MPTL) was established to fulfill the research necessity in Advanced Materials Processing and Nano Materials. MPTL was developed to complement the ITMA ecosystem, which aims to be a leader in the field of Nanotechnology and Advanced Materials. MPTL focuses on developing and promoting research in Materials Technology and Advanced and Nano Materials Processing in Malaysia.

The main activities of the laboratory are :

1. Conducting research in related fields.
2. Postgraduate research programs.
3. Provide trainings and consultancy services.

OBJECTIVES

1. To be a leading research center in processing and technology for advanced materials and nanomaterials
2. To produced experts in the field of processing and technology for advanced materials and nanomaterials.
3. To be a knowledge dissemination center of processing and technology for advanced materials and nanomaterials.
4. To build a network of strategic partnership between local and international researchers from public and private institutions.

MPTL Research Group

Materials Processing

This program focuses on developing research related to scalable processing of advanced materials and nanomaterials. We have expertise in synthesis of carbon nanotructures such carbon nanotubes (CNTs) and CNTs cotton by both batch and continuous chemical vapour deposition (CVD) processes. The existing know how and facilities in CVD processing open other venues for research such as superconductor thin film and bottom-up synthesis of graphene and homologous graphene. Scalable top-down processes for preparation of graphene oxide and graphene quantum dots are also being actively pursued. Other scalable processes for synthesis of advanced materials and nanomaterials include hydrothermal and solvo thermal approaches.

Nanomaterials Technology

This program focuses on the development of innovative products using advanced materials and nanomaterials for various applications. The different types of nanomaterials used include carbon based nanostructures such as carbon nanotubes (CNTs), graphene oxide and reduced graphene oxide, graphene quantum dots as well as other various types of metal oxide nanoparticles. The products being developed are diverse and include nanofluids such as nanomaterial enhanced drilling fluids and heat transfer fluids for microfluidics, nanoemulsion systems such as nanoemulsion fuels and pesticides, a wide range of nanocomposites, nanocatalysts, nanocoatings and smart materials. The nature of research under this program ranges from fundamental studies to applied research to proof of concept and performance testing.

MPTL Laboratory Members

Assoc. Prof. Dr. Ts. Suraya Abdul Rashid
Head of Laboratory
Expertise:
Nanotechnology & Nanomaterials

Dr. Umer Rashid
Research Fellow
Expertise:
Renewable Energy (Biodiesel)

Prof. Dr. Robiah Yunus
Research Associate
Expertise:
Biolubricants, Palm Oil Products and Process Development, Biofuel, Carbon Fiber Reinforced Composites

Assoc. Prof. Dr. Nor Azowa Ibrahim
Research Associate
Expertise:
Polymer Chemistry, Environmental Chemistry

Assoc. Prof. Dr. Mohamad Amran Mohd Salleh
Research Associate
Expertise:
Particle Technology, Biochar and Nano-technology, Carbonaceous Particulates

Dr. Dayang Radiah Awang Biak
Research Associate
Expertise:
Heat Transfer, Modelling, Food Processing, Crystallisation, Pharmaceutical Products

Assoc. Prof. Dr. Siti Hajar Othman
Research Associate
Expertise:
Nanotechnology and Nanomaterials, Packaging Engineering

Dr. Shafreeza Sobri
Research Associate
Expertise:
Electrocrystallisation and Electrochemical Engineering

Dr. Faizah Mohd Yasin
Research Associate
Expertise:
Nanotechnology, Advanced Materials

Dr. Nordin Hj. Sabli
Research Associate
Expertise:
Photoelectrochemical Cell, Fuel Cell

Dr. Tan Tong Ling
Post Doctoral
Expertise:
Carbon Nanomaterials, Photocatalysis

Dr. Siti Zulaika Razali
Research Officer
Expertise:
Biobased Products, Nanotechnology, Drilling fluid

Juraina Md Yusof
Research Officer
Expertise:
Carbon Nanomaterials, Carbon Particles, Piezoelectric Materials

Mohd Ali Mat Nong
Research Officer
Expertise:
Nanoelectronics, Solar Cell, Nanomaterials

Roslina Abdul Rashid
Science Officer
Expertise:
Materials Science, Material Characterization

Ab Haffiz Ab Jalil
Assistant Engineer
Expertise:
Electrical and Electronics, Gas Chromatography

Zakky Yamanie Jamiauddin
Assistant Engineer
Expertise:
Mechanical Engineering

Functional Devices Laboratory (FDL)

BACKGROUND

Functional Devices Laboratory (FDL), formerly known as Sensor Technology Laboratory (STL) had been restructured and renamed in line with ITMA new ecosystem. The laboratory aims to be a leader in sensor technology and electron devices for nanotechnology and advanced materials. The main activities of the laboratory are conducting research in related fields, postgraduate programs, provide trainings and consultancy services.

OBJECTIVES

1. To be a leading research center in sensor technology and electron devices for advanced materials and nanomaterials.

2. To produce experts in the field of sensor technology and electron devices for advanced materials and nanomaterials.

3. To be a knowledge dissemination center of sensor technology and electron devices for advanced materials and nanomaterials.

4. To build a network of strategic partnership between local and international researchers from public and private institutions.

FDL Research Group

Sensor Technology

Sensor technology includes the study and preparation of sensing material and characterized by related transducer , signal processing and design of system or devices (including micro and nanoscale) in development of sensor to meet society and industrial demands. Sensor system includes (but not limited to) electronic sensors, biosensors, and chemical sensors. Sensor technology has a very important role as the key technology to support a wide variety of research and industrial applications. It is also a vital element that can be applicable to water security, environment and green technology.

Electron Devices

Electron Devices is a program that has been offered under this laboratory starting from 2012. This program aims to perform basic and applied research in the growth of semi conductors and related electronic materials, as well as micro analysis with the aim of developing new and improved electronic devices. The vision in this area is next generation electronic devices and sensors for improved performance and reliability in complex environments. Research areas include nanoelectronics and MEMS, RF and energy harvesting.

FDL Laboratory Members

Assoc. Prof. Dr. Suhaidi Shafie
Head of Laboratory
Expertise:
CMOS Image Sensor, Porous Silicon, Solar Cell, VLSI Design, Analog TV/VCR Tuners

Dr. Amir Reza Sadrolhosseini
Research Fellow
Expertise:
Nanomaterials, Plasmonic and Optic Sensors

Prof. Dr. Nor Azah Yusof
Research Associate
Expertise:
Analytical Chemistry, Electrochemistry, Environmental Chemistry

Prof. Dr. Mohd Nizar Hamidon
Research Associate
Expertise:
Microelectronics (Sensor Technology) MEMS, Devices Fabrication and Packaging, Wireless System

Assoc. Prof. Dr. Jaafar Abdullah
Research Associate
Expertise:
Analytical Chemistry

Assoc. Prof. Dr. Norhafiz Azis
Research Associate
Expertise:
Transformer Condition Monitoring, Insulationm Ageing and Diagnostics Asset Management and Alternative Insulation Materials for High Voltage Power Equipments

Assoc. Prof. Dr. Yusran Sulaiman
Research Associate
Expertise:
Analytical Chemistry, Electrochemistry, Materials Chemistry

Assoc. Prof. Dr. Yap Wing Fen
Research Associate
Expertise:
Optical Sensor based on Surface Plasmon Resonance Technique, Optical Studies on Glass Ceramics Composite Materials, Optical Properties of Nanocomposite Thim Film, Physics Literacy, Simulation & Multimedia

Assoc. Prof. Dr. Wan Zuha Wan Hasan
Research Associate
Expertise:
Bio Medical Engineering, Robotic and Automation, Sensor and Solar Technology

Dr. Mohd Nazim Mohtar
Research Associate
Expertise:
Niomedical Nanoelectronics Engineering, Lab on a Chip, Energy Harvesting

Assoc. Prof. Dr. Suriati Paiman
Research Associate
Expertise:
Nanowires, MOCVD, Indium Phosphide

Dr. Haslina Jaafar
Research Associate
Expertise:
Flexible Sensors & Electronics, Micro-Electro Mechanical Systems (MEMS), Carbon Nanomaterials and Embedded Systems

Dr. Amrallah Mustafa
Research Associate
Expertise:
Solar Cell, CMOS Image Sensors, Analog IC Design, Robotics

Dr. Sharul Ainliah Alang Ahmad
Research Associate
Expertise:
Analytical Chemistry

Dr. Intan Helina Hasan
Research Officer
Expertise:
Electron devices, Thick Film Technology, Printed Electronics

Rosiah Osman
Research Officer
Expertise:
Electrical and Electronics Engineering, Materials Science

Dr. Nor Hapishah Abdullah
Post Doctoral
Expertise:
Magnetic, Ferritite, Multiferroic, Nanomaterials, Ferroelectric and Dielectric Materials

Md. Ali Rani
Science Officer
Expertise:
Material Characterization

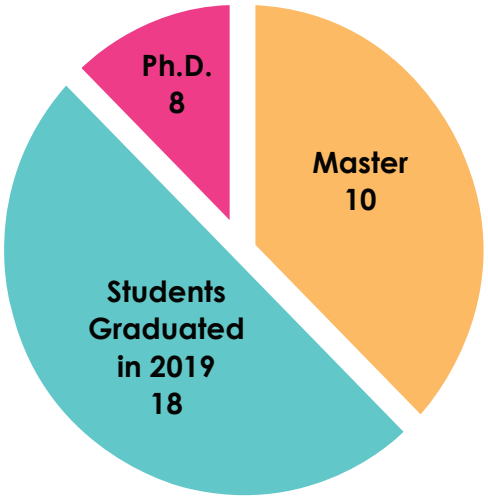
Mohd Wafi Azimin Muhammad Jan
Assistant Engineer
Expertise:
Specialize in Inject Printing

POST GRADUATE

ITMA provides opportunities to graduates to enhance their knowledge and training in research and development (R&D) by pursuing higher degree studies at Master and Ph.D. levels. ITMA offers various fields of study in the area of Advanced Materials and Nanotechnology.

Student Graduated

Eighteen students graduated in 2019; eight graduated with Ph.D. and ten graduated with Master.



Student Enrollment

141 students enrolled in 2019; 71 enrolled for Ph.D. and 70 for Master.

Program	Nationality	No. of Students	Total
PhD	Malaysia	60	71
	Iran	4	
	Iraq	1	
	Nigeria	3	
Master	Malaysia	63	70
	Iraq	1	
	Nigeria	3	
	Yemen	1	
	China	1	
	Bangladesh	1	

Mobility Programs

Students can expand their personal horizons and fulfill their potential by taking part in global education. Various options are offered, such as short summer school courses, internships and field camps as well as practical training and research in the field of science and technology. Students will benefit greatly from their understanding of the history, culture of the country themselves. They will also understand the education system, and will improve the language skills and learn new languages through friendships with new friends, indirectly enhances communication capabilities through mobility programs.

In-bound Mobility Program

Eighteen students were involved in the In-bound Mobility Program.

NO.	COUNTRY	ORGANIZATION	NO. OF STUDENTS
1	Japan	KYUTECH	11
2	India	National Institute of Technology Kamataka	3
3	Turkey	Ataturk University	2
4	Germany	Technical University of Munich	1
5	Algeria	Badji Mokhtar University	1

Out-bound Mobility Program

Eight students were involved in the Out-bound Mobility Program.

NO.	ORGANIZATION	NO. OF STUDENTS	
		Ph.D.	Master
1	Erzurum Technical University	4	0
2	Kyutech	1	1
3	Korea Advanced Institute of Science and Technology	0	1
4	University of California, Berkeley	1	0

FIELD OF STUDY

Nanosciences

Nano-size materials exhibit novel and superior physical and chemical properties, phenomena and processes, which are different from those of bulk materials. Metal nanoparticles have been intensively studied recently due to their novel optical, electronic, magnetic and electrochemical properties. In particular, silver nanoparticles have many potential applications in optical waveguides, optical switches, molecular identification, catalysis, pronounced surface plasmon resonance absorption, surface enhanced Raman scattering and surface-enhanced fluorescence. The properties of metal nano particles depend on several factors such as the electron density, size and shape of the nanoparticles, dielectric constant of the medium. The group has embarked on the preparation of polymer/metal nanocomposites by reduction of g radiation, chemical and physical methods. Various characterization techniques are employed including SEM, TEM, XRD, UV-visible spectroscopy and electrical properties.

Carbon Nanotubes (CNTs) Nanotechnology has become one of the most important and exciting forefront fields. Various devices in the nanoscale will be created in the near future. Demands for nanosized materials are increasing due to new inventions and innovations in nanotechnology. One of nanomaterials that have garnered the interest of researchers in the world is CNTs which deemed to change the scale of our current equipment. Based on the need of rising interests in synthesizing CNTs for nanotechnology, commercial PLAD systems and components with low start-up cost must also reached the market . We have designed an inexpensive new chamber for the pulsed laser ablation deposition (PLAD) system to synthesis CNTs.

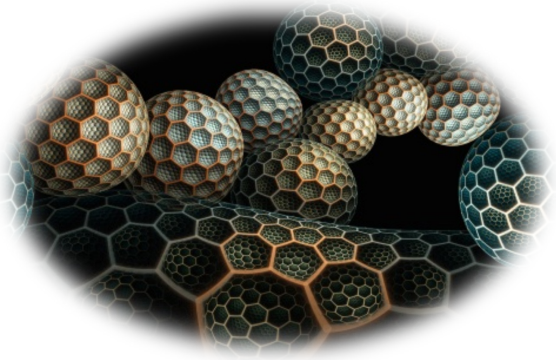
A T-shaped steel vacuum chamber was designed which has a cylindrical shape, with diameter of about 15 cm and 45 cm length. CNTs were formed by ablating the graphite pellet mixed with catalysts using the laser. Immediately the hot vapor plume is formed and expands then cools rapidly during the ablation process. Vaporized small carbon molecules condensed on the substrate to form CNTs. Another interesting nanomaterial produced by our system is web-like Fe_2O_3 with a diameter less than 17 nm and cotton-like Bi_2O_3.The same PLAD system developed in-house was used and parameters were retained as CNTs.

Advanced Materials

Advanced Materials Engineering is designed to train students in the materials and processes fields, for the purpose of integrating them in high-tech and traditional technological industries or in materials research at advanced degree levels. This program aims at preparing students with in-depth multi disciplinary knowledge, current issues and practices in the field of Advanced Materials such as composite, ceramic, electronic materials, magnetic material, smart material, plastic and polymer.

Green Engineering

Green Engineering is the process and design of products that conserve natural resources, and impact the natural environment as little as possible. The term is often applied to system or device that requires engineering, and incorporates sound environment principles. Though green engineering is somewhat more expensive, many countries, recognizing the value of such work, have begun to offer tax breaks, and other incentives to those who incorporate its use.



Energy

The field of energy engineering covers both fundamental and applied research that involves development, design and usage of alternative energy, renewable energy and sustainable technology. Renewable energy covers solar, wind, hydro, tidal, biomass and hydrogen energies. Research areas for renewable energy covers machine development, instrumentation, energy generation, energy storage that are environmentally friendly. For development of solar energy system, its instrumentation covers solar tracking device, modification of stirling engine, water drainage system, solar mirrors and smooth operation for the energy generation for a solar bowl. Wind farm requires a generation system, energy distribution and energy storage facilities. Development of gasifier and purification of synthesis gas for generation of electrical energy direct from oil palm biomass and generation of gases from biomass and some aspects of biomass energy generation. Animal tracking system and development of automatics methane gas generation are challenges for this research. Development of smart window, smart chimney and use of photo voltaic in creating a healthy indoor environment are part of sustainable technology. Students are required to take courses in related fields as stated and to conduct research as well as presenting research results in seminars.

Sensor Technology

Sensor Technology Engineering is the design and development of sensors to meet the need of the growth in products and services that utilize information from different types of sensors. Sensor technology has a very important role as the key technology to support a wide variety of research and industrial application. It is also a vital element that can be applicable in agriculture, water security, environment and green technology. The term is applied mostly in development of sensor networks, which also include wireless sensor networks (WSN). Although sensors can include electronic sensors, biosensors, and chemical sensors, the focus will be on the development and design of the electronic sensors.

Nanotechnology

This program aims at preparing students with knowledge related to nanotechnology which deals with developing materials, devices, or other structures possessing at least one dimension sized from 1 to 100 nanometres. Nanotechnology is the study of manipulating matter on an atomic and molecular scale. Nanotechnology entails the application of fields of science as diverse as surfacescience, organic chemistry, molecular biology, semi conductor physics, microfabrication. Some of typical applications of nanotechnology are in sensor, in delivery system, nanoabsorbents, nano electronic, nano machine, nano composites, nanotubes, and nanocarbons.

LINKAGES & NETWORKING

ITMA establishes linkages and networking with other entities (universities, industries, and communities) through various activities such as university-university visits, industrial university visits, community engagements, MoU/MoA agreements, and mobility programs.

Industrial Linkages

Counter-Visit from Chulalongkorn University Delegates

ITMA received a counter-visit from Chulalongkorn University, Bangkok, Thailand in May 2019. The delegates were Assoc. Prof. Dr. Chawalit Ngamcharussrivichai and Dr. Wayu Jindapon from Department of Chemical Technology. The visit intended to discuss potential future collaborations such as research collaborations, student exchange and mobility programmes. The visit created opportunities for ITMA researchers to undertake collaborative research with Chulalongkorn University, Bangkok. It is the initial phase to forge a close research network with another international university. During the visit, the delegation got the opportunity to tour ITMA's laboratories and Centre of Excellence for Catalysis Scienceand Technology (PutraCAT), Faculty of Science, UPM.

A Visit by ICMA's Delegation

ITMA was honoured to receive a delegation from Aragón Materials Science Institute (ICMA), University of Zaragoza, Spain in June 2019. The delegation was headed by Prof. Dr. Javier Campo (Director) and accompanied by Prof. Xerman de la Fuente (scientist) who also delivered a lecture entitled "Laser application in materials science and engineering" to UPM researchers and students at ITMA Seminar Room. Prof. Javier expressed his desire to strengthen further the relationship with ITMA and UPM after a discussion between him and ITMA researchers. Signing an MoU is one of the plans. A meeting was arranged between ICMA delegates and UPM Vice Chancellor, Prof. Datin Paduka Dato' Dr. Aini Ideris at Vice Chancellor's Office. The meeting was also attended by Prof. Dato. Dr. Ing. Ir. Renuganth Varatharajoo (Deputy Vice Chancellor of Industry & Community Relations), Prof. Dr. Zulkifli Idrus, (Deputy Vice Chancellor of Research & Innovation), Prof. Dr. Mohd Nizar Hamidon (ITMA Director), Assoc. Prof. Dr. Abdul Halim Abdullah (ITMA Deputy Director) and Prof. Dr. Mehmet Ertugrul (ITMA Visiting Professor from Ataturk University).

Researchers and Industrial Experts Sharing Platform on Materials Characterization Techniques

ITMA invited several experts to share materials characterization techniques in the "Materials Characterization Seminar 2019" held at the ITMA Seminar Room in November 2019.

In this three-day seminar, 25 participants were able to learn and enhance the understanding of several main materials characterization techniques such as X-ray Diffraction, Surface Area Particle Size Analyzer, Nanosizer, Raman Spectroscopy, Multimode Reader (Fluorescence, Absorbance & Luminescence), Ultra High-Resolution Scanning Electron Microscope and Energy Dispersive X-ray.

The experts from the university were Prof. Dr. Mohd Zobir Hussein and Dr. Nizam Tamchek while the experts from industries were Mr. Tue Chuan Huat (RGS Corporation Sdn. Bhd), Ms. Hong Chia Yean (Chemopharm Sdn. Bhd.), Mr. Ho Oi Kuan (Crest Nanosolutions Sdn. Bhd.) and Dr.Wu Jiang (Oxford Instrument Singapore).

Alongside the material characterization techniques, the participants also got a chance for a laboratory tour where some demonstration on other testing equipment were conducted by ITMA researchers and technical staff.

This program could also be a promotion for ITMA to promote its facilities and testing services offered to UPM researchers particularly and other institutions generally.

Visit to Magna Value Sdn. Bhd.

Director, Prof. Dr. Mohd Nizar Hamidon together with ITMA Visiting Scientist, Prof. Dr. Mehmet Ertugrul visited Magna Value Sdn. Bhd, a trading company specialized in the battery, fuel cell, nanotechnology, and analytical instrument located at Sg. Petani, Kedah.

ITMA intends to build a network with any potential industry for expanding research activities that meet the needs of both parties. The company keened to co-operate in the development of the Sputtering System after some discussions during the visit.

Community Engagements

ITMA helps SKTPP to win the Fourth Place in *Anugerah Pengurusan Pusat Sumber Sekolah Cemerlang Peringkat Kebangsaan*

Materials Processing and Technology Laboratory (MPLT) and Functional Devices Laboratory (FDL), ITMA together with Faculty of Design and Architecture (FRSB), UPM, helped Sekolah Kebangsaan Taman Putra Perdana (SKTPP) to win the fourth place in Anugerah Pengurusan Pusat Sumber Sekolah Cemerlang Peringkat Kebangsaan (APPSSCK) 2019 which was held in July 2019.

The assessment included the Green Technology Garden, which was built through a Knowledge Transfer Program to the community led by Assoc. Prof. Dr. Ts. Suraya and Assoc. Prof. Dr. Suhaidi (ITMA), together with Assoc. Prof. Dr. Nor Atiah Ismail (FRSB).

The works of garden construction began in March 2019. It was divided into three sections: "Nanotechnology Corner" and "Airport Garden" at "Anjung ITMA-FRSB UPM" and "Interactive Sprinkler" at "Anjung Botani".

The garden features science, recycling, and interactive elements to attract students' interest while delivering knowledge. Through this program, ITMA-FRSB aims to help teachers develop learning and facilitation methods (PdPC) for students outside of the classroom besides the main library called "Ujana Ilmu" with an airport theme.

Science Exploration Camp for School Students

"Kem Eksplorasi Sains: Inspirasi Kampus Putra 2019/2020" is one of the community programs conducted by ITMA at Sekolah Menengah Kebangsaan Puchong Perdana (SMKPP), Puchong. The program was held in October 2019.

About ninety students and six science teachers participated in the program. The program presented motivational talks entitled "STEM Creativity in Conservation of Nature", "Research is your Future" and "F.U.T.U.R.E.". STEM stands for science, technology, engineering and mathematics.

The program emphasized on the importance of science in life as well as promoted "Avoid Single Use Plastic" campaign to support the Faculty of Educational Studies (FPP) Green Technology Program in collaboration with the Yayasan Hijau Negara.

Exchanging certificates of collaboration and tokens of appreciation as a symbol of cooperation between ITMA and SMKPP were held at the end of the program.

Program Peduli Pendidikan STEM in Felda Belitong

The Institute of Advanced Technology (ITMA) collaborated with the Faculty of Educational Studies (FPP) in organizing the "Program Peduli Pendidikan STEM Sekolah Luar Bandar" (STEM-Care 1.0) at Sekolah Menengah Kebangsaan LKTP Belitong, Felda Ulu Belitong, Kluang, Johor. This awesome program was held in November 2019 and involved almost 150 students from Form 1 to Form 4.

The program focused on increasing students' interest in science and technology, exposure to STEM applications in their daily routine as well as career opportunities and pathways.

There were four sessions with different inputs delivered by Dr. Intan Helina Hasan and Mr Muhammad Asnawi Mohd Kusaimi (ITMA) and Dr. Nurzatulshima Kamarudin and Lt. Col. Othman Jailani (FPP).

Knowledge Transfer Program: Empowering Science and Technology of SMK Batu 8 Science Stream Students

A Knowledge Transfer Program (KTP) had been done between ITMA and SMK Batu 8 Puchong (SMKBP). 131 students and four teachers attended the program, Empowering Science and Technology of SMK Batu 8 Science Stream Students.

The program started with a motivational talk entitled "Expressive Art Therapy: My Future Self Portrait" followed by a talk entitled: "Mathematics, What's Next".

The students also got an opportunity to conduct some advanced experiments related to Chemistry, Physics and Biology subjects. Among the activities performed were "Magnetic Slime", "Fun with Light", "High Temperature Superconductor System", "Zebrafish: Exploring Embryogenesis" and others.

Alongside the laboratory tour, the students had a chance to meet post-graduate students and observed their routine.

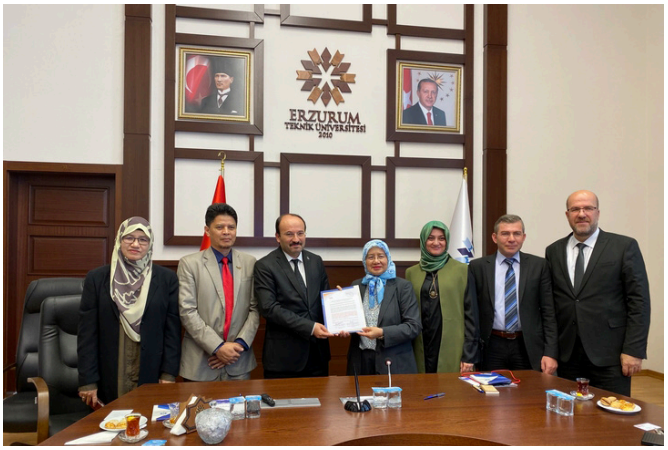
Mobility Program

Mobility Program to Turkey

Institutions:
i) Ataturk University
ii) Erzurum Technical University
iii) Middle East Technical University
iv) Istanbul Technical University

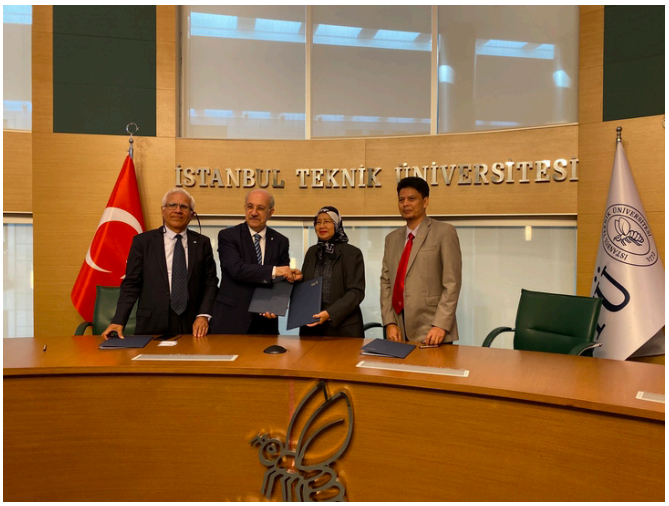
Date: 18 - 31 October 2019

UPM staff and students under the mobility program together with the management representatives of Ataturk University at Universities in Turkey.



UPM Vice-Chancellor, Prof. Datin Paduka Dato' Aini Ideris and Erzurum Technical University Rector, Prof. Dr. Bulent Ckamak signed the Memorandum of Understanding on the Mevlana Exchange Program.

Dr. Ismayadi with other researchers during his research attachment at Ataturk University.



UPM Vice-Chancellor, Prof. Datin Paduka Dato' Aini Ideris and Istanbul Technical University Rector, Prof Dr. Mehmet Karaca signed the Memorandum of Understanding on the Mevlana Exchange Program.

MoU/MoA

The strategic alliances and cooperation forged between universities and the private sector is a great initiative to have a platform to share expertise in the area of research, teaching and professional services.

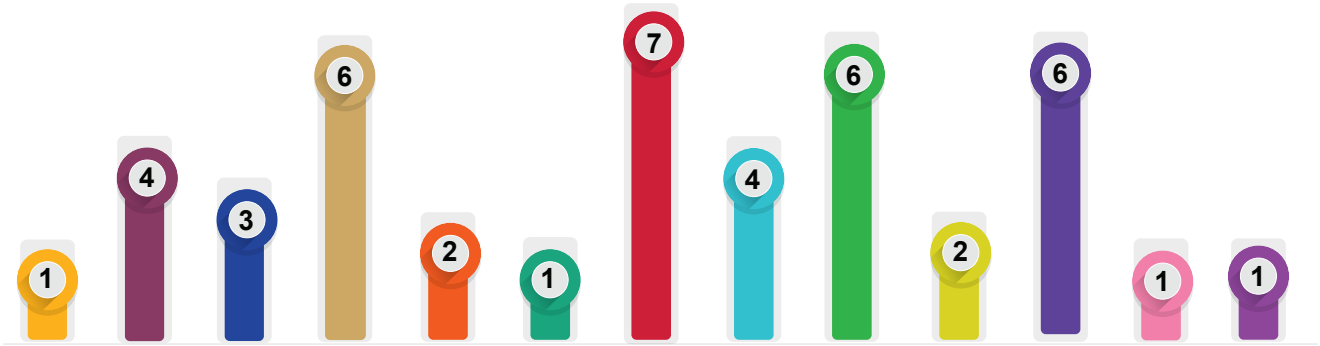
List of MoU/MoA

NO.	COUNTRIES	ORGANIZATION	SIGNATURE DATE	EXPIRED DATE
1	Malaysia	Continental Sdn. Bhd.	28 May 2019	28 May 2024
2	Malaysia	Syarikat Upstream Downstream Process and Services Sdn Bhd (UDPS)	9 October 2019	9 October 2024
3	Turkey	Middle East Technical University (METU)	22 October 2019	22 October 2024
4	Turkey	Istanbul Technical University (ITU)	23 October 2019	23 October 2024
5	Nigeria	University Bayero, Kano	24 October 2019	24 October 2024
6	Malaysia	SIRIM Berhad, Universiti Teknologi Petronas (UTP), MIMOS Berhad, Universiti Sains Malaysia (USM) & Institute for Medical Research (IMR)	8 November 2019	8 November 2024

HUMAN RESOURCES

ITMA is supported by a group of dedicated staff to facilitate the overall operation of the institute's functions and activities. Several committees were also formed to implement or monitor various activities such as the quality system and safety in the laboratory.

Staff



The total number of staff in 2019 is 44 people

PROFFESSOR
RESEARCH FELLOW
ADMINISTRATIVE OFFICER
RESEARCH OFFICER
ASSISTANT ENGINEER
ADMINISTRATIVE ASSISTANT
DRIVER
ASSOCIATE PROFFESSOR
POST DOCTORAL
EXECUTIVE OFFICER
SCIENCE OFFICER
SECRETARY
OPERATION ASSISTANT

Excellence Service Award 2019

Assoc. Prof. Dr. Abdul Halim Abdullah

Dr. Intan Helina Hasan

Nazrul Abdullah

Staff Retired in 2019

Normah Ludin

Mahmood Ismail

Committee

Occupational Safety and Health Committee

Chairman:
Assoc. Prof. Dr. Lim Hong Ngee

Deputy Chairman:
Md Ali Rani

Secretary:
Noor Lina Shamsuddin

Employer Representatives:
Sarinawani Abdul Ghani
Roslina Abdul Rashid
Nurnazeera Zulkefli
Norizanne Abd Rahim
Nazrul Abdullah

Employee Representative:
Ab Haffiz Ab Jalil
Mohd Wafi Azimin Mohammad Jan
Mohd Kadri Masaud
Zakky Yamanie Jamiauddin
Zamzurina Abdul Wahab

Chemical Waste Coordinator:
Mohd Kadri Masaud

E-Waste Coordinator:
Mohd Wfi Azimin Mohammad Jan

Radiation Protection Supervisor (RPS):
Sarinawani Abdul Ghani

Radiation Worker:
Mohd Kadri Masaud

Industry and Community Linkages Committee

Deputy Director:
Assoc. Prof. Dr Abdul Halim Abdullah

Chairman JIMN:
Rosiah Osman

Secretariat ICRIS:
Nursyahirah Amirah Mazlan

Committee Members:
Roslina Abdul Rashid
Dr. Idza Riati Ibrahim
Dr. Intan Helina Hassan

Quality Management System (QMS) MS 9001 Committee

Deputy Management Representative:
Din Bin Ayup

Deputy Document Control Officer:
Mohd Ali Mat Nong

Deputy Internal Audit Coordinator:
Norizanne Abd Rahim

Deputy Customer's Satisfaction Coordinator:
Nursyahirah Amirah Mazlan

Deputy Staff Training Coordinator:
Din Bin Ayup

Lead Auditor:
Md Ali Rani

Internal Auditors:
Rosiah Osman
Juraina Md Yusof
Roslina Abdul Rashid
Rokiah Deraman
Mohd Wafi Azimin Muhammad Jan
Nazrul Abdullah
Sarinawani Abdul Ghani

ITMA'S Website Committee

Chairman:
Roslina Abdul Rashid

Secretary:
Mohd Ali Mat Nong

Webmaster:
Nursyahirah Amirah Mazlan

Members:
Dr. Siti Zulaika Razali
Rosiah Osman
Rosnah Nawang
Juraina Md Yusof
Md Ali Rani
Ab Haffiz Ab Jalil
Din Ayup
Norizanne Abd Rahim
Nurnazeera Zulkefli
Rokiah Deraman

Emergency Response Team (ERT)

Commandant:
Assoc. Prof. Dr. Lim Hong Ngee

Deputy Commandant:
Md Ali Rani

Liason Officer:
Noor Lina Shamsuddin

Planning:
Roslina Abdul Rashid

Head of ERT Operation:
Ab Haffiz Ab. Jalil

Logistic:
Sarinawani Abdul Ghani

Finance:
Din Ayup

First Aider:
Zamzurina Abdul Wahab

Public Officer:
Mohd Kadri Masaud

Fire Fighting Officer:
Mohd Kadri Masaud

Evacuation Team:
Mohd Wafi Azimin Mohammad Jan
Nazrul Abdullah
Zakky Yamanie Jamiauddin
Nurnazeera Zulkefli

Traffic Control:
Nor Azli Sulaiman

Technical and Quotations Meeting

Chairman:
Assoc. Prof. Dr. Suhaidi Shafie

Secretary:
Din Ayup

Committee Members:
Assoc. Prof. Dr. Abdul Halim Abdullah
Assoc. Prof. Dr. Ts. Suraya Abdul Rashid
Assoc. Prof. Dr. Lim Hong Ngee
Sarinawani Abdul Ghani

Quality Management System (QMS) MS ISO/IEC 17025 Committee

Quality Manager:
Sarinawani Abdul Ghani

Deputy Quality Manager:
Roslina Abdul Rashid

Technical Manager:
Dr. Ismayadi Ismail

Deputy Technical Manager:
Md Ali Rani

Document Control Officer:
Mohd Ali Mat Nong

Member:
Nurnazeera Zulkefli

Research Committee

Director:
Prof. Dr. Mohd Nizar Hamidon

Chair Person:
Dr. Intan Helina Hasan

Committee Members:
Dr. Ismayadi Ismail
Rosiah Osman
Juraina Md Yusof
Norizanne Abd Rahim

Calibration and Verification Committee

Chairman:
Assoc. Prof. Dr. Ts. Suraya Abdul Rashid

Secretary:
Noor Lina Shamsuddin

Committee Members:
Nazrul Abdullah
Ab Haffiz Ab Jalil
Mohd Wafi Azimin Mohammad Jan
Mohd Kadri Masaud
Zakky Yamanie Jamiauddin

Exiting Facilities

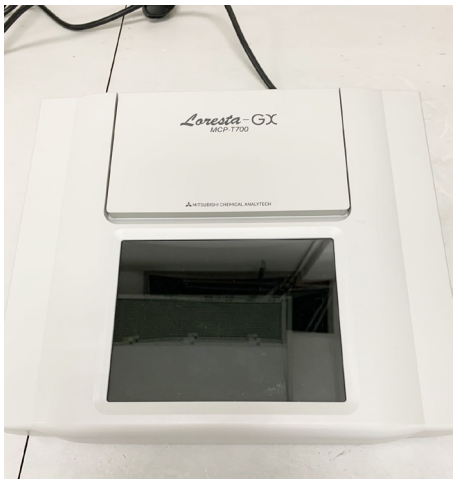
NEW TESTING FACILITIES

ITMA provides testing services using a variety of equipments to meet the needs of research, especially in the areas of advanced materials and nanotechnology. One of ITMA's analytical laboratory services has been granted accreditation of MS ISO/IEC 17025.

4 POINT PROBE / RESISTIVITY METER
Brand: Mitsubishi
Model: Loresta GX (MCP-T700)

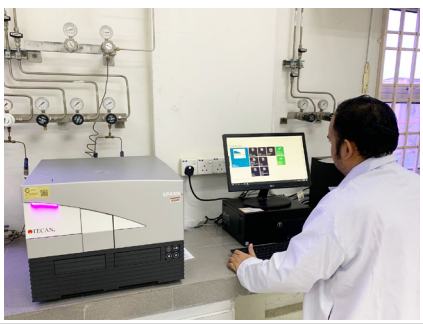
Equipment to measure conductivity, resistivity and sheet resistance of a solid sample (bulk or film type). Measuring range is from 0.01 Ω to 10 MΩ.

The measurement method is using a 4 terminal 4 pin method, with internal calibration and probe checker available. There are several types of probes available for different sample sizes.



MULTIMODE READER
Brand : Tecan
Model : Spark

The Spark microplate reader is a fully modular multimode microplate reader which offers solutions to detect fluorescence, absorbance and luminescence. This equipment complete with dedicated Xenon flash lamp light source for absorbance and fluorescence modules. It is able to determine 3D fluorescence scan which covering excitation wavelength of 230 to 900 nm and emission wavelength of 280 to 900 nm. This multimode reader consists of dedicated photomultiplier tube (PMTs) for fluorescence and lumine scence detection. The PMT for fluorescence detection is sensitive and can be optimized to detect from UV to far red wavelengths, covering the full fluorescence spectrum. With its High Speed Spark provides unparalleled wavelength accuracy for DNA and protein analysis. Spark capability for full absorbance spectrum data is from 200 to 1000 nm.



ACTIVITIES REPORT

ITMA organizes various activities each year to share and promote expertise in a variety of topics and fields. These activities also serve as a platform for meeting with experts to further develop the network with various stakeholders.

Laboratory Activities

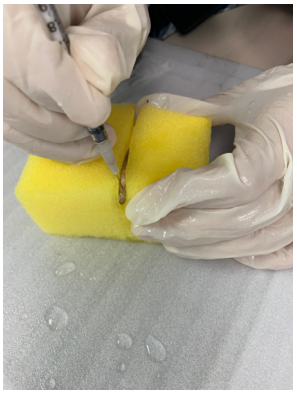
Congratulations! ITMA Successfully Retained the MS ISO/IEC 17025 Certification.

Characterization Laboratory, Institute of Advanced Technology (ITMA) has successfully retained the Quality System of MS ISO/IEC 17025 Certification. The re-assessment on the implementation of MS ISO/IEC 17025 quality systems was carried out on 10th January. The assessment process was conducted by two assessors from the Department of Standards Malaysia comprising of Ms. Ng Pui Wan (Lead Assessor) and Mr. Lau Cheng Siew (Technical Assessor).

ITMA has been accredited for two testing methods. They are "Morphology Imaging of Solid Materials using FESEM" and "Qualitative Determination of the element from Beryllium to Uranium Periodic Table for Solid Materials (EDX)" under the scope of Mechanical and Chemistry using ULTRA HIGH RESOLUTION SCANNING ELECTRON MICROSCOPE (FESEM) equipment since 2016.

The Quality Manager, Ms. Sarinawani Abdul Ghani said that this success is the result of teamwork in ensuring the continuity of the implementation of quality systems in the characterization laboratory. "We will make every effort to retain our certification and serve the best service to all customers," she said.

Zebrafish Workshop 2019



"Zebrafish Workshop 2019: Zebrafish as Model System for Nanotoxicology" was successfully held at the Materials Processing and Technology Laboratory (MPTL) in April 2019. This workshop was conducted by Danio Assay Laboratories Sdn. Bhd.

This program began with the lecture session presented by Assoc. Prof. Dr. Syahida Ahmad from UPM and continued with the practical sessions. The practical sessions were divided into six such as handling zebrafish embryo, survival rate and LC30 measurement, scoliosis determination and heart rate measurement.

Participants were assisted by two facilitators. About 26 participants attended the workshop involving students and staff from several other faculties and external institutions.

Sensors in Medical, Agriculture and Environment 2019 Workshop

ITMA, in collaboration with the Sensor Technology Development Association and the Faculty of Science, organized a workshop on "Sensors in Medical, Agriculture and Environment" workshop in conjunction with iSAMN2019.

A total of twenty participants comprising staff and students participated in this workshop.

This two-day workshop was conducted with lectures in the morning at ITMA and "hands-on" sessions in the afternoon at the Chemical Laboratory, Faculty of Science.

The speakers were from UPM, UKM, UNIMAP and Ministry of Health.

International Symposium on Advanced Materials and Nanotechnology 2019 (iSAMN2019)

This year iSAMN2019 featured a list of internationally renowned speakers from China, Japan, United Kingdom, Hong Kong, India, Saudi Arabia as well as Malaysia and successfully gathered over ninety participants.

With the theme "Achieving Sustainability through Innovative Nanotechnology Advancements", the two-day symposium took place at the Putrajaya Marriott Hotel and officiated by the Deputy Vice Chancellor (Research & Innovation), Prof. Dr. Zulkifli Idrus.

iSAMN2019 introduced Materials Technology Challenge Version 2.0. (MTC 2.0) as a platform for poster presentation beside the oral presentation. The participants had to creatively present their research works drawn on posters to impress the judges. Three gold medals were awarded to the best three poster presenters.

All the presented papers in this symposium will be peer-reviewed for publication in the "iSAMN2019 Special Issue" of the International Journal of Nanotechnology Inderscience Publishers, and the Journal of Solid State Science and Technology.

Alongside the presentations, the Best Micrograph Award Competition was also given. The winner was Dr. Foo Chuah Yi from Xiamen University Malaysia.

Intensive Workshop on High Impact Journal Publishing

ITMA and UPM Education & Training Sdn. Bhd jointly organized an "Intensive Workshop on High Impact Journal Publishing" in April 2019 at Klana Beach Resort, Port Dickson. A total of twenty participants from ITMA including associate researchers, research fellows, post-doctoral, research officers and post-graduate students participated in this workshop.

This two-day workshop was guided by Dr. Mohd Hafiz Mohd Zaid (Faculty of Science). His sharing started with his experiences on the creation of impactful manuscripts and the writing process to the delivery of manuscripts to high-impact journals.

His second sharing was on the process of submitting manuscripts to high-impact journals and some useful tips on selecting journals that are relevant to the participants' article topics.

Thick Film Fabrication Workshop 2019 (TFFW2019)

ITMA organized the Thick Film Fabrication Workshop 2019 (TFFW2019) in November 2019. This workshop was led by Functional Device Laboratory (FDL).

ITMA proudly shared its printed circuit technology using an organic paste during the workshop. This research is led by the ITMA Director, Prof. Dr. Mohd Nizar Hamidon.

Participants had the opportunity to learn the testing techniques for the produced circuit using the high-tech equipment available at ITMA. They were also went to Khai Lien Silk Screen Suppliers (M) Sdn. Bhd. to see the manufacturing of stencils used for printing circuits or any design according to applications on the substrate, either circuit board, plastic film or paper.

The two-day workshop also covered lectures and produced some printed circuits at FDL.

Stimulating and Intensive Membrane Technology Workshop

ITMA successfully invited a membrane technology expert from the National Institute of Technology Karnataka (NITK), India, Prof. Dr. Arun Mohan Isloor for a three-day intensive workshop on membrane technology research including hands-on sessions for synthesis and membrane casting.

This workshop was jointly organized with the Department of Chemical and Environmental Engineering, Faculty of Engineering, UPM and attended by sixteen researchers from UPM. Prof. Arun's talk covered the topics on introduction to membrane technology, Membrane preparation, polymers - Classification, polymers suitable for membranes, fouling mitigation by additives, etc. Polymer synthesis for membrane application, membrane characterization and tailor-made nanoparticles as a performance enhancer for membranes.

He also demonstrated the membrane preparation by DIPS method, polymer, and nanoparticle synthesis as well as its membrane casting. The participants had an opportunity to make the membrane in our laboratory. This kind of workshop is not only meant for knowledge sharing but also to strengthen our networking with international researchers or collaborators.

ITMA Open Day in conjunction with ITMA

ITMA Creates Success in its 20 years of Establishment

ITMA organized its first and foremost Open Day on Dec 5, 2019, in conjunction with its 20th anniversary. The program was officiated by the Director of the Research Management Centre, Universiti Putra Malaysia (UPM), Prof. Dr. Mohammad Hamiruce Marhaban, also ITMA's former research associate. The event was a success and received massive support from ITMA's former directors, researchers, staffs, and alumni.

20 years big achievements recap:

- RM 28 million of IRPA grant for compressed natural gas direct injection (CNGDI) projects led by Prof. Ir. Dr Barkawi Sahari.
- RM 5 million of LRGS grant worth led by Prof. Dr. Robiah Yunus
- RM 5 million of LRGS-Nanomite grant led by Prof. Dr. Nor Azah Yusof.
- The total grant amounts of more than RM 85 million in 20 years
- 2 500 journal manuscripts cumulatively in which 1 800 are Scopus indexed journal manuscripts.
- 278 of graduated students from Master's and Phd's programs

Jasa Setia Award was granted to Prof. Dr. Mohd Zobir Hussein for his honoured achievement. He has been with ITMA since 2007 till present.

5 December 2019
20th ITMA Open Day

NanoScope 2019

2019 PICTORIAL

16 January 2019
Farewell Celebration for En. Mahmood & En. Zuhairi

27 April 2019
Bengkel Pemantapan dan Pencapaian Strategi KPI 2019

28 April 2019
ITMA Family Gathering

3 May 2019
Laman Hijau ITMA Communal Works

25 May 2019
Iftar Ceremony

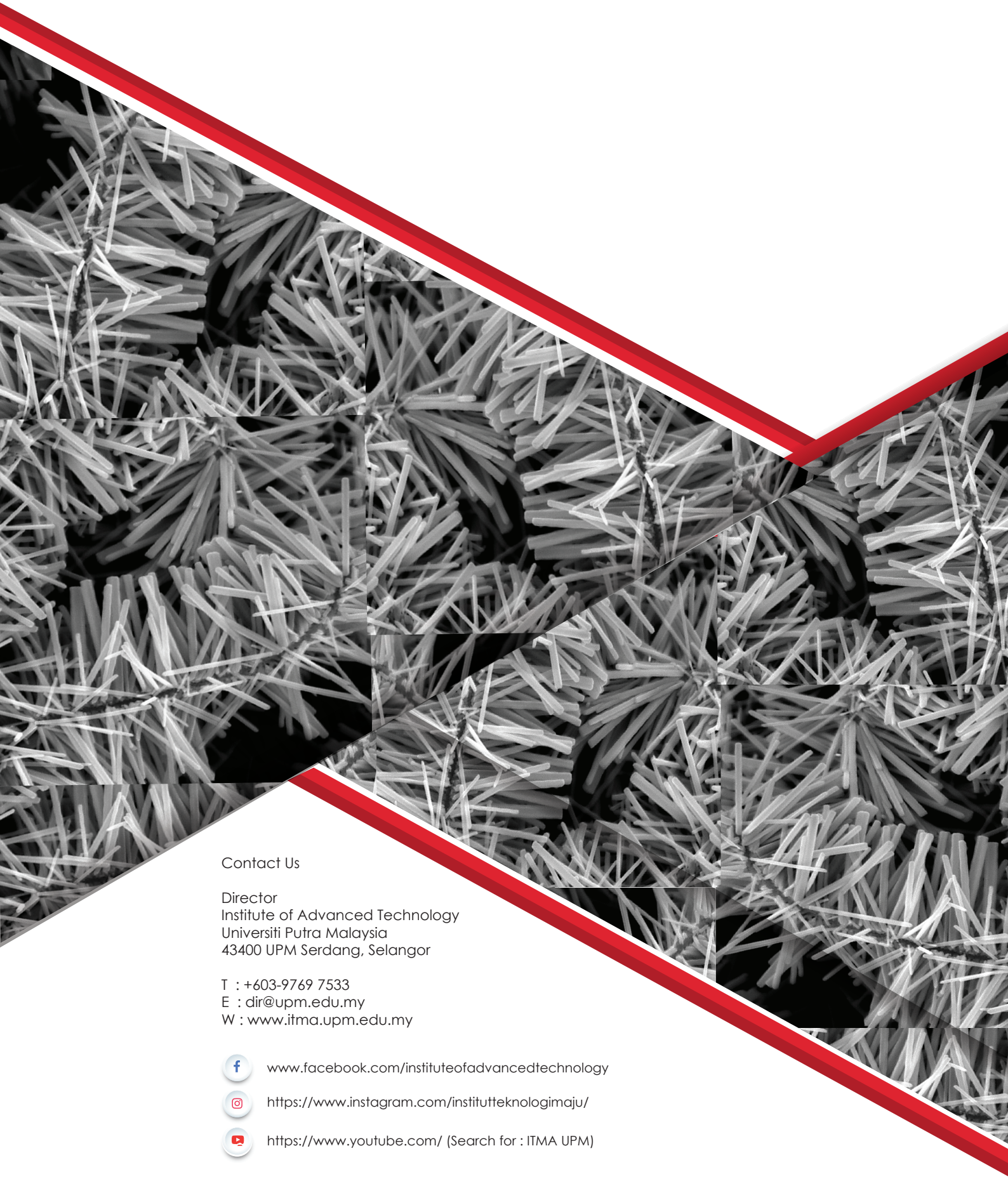
21 June 2019
ITMA Eid Celebration

3 September 2019

Team Building Program Towards KPI Achievement

17 October 2019

Science Camp



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