



UPM
UNIVERSITI PUTRA MALAYSIA
BERILMU BERBAKTI



Institute of Advanced Technology

NanoScope

2020

COVER :

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

SAMPLE :

Zinc Oxide

By Prof. Dr. Halim Shaari

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INSTAGRAM



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DIRECTOR'S FOREWORD



Prof. Dr. Mohd. Nizar Hamidon
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Welcome to NanoScope2020. It is the seventh edition of the ITMA annual magazine.

The year 2020 has been a year like no other. The COVID-19 pandemic presented challenges to almost all universities in Malaysia, including Universiti Putra Malaysia. This pandemic has not only posed short-term research activities disruption due to laboratory and office closure but has prompted delays of most operational activities, including financial, testing and services.

Whatever the outcome, ITMA remains anchored to our core strengths - people and research. Everyone switched to a new paradigm of work-from-home and adopted digital technology to run meetings and discussions. In ensuring the continuity of research activities, series of webinars were conducted by each laboratory. On top of that, annual workshops, and symposiums such as SAPSiD 3.0, Separation Science and iSAMN2020 also took the same approach. iSAMN2020 was a successful online joint-event with universities in Turkey.

As we continue to navigate the COVID-19 pandemic and its impact, we remain focused on our strategy to deliver our main KPIs such as publications and grants. We were able to push the number of publications and the percentage of articles published in Q1 and Q2 journals. In addition, ten manuscripts had been published in the Top 10% JCR journal. We hope that we can continue to disseminate our findings through quality manuscripts published in flagship journals.

Although we have have progressed in terms of publications, ITMA has seen a decrease in student admissions and enrolments as well as linkages and networking. We believe that uncertainties in financial, traveling restrictions with tight procedures, limitation on research activities, and others contributed to these matters. However, this has not limited ITMA's steadfast efforts in other commitments.

I would like to take this opportunity to thank everyone who contributed to ITMA's achievements. I would also like to thank our management and all staff for their dedication and swift adaptation to the new norm of working culture with minimal hiccups. I hope that we will continue to grow and empower ourselves in assuring ITMA's vision and mission will be achieved.

OVERVIEW

The Institute of Advanced 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 sensors and functional devices. It supports over 50 researchers and fellows, and over 100 postgraduate 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.

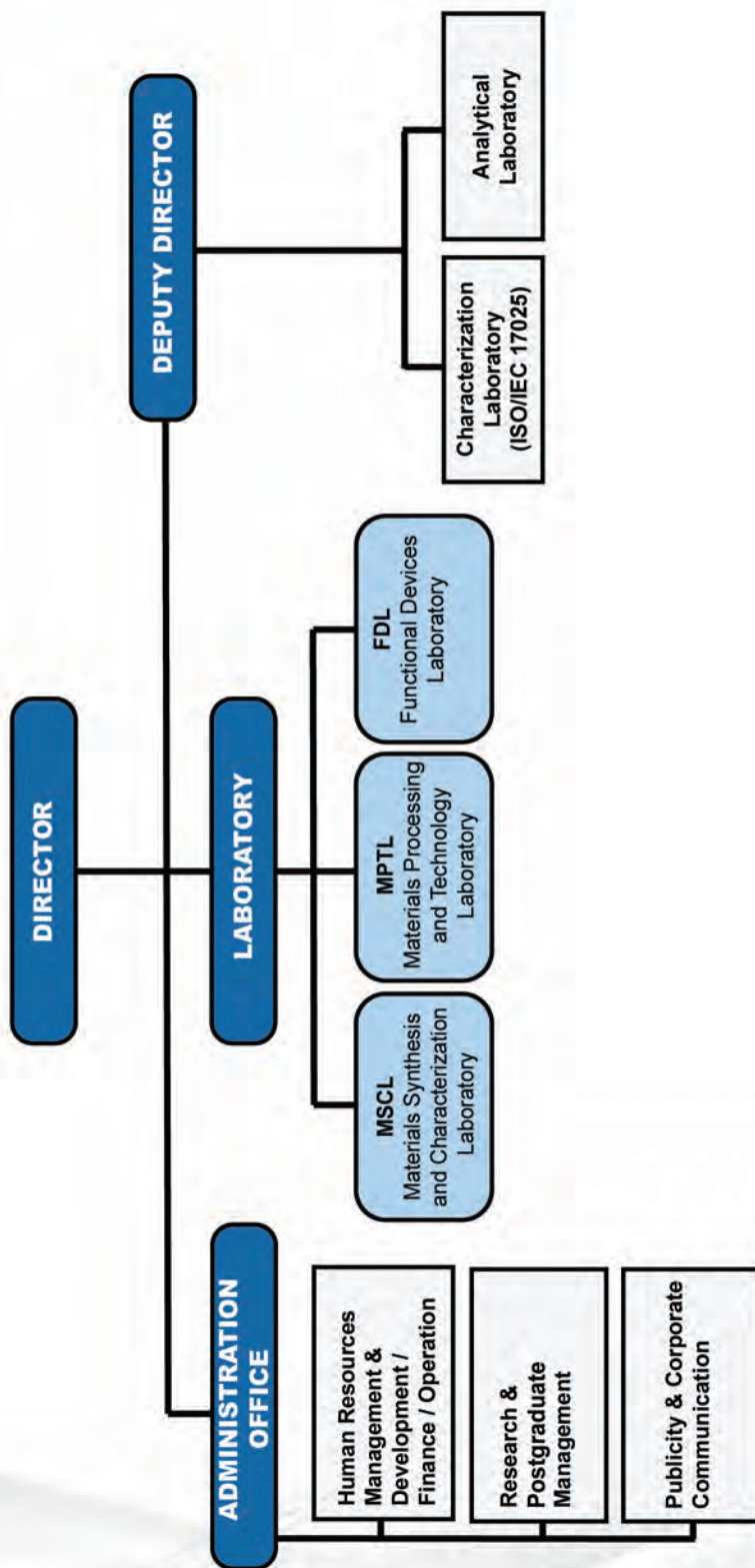
MISSION

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.

ORGANIZATIONAL STRUCTURE



ITMA TOP MANAGEMENT



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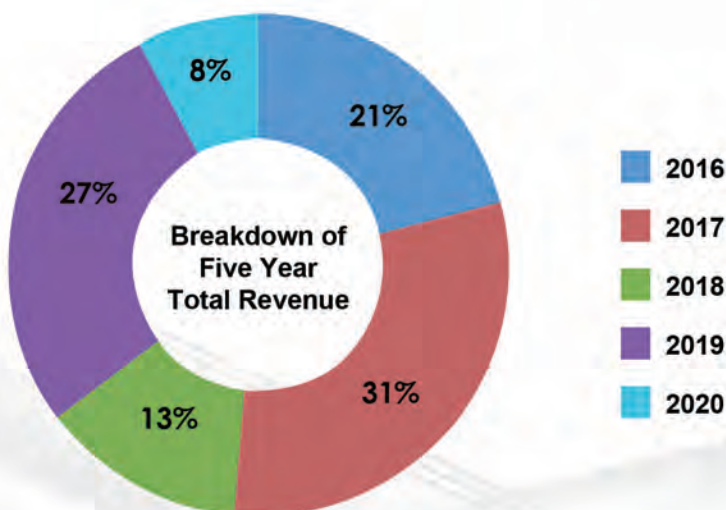
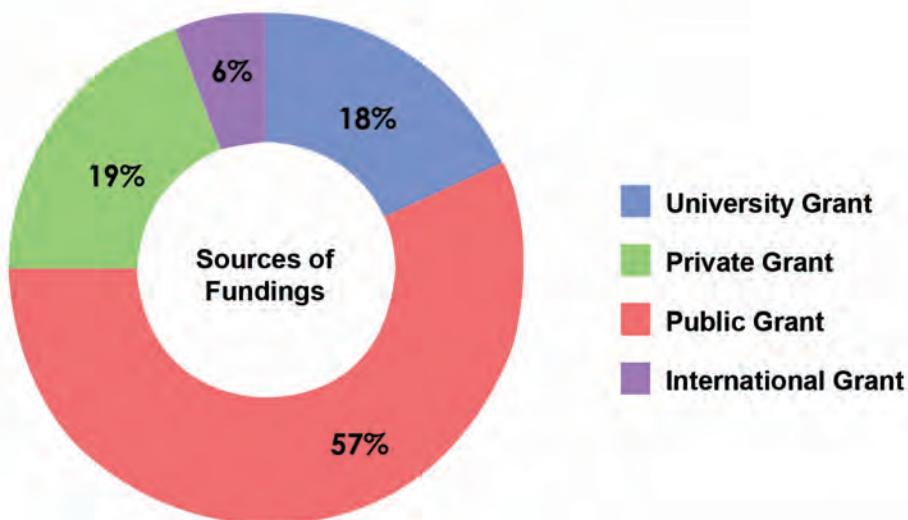
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RESEARCH : ACHIEVEMENTS

Research Grants

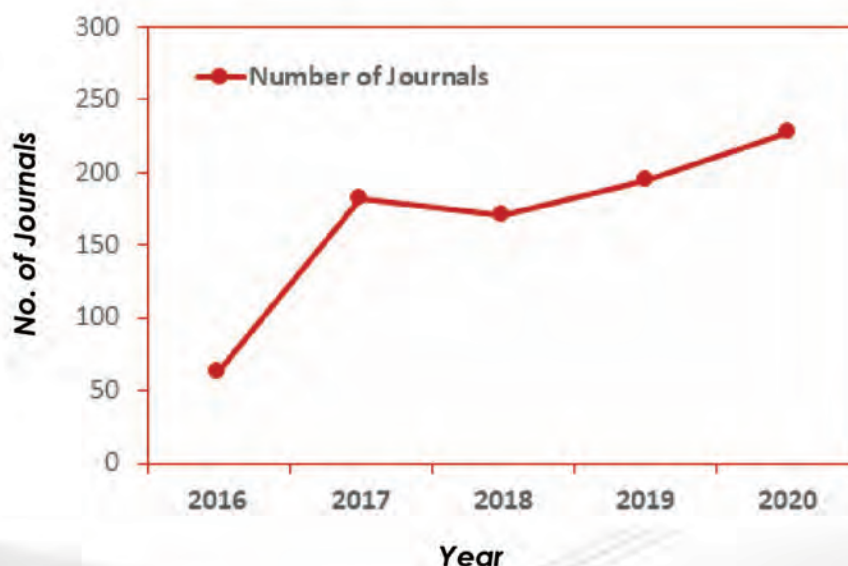
2020 was a challenging year for our research activities. The tighter grant selection process made the chances of receiving research funding became more difficult. Despite that, ITMA researchers still managed to secure five research projects from various funding sources, including international grants in 2020. The total revenue of ITMA research funding recorded in 2020 is RM 556 812, scoring at almost one-third of 2019 revenue of RM 1 981 601. Below are the complete research funding breakdown by source and five year-total revenue:



Publications

In realizing the challenges that ITMA researchers faced as the COVID-19 outbreak quickly developed into a pandemic, manuscript publication and preparation guidelines through online seminars were amongst the best strategies to ensure the sustainability of research activities. Notably, these strategies increased the number of publications and the percentage of articles published in Q1 and Q2 journals (Graph). In addition to that, 10 of 228 articles fell under the Top 10% JCR journal. The detailed achievements are tabulated below:

<i>Key Performance Indicator (KPI)</i>	<i>Achievements</i>
<i>Scopus Indexed Journal</i>	228 (100%)
<i>JCR Indexed Journal</i>	209 (92%)
<i>Top 10% Journal</i>	10
<i>Conference Proceedings</i>	12
<i>Publication in Q1 & Q2</i>	75.4%
<i>Chapter in Book</i>	7



2019 Excellent Researcher and Student Awards

ITMA awards researchers and students who have been credited with outstanding achievements every year. Each winner receives a certificate and some allocation of a short team grant.

Two researchers of the Functional Devices Laboratory (FDL) outperformed for Excellent Researcher Associates Award for 2019. The recipients were Assoc. Prof. Dr. Yusran Sulaiman and Assoc. Prof. Dr. Yap Wing Fen. Another winner was Assoc. Prof. Dr. Che Azurhanim Che Abdullah from Materials Synthesis and Characterization Laboratory. All of them are also lecturers in the Faculty of Science, Universiti Putra Malaysia.

Meanwhile, the Young Researcher Award recipient was Assoc Prof Dr. Shahrul Ainliah Alang Ahmad, also from FDL (Faculty of Science, Universiti Putra Malaysia).

Rahayu Emilia Mohamed Khaidir won the most outstanding student in Masters Student-category. Dr Salisu Nasir was nominated as the most exceptional PhD student in 2019. Both studied advanced materials.

Congratulations to Lau Gee Een!

Ms. Lau Ee Gee, an ITMA PhD candidate, has been named first runner-up in the “Pertandingan Tesis 3 Minit Alam Sekitar 2020” competition. She submitted an entry titled “Sintesis Nanopartikel Zink Oksida dengan menggunakan Bunga Asam Belanda dan Daun Kelapa Sawit untuk Rawatan Air.” Excellent work, and once again, congratulations!



Gold Medal at v-MTC 4.0

Congrats to Wan Mohd Ebtisyam Mustaqim Mohd Daniyal (ITMA PhD candidate), Assoc. Prof. Dr. Yap Wing Fen and their team members for winning a gold medal at the Virtual Materials Technology Challenges 4.0 (v-MTC 4.0). Materials Technology Challenges (MTC) is an innovation competition co-organized by the Malaysian Solid State Science and Technology Society (MASS) Chapter UPM and Department of Physics, Faculty of Science, UPM. Their research project titled “Exploration of Chitosan Graphene Oxide Decorated Quantum Dots Modified Active Layer Thin Film for Potential Sensing Application”.



ITMA researchers took home two gold medals at the Perlis International Engineering Invention & Innovation Exhibition (Pi-ENVEX) 2020. The invention exhibition took place on March 18-21, 2020, at the UniMAP Pauh Putra Main Campus in Perlis. Congratulations to Dr. Nur Alia Sheh Omar, Assoc. Prof. Dr. Yap Wing Fen, Assoc. Prof. Dr. Jaafar Abdullah, and Wan Mohd Ebtisyam Mustaqim Mohd Daniyal on their project, Novel Integrated Sensor Chip with SPR Sensor for Rapid Detection of Dengue Virus. Another project led by Assoc. Prof. Dr. Yap Wing Fen and Wan Mohd Ebtisyam Mustaqim Mohd Daniyal also selected as the gold winner with title "High Potential Metal Ion Detection Using Novel Nanocrystalline Cellulose SPR Based Optical Sensor".



Choo Thye Foo, an ITMA PhD candidate, was honored by the International Center for Data Diffraction (ICDD) for his significant contribution to one patent in the Powder Diffraction File - Release 2021. He is supervised by Assoc. Prof. Dr. Mohamad Amran Mohd Salleh. Keep up the good work!



ITMA Retains SAMM Certification. Congratulations!



After passing a monitoring audit and transitioning to MS ISO / IEC 17025: 2017 on June 29-30, 2020, ITMA successfully retained its Malaysian Laboratory Accreditation Scheme (SAMM) certification. The SAMM No. 763 certification is valid until March 2022.

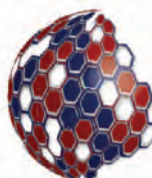
The assessment process was conducted by two assessors from the Department of Standards Malaysia comprising of Ms. Ng Pui Wan (Lead Assessor) and Mr. Lau Cheng Siew (Technical Assessor).

Congratulations, ITMA Researchers Receive New Research Grants!

Two ITMA researchers had been awarded Prototype Development Research Grant Scheme (PRGS) through the Ministry of Higher Education (MOHE). Prof. Dr. Norhisam Misron and Assoc. Prof. Dr. Yap Wing Fen have received more than RM 315 000 in funding over the next two years for their research projects. The funding will be used for research in the areas of wind turbine and dengue virus detection.

Dr. Ismayadi Ismail from Materials Synthesis and Characterization Laboratory (MSCL) received RM 102 500 to develop continuous production of bio-based carbon nanotube cotton for conductive ink applications. The project was funded by Universiti Putra Malaysia (UPM) under Geran Putra Berimpak (GBP). He had also been awarded National Graphene Action Plan (NGAP) 2020 grant worth RM 106 912 to develop anti-radar graphene-based textile.

Meanwhile, ITMA Director, Prof. Dr. Mohd Nizar Hamidon received an international research grant through Scientific Research Project entitled 'Cu-Graphene Composite Structure Conductor Production Technique'.



**NATIONAL
GRAPHENE
ACTION PLAN**



RESEARCH : HIGHLIGHTS

Electronic Nose for Detection of *G.Boninense* Infected Oil Palm Trees

Malaysia is currently the second primary producer of palm oil in the world after Indonesia. Malaysia exports palm oil of 39% of world palm oil production and 44% of world exports. However, the oil palm planters in Malaysia are facing a devastating crop disease infection called Basal Stem Rot (BSR). BSR is mostly caused by *Ganoderma boninense*, which is a basidiomycete white rot fungus that will disrupt the water and nutrient transport to the upper part of the palm, thus causing frond wilting, yellowing of fronds, unopened spear leaves, reduce "one-sided mottling" canopy and emergence of basidiocarps on the lower stem.

The ability to detect *G.boninense* at an early stage is crucial to give guidance in deciding the most suitable way for disease control measures so that the number of 1) death palms and 2) disease control cost can be reduced. There are several techniques reported in detecting the disease, including polymerase chain reaction-DNA (PCR-DNA) technique, Enzyme-Linked Immunosorbent Assays-Polyclonal Antibody (ELISA-PAb), ergosterol extraction with HPLC and TLC. These methods use invasive techniques with several disadvantages, such as tedious procedures, time-consuming, and required skilled personnel.

To overcome these problems, an electronic nose (E-Nose) is used in this research for the early detection of *G.boninense* in oil palm trees. E-Nose is used as a detector for secondary metabolites (chemical defence metabolites released during the resistance against pathogen and abiotic stressor) based on odours evaluation.

E-noses have several advantages, including rapid analysis for gaseous mixture, non-invasive sample analysis and simple measurement with unique response pattern for each odorant. Furthermore, e-noses are often very small and, therefore, portable. This is particularly important when analysis has to be carried out in the oil palm nurseries and not in laboratories.

E-noses concept mimics the mammalian olfactory systems, capable of detecting many more odorants than the number of receptors it has by utilizing cross-reactive odorant receptors that generate unique response patterns for each odorant. In the same way, an artificial nose combines cross-reactive sensor arrays of semi-selective sensors. Hence, a product with a similar aroma generally results in a similar sensor response pattern (similar "fingerprints"), where as a product with distinct aroma show differences in their patterns (difference "fingerprint").

E-noses have been used for the last two decades in various applications, including food product, quality assurance, health care, environmental monitoring, cosmetic products, pharmaceuticals, safety and security, indoor air quality, and military. E-noses can be divided into three main components; the vapour delivering system, the sensor arrays and the pattern recognition algorithm. The vapour delivery system controls how the sample is delivered to the sensors array, including sample collection, preconditioning and filtration.



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The sensors array consists of a series of gas sensors that shows different sensitivities to different classes of compounds (adsorption, signal generation, desorption). The interaction of volatiles vapour with the array of sensors provokes a series of signals which are then processed by computer via a pattern recognition program. Pattern recognition technique used for data interpretation is very important for the overall performance of e-noses. Since odours are often a complex mixture of gaseous compounds, e-noses usually only allow qualitative analysis of a multi-component matrix.

Some researchers had reported using an electronic nose to detect root rots in shade tree species. Commercialized PEN3 e-nose (metal oxide sensor) were successfully discriminating between healthy and decayed tree root samples of all tree species tested. It also can discriminate between most fungal etiologic agents of decay tested in roots of five tree species, regardless of the contribution of soil-substrates VOCs to the complex root aroma mixtures. Therefore, we believe that E-Nose technology can be used as a tool for early diagnostic of *G. boninense* infected oil palm trees.

We have fabricated E-Nose with metal oxidesemiconductors (MOS) gassensors as a sensors array. MPOB Keratong provided the samples to test E-Nose's potential for discrimination between healthy and *G. boninense* infected oil palm trees. The sample odours from frond no 3 of oil palm seedlings was collected by using nalophan bag as shown in Fig.1.



Fig. 1 : VOCs sampling from oil palm seedlings leaves at nurseries.

The results of E-Nose showed that the device can discriminate around 50% between infected and healthy oil palm seedlings. However, these results are not satisfactory and need to be improved. Therefore, the new prototype of E-Nose (Fig. 2) will be fabricated that is an upgraded version from the current design of E-Nose, which seems to have several limitations, including ample headspace.

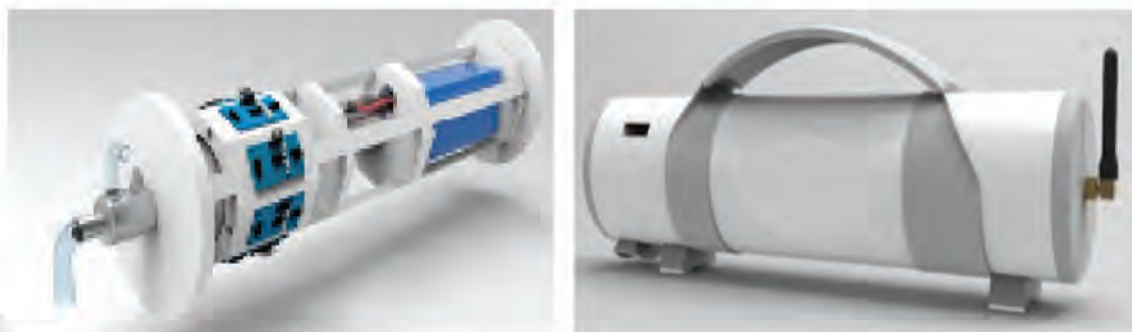


Fig. 2 : New E-Nose designed with small headspace.

New E-Nose device was designed with small headspace, which can improve the gas sensors' sensitivity to detect odours. Besides, it has a memory reader and wireless connection to mobile for data collection. Since the device is small for handheld, it is suitable for on-site monitoring.

Bionanocomposite : A Potential Sustainable Food Packaging Material

Food packaging materials such as glass, paper, and plastics are used to preserve and lengthen the shelf life of food products. Among the materials, plastics are widely used due to their excellent properties. However, conventional plastics are usually made up of petroleum resources that are non-sustainable and non-degradable, thus increasing the municipal solid waste in the landfill, which can lead to serious pollution.

As an alternative, biopolymer materials such as starch have great potential to replace conventional plastics due to their non-toxicity, non-pollutant, biodegradable, edibility, and availability.

However, the mechanical, thermal, and barrier properties of the biopolymer materials are not comparable to conventional plastics, which limit their application as food packaging materials. Advancement of nanotechnology reveals that the incorporation of nano-sized materials (<100 nm) as fillers like chitosan nanoparticles (CNP) into the matrix of the starch biopolymer to produce bionano composite is effective to improve the properties of biopolymers compared to bulk material counterparts. The minuscule size of the fillers leads to the extreme increment in the surface area of the fillers, which is favoured for bionanocomposites for a large interfacial area between the biopolymer matrix and filler. The large interface allowed the modification of molecular mobility and relaxation behaviour, thus improving the properties of the bionanocomposite materials. The CNP incorporated in the composites also exhibits active roles such as antimicrobial and antioxidant agents that can extend shelf life and maintain the quality of foods, thus ensuring food safety and security.



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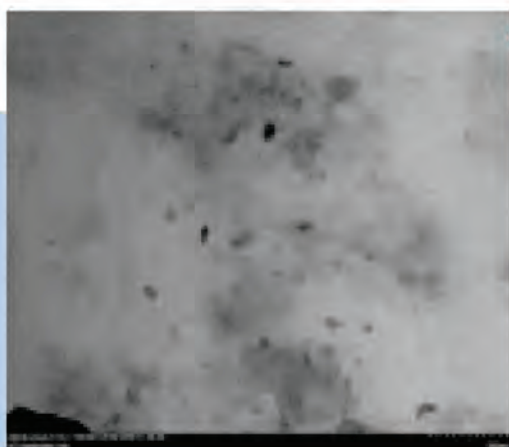


Fig. 1 :
Transmission electron microscope
(TEM) image of starch/CNP
bionanocomposite.

Fig. 2 :
Transparent bionanocomposite film.



When an optimum concentration of CNP is incorporated into starch biopolymer to produce starch/CNP bionanocomposite, the bionanocomposite material is found to exhibit high transparency, which is desirable for food packaging applications. The tensile strength and the elongation at break of the material are improved by 7.96 and 0.35-fold increments, respectively due to the formation of strong intermolecular hydrogen bonding between the starch chain and CNP. The mechanical properties of the material are comparable to commercial food packaging plastic particularly low-density polyethylene (LDPE). The thermal stability of the material is also improved by a 2-fold increment. The barrier properties in terms of water vapor and oxygen permeabilities are improved by 4 and 0.5-fold decrements, respectively due to the formation of a tortuous pathway in the biopolymer matrix with the existence of CNP.



Fig. 3 :
Shelf-life study conducted on cherry tomato packaged with the bionanocomposite material.

The starch/CNP bionanocomposite also exhibits antibacterial properties when tested against gram-positive (*Bacillus cereus*, *Staphylococcus aureus*) and gram-negative (*Escherichia coli*, *Salmonella typhi*) bacteria. The starch/CNP bionanocomposite materials manage to maintain the quality and extend the shelf life of food, particularly cherry tomatoes packaged with the material to more than 10 days, demonstrating the potential of the material as food packaging material.

Knowledge from this research is essential to the development of sustainable and environmentally friendly food packaging materials that are active and exhibit good properties, thus supporting the National Green Technology Policy. This will meet increasing demands in society and nation for sustainability, environmental safety, and quality as well as contribute to food safety and security.

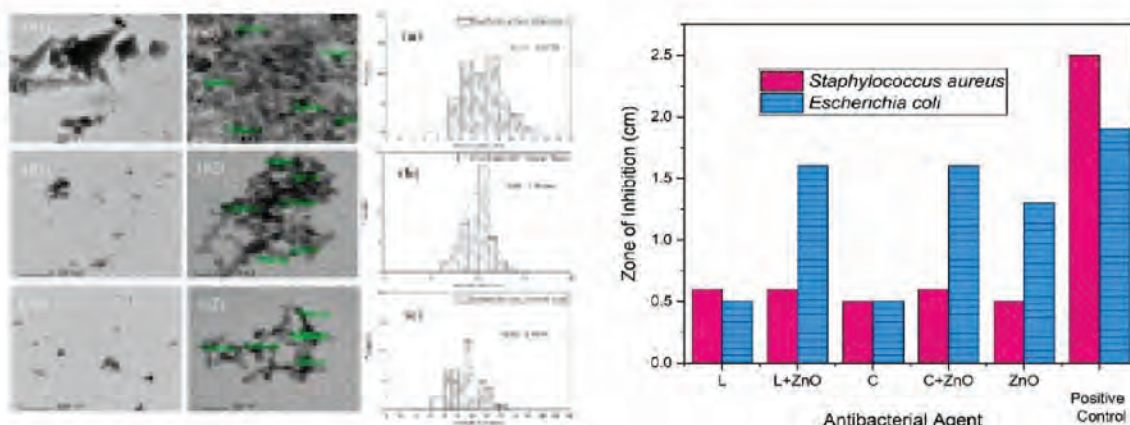
Green Synthesis of Zinc Oxide Nanoparticles (ZnONPs) from Agriculture Waste, Characterization and Their Photocatalytic, Antibacterial and Nanotoxicity Evaluation

In recent trends, the green synthesis of nanoparticles has received great attention due to its wide range of applications. In addition to the low cost and easy preparation, metal oxide nanoparticles prepared with plant extracts show promising prospects. Green synthesized nanoparticles will reduce the use of highly toxic compounds and produce sustainable, environmentally friendly products. Due to its special abilities at its nanoscale size, nanoparticles are widely used in the medical field such as an



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anti-microbial agent. Zinc oxide nanoparticles (ZnONPs) synthesized using agricultural waste, have shown fascinating antibacterial and photocatalytic properties since they have small particle sizes that lead to good surface reactivity. This study highlights a rapid approach of green synthesis to produce ZnONPs using agricultural extracts from Malaysia, such as oil palm leaf, roselle flower, lemongrass, and turmeric. ZnONPs with a size range of 10-15 nm have been successfully synthesized and found to be spherical in form. The functional groups of biomolecules responsible for forming ZnONPs were determined by FTIR. At a wavelength of 375 nm, the UV-Vis spectra revealed a characteristic absorption peak, the ZnO intrinsic band-gap absorption. Green ZnONPs are made attractive by strong and stable photocatalytic performance in environmental applications, particularly in the reduction of organic pollutants in wastewater. ZnONPs play a vital role as a photocatalyst material. Photocatalysis is a promising wastewater treatment technology, especially for those containing organic compounds that are difficult to remove. The results showed that ZnONPs were successfully synthesized by aqueous agricultural extract with strong photocatalytic activity in the reduction of synthetic dye of interest. The assessment of nanotoxicity was evaluated using the aquatic model organism, brine shrimp (*Artemia Salina* L), prior to its application as photocatalyst. Data revealed that our green synthesized ZnONPs is safe and biocompatible. ZnONPs demonstrated high antimicrobial activity against gram-negative bacteria (*Escherichia coli*) and gram-positive bacteria (*Staphylococcus aureus*) using the disc diffusion method. The current approach suggests that in cultivating a green chemistry process for mass scale production, low cost, waste to wealth and rapid synthesis of ZnONPs would be attainable.



TEM images showing the average size of synthesized ZnONPs (left) and the zone of inhibition of gram-positive and gram-negative bacteria when tested with antibacterial agents (synergism of lemongrass and curcumin ZnONPs)

The uniqueness of the research lies in the utilization of various domestic waste materials. That is consistent with UPM's goal of being the leading higher education and agricultural research institution. To date, many material scientists are focusing on green nanotechnology using environmentally friendly and non-toxic nanomaterials for environmental and health applications. Green nanomaterials also reduce the cost of expensive fertilization and greenhouse emissions in agriculture. Research focused on the development of nanoparticles of metal oxide using local agriculture waste is carried out by Assoc. Prof. Dr. Che Azurahaman Che Abdullah and her student, Lau Gee Een in collaboration with researcher from the Faculty of Health and Medical Science UPM and School of Biomedical USM. The current approach suggests that low costs, waste to wealth and

rapid synthesis of ZnONPs would be achievable in cultivating a green chemistry process for mass scale production. This project has been chosen and financed by the Kurita Water Environmental Fund (KWEF), Japan for environmental applications to be specific ZnONPs as a water purification agent. This project also won gold award in a few innovation competitions (INIIC 2019, WIAC 2020, and VIDE 2020). The plant-mediated green synthesis of nanomaterials is an important branch of nanotechnology. Due to its environmentally friendly, low cost, biocompatibility, and the prevention of toxic chemicals, it has grown and gained importance. This allows nanomaterials to positively impact modern agriculture, where, apart from food and nutritional security, human health and the environment are of great concern.



(i) Gold Medal in Korea World Invention and Academic Conference (WIAC) 2020.



(ii) Gold Medal in Virtual Expo of Innovation Products and System Design (VIDE) 2020.



(iii) Gold Medal in International Invention & Innovative Competition (INIIC Series 1/2019).

July 2020

Dear Ms. Lau Gee Ean
University Putra Malaysia

We inform you that your research program has been adopted for Kurita Overseas Research grant 2020 based on the advice of the selection committee.

Reference number : ZCPHY054.A24
Research Program : Development of Biogenic Nanomaterials from Malaysian Oil Palm Waste Residues for Potential Water Purification Agent
Grant Amount (JPY) : 400,000

Please note following terms and conditions again which you accepted at the time of application.

a. KWEF does not provide the grant money directly to the grantee. KWEF will transfer the grant money in US dollars to a bank account of the institution which the grantee belongs. The institution must provide the bank account information that KWEF can transfer the grant money in US dollars from Japan. manage the grant money and submit the progress report to KWEF. Some conditions...

(iv) Kurita Water and Environmental Fund 2020

RESEARCH : LABORATORIES

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 superconducting materials, dielectric ceramic materials, semi-conducting 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 Reticular Materials for Sustainability

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.

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Materials Chemistry

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Expertise :
Synthesis Metal-Organic Frameworks (MOFs)

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Materials for Biomedical Applications,
Nanotechnology

ASSOC. PROF. DR. RABA'AH SYAHIDAH AZIZ

Research Associate
B.Sc. (UPM), MS (UPM), PhD (Warwick, UK)
Expertise :
Ceramics, Magnetic Materials,
Nuclear Magnetic Resonance

ASSOC. PROF. DR. MAS JAFRI MASRUDDIN

Research Associate
PhD (La Trobe University)
Expertise : Nanobiotechnology, Drug delivery,
Anticancer Therapeutics,
Microbial- Synthesis of Nanomaterials

DR. JOSEPHINE LIEW YING CHYI

Research Associate
B.Sc. (UTM), MS (UPM), PhD (UPM)
Expertise :
Semiconductor Materials Characterisation,
Synthesis, & Utilization

P. DR. MOHD BASYARUDDIN ABDUL RAHMAN

Research Associate
B.Sc. (UTM), PhD (Southampton)
Expertise :
Theoretical and Computational Chemistry,
Catalysis, Synthesis, Oleochemistry

DR. ISMAYADI ISMAIL

Research Officer
B.Sc. (UKM), MS (UPM), PhD (UPM)
Expertise : Magnetic materials,
EM-wave absorbing materials,
Carbon-based Nanomaterials

ROSNAH NAWANG

Research Officer
B.Sc. (USM), MS (USM)
Expertise :
Bioceramics, Bone regeneration

SARINAWANI ABDUL GHANI

Science Officer
B.Sc. (UPM)
Expertise :
Nanomaterials

MOHD KADRI MASAUD

Assistant Engineer
Diploma of Electronic Engineering
Expertise : XRD

NAZRUL ABDULLAH

Assistant Engineer
Dip. Eng. (Mechanical), B.Eng. (UTM)
Expertise :
BET and 3D Modeling Softwares

DR. IZWAHARYANIE IBRAHIM

Post-Doctoral
B.Sc. (UNIMAS), PhD (UM)
Expertise :
Carbon Nanomaterials, Photocatalysis

DR. IDZA RIATI IBRAHIM

Post-Doctoral
B.Sc. (UPM), MS (UPM), PhD (UPM)
Expertise :
Nanomaterials and Nanotechnology,
Magnetic Materials



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 nanomaterials. 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 nanomaterials 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 material 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 nanostructures 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

PROF. DR. TS. SURAYA ABDUL RASHID

Head of Laboratory
B.Eng. (Nottingham),
PhD (Imperial College)

Expertise :
Nanotechnology and Nanomaterials

DR. UMER RASHID

Research Fellow
B.Sc. (Pakistan),
MS Chemistry (Pakistan), PhD (Pakistan)

Expertise :
Renewable Energy (Biodiesel)

ASSOC. PROF. DR. NOR AZOWA IBRAHIM

Research Associate
B.Sc. (Kansas), MS (Illinois), PhD (UPM)

Expertise : Particle Technology,
Biochar and Nanotechnology,
Carbonaceous particulates

A. P. DR. MOHAMAD AMRAN MOHD SALLEH

Research Associate
B.Eng. Sc. (Western Ontario), PhD (Birmingham)

Expertise : Particle Technology,
Biochar and Nanotechnology,
Carbonaceous Particulates

DR. DAYANG RADIAH AWANG BIAK

Research Associate
B.Eng. (CWRU), PhD (Birmingham)
Expertise : Heat Transfer, Modelling,
Food Processing, Crystallisation,
Pharmaceutical Products

ASSOC. PROF. DR. SITI HAJAR OTHMAN

Research Associate
B.Eng. (Vanderbilt), PhD (UPM)
Expertise :
Food Packaging Engineering

DR. SHAFREEZE SOBRI

Research Associate
B.Eng. (UTM), PhD (Newcastle)
Expertise :
Electrocrystallisation and
Electrochemical Engineering

DR. FAIZAH MOHD YASIN

Research Associate
B.Eng. (TUT), MS (UPM),
PhD (University of Western Australia)
Expertise :
Nanotechnology, Advanced Materials

DR. NORDIN BIN HAJI SABLI

Research Associate
B.Eng. (TUT), M. Eng (UPM), PhD (UPM)
Expertise :
Photoelectrochemical cell, Fuel Cell

DR. NORIZAH ABDUL RAHMAN

Research Associate
B.Sc. (Hons) (UTM),
MS (UTM) PhD (Auckland)
Expertise : Conducting polymers and
electrospun polymer nanofiber

PROF. DR. ROSNAH SHAMSUDIN

B.Eng. (UPM), MS (UPM), PhD (UKM)
Expertise :
Process machinery design,
food properties, postharvest engineering

A. P. DR. NORKHAIRUNNISA MAZLAN

Research Associate
B.Eng. (USM), MS (USM), PhD (USM)
Expertise :
Polymer nanocomposite materials

DR. SITI ZULAIKA RAZALI
Research Officer
B.Eng. (UKM), MS (UPM), PhD (UPM)
Expertise :
Biobased products,
Nanotechnology, Drilling fluid

JURAINA MD YUSOF
Research Officer
B.Eng. (USM), MS (UKM)
Expertise :
Carbon Nanomaterials,
Carbon particles, Piezoelectric materials

MOHD ALI MAT NONG
Research Officer
B.Eng. (UPM), MS (UPM)
Expertise :
Nanoelectronics,
Solar cell, Nanomaterials

DR.TAN TONG LING
Post Doctoral
B.Sc. (UNIMAS), PhD (UM)
Expertise :
Carbon Nanomaterials,
Photocatalysis

ROSLINA ABDUL RASHID
Science Officer
B.Sc. (UPM)
Expertise :
Materials Science,
Materials Characterization

AB HAFFIZ AB JALIL
Assistant Engineer
Diploma in Engineering
(Politeknik SSAAS), B.Eng. (UTM)
Expertise : Electrical and Electronics,
Gas Chromatography

ZAKKY YAMANIE JAMIAUDDIN
Assistant Engineer
Certificate of Engineering (Politeknik TSM Kulim)
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. TS. DR. SUHAIDI SHAFIE

Head of Laboratory
B.Eng. (University of Ryukyus),
MS (Tokyo University of Agriculture and
Technology, Japan), PhD Eng.
(Nanovision) (Shizuoka University, Japan)
Expertise : CMOS Image Sensor,
Porous Silicon, Solar Cell,
VLSI Design, Analog TV/VCR Tuners

DR. AMIR REZA SADROLHOSSEINI

Research Fellow
B.Sc. (University of Tehran),
MS (Azad University), PhD (UPM)
Expertise :
Nanomaterial, Plasmonic and Optical Sensor

PROF. DR. NOR AZAH YUSOF

Research Associate
B.Sc. (Hons), (UKM), PhD (UKM),
Postdoctoral (University of Cambridge)
Expertise : Chemical Analysis,
Electrochemistry, Environmental Chemistry

PROF. DR. MOHD NIZAR HAMIDON

Head of Electron Devices Program
B.Sc. (Hons) (UM), MS (UKM),
PhD (University of Southampton)
Expertise :
Microelectronics (Sensor Technology),
MEMS, Devices Fabrication and
Packaging, Wireless System

DR. SHAHRUL AINLIAH ALANG AHMAD

Research Associate
B.Sc. (UPM), PhD (University of Sheffield),
Postdoctoral (University of New South Wales)
Expertise :
Analytical Chemistry

TS. DR. MOHD NAZIM MOKHTAR

Research Associate
B.Eng (Hons) (Surrey), PhD (Surrey)
Expertise :
Biomedical Nanoelectronics Engineering,
Lab on Chip, Energy Harvesting

ASSOC. PROF DR. YAP WING FEN

Research Associate
B.Sc. (UPM), PhD (UPM)
Expertise : Optical Sensor Based on
Surface Plasmon Resonance Technique,
Optical Studies on Glass Ceramics
Composite Materials,
Optical Properties of Nanocomposite Thin Film,
Physics Literacy, Simulation & Multimedia

ASSOC. PROF. DR. JAAFAR ABDULLAH

Research Associate
B.Sc. (Hons) (UKM), PhD (UKM)
Expertise :
Analytical Chemistry

ASSOC. PROF. DR. SURIATI PAIMAN

Research Associate
B.Sc. (UTM), MS (UTM),
PhD (Australian National University)
Expertise : Crystal Growth,
Semiconductors Nanostructured Materials,
Nanomaterials, Thin Films,
Optoelectronics Applications

DR. NORHAFIZ AZIS

Research Associate
B.Eng. (UPM), PhD (Manchester)
Expertise : Transformer condition monitoring,
Insulation ageing and diagnostics,
Asset management,
Alternative insulation materials for
high voltage power equipment

ASSOC. PROF. DR. YUSRAN SULAIMAN

Research Associate
B.Sc. (Hons) (UTM),
MS (UTM), PhD (Durham)
Expertise : Analytical Chemistry,
Electrochemistry, Materials Chemistry

ASSOC. PROF. DR WAN ZUHA WAN HASAN

Research Associate
B.Eng. (UPM), MS (UPM), PhD (UPM)
Expertise : Bio Medical Engineering,
Robotic and Automation,
Sensor, Solar Technology

TS. DR. HASLINA JAAFAR

Research Associate
B.Eng. (UKM), MS (UKM), PhD (USM)
Expertise: Flexible Sensors & Electronics,
Micro-Electro Mechanical Systems (MEMS),
Carbon Nanomaterials and Embedded Systems

DR. AMRALLAH MUSTAFA

Research Associate
B.Eng. (UPM), MS (UPM),
PhD(Eng)(Shizuoka)
Expertise : CMOS Image Sensor,
Image Processing, Solar Car

DR. INTAN HELINA HASAN

Research Officer
B.Sc. (Yokohama National University),
MS (UPM), PhD (UPM)
Expertise : Electron devices,
Thick film technology, Printed electronics

ROSIAH OSMAN

Research Officer
B.Sc. (The University of Southwestern Louisiana
(Lafayette), MS (UPM)
Expertise : Electrical and Electronics Engineering,
Materials Science

DR. NOR HAPISHAH ABDULLAH

Research Officer
B.Sc. (UPM), MS (UPM), PhD (UPM)
Expertise : Magnetic, Ferritite, Multiferroic,
Nanomaterials, Ferroelectric and
Dielectric Materials

DR. NUR HAWA NABILAH AZMAN

B.Sc. (Hons) (UPM), Ph.D. (UPM)
Expertise :
Materials Science

MD. ALI RANI

Science Officer
B.Sc. (UPM)
Expertise : Materials Characterization

DR. FATIN NABILAH MOHD FAUDZI

B.Sc. (UTM), Ph.D. (UniMAP)
Expertise :
Biosensor, Carbon nanomaterials

MOHD WAFI AZIMIN MUHAMMAD JAN

Assistant Engineer
Certificate of Electronic Engineering
Expertise : Inject Printing



POSTGRADUATE

COVID-19 has significantly impacted the recruitment number of new postgraduate students, whereby ITMA received only sixteen student admissions in 2020. Enrolment of existing postgraduate students in ITMA also decreased by 8.5% compared to 2019. We believe that uncertainties in financial, movement restriction, limitation on research activities, and others contributed to low enrolment and admission. Despite a low number of admission and enrolment, ITMA had a consistent number of graduation rates in 2020, whereby eleven graduated with PhD and eight with Masters degree.

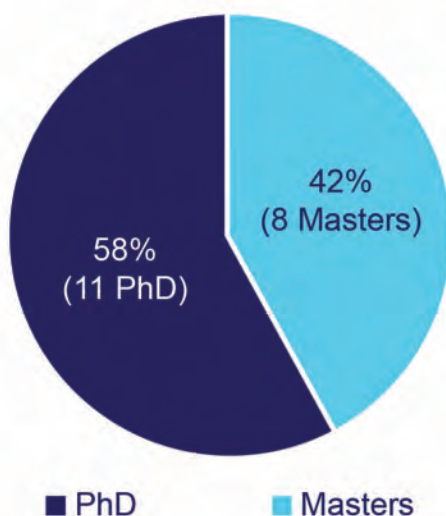
Postgraduate Student Admission 2020

<i>Program</i>	<i>Nationality</i>	<i>No. of Students</i>	<i>Total</i>
Master	Malaysia	7	9
	Iraq	1	
	China	1	
PhD	Malaysia	4	7
	Iraq	1	
	Nigeria	2	

Postgraduate Student Enrolment 2020

<i>Program</i>	<i>Nationality</i>	<i>No. of Students</i>	<i>Total</i>
Master	Malaysia	55	61
	Iraq	2	
	China	2	
	Bangladesh	1	
	Nigeria	1	
PhD	Malaysia	57	68
	Iran	3	
	Iraq	2	
	Pakistan	1	
	Sri Lanka	1	
	India	1	
	Nigeria	3	

Masters and PhD Graduates 2020



Congratulations!



**MUHAMMAD ASNAWI
MOHD KUSAIMI**
MSc: Nanotechnology



**ALIF SYAFIQ KAMAROL
ZAMAN**
MSc: Nanotechnology



NAZIFAH ARIFFIN
MSc: Sensor Technology



NUR AIN ASYIQIN ANASI
MSc: Sensor Technology



**EKEMINI MONDAY
ISOKISE**
MSc: Green Engineering



**AISYAH ZAKIAH KHIREL
AZMAN**
MSc: Material Science



SURAYA SHABAN
MSc: Energy



MOHD. ALI MAT NONG
MSc: Smart Technology and
Robotic



RUZANNA IBRAHIM
PhD: Nanomaterials and
Nanotechnology



NUR ALIA SHEH OMAR
PhD: Sensor Technology



**SITI AMANIAH
MOHD CHACHULI**
PhD: Sensor Technology



SURIA MOHD SAAD
PhD: Sensor Technology



SAMAN AZHARI
PhD: Nanotechnology



**NAEEMAH ABDALABBAS
IBRAHIM**
PhD: Nanotechnology



DALILA ALIAS
PhD: Nanotechnology



FARHATUN NAJAT MALUIN
PhD: Nanotechnology



SITI NOR AIN RUSLY
PhD: Advanced
Materials



**MAHANIM SARIF@
MOHD ALI**
PhD: Advanced
Materials



**SHEHU IBRAHIM
AKINFALABI**
PhD: Green Engineering

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 nanoparticles depend on several factors such as the electron density, size and shape of the nanoparticles, and 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.

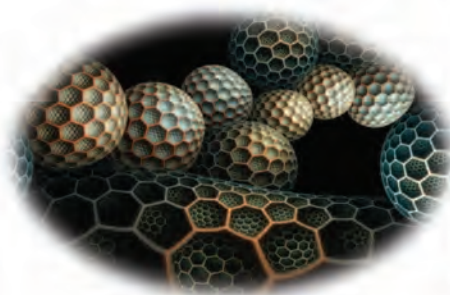


Advanced Materials

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 automatic 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 nanometers. Nanotechnology is the study of manipulating matter on an atomic and molecular scale. Nanotechnology entails the application of fields of science as diverse as surface science, 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, nanocomposite, 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, industry-university visits, community engagements, MoU/MoA agreements, and mobility programs.

Industrial Linkages

Courtesy Visit to Biotechnology and Nanotechnology Research Center, Malaysian Agricultural Research and Development (MARDI)

Materials Processing and Technology Laboratory (MPTL) led by Prof. Ts. Dr. Suraya Abdul Rashid and the researchers visited Biotechnology and Nanotechnology Research Center in MARDI on 24 September 2020.

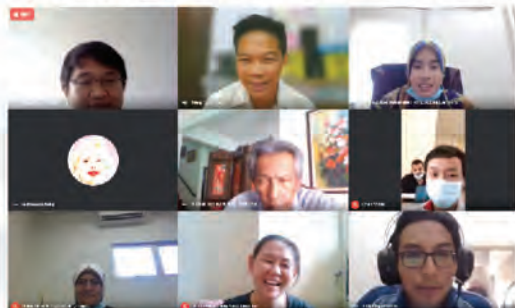
ITMA Director, Prof. Dr. Mohd Nizar Hamidon was also honored to join the visit. The visit was aimed to network with key persons, develop a strong relationship in research collaboration, exchange ideas and experiences.

Thank you to Dr. Faridah Salam, Director of Biotechnology and Nanotechnology Research Center, for a tour of the laboratories and the warm hospitality.



Sharing Session on “Emerging Applications of Raman Spectroscopy in Biomedical and Pharmaceutical”

The networking between industry and university continues despite the implementation of the Conditional Movement Control Order (CMCO) due to the increasing number of COVID-19 cases in Selangor. The Materials Synthesis and Characterization Laboratory (MSCL) collaboration with Hi-Tech Instruments in Malaysia organized a sharing session on “Emerging Applications of Raman Spectroscopy in Biomedical and Pharmaceutical” on 16 December 2020.



This online sharing session was chaired by Assoc. Prof. Dr. Che Azurhanim Che Abdullah, and the talk was delivered by Mr. Tok Hong Yuan, the Application Specialist from Instruments.

There were about 47 researchers and students from local and abroad universities who participated in the program. The program ended with a successful Q&A session.

Industrial Support for SAPSiD 3.0 Program

Surface Area and Particle Size Distribution Seminar (SAPSiD 3.0) had received industrial support for the year 2020 from Evergreensel Sdn Bhd, Megwena Synergy Supply, and Metrohm Malaysia Sdn. Bhd. SAPSiD is an annual program conducted by the Materials Synthesis and Characterization Laboratory (MSCL), Institute of Advanced Technology (ITMA).

The two previous series of SAPSiD were conducted in 2017 and 2018, combining theory and practical sessions. SAPSiD 3.0, on the other hand, was performed via the online platform in order to respond to the current COVID-19 outbreak standard, and only theories were presented.

Nevertheless, the event successfully attracted more than forty participants from various institutions to attend this online seminar. Besides UPM, there were participants from UPSI, UMT, UTHM, PICOM, and Universitas Brawijaya, Indonesia. The speaker for this half-day seminar was ITMA's Research Fellow, Prof. Dr. Mohd Zobir Hussein.

Community Engagements

ITMA Organizes “Science Knowledge Transfer and Charity Program” at Rumah Bakti Al Kausar

The Institute of Advanced Technology (ITMA) successfully organized a community project called the “Science Knowledge Transfer and Charity Program” at Rumah Bakti Al Kausar located in Section 4 Bandar Baru Bangi. The Rumah Bakti is a home to 30 asnaf students and orphans aged from 8 to 17 years old. The main purpose of the program is to inculcate an interest in science among the students. In addition, this community program is also part of the ITMA's efforts to provide assistance and donations to ease their burden.

The program began with a welcoming speech from the Chairman of the Program, as well as the Head of Functional Device Laboratory, Assoc. Prof. Ts. Dr. Suhaidi Shafie. Then the director of ITMA, Prof. Dr. Mohd Nizar Hamidon officiated the ceremony.

The participants were then briefed on Universiti Putra Malaysia and Institute of Advanced Technology by Mrs. Rosiah Osman. The program continued with an explanation of “Solar Technology” by Mr. Mohd Ruzaimi Ariffin. Participants practically assembled the electrical component to obtain electricity from solar panels to turn on the light bulb. Ts. Dr. Intan Helina Hasan further presented on the science, research and challenges of future research.

The program ended with a closing speech by Mr. Abu Bakar, on behalf of the management of Rumah Bakti Al Kausar. ITMA then presented the certificates, gifts and financial donations to Rumah Bakti representative and each student. We hope that this effort will benefit all students in particular and the Rumah Bakti in general and will continue in the future.



MoU/MoA

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

List of MoU/MoA 2020

NO.	COUNTRIES	ORGANIZATION	SIGNATURE DATE	EXPIRED DATE
1	Thailand	Synchrotron Light Research Institute (SLRI)	9 March 2020	9 March 2025
2	Iran	Institute for Color Science & Technology	12 July 2020	12 July 2025
3	Pakistan	University of Sindh Pakistan	21 December 2020	21 December 2025



UNIVERSITY OF
SINDH

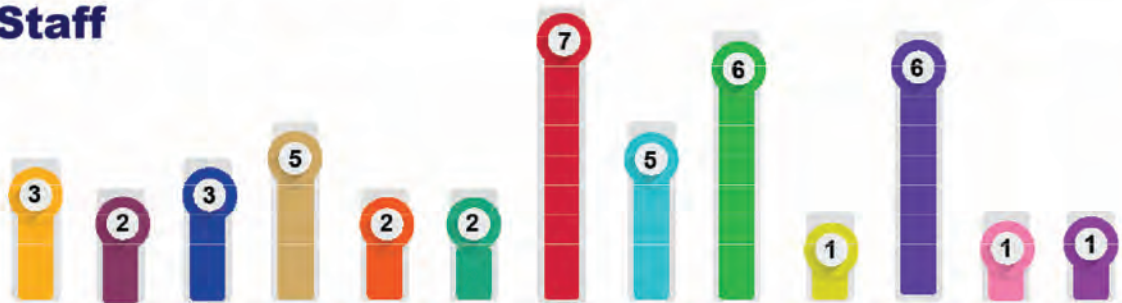


Institute for Color Science and Technology

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 are also formed to implement or monitor industry-university such as the quality system and safety in the laboratory.

Staff



The total number of staff in 2020 is 44 people



Excellence Service Award 2019



PROF. DR. MOHD
NIZAR HAMIDON



MD. ALI RANI



ROSLINA WARNO@RAHMAD

Staff Retired in 2020



ROSLINA WARNO@RAHMAD

COMMITTEE

Occupational Safety and Health Committee

Chairman : Prof. Dr. Lim Hong Ngee

Deputy Chairman : Md Ali Rani

Secretary : Noor Lina Shamsuddin

Employer Representatives :

Sarinawani Abdul Ghani

Roslina Abdul Rashid

Nurmazeera 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 Wafi 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

Ts. Dr. Intan Helina Hassan

Quality Management System (QMS) MS 9001 Committee

Deputy Management Representative :

Din 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 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

Nurmazeera Zulkefli

Rokiah Deraman

Emergency Response Team (ERT)

Commandant :
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

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 : Ts. Dr. Intan Helina Hasan

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

Technical and Quotations Meeting

Chairman :
Assoc. Prof. Ts. Dr. Suhaidi Shafie

Secretary :
Din Ayup

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

Calibration and Verification Committee

Chairman : Prof. Ts. Dr. 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

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.

Thermogravimetric Analyzer-Differential Scanning Analysis (TGA-DSC)

Brand: Mettler Toledo
Model: TGA-DSC HT 3

The TGA/DSC equipment is able to measure the changes in the properties of materials as they are heated. This equipment provides two methods of measurement, i.e. Thermogravimetric Analysis (TGA) and Differential Scanning Calorimetry (DSC). Temperature Range: 25 to 1600 °C



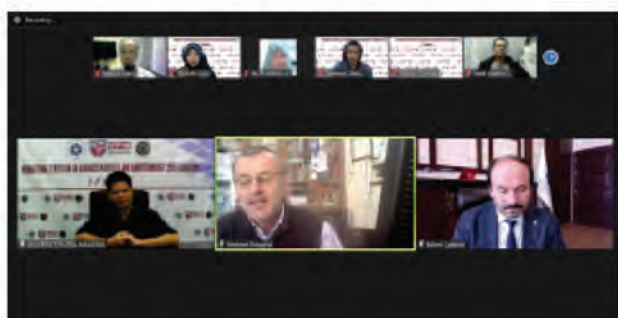
Existing facilities



ACTIVITIES

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.

International Symposium on Advanced Materials and Nanotechnology 2020 (iSAMN2020)



The arrangement of the iSAMN2020 is slightly different from previous years due to the impact of the COVID-19 pandemic that struck the whole world. It was supposed to be held in Turkey, but the plan was changed to suit the current pandemic situation. Unanimously, ITMA and the joint organizers from two universities in Turkey, namely Ataturk University and Erzurum Technical University agreed to organize the iSAMN2020 via

online platform using the network conference facilities. A total of 106 participants from different countries participated in this symposium which lasted for three days, from 1-3 December 2020.

The theme of the symposium was "Functional Nano-structured Materials and Devices", which covered basic principles up to the latest advanced materials technology and nanotechnology in the field.

The opening speech was delivered by Prof. Dr. Mohd Nizar Hamidon, Director of the Institute of Advanced Technology, followed by the opening speech by the Rector, Ataturk University, Prof. Dr. Ömer Çomaklı and, Rector, Erzurum Technical University, Prof. Dr. Bülent Çakmak. The opening ceremony was officiated by the Vice Chancellor of UPM, the honorable Y. Bhg. Prof Dr. Mohd. Roslan Sulaiman. In his inaugural speech, Y. Bhg. Vice-Chancellor expressed his proudness and gratitude for ITMA's dedication in organizing iSAMN for eight years consecutively. After the opening speech, Prof. Dr. Muammer Yaylali, one of the Members of the Board of Education Council, Turkey delivered his welcoming remark.



A total of fifteen experts from various fields in nanotechnology and advanced materials delivered their keynote speeches in their respective fields of expertise. The first day of the symposium presented four keynote speakers; Prof. Dr. Mohd Basyaruddin Abdul Rahman (Universiti Putra Malaysia), Prof. Dr. Raşit Turan (Middle East Technical University, Turkey) Prof. Dr. Ayse Bayrakceken Yurtcan (Ataturk University, Turkey) and Prof. Dr. Songul Duman (Erzurum Technical University, Turkey).



The second day of the symposium featured six other keynote speeches delivered by experts from Malaysia, Turkey, and the United Kingdom. The session started with a keynote address by Prof. Dr. Nor Azah Yusof (Universiti Putra Malaysia) followed by Prof. Dr. Mohd Ambri Mohamed (Universiti Kebangsaan Malaysia) and Prof. Dr. Asrulnizam Abd Manaf (Universiti Sains Malaysia). The second keynote session resumed after the completion of the

plenary session, which was divided into three sessions. Two experts from Turkey and one from the United Kingdom delivered their respective keynote speeches. They were Prof. Dr. Bulent Cavusoglu from Ataturk University, Turkey, followed by Prof. Dr. Levent Trabzon from Istanbul Technical University and Dr. Tapas Sen from the University of Central Lancashire, United Kingdom.

On the last day of the symposium, five other experts delivered the keynote speeches, namely Prof. Ir. Dr. Norhayati Soin (University of Malaya), Assoc. Prof. Ts. Dr. Wan Zuha Wan Hasan (Universiti Putra Malaysia) followed by Dr. Fauzan Ahmad (Universiti Teknologi Malaysia). The second keynote session featured Prof. Dr. Sebahattin Tüzemen and Prof. Dr. Guven Turgut from Ataturk University and Erzurum Technical University, Turkey. Additionally, seventy papers were presented in three separate plenary sessions that took place during the three days symposium.

Speaking at the closing ceremony, the Chairman of iSAMN2020, Prof. Dr. Mohd Nizar Hamidon hoped that this annual event will pave new opportunities for all participants to conduct more advanced research. The symposium closing speech was delivered by Prof. Dr. Mehmet Ertergrul, representing the Rector of Ataturk University, and Prof. Dr. Bülent Çakmak, Rector, Erzurum Technical University.

Overall, this year's symposium provided new dimensions and experiences to the participants and those involved in planning for future symposiums using online methods. The diversity of expertise in the presented keynote speech and paperwork attracted participants to share their latest information and technology in developing their research. See you at iSAMN2021!!

Refresher Workshop on ISO/IEC 17025: 2017

Institute of Advanced Technology organized a one-day Refresher Workshop on ISO/IEC 17025:2017 on 12 February 2020. The workshop was attended by the ITMA Quality Management System (QMS) MS ISO/IEC 17025 Committee to refreshen their knowledge in laboratory quality management. The facilitator of the workshop was Ms. Anijah Pangat, Consultant from SIRIM STS Sdn. Bhd.



ITMA Encourages Students to Remain Creative during MCO

During the Movement Control Order (MCO), ITMA collaborated with MajalahSains.com to organize the first Science Article Writing Competition, which focused on "Nanoscience and Nanotechnology." The goals were to inspire students to be innovative and creative while also assessing their comprehension of the highlighted subject, which is ITMA's niche areas.

The competition, which ended on 30 May offered a cash prize of RM650.00 in total. This competition received a good number of participation from various universities, including UKM, USM, UNIKL, UTM, UiTM, UNISZA, UIA, Polytechnic, YILDIZ TECHNICAL UNIVERSITY (TURKEY), and UPM.



The most creative article was written by Putera Arif Haikal Rusli (UPM) entitled "Teknologi Nano untuk Tenaga Masa Hadapan". The second and third prize winner were Siti Husnaa Mohd Taib (UTM) and Nurul Hidayah Ramli (USM). ITMA feels very thankful for the great support and congratulates all winners.

Grant Proposal Workshop to Strategize MPTL's Future Grants



Despite the Recovery Control Movement Order (RCMO), Material Processing and Technology Laboratory (MPTL) had successfully organized an online Grant Proposal Workshop via Microsoft Teams to practice social distancing as a new norm to break the chain of COVID-19.

This one-day program was attended by twelve MPTL members, including the Head of Laboratory, research associates, post-doctoral, and research officers. The program began with the brainstorming session, whereby all the attendees presented their research. This session was important, for research associates to understand the research direction of the institute. The program also discussed strategies to improve the number of research grants, either internal, public, international, or private grants.

Prof. Ts. Dr. Suraya Abdul Rashid and Dr. Umer Rashid, two key members of MPTL, shared their experiences in writing successful grant proposals as well as tips on how to improve them. The discussion was fruitful and productive for all of the participants. Hopefully, all of this information will assist the researchers in the future in preparing a good and successful research grant proposals.

Adapting to the New Normal, ITMA Shares Knowledge via Online Platforms

Due to the COVID-19 outbreak, the Institute of Advanced Technology (ITMA) successfully organized three series of online seminars across the Movement Control Order (MCO). Despite new normal circumstances, this effort aimed to maintain ongoing knowledge sharing activities with students and researchers.

A total of twelve sharing sessions were successfully conducted during the series of online seminar. Six researchers from the Laboratory of Materials Processing and Technology (MPTL) successfully conducted their presentation in April, three researchers from the Functional Device Laboratory (FDL) in May, two researchers from the Synthesis and Characterization Laboratory (MSCL), and an invited speaker from the Gandhiram Rural Institute in India, Prof. Dr. Abraham John in June 2020. They shared a variety of topics and tips relating to their areas of expertise and recent projects.

The seminar's main goal was to keep students and researchers engaged in research activities despite the limitations imposed by MCO, especially in laboratory work. In addition to keeping their motivation high and productive, the sharings may provide ideas for preparing another research proposal.

About 250 participants, including UPM and other institutions such as UKM, UiTM, UMT, UNITEN, UTeM, UTM, Adamawa State University (Nigeria), Universitas Internasional Batam (Indonesia), Kyutech (Jepun), and Sri Vidya Mandir College of Arts and Sciences (India) attended the online seminar. This practice can raise ITMA's profile and extend the list of potential networking opportunities in the future.

Students and researches are becoming more comfortable with conducting activities in an online environment. Keep an eye out for upcoming online activities!



IEEE Electron Devices Society (EDS) Malaysia Chapter Visit to ITMA and IEEE EDS Lecture Series

On 22 September 2020, ITMA received twenty delegates from IEEE Electron Devices Society (EDS) Malaysia Chapter from various universities in Malaysia. The purpose of the visit was to give an insight to the delegates regarding the various high-end technology tools and equipments in our institute. It also allowed the EDS members to explore the current techniques and devices and potential collaboration in academics and research.

IEEE EDS members arrived at 10.00 a.m. and were welcomed by ITMA Director, Prof. Dr. Mohd Nizar Hamidon, who then gave a brief introduction about UPM and ITMA. The program continued with the IEEE EDS Lecture Series at 10.30 a.m. by Associate Professor Dr. Nafarizal Nayan from Universiti Tun Hussein Onn (UTHM), entitled Magnetron Sputtering Technique for Versatile Thin Film Deposition. A total of 40 participants joined this interesting talk, including ITMA researchers, students, and IEEE EDS members.

After the talk, the delegates then visited ITMA laboratories such as Functional Devices Laboratory, Analysis Laboratory and Characterization Laboratory to be introduced to various high-end equipment that ITMA has to offer. Since most of the delegates are currently doing research work on electron devices, the introduction and briefing of current research projects in ITMA have been very exciting and created various opportunities for joint among the researchers.



ITMA Webinar : Separation Science



Separation Techniques

Dr. Umer Rashid
Fellow Researcher
Material Processing & Technology Laboratory,
Institute of Advanced Technology



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On 12 August 2020, 2020, the Materials Processing and Technology Laboratory (MPTL) successfully conducted the webinar "Separation Science: From Basic to Advance." The webinar is a continuation of the previous Gas Chromatography Workshop series. However, due to social distancing requirements, the management of the Institute of Advanced Technology (ITMA) agreed to turn the regular hands-on workshop into a webinar.

The basics of chromatography, methods, and analysis were covered in this webinar. To supplement the hands-on workshops, video presentations of gas

chromatography process and maintenance were provided. The webinar had sixteen participants, including lecturers and students from ITMA and other faculties. Dr. Umer, MPTL ITMA Research Fellow, delivered the lecture.



2020 PICTORIAL



7 August 2020
Farewell Celebration for Puan Roslina Warno



7 August 2020
Staff Birthday Celebrations (January - June)



11 September 2020
Appreciation Ceremony For
Assoc. Prof. Dr. Abdul Halim Abdullah



7 August 2020
Staff Birthday Celebrations (January - June)

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