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Faculty of Engineering

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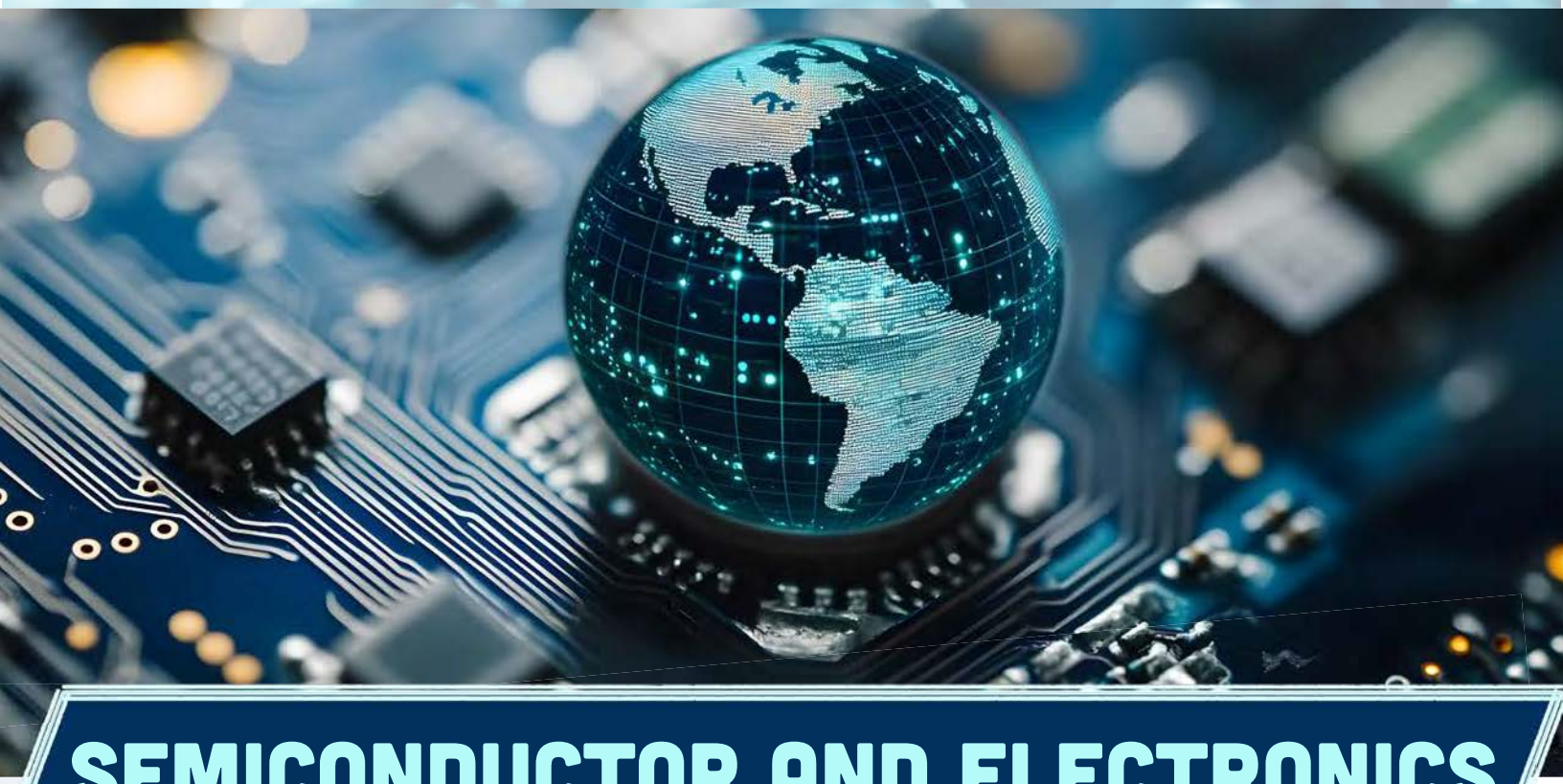
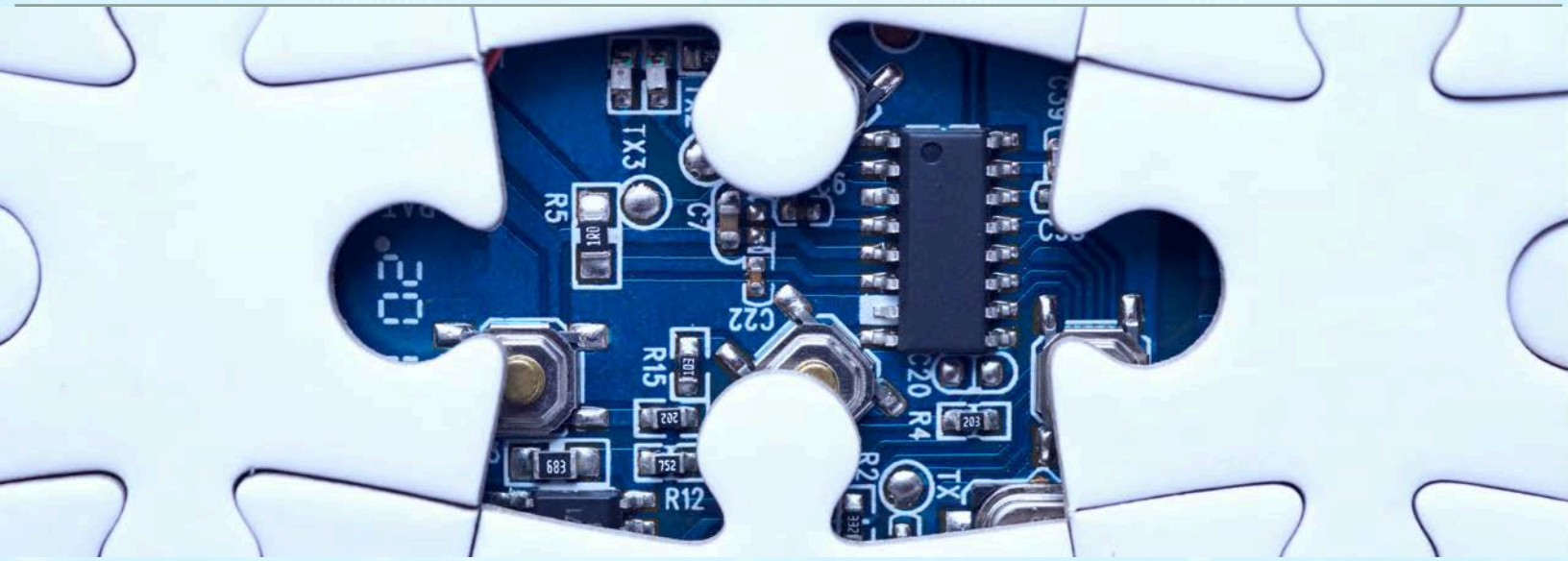
enginitium

The official bulletin of the Research office, Faculty of Engineering, Universiti Malaya



SEMICONDUCTOR AND ELECTRONICS

The semiconductor and electronics sector contributes about 6% to Malaysia's GDP and over 35% of its exports, supported by strong manufacturing and export-oriented capabilities. As the industry shifts toward higher-value activities like IC design, advanced packaging, and smart systems, local universities play a crucial role in developing skilled talent and research capacity. This issue of enginitium focuses on the ways Universiti Malaya supports this national agenda through comprehensive academic programs and active research in areas such as integrated circuit design, embedded systems, microelectronics, and semiconductor materials.



IN THIS ISSUE

'Semiconductors and Electronics' Enginitium Vol.4, June 2025

FOREWORD

Postgraduate education lies at the heart of the Faculty of Engineering's mission to advance knowledge, nurture leaders, and foster partnerships with industry. Our postgraduate students and supervisors are key contributors to a thriving research ecosystem that continues to grow in strength, diversity, and impact.

In 2024, we proudly celebrated the graduation of 80 PhD students, with 25% completing their degrees on time—a testament to the strength of our supervisory framework and the perseverance of our candidates. In 2025, we will continue to strengthen efforts to increase the number of graduates and improve our Graduating on Time (GOT) performance, ensuring timely and high-quality research outcomes.

During the 2024/2025 academic session, the intake for our Master of Engineering (Coursework) programmes increased by 57%, reflecting growing demand for advanced engineering education that is increasingly industry-driven. Our internationalisation efforts have also yielded progress, with the international-to-local student ratio now at 3.3:1—a strong indicator of the global appeal of our programmes.

Moving forward, the Postgraduate Office has embarked on several strategic initiatives to enhance the research quality by (1) streamlined academic processes, (2) securing top talent, (3) enhancing the student experience for lifelong employability, (4) ensuring programme quality. Through these initiatives, we continue to prepare graduates who are technically skilled, proficient and globally aware, and ready to meet the evolving challenges of the engineering profession.

To our postgraduate students: approach your journey with curiosity, integrity, and a commitment to meaningful impact.
To our supervisors: thank you for your unwavering mentorship and dedication—your role is central to our collective success.
Let this edition of Enginitium serve as both a reflection of our achievements and an inspiration for the journey ahead.

Assoc. Prof. Ir. Dr. Alex Ong Zhi Chao

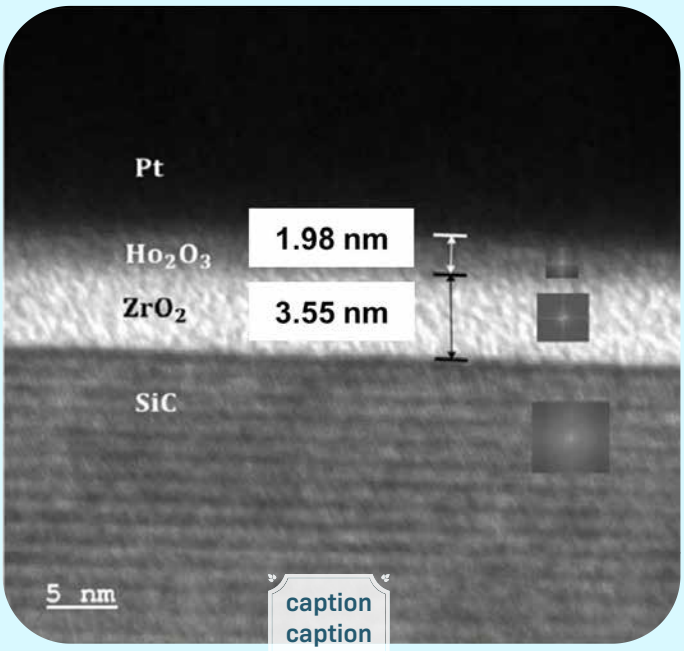
Deputy Dean (Postgraduate Studies)
Faculty of Engineering
Universiti Malaya

Advancing Wide Bandgap Semiconductor Technology with Transition and Rare-Earth Metal Oxide Ultrathin Film

Professor Ir. Dr. Wong Yew Hoong

As the demand for faster, smaller, and more energy-efficient electronic devices grows, the limitations of traditional silicon dioxide (SiO2)-based technologies have become increasingly apparent. In particular, the insulating layer of SiO2, long used in metal-oxide-semiconductor (MOS) devices, struggles with issues such as leakage current when scaled down, undermining device performance.

To overcome these challenges, researchers are turning to high-k metal oxides as promising alternatives. Leading this research innovation from the Faculty of Engineering, Universiti Malaya, our team focuses on engineering advanced gate dielectric materials to support wide bandgap (WBG) semiconductor devices.



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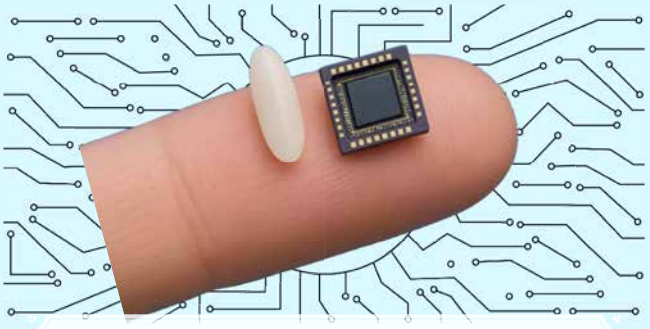

Miniaturization of devices – a comparison between a modern semiconductor chip and the size of a grain of rice

In our recent work, we explored the use of zirconium oxide (ZrO2) and holmium oxide (Ho2O3) as ultrathin dielectric layers. The team has successfully developed a ZrO2/Ho2O3 bilayer or stacking structure that significantly reduces leakage current — from 10-3 A/cm2 in Ho2O3 alone to just 10-6 A/cm2 in the bilayer or stacking system. This improvement is attributed to enhanced chemical bonding (Zr–O–Si and Ho–O–Si), which increases the energy band gap and improves the chemical stability of the dielectric interface.

The team also discovered that incorporation of nitrogen via nitrous oxide (N2O) gas during the deposition process yields optimal performance due to superior interface quality. This nitridation technique enhances material durability, making it well-suited for high-performance WBG devices used in power electronics and high-temperature environments.

Looking ahead, we aim to explore other rare-earth oxides (REOs) to further boost performance and improve compatibility with various substrate materials. Key priorities include enhancing thermal stability, reducing defects and charge trapping, and refining the gas mixture balance to optimize interface quality.

Collaborations with industry partners are also underway to transition this bilayer stacking structure technology into real-world device prototypes. Additionally, the research team is committed to sustainable fabrication processes that minimize environmental impact and energy consumption.

The work in the Faculty of Engineering, Universiti Malaya, marks a significant milestone in the development of next-generation MOS devices.


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東西好不好 靠材料工程師點石成金

撰述：本報梁慧穎
攝影：本報陳啟慧

材料工程師到底做什么？这里以政府2023年提出的国家愿景"思维教师（NETR）为例，走马大材料工程学系教授黄耀源讲解材料工程师扮演着什么样的角色。

● 储能技术
● 电动车
● 建筑材料
● 制造业
● 生物燃料
● 循环经济
● 再生能源

材料工程系可有可无？

材料会不断创新

By innovating material design and refining deposition processes, we are paving the way for energy-efficient, high-performance electronics that meet the demands of the future.

> *"The research team is committed to sustainable fabrication processes that minimize environmental impact and energy consumption."*

Professor Ir. Dr. Wong Yew Hoong
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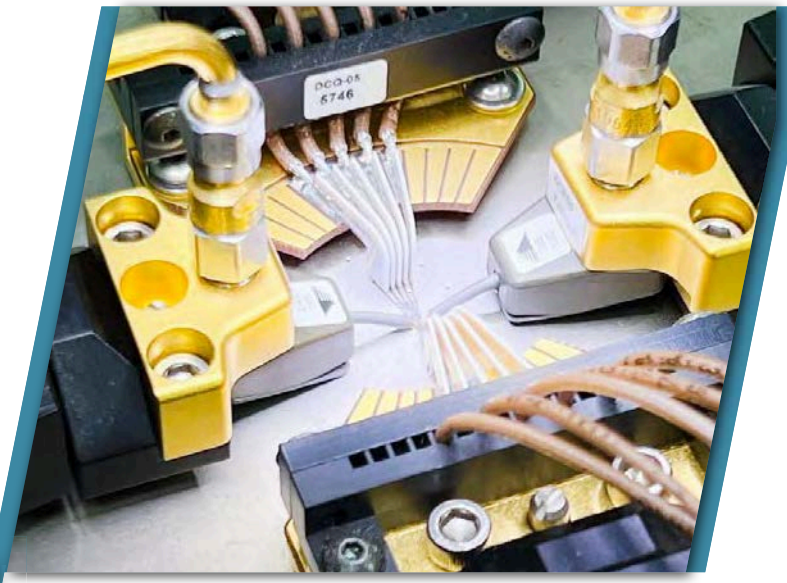
Research Highlights

Pioneering Innovation: UMIC Transforms Malaysia's Semiconductor Landscape

Analog, Digital and RF Research Group

In the rapidly evolving landscape of global technology, Malaysia is steadily establishing itself as a significant player in the semiconductor and microelectronics sector. At the forefront of this transformation stands the Analog, Digital and RF Research Group (UMIC Group) at Universiti Malaya, led by Professor Ir. Dr. Harikrishnan Ramiah, a distinguished figure in microelectronics integrated circuit design globally and a driving force behind Malaysia's growing influence in advanced IC development.



Industry Collaboration & Economic Impact

Since its establishment in 2010, UMIC Group has emerged as a national leader in microelectronics IC design and pioneered the work in RF energy harvesting. Under Prof. Harikrishnan's leadership, the research group has spearheaded groundbreaking innovations that have significantly advanced System-on-Chip (SoC) integration for both multinational corporations and small-medium enterprises in Malaysia.

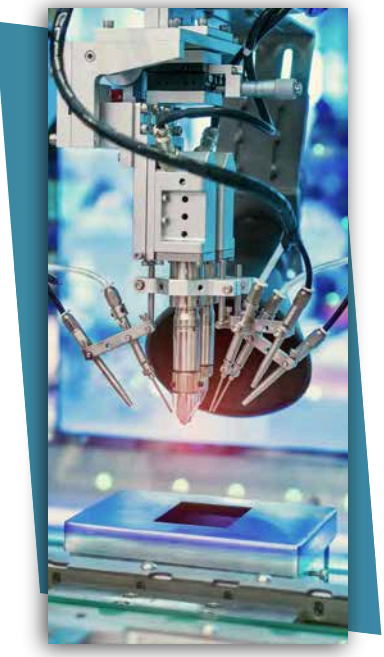
Research Highlights

Breakthroughs in RF Energy Harvesting

Among UMIC's most notable achievements is the development of a high-efficiency Integrated RF Energy Harvesting System, with a collaborative effort between Infinecs Systems Sdn Bhd, Asia Pacific University of Technology and CREST Project.

This innovative system converts ambient radio frequency energy into usable electrical power for Internet of Things (IoT) devices, representing a significant advancement in sustainable energy solutions. The technology features advanced multi-band harvesting with high conversion efficiency. The system has already achieved Industrial Readiness Level (IRL) 7. A practical application of this technology has been deployed in Turkey's agricultural sector as a Battery-Assist System for remote monitoring.

In 2024, UMIC received the prestigious Top in Tech Award for Most Impactful Academia-Industry Collaboration (R&D), recognizing their exceptional work in bridging academic research with industry applications.

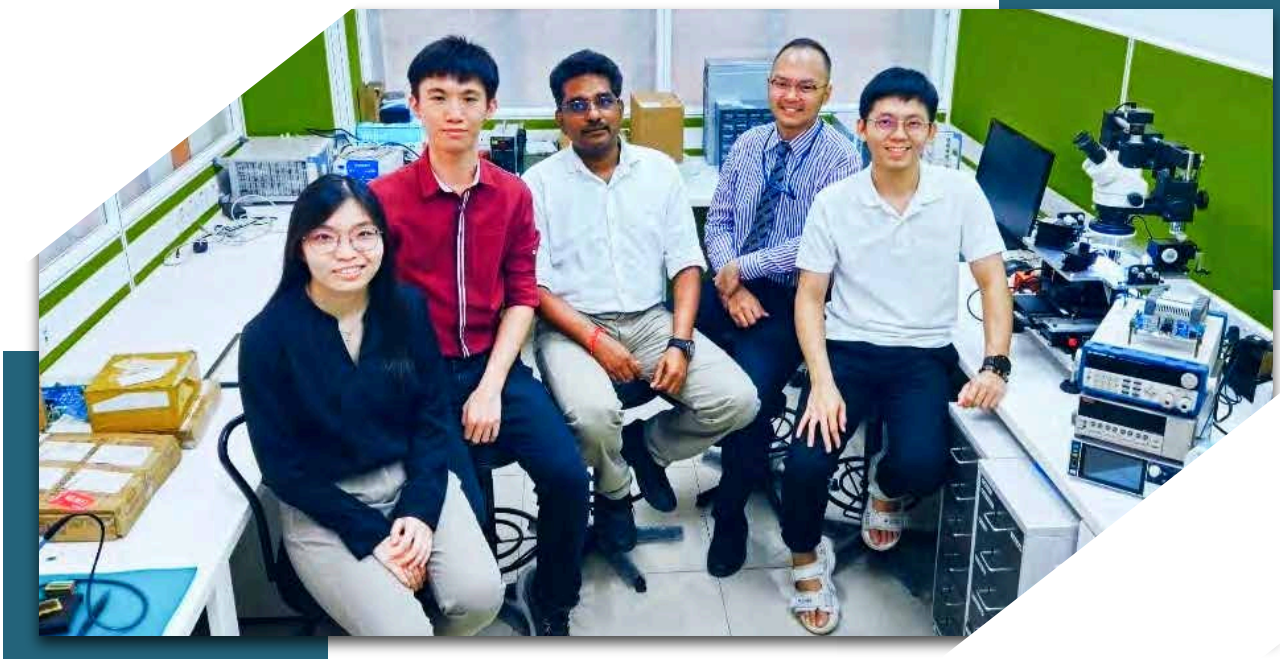


Academic-Industry Synergy & Industrial Collaboration

Another milestone of UMIC Group achievement was the publication of Malaysia's first paper in the prestigious IEEE Journal of Solid-State Circuits (JSSC) in 2018—considered the pinnacle of publication for solid-state circuits and often referred to as the "Olympic Games" of chip design. This significant achievement has elevated Malaysia's presence in high-impact IC research on the global stage.

UMIC Group has cultivated strong partnerships with industry players, including Motorola Solutions Foundation, Western Digital, OSRAM, Nexperia R&D, and LSF Technology, among others. These collaborations, along with support from government agencies like MITI and CREST, have resulted in over RM 7 million in research grants, advancing Malaysia's position in cutting-edge R&D. UMIC's innovations have delivered technological breakthroughs for SMEs and MNCs, with measurable increases in gross profit and business direction as reported in Infinecs Systems' annual Business Update Report.

These successful collaborations exemplify the synergistic relationship between academia and industry that drives technological innovation and economic growth.



Expanding Horizons

As Malaysia continues to strengthen its position in the global semiconductor industry, UMIC Group remains committed to pushing the boundaries of innovation in microelectronics and RF technology.

"Our team is developing 5G-enabled IoT sensors and biomedical wearables that leverage our analog IC expertise. We're also exploring AI-enhanced industrial automation solutions that align with Malaysia's Industry 4WRD initiative and the National Semiconductor Strategy", says Prof. Harikrishnan.

The group has secured several ongoing grants to advance next-generation chip design, including recently approved projects in low-power circuits. These initiatives will not only enhance the RF Energy Harvesting System's performance but also expand its applications to meet emerging technological needs.

With its blend of academic excellence, industry collaboration, and talent development, UMIC Group is poised to play a pivotal role in shaping Malaysia's technological future and establishing the nation as a key player in the global semiconductor landscape.

> *"UMIC's innovations have delivered technological breakthroughs for SMEs and MNCs, with measurable increases in gross profit"*

PROFESSOR IR. DR. HARIKRISHNAN A/L RAMIAH
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Research Highlights

Empowering Prosthetic Mobility with Semiconductors: Compact PCB Design for a Powered Ankle System

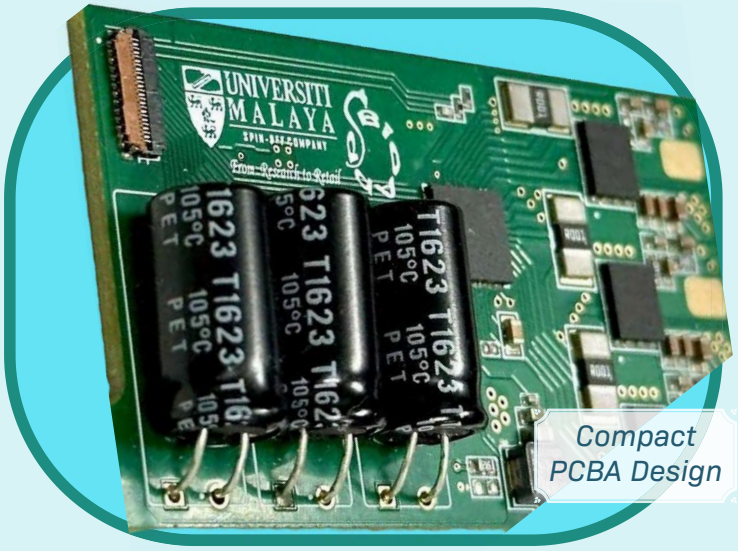
Prof. Dato' Seri Ir. Dr. Noor Azuan Bin Abu Osman & Zaina Al-Hashimi

In the fast-evolving world of wearable technology, the push toward smarter, smaller, and more human-centric devices is accelerating. Whether it's enhancing mobility, restoring independence, or enabling real-time connectivity, the role of semiconductors in wearable assistive systems has never been more crucial. In the Centre for Applied Biomechanics (CAB), our latest research focuses on a field where form meets function: the development of a compact, semiconductor-based control system for a powered prosthetic ankle.

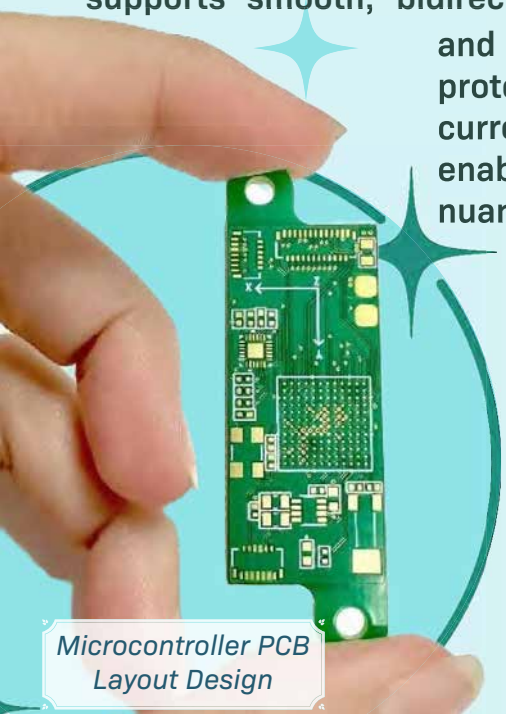
144-pin Microcontroller in BGA Package

As part of our broader initiative in wearable biomedical systems, we are engineering a highly integrated PCB solution tailored to meet the demanding constraints of lower-limb prosthetics. The goal is simple yet ambitious: enable precise, adaptive motor control in a form factor small enough to disappear into the mechanical structure of the ankle, without compromising performance.

At the core of the design is a low-power, high-efficiency microcontroller (MCU), chosen for its robust real-time processing capabilities, compact footprint, and rich peripheral support. This MCU orchestrates motor behavior, sensor fusion, and system diagnostics with deterministic timing. A dedicated motor driver IC supports smooth, bidirectional motor control and includes built-in protection features and current feedback to enable safe actuation and nuanced torque control.



Compact PCBA Design



Microcontroller PCB Layout Design

Thanks to modern semiconductor efficiency, we have integrated high-density ICs & Bluetooth Low Energy (BLE) via a semiconductor-based RF module, enabling wireless communication for configuration, tuning, and future user feedback applications.

CAB research team

Thermal performance is a key constraint due to the device's embedded nature. Our layout employs thermally optimized copper pours, strategic component placement, and high-efficiency power paths to manage dissipation without passive cooling—yet another area where semiconductor design plays a crucial role.

This system exemplifies how semiconductors are not just components, but enablers of advanced, life-enhancing technologies. It reflects a broader shift toward embedded intelligence in biomedical electronics, where human-centered design meets cutting-edge electronics to create solutions that truly move with people, both literally and metaphorically. As we move into the next phase, the roadmap includes enhanced power management, integrated sensor modules, and the application of TinyML at the edge—laying the groundwork for a new generation of smart, responsive prosthetics powered by semiconductor innovation.

> *This system exemplifies how semiconductors are not just components, but enablers of advanced, life-enhancing technologies*

PROF. DATO' SERI IR. DR. NOOR AZUAN BIN ABU OSMAN
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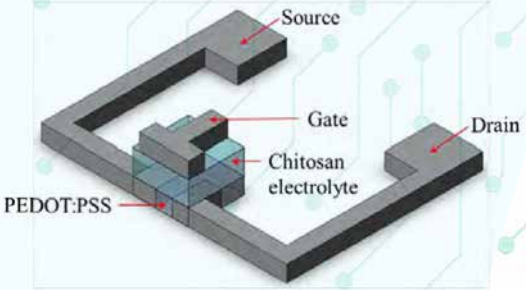
Research Highlights

Green Electronics: Flexible, Biodegradable OECTs for Next-Gen Bio-Medical and Agro Monitoring

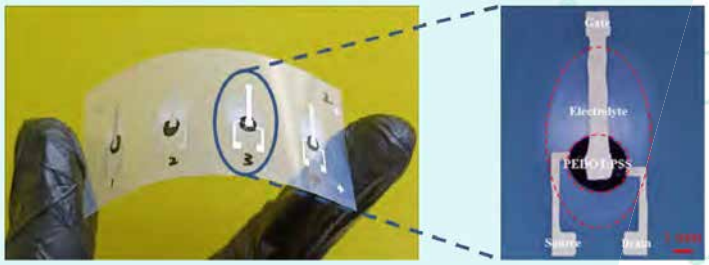
Associate Professor Dr Sharifah Fatmadiana Wan Muhamad Hatta

As the need for smarter, more sustainable technology continues to grow, electronics that can flex, adapt, and safely break down after use are becoming more important than ever. In this project, we introduce a new type of flexible, biodegradable organic electrochemical transistor (OECT) designed for use in both medical monitoring and agricultural sensing.



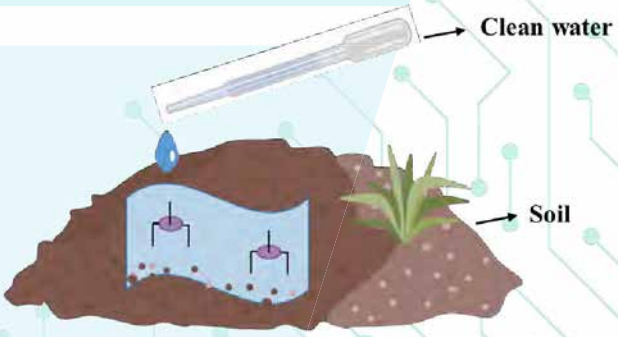
These transistors are built using soft, eco-friendly materials that can easily bend and stretch, making them ideal for wearable health devices or sensors placed directly in soil. What sets them apart is their ability to function reliably during use, and then degrade naturally, reducing electronic waste.

By combining low-voltage performance with simple, scalable fabrication, this work opens the door to a new generation of green, smart electronics; designed to work with the body or the environment and disappear when they're no longer needed.



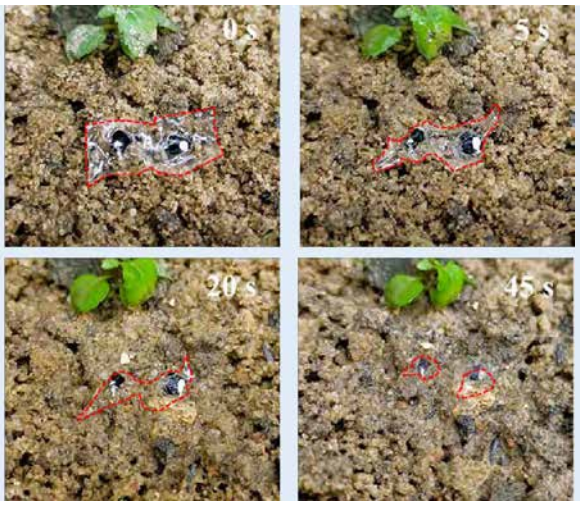
Here highlights the foundation of our work - a flexible organic electrochemical transistor (OECT) built using a stretchable, biodegradable platform. The structure and materials shown here are crucial for enabling soft, wearable electronics that can conform to the skin or natural surfaces without losing performance.

We compared several OECT layouts - including top-gated, bottom-gated, and side-gated configurations, to better understand how gate positioning affects performance. This comparison helped us fine-tune our design for optimal charge transport, especially under flexible conditions.

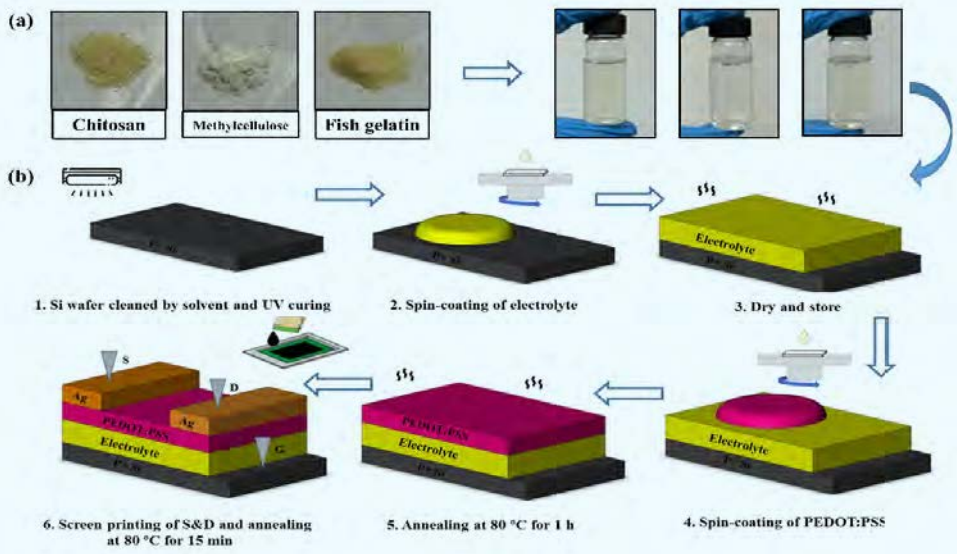


Our self-supporting OECTs begin to visibly degrade within just 45 seconds when placed in damp soil conditions (67% humidity, 30°C).

The experiment highlights the device's biodegradable nature, demonstrating its potential for short-term, disposable applications where electronic waste must be minimized. This rapid breakdown is made possible by the use of natural, organic materials, making the technology especially promising for eco-conscious medical and agricultural uses.



In this work, we also looked at how three naturally derived materials — chitosan, methylcellulose, and fish gelatin — can be used as solid-state electrolytes in organic electrochemical transistors (OECTs). Our OECT demonstrates low V_{th} of −0.71V, high I_{on}/I_{off} ratio of ~4.37×10^2, and strong g_m of ~4.75×10^{-6} S.



By combining these with the well-known PEDOT:PSS channel material, we created a fully organic and biodegradable device platform. This approach offers a more sustainable alternative to traditional electronics and opens the door to eco-friendly sensors that can be safely used in both medical and environmental applications.

> *"The experiment highlights the device's biodegradable nature, demonstrating its potential for short-term, disposable applications"*

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Fourth Generation Perovskite Solar Cells

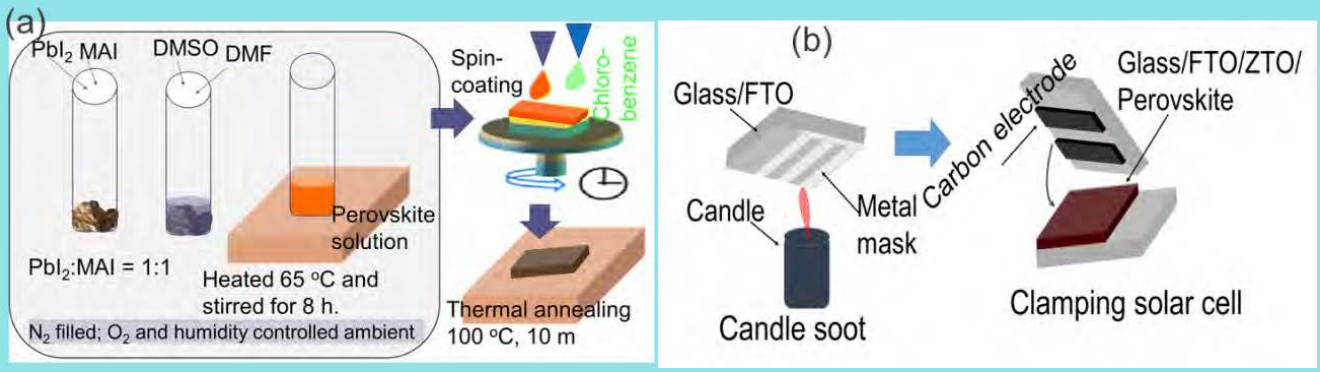
Dr. Mohammad Aminul Islam

In recent years, solar photovoltaic (PV) technology has emerged as a major way to lessen reliance on fossil fuels and combat climate change. Solar PV energy is expected to have extraordinary growth in the future as a result of further industry improvements, higher investments, and robust legislative support. The International Energy Agency (IEA) predicts that by 2050, solar energy will generate more than 30% of the world's electricity, further solidifying the trend toward a solar-powered future. The future of solar energy will be driven by ongoing technical improvement.

Some of the most promising technologies are perovskite solar cells (PSCs), bifacial solar cells, transparent solar cells, and solar paint and coating.

Interestingly, as fourth generation solar cells, PSCs are currently leading to the development of other types of promising solar cells, such as bifacial, semi-transparent, building-integrated, and/or vehicle-integrated solar cells.
PSCs have two major disadvantages: they are unstable in ambient conditions, and the most effective PSCs include toxic Led (Pb).

Currently, our research teams are working to fabricate PSCs that are both highly stable and function well in ambient conditions. We also focus on semitransparent, Led (Pb)-free building integrated PSCs. We follow the easiest and novel fabrication technique to fabricate PSCs.

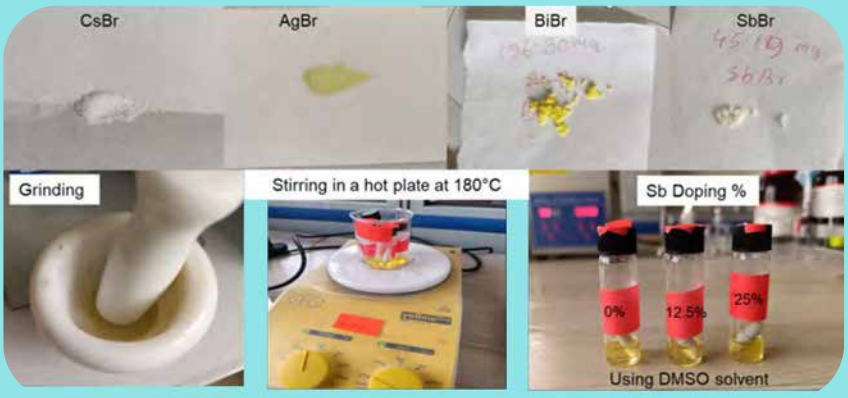


Schematic of the process flow for fabricating perovskite films and solar cells, (a) the preparation of perovskite precursor in an N2 and O2 controlled glove box, and perovskite film deposition via spin coating technique, back contacting via candle soot technique (c).

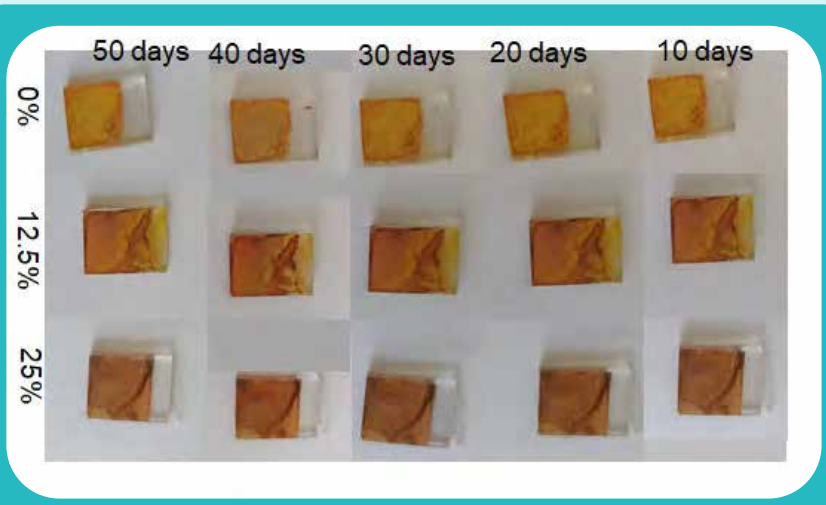
Research Highlights

Our group's most recent focus is on developing Pb-free perovskite materials that could be fabricated in ambient conditions.

It should be mentioned that the most effective perovskites are made in controlled environments, which adds complexity to the procedure. The highly stable of Pb-free Halide Double Cs2AgBiBr6 perovskite absorber layer has been fabricated by our group, details observation on PSCs sell performance and it's stability still in going.



The process of preparing the precursor of Pb-free Halide Double Cs2AgBiBr6 perovskite absorber layer



The optical photograph of the Pb-free Halide Double Cs2AgBiBr6 perovskite thin films, the stability of the films could be clearly observed in the photographs.

This project will be an important milestone for solar photovoltaic technology in Malaysia's renewable energy sector. The basic research findings may have contributed to demonstrating how University Malaya's work can spur innovation in the newest technologies, advancing the university's position as a pioneer in the rapidly developing field of renewable energy.

"The International Energy Agency (IEA) predicts that by 2050, solar energy will generate more than 30% of the world's electricity."

Dr. Mohammad Aminul Islam
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Integrated Multi-Sensors Smart Wearable Device For Healthcare Monitoring

Centre of Printable Electronics

Low-cost Smart Glucose Monitoring

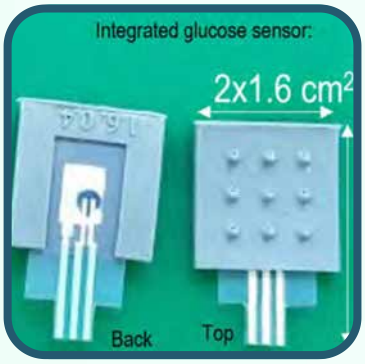
Diabetes is a significant public health concern in Malaysia, where the prevalence has seen a dramatic increase over the past few decades.

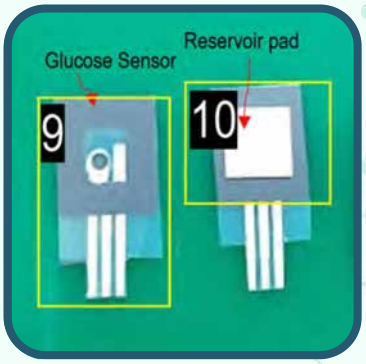
Glucose sensors, particularly continuous glucose monitors (CGMs), are, however, quite expensive, with costs associated not only with the device itself but also with the sensors that require regular replacement. This can be a barrier for many users. The Centre of Printable Electronics initiative, funded by CREST and supported by UMCH Sdn Bhd, aims to develop a low-cost continuous glucose monitor (CGM) that is both affordable and reliable for diabetic patients.

1. Low-cost Replaceable Glucose Sensor

The sensor consists of three main parts:

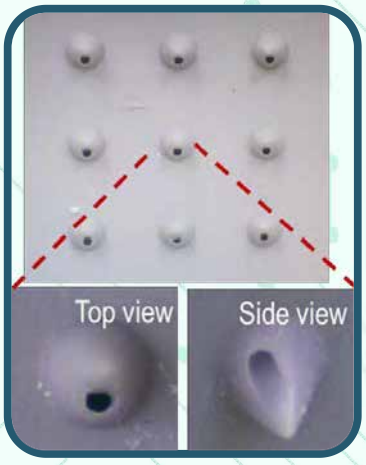
- a microneedle for ISF extraction,
- a reservoir pad for ISF storage, and
- a novel OTFT biosensor.



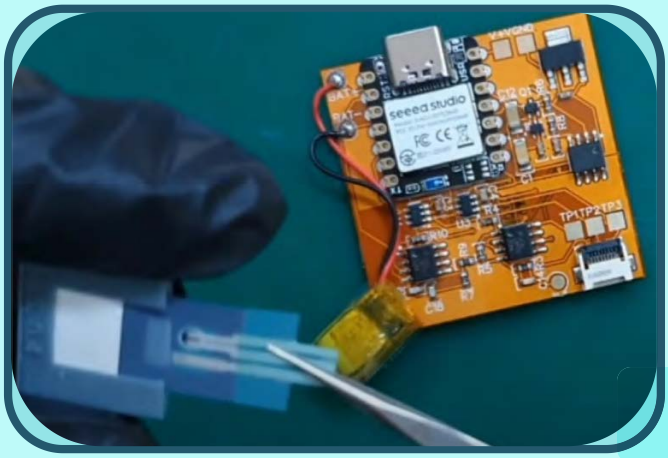


Microneedles offer several advantages for diabetes management, particularly in the context of continuous glucose monitoring:

- Microneedles are minimally invasive, reducing the fear and pain associated with pricking the fingers for blood extraction using conventional methods.
- The microneedle is fabricated by utilising customised advanced CPE's 3D printing techniques, where the cost is relatively low compared to current market CGM sensors.



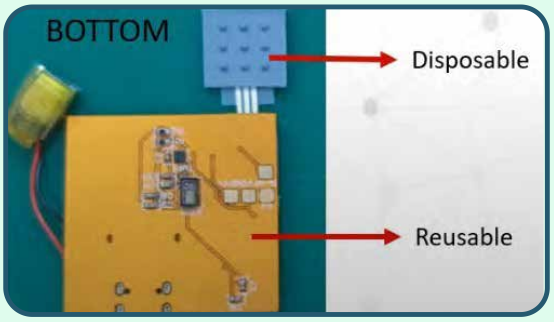
2. Integrated Reusable Flexible IoT Sensors



The module integrates a heart rate sensor, a temperature sensor, a rechargeable battery, and an ultra-low-power Bluetooth module, all of which are soldered onto a flexible substrate. This module feature provides several advantages:

- Flexible PCB able to assimilate with human body contours, enabling it to be placed on various human body parts.
- The temperature sensor and heart rate sensor can provide continuous data for reliable monitoring.
- The ultra-low power Bluetooth module can prolong operation duration up to 1 week after a full charge.
- The module is connected to the UMCH mobile apps for glucose monitoring and alerts the patient to their glucose level.

Thus, these two parts integrate as a low-cost CGM that can cater to diabetes patients who face financial constraints, and infants or kids with diabetes who need constant monitoring.



Both the sensors and electronics are entirely fabricated and developed by the Centre of Printable Electronics. This novel invention has been submitted for a patent.
Patent Filing No - PI2025001135

This work is brought to you by:
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Designing Systems, Building Futures

Ir Yau Chau Fong

I'm an electrical engineer by training, but more than that—I see myself as someone who is constantly learning, evolving, and contributing to a field that shapes the very fabric of modern life. I graduated with a Bachelor of Electrical Engineering (Hons) from Universiti Malaya in 2001, and the journey since then has been a deeply rewarding one.

Over the last two decades, I've been fortunate to work across major consultancy firms and later lead my own company, Duriane Professionals Sdn Bhd, which I founded in 2011. My work has focused heavily on the design, implementation, and contracting of large-scale electrical systems for a wide range of buildings: aviation hangars, high-rise towers, industrial plants, and critically, data centres. I am proud to be certified as an Uptime Institute Accredited Tier Designer (ATD), and was responsible for certifying Malaysia's first-ever Tier III Data Centre in Shah Alam. Sustainability has been a key focus for me in recent years. I advocate for engineering solutions that support low-carbon, resilient communities through better planning and infrastructure. Our role is not just to build, but to improve how people live.

Professionally, I continue to stay involved in the broader engineering community. I currently serve as the Deputy President of IEM (2024/25), a Board Member of BEM, and Chair of the Electrical Engineering Technical Division within IEM. Over the years, I've contributed to standards writing (such as WG 1979: Electrical Installation Code of Practice) and led position papers on Renewable Energy. I also chair the AEI-EI Steering Committee (AFEO) and sit on several national and international technical committees including SIRIM/DSM and IEC. At the same time, I actively serve as an Industry Advisory Panel for universities like UM, UCSI, and Nottingham Malaysia, and I'm currently the President of the UM Engineering Alumni Association.

In terms of future trends, I always remind young engineers to prepare for "ABCD": Artificial Intelligence, Blockchain, Cloud Computing, and Data Analytics. These four pillars will drive the next wave of innovation and disruption across all industries, including healthcare, where AI and big data can radically improve diagnostics and patient care.

The engineering landscape is evolving and if we don't keep learning, we'll be left behind. My message to the next generation of engineers is simple: Be humble. Stay updated. Let the magic of engineering shine—because we're not just building systems, we're shaping society.

IR YAU CHAU FONG
Managing Director, Duriane Professionals Sdn Bhd
Alumni 2001, Faculty of Engineering

Meet Dr. Ahmad Haziq Aiman Rosol

Dr. Ahmad Haziq Aiman Rosol is a Senior Lecturer at the Department of Electrical Engineering, Universiti Malaya. He specializes in ultrashort pulse generation and fiber laser technologies, with a strong research focus on the development of novel saturable absorbers and advanced optical fiber configurations for pulsed laser systems.

Dr. Ahmad Haziq obtained his Ph.D. in Photonics from Universiti Malaya in 2021, following an MSc and BEng (Hons) in Electrical Engineering from Universiti Teknologi MARA, where he graduated with First Class Honors. His academic journey is rooted in pushing the frontiers of optical engineering for both scientific research and practical applications.

During his postdoctoral research at Universiti Teknologi Malaysia, Dr. Ahmad Haziq explored D-shape fiber-based ring cavities operating at 1550 nm, while his international stint at Airlangga University, Indonesia, led to key advancements in gold nanoparticle saturable absorbers. These materials were pivotal in producing mode-locked and Q-switched operations in fiber lasers, contributing to next-generation photonics systems.

Throughout his tenure as a research engineer, Dr. Ahmad Haziq spearheaded several impactful engineering projects, including a high-power Ytterbium-doped fiber laser welding machine and a portable 1550 nm ASE broadband light source.

His leadership in these projects highlights a strong blend of academic excellence and real-world innovation.

Meet our researchers

Dr. Ahmad Haziq's work is widely recognized within the photonics community, with over 15 peer-reviewed publications in reputable journals such as Optics & Laser Technology, Physica Scripta, and Optical Fiber Technology. He has also co-authored two book chapters on advanced saturable absorbers. An active member of the photonics community, he has contributed to conferences like Photonic Meeting 2023 and iCOSINE, and holds leadership roles, including serving as the Secretary of the Optical Society of Malaysia (OSM). His research interests include near- and mid-infrared lasers, saturable absorber materials, and fiber optic sensors for advanced communication and sensing technologies.

Selected Publications

- A.H.A. Rosol et al., "Molybdenum gallium carbide coated D-Shape fiber for nanosecond dark pulse generation," Physica Scripta, 2024.
- A.H.A. Rosol et al., "Microsecond and nanosecond pulse initiator by Mo_2Ga_2C DSF SA with EDFL ring cavity," Optics & Laser Technology, 2024.
- A. Rosol et al., "Short pulsed (1088.5 nm) neodymium-doped fiber laser via Ti_3C_2TxPVA film-based SA," Optik, 2024.
- A. Rosol et al., "Ti_3C_2Tx saturable absorber as Q-switched initiator in passive neodymium doped fiber laser," Optical Fiber Technology, 2023.
- A.H.A. Rosol et al., "Mode-locked operation with 9kW peak power using Au nanoparticles saturable absorber," Optik, 2021.
- A.H.A. Rosol et al., "MXene Ti_3C_2Tx thin film as a saturable absorber for passively mode-locked and Q-switched fibre laser," Journal of Modern Optics, 2021.

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Publon
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ITEX MALAYSIA

Congratulations to Our ITEX 2025 Champions!

The International Invention, Innovation, and Technology Exhibition (ITEX) 2025 took place on 29–30 May 2025 at the Kuala Lumpur Convention Centre (KLCC) in Malaysia. The event showcased groundbreaking innovations and technologies from across Asia and beyond, aiming to connect inventors with investors and industry leaders. We are proud to celebrate the outstanding achievements of our researchers from the Faculty of Engineering, University of Malaya, at ITEX 2025!

GOLD MEDAL

HENRY GOH AWARD
BEST INVENTION
-ENVIRONMENT-

DR. MUHAMAD FAZLY ABDUL PATAH & TEAM

Revolutionizing Waste Management: Turning Plastic Waste into Sustainable Fuels

Your project highlights a vital solution for environmental sustainability through innovation in waste-to-energy technology. Congratulations!

GOLD MEDAL

DR. MUHAMMAD IMRAN RAMLI & TEAM

Measurement of Respiratory Muscle Performance During Singing Using Muscle Vibration Sensor in People with Spinal Cord Injury

Your innovative work in rehabilitation science has set a new benchmark in merging technology with human well-being. Congratulations on this well-deserved recognition!

SILVER MEDAL

DR. EFFARIZA BINTI HANAFI & TEAM

Smart Manhole: Ensuring Worker Safety and Efficient Sewer Management

Your contribution to urban safety and smart infrastructure is a testament to engineering excellence with societal impact. Well done!

We commend all of you for your hard work, creativity, and commitment to making meaningful change.
Your success at ITEX 2025 reflects the spirit of innovation that drives our faculty forward.

Path to Excellence: Grants

International Grant

Associate Professor Ir. Ts. Dr. Lai Khin Wee

Exploratory Research on the Relationship between Individual Learning Efficiency and the Brain, Genes, and Behavior in Cognitive Neuroscience

RM 250,000

Shanghai Data Rhythm Medical Technology Co., Ltd, China

Exploring and Treating Cardiovascular Comorbidities: Toard Integrated Management Strategies

RM 100,000

Suzhou Huiruikang Intelligent Technology Co., Ltd, China

UM Living Labs Grant

Dr. Mohd Hafizan Md. Isa

Integrating Vegetation Into Porous Concrete For Sustainable Slope Erosion Control

RM 20,000

Dr. Hanee Farzana Hizaddin

Designing A Sustainable E-Waste Ecosystem At Um: Circular Economy, Recovery Technologies, And Behavioural Change

RM 30,000

Gs. Ts. Dr. Sanizam Sazmee Sinoh

Life Cycle Assessment Of Universiti Malaya Campus Towards Net Zero Carbon Emissions

RM 30,000

List of Publications April-June 2025

- A Capacitorless Flipped-Voltage-Follower-Based Low-Dropout Regulator Incorporating Adaptive-Compensation Buffer — http://dx.doi.org/10.1109/TVLSI.2025.3535630
- A New Decoupling Technique for Multiple Transmitters and Multiple Receivers to Improve Power Transfer and Misalignment Tolerance in WPT Systems — http://dx.doi.org/10.1109/TTE.2024.3482351
- A novel deep eutectic solvent-based liquid membrane for the extraction of glycerol from crude biodiesel — http://dx.doi.org/10.1002/aocs.12951
- A novel scoring system for heart failure screening utilizing combined electrocardiogram, phonocardiogram, and radial artery features — http://dx.doi.org/10.1038/s41598-025-99039-z
- A structural equation modeling approach to investigating the influence of smart kitchen appliance design features on older adults' technology acceptance — http://dx.doi.org/10.1016/j.archger.2025.105781
- A theoretical framework for chemical storage tank pool fire domino effect prevention based on inherent safety concepts — http://dx.doi.org/10.1016/j.psep.2025.106924
- Advanced cryocooler system design for superconducting aircraft propulsion: Integrating air-cycle reverse Brayton refrigeration with cryogenic hydrogen cooling — http://dx.doi.org/10.1016/j.tsep.2025.103451
- Advancing optical nanosensors with artificial intelligence: A powerful tool to identify disease-specific biomarkers in multi-omics profiling — http://dx.doi.org/10.1016/j.talanta.2025.127693
- Application of response surface methodology to optimize the treatment process of high conversion of free fatty acids using (1R)-(-)-camphor-10-sulfonic acid and iron(III) sulphate — http://dx.doi.org/10.2298/HEMIND240515003H
- Artificial intelligence in chemical exchange saturation transfer magnetic resonance imaging — http://dx.doi.org/10.1007/s10462-025-11227-5
- Can Time and Cost Efficiency Be Enhanced for GWQI Prediction Utilizing Machine Learning Modeling? — http://dx.doi.org/10.1007/s11269-025-04190-x
- Comprehensive investigation of rooftop photovoltaic power plants with monocrystalline polycrystalline and thin-film technologies for exergy economic and environmental assessments — http://dx.doi.org/10.1038/s41598-025-99939-0

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- Cross-Granularity Network for Vehicle Make and Model Recognition — http://dx.doi.org/10.1109/TITS.2025.3549217
- Current scenario and future trends on stability issues of solar cells: A mini review — http://dx.doi.org/10.1016/j.cocis.2025.101895
- Dark pulse generation in mode-locked erbium-doped fiber lasers using chromium gallium carbide film-based pulse transducer — http://dx.doi.org/10.1088/1402-4896/adcb76
- Detection and Measurement of Interfacial Charge Transfer Relaxation Time: FeNi/NF Electrocatalysts for Water Splitting to Hydrogen — http://dx.doi.org/10.1021/acsami.5c02561
- Determining Carbon Dioxide Emission Factors of Indonesia Coal-Fired Power Plants with CEMS Measurement Data — http://dx.doi.org/10.1007/s44408-025-00002-4
- Development of natural deep eutectic solvent-assisted liquid-liquid extraction method for soap removal from biodiesel: Optimization and kinetics — http://dx.doi.org/10.1002/aocs.12939
- Development of Rapidly Dissolving Microneedles Integrated with Valsartan-Loaded Nanoliposomes for Transdermal Drug Delivery: In Vitro and Ex Vivo Evaluation — http://dx.doi.org/10.3390/pharmaceutics17040483
- Development of ZrO2 and Ho2O3 as Gate Dielectrics on 4H-SiC Substrate with N2O and O2 Gas Concentration Variations — http://dx.doi.org/10.1007/s11664-025-11804-y
- Economic feasibility assessment of optimum grid-connected PV/battery systems to meet electricity demand for industrial buildings in Saudi Arabia — http://dx.doi.org/10.1016/j.enbuild.2024.115126
- Effectiveness Of Myofascial Release And Stretching Of Calf Muscle In Exercises For Flat Foot Intervention: A Systematic Review — http://dx.doi.org/10.1142/S0219519425300017
- Effects of Infrared Radiation Parameters on Drying Characteristics and Quality of Rice: A Systematic Review — http://dx.doi.org/10.1007/s11947-025-03881-y
- Efficiency of Clay-Burnt Brick Fines as an Internal Curing Agent for Enhancing Mechanical and Durability Properties of High-Strength Concrete — http://dx.doi.org/10.1061/JMCEE7.MTENG-19519

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- Electrochemical properties of Fe(II) spincrossover complexes in different spin states: an investigation through electrochemical impedance spectroscopy — http://dx.doi.org/10.1007/s11581-025-06210-7
- Emerging Metal-Polymer Frameworks: Structure, Applications, and Perspectives — http://dx.doi.org/10.1002/adfm.202425506
- Energy consumption prediction for office buildings: Performance evaluation and application of ensemble machine learning techniques — http://dx.doi.org/10.1016/j.jobe.2025.112021
- Enhanced stability and optimization of SMES-based deregulated power systems using the repulsive firefly algorithm — http://dx.doi.org/10.1016/j.physc.2025.1354692
- Enhancement of cellulose nanocrystal yield from oil palm empty fruit bunches: A comparative study of binary and ternary deep eutectic solvents with pulsed electric field pretreatment — http://dx.doi.org/10.1016/j.biombioe.2025.107672
- Ethylene glycol-based nanofluids: machine learning predictions for improved solar thermal performance — http://dx.doi.org/10.1007/s10973-025-14271-z
- Evaluation of mandibular advancement surgery efficacy in treating obstructive sleep apnea: A study on turbulence kinetic energy — http://dx.doi.org/10.1016/j.cmpb.2025.108610
- Finite element analysis and clinical evaluation of cross locking external fixator configuration for distal third tibia fracture — http://dx.doi.org/10.1038/s41598-025-97090-4
- Generation of Copper Oxide Nanoparticles from Discarded Printed Circuit Boards: Microscopy Characterization and Surface Impact with Electrolytes — http://dx.doi.org/10.1007/s10876-025-02814-1
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- High-precision pest and disease detection in greenhouses using the novel IM-AlexNet framework — http://dx.doi.org/10.1038/s41538-025-00426-7
- Impact of endospore-forming bacterial co-culture on the long-term self-healing efficiency and hardened properties of cement mortar — http://dx.doi.org/10.1016/j.conbuildmat.2025.140756

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- Impact of water-washing pretreatment on key properties of torrefied palm kernel shells: A statistical optimization study — http://dx.doi.org/10.1016/j.indcrop.2025.120729
- Improved Branch-and-Bound Antenna Selection Algorithm for Massive MIMO — http://dx.doi.org/10.3390/electronics14081617
- Indoor thermal comfort evaluation of stone houses in Shandong mountainous region of China — http://dx.doi.org/10.1080/00038628.2025.2493813
- Innovative in-house sodium silicate derived from coal bottom ash and its impact on geopolymer mortar — http://dx.doi.org/10.1016/j.jobe.2024.111428
- Intelligent grading system for mangosteen based on faster-FRNet: Enhancing accuracy and efficiency in post-harvest quality control — http://dx.doi.org/10.1016/j.jfca.2025.107394
- Long Short-Term Memory-Model Predictive Control Speed Prediction-Based Double Deep Q-Network Energy Management for Hybrid Electric Vehicle to Enhanced Fuel Economy — http://dx.doi.org/10.3390/s25092784
- Microstructural characterization and reaction mechanism of home-brewed activator derived from eco-processed pozzolan for one-part geopolymer mortar — http://dx.doi.org/10.1016/j.conbuildmat.2025.140513
- Modeling and simulation of phase change material-based passive and hybrid thermal management systems for lithium-ion batteries: A comprehensive review — http://dx.doi.org/10.1016/j.est.2025.116011
- Morphological, chemical, and crystallographic aspects of interface evolution in Al/Mg dissimilar friction stir welds — http://dx.doi.org/10.1016/j.jmrt.2025.04.304
- Multifunctional prospects of physical vapor-deposited silver-based metal-dielectric nanocomposite thin films — http://dx.doi.org/10.1016/j.jsamd.2025.100871
- Natural deep eutectic solvent integrated with bulk liquid membrane system for salicylic acid removal from wastewater — http://dx.doi.org/10.1016/j.psep.2025.107047
- Natural deep eutectic solvents as a green inhibitor of carbon steel corrosion in sulphuric acid — http://dx.doi.org/10.1007/s11696-025-03983-z

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- Nitrogen doping on fluorescent carbon dot nanoparticles synthesized from lychee exocarps for applications in UV tube down-conversion and pH-responsive curcumin delivery — http://dx.doi.org/10.1039/d4nj05515b
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- Optimizing microchannel heat sinks with rhomboid vortex generators: An artificial neural network approach and its application in superconducting synchronous condensers — http://dx.doi.org/10.1016/j.csite.2025.105911
- Performance evaluation of green synthesized graphene nanoplatelets / multiwall carbon nanotubes hybrid nanofluids for the retardation of mineral fouling and its environmental benefits — http://dx.doi.org/10.1016/j.carbon.2025.120243
- Performance evaluation of MEMS heat sinks having straight microchannels integrating rectangular sidewall cavities in in-line pattern — http://dx.doi.org/10.1016/j.applthermaleng.2025.125696
- Polarization state of light manipulation via MXene driven all optical modulator — http://dx.doi.org/10.1016/j.yofte.2025.104173
- Polyethylene terephthalate membrane: A review of fabrication techniques, separation processes, and modifications — http://dx.doi.org/10.1016/j.seppur.2024.129343
- Porous carbon nanoparticles for flat plate solar collectors: A thermal, economic and environmental investigation — http://dx.doi.org/10.1016/j.mseb.2025.118085
- Preparedness of Vietnam's regulatory framework for the development of hydrogen fuel cell vehicles — http://dx.doi.org/10.1016/j.ijhydene.2025.02.270
- Q-switched neodymium doped all-fiber laser with iron phthalocyanines saturable absorber — http://dx.doi.org/10.1016/j.yofte.2025.104235
- Quantum physics analysis of electroencephalogram signals for drug users using distribution of quantum uncertainty products — http://dx.doi.org/10.1016/j.bspc.2025.107816
- Relaxation dynamics of hydrogen bonds in hydrophobic deep eutectic electrolytes — http://dx.doi.org/10.1016/j.electacta.2025.146111

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- Review on integral stiffened panel of aircraft fuselage structure — http://dx.doi.org/10.1016/j.dt.2024.11.005
- The revolutionary solutions of graphene-based nanomaterials for desalination and water purification membranes and its applications — http://dx.doi.org/10.1007/s10853-025-10813-w
- Robust hydrophobic ceramic hollow-fibre membranes grafted by fluoroalkylsilane for water desalination via direct contact membrane distillation — http://dx.doi.org/10.1002/jctb.7843
- Single-magnetometer 3D localization of DC electromagnets with high precision — http://dx.doi.org/10.1016/j.measurement.2025.117464
- Structural impact resilience of lightweight fiber-reinforced LECA concrete using ANN and RSM technique — http://dx.doi.org/10.1016/j.conbuildmat.2025.140699
- Suppression of Subsynchronous Resonance in a Hybrid Steam-Turbine Generator/Offshore Wind Farm System Using a Static Synchronous Compensator With a Vanadium Redox Flow Battery — http://dx.doi.org/10.1109/TIA.2025.3537061
- Techno-economic and environmental analysis of a fully renewable hybrid energy system for sustainable power infrastructure advancement — http://dx.doi.org/10.1038/s41598-025-96401-z
- The angle of polarized light (AOP) property for optical classification of the crosslinked polymer — http://dx.doi.org/10.1016/j.saa.2024.125503
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