UNIVERSITI MALAYA

Volume 6 : December 2025

ENGINITIUM

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

Rare Earth Elements (REEs) & Advanced Materials - Powering Tomorrow's Technologies

REEs are key to unlocking the potential of advanced materials. Their unique optical, magnetic, and electronic properties enable innovations in:

Energy & Electronics
Catalysts & Biomedical Devices
Defense & Industrial Applications

By combining REEs with advanced materials, researchers are creating smarter, more efficient, and sustainable solutions for the future.

CONTENTS

FOREWARD

DEPUTY DEAN OF UNDERGRADUATE STUDIES

Welcome to the sixth edition of Enginitium, the official bulletin of the Research Office, Faculty of Engineering bulletin, themed Rare Earth Elements (REE) and Advanced Materials. It is with great pleasure that I welcome you to the latest edition of our Faculty of Engineering Bulletin, a reflection of our commitment to excellence, innovation, and community in the field of Engineering.

This edition offers an in-depth look at the diverse and impactful work being done by our faculty, staff, and students. I am proud to share some of the key highlights with you. This volume highlights the growing role of materials science in shaping future technologies.

Rare Earth Elements enable advanced materials with unique optical, magnetic, and electronic properties, supporting high-impact applications in energy, electronics, biomedical, catalysis, and defence sectors. At Universiti Malaya, our researchers continue to advance innovation through enhanced functionality, efficiency, and sustainability.

I encourage you to explore the inspiring research and activities featured within these pages. Each story, study, and innovation reflects the dedication and expertise of our research community. I hope it inspires academics, industry partners, and policymakers to explore the potential of REEs and advanced materials in addressing global challenges. Thank you for your continued support and engagement with the Faculty of Engineering.

ASSOC. PROF. DR RAJA ARIFFIN RAJA GHAZILLA
Deputy Dean of Undergraduate Studies
Faculty of Engineering

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RESEARCH HIGHLIGHT

Advancing Utilization of Rare Earth Elements (REEs) via Surface Engineering Process for Tailored Applications

DATIN PROFESOR IR. DR. BUSHROA BINTI ABDUL RAZAK
Department of Mechanical Engineering

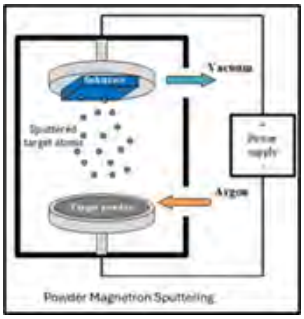
Recently, Malaysia has gained more prominence due to its REE reserves and is seen as a means to reduce reliance on China, which accounts for approximately 85% of the global supply. Malaysia is estimated to have 18.2 million tonnes of non-radioactive REEs by the year 2030, valued at approximately RM 809 billion. Indeed, these materials are strategic to Malaysia. By focusing on downstream processes, specialized techniques are employed to create a functionalized thin layer adhered to the surface of component. This process modifies the material's surface to improve microstructure, properties and overall performance. Surface modification may promote the generation of surface vacancies, the reconstruction of polar bonds, and the optimization of surface roughness. The utilization of specialized process in Surface Engineering, such as environmentally friendly anodization and powder magnetron physical vapor deposition techniques, is emerging, although they remain limited in industries like energy, healthcare and manufacturing. These processes have high potential for contributing to innovation and sustainability.

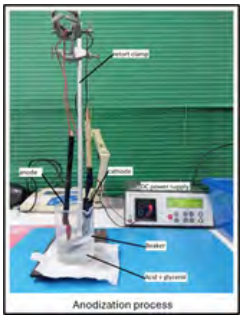
1. ***Lanthania (La_2O_3) in Modifying Surface Microstructure for Improving Optical and Electronic Properties***

La_2O_3 powder of around 30 µm was incorporated into a thin film of TiO_2 doped with SnO_2 on a glass substrate by utilizing a sustainable anodization process. This process is considered sustainable as citric acid ($C_6H_8O_7$) from plant sources was used to substitute ammonium fluoride (NH_4F) as the electrolyte.

Prior to La_2O_3 incorporation, SnO_2 dopant was previously sputtered on the glass substrate using a novel powder magnetron sputtering (PMS) technique, designed in-house by researchers in the Surface Engineering lab at the Faculty of Engineering. The thin layer of the nanocomposite La_2O_3/TiO_2SnO_2 has significantly enhanced nanostructure and, consequently, energy band gap, transparency and antifogging performance. Unlike the glass without La_2O_3, the performance is justified as follows:

- The nanostructure indicates that a lower amount of La_2O_3 ie 0.5 wt% results in a homogeneous porosity of around 67 nm.
- The nanostructure reduces the wettability of the surface to 25%, thus enhancing hydrophilic characteristics. Hydrophilicity helps wash away dust or dirt accumulated on the surface.
- In addition to improving the hydrophilicity, the energy band gap is slightly reduced by 1%, while the transparency and antifogging performance remain consistent before and after La_2O_3 incorporation.



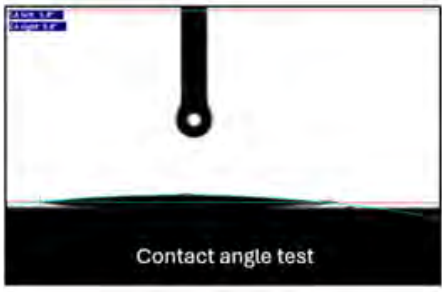


RESEARCH HIGHLIGHT

2. Scandia (Sc_2O_3) co-doped ZrO_2 for durable thin films in antifogging applications

Sc_2O_3, ZrO_2 and TiO_2 powders of around 70 µm were well mixed and loaded into the PMS machine chamber for the preparation of a two-dimensional (2D) thin layer on glass. The primary focus on durable antifogging is a significant topic, primarily for safety and efficiency, as it prevents the loss of visibility caused by condensation on transparent surfaces. Antifogging is associated with superhydrophilicity, whereby the surface strongly attracts water, flattening and spreading microscopic droplets evenly to escalate evaporation, thus allowing light to pass through clearly.

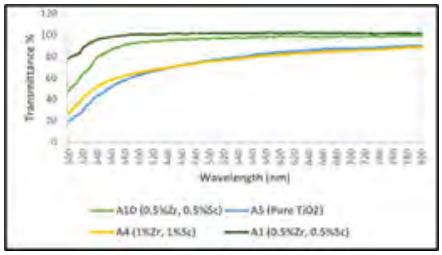
- A lower, equal percentage of scandia to zirconia (ie 0.5%Sc_2O_3, 0.5%ZrO_2) reveals the greatest superhydrophilicity with a contact angle of less than 10° as observed through water contact angle measurement.



- Qualitative measurements from both steam and fog evaluation tests validate that 0.5%Sc_2O_3, 0.5%ZrO_2 mixture was the most promising antifogging candidate after 60 seconds, achieving complete defog. In contrast, a bare glass exhibits sizable water droplets.
- The 0.5%Sc_2O_3, 0.5%ZrO_2 mixture contains the highest transmittance, approaching 100% in the visible light range, which is a 16% improvement over undoped TiO_2 film.
- Upon weathering test, the 0.5%Sc_2O_3, 0.5%ZrO_2 mixture maintains approximately 85% transmittance.

No.	Sample	Weathering Test Contact Angle (°)	
		Before	After
1	0.5%Sc2O3, 0.5%ZrO2	6.70 ± 0.900	21.1
2	0.25%Sc2O3, 0.75%ZrO2	21.00 ± 1.15	46.4
3	0.75%Sc2O3, 0.25%ZrO2	11.93 ± 2.01	36.7
4	1%Sc2O3, 1%ZrO2	77.93 ± 0.55	87.6
5	0%Sc2O3, 0%ZrO2	55.60 ± 1.99	79.75
6	Uncoated glass	66.36 ± 1.87	0

Contact angle before and after weathering test



Implications of REE in driving downstream capabilities for improved value innovation

Practical implications of REEs are substantial, positioning these elements in particular, downstream sector. By modifying the surfaces of components, REEs provide functional 2D thin layer of nanometer thickness, resulting in improvement transparency, antifogging and enhanced properties of the host materials.

Acknowledgement

Dr. Mahmoud (Advanced Manufacturing and Materials Processing Centre) (AMMP), Dept of Mech Eng;
Dr. Muhammad Shakeel (Power Energy Dedicated Advanced Centre) (UMPEDAC);
Mr. Soon Wee Teck and Miss Laila, Dept of Mech Eng;
This project appreciates grants UM Living Labs (FYP SDG@UM), and GA034-2023 from the Tin Industry (Research and Development) Board, Malaysia

RESEARCH HIGHLIGHT

Harnessing Rare Earth Elements for the Next Generation of Electronic Materials

PROFESSOR IR. DR. WONG YEW HOONG
Department of Mechanical Engineering

Rare earth elements (REEs) have emerged as indispensable enablers of modern electronics, driving innovations across computing, communication, energy, and health technologies. Their unique 4f electron configurations impart exceptional magnetic, optical, and electronic properties that are difficult to replicate using conventional transition metals. From high-performance permanent magnets in electric vehicles to phosphors in display screens and dopants in optical fibers, REEs underpin the miniaturization, efficiency, and reliability of today's devices.

Within the electronics sector, REE-based oxides—particularly lanthanide sesquioxides such as samarium oxide (Sm_2O_3), holmium oxide (Ho_2O_3), and gadolinium oxide (Gd_2O_3) – play a critical role in microelectronic device fabrication. Their high dielectric constants (κ-values), wide band gaps, and chemical stability make them promising candidates for replacing traditional silicon dioxide (SiO_2) as gate dielectrics in metal-oxide-semiconductor (MOS) devices.

At the Faculty of Engineering, Universiti Malaya, our research team explores how structural engineering and process optimization of these REE-based materials can enable high-performance, energy-efficient electronic components compatible with next-generation wide bandgap (WBG) semiconductors such as GaN and SiC. These materials are vital for advanced power electronics, electric mobility, and sustainable energy conversion systems.

Rare-earth oxides (REOs) provide several advantages over conventional oxides due to their strong ionic character and ability to form stable interfaces with semiconductor substrates. For example, holmium oxide (Ho_2O_3) exhibits a dielectric constant ($k \approx 25–30$) nearly an order of magnitude higher than SiO_2, significantly improving capacitance without increasing leakage current.

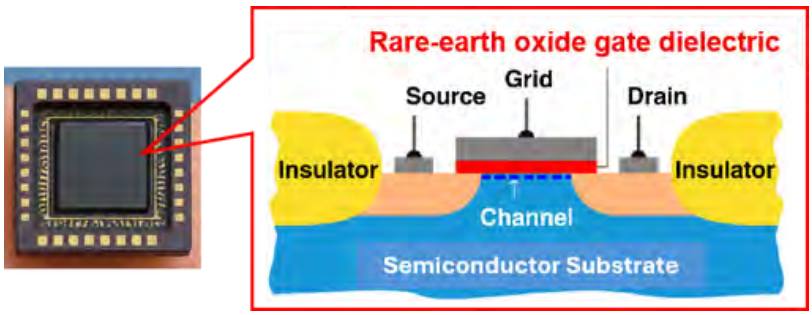


Figure 1: Schematic illustration of rare-earth oxide gate dielectric integration in an electronic chip.

RESEARCH HIGHLIGHT

Rare-earth-based materials hold great potential to transform the future of electronics. By improving how these materials are designed and processed, we can create electronic components that are smaller, faster, and more energy efficient.

At Universiti Malaya, our research continues to explore new combinations of rare-earth oxides, develop sustainable fabrication methods, and strengthen collaborations with industry to bring these technologies from the laboratory to real-world applications. These innovations will support the next generation of devices used in computing, communication, and advanced technologies such as artificial intelligence and quantum systems.

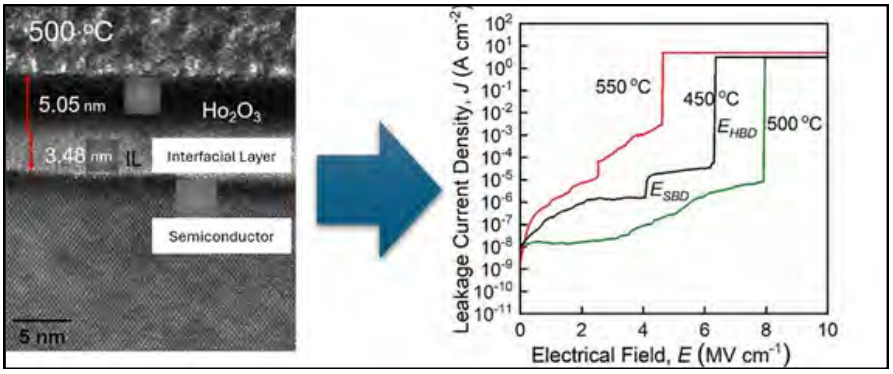


Figure 2: High-resolution transmission electron microscopy (HRTEM) image of the Ho2O3 rare-earth oxide on semiconductor substrate and enhanced electrical performance with reduced leakage current

Figure 3: Prof. Wong with his PhD graduates during the Universiti Malaya Convocation Ceremony 2024, celebrating research achievements in advanced materials and rare-earth-based electronic materials.

RESEARCH HIGHLIGHT

The Magic of Graphene – A Niche Application in Drilling Fluid

ASSOCIATE PROF. DR. BADRUL HISHAM BIN MOHAMAD JAN
Department of Chemical Engineering

To drill or not to drill? To damage or not to damage? These are compelling questions. Recent research has put extensive focus on the magic of graphene in drilling fluids. Graphene, because of its thermal, electrical, chemical, and mechanical properties, improves mudcake stability and minimizes fluid loss that eventually reduces formation damage.

The term “graphene” was introduced in 1986, and, in 2004, the extraction of graphene was presented, which later made it commercially available. In 2010, the Scotch-tape method was announced to peel off the tiny graphite flakes into a monolayer, 2D graphene layers with the fewest possible defects. The rest, as they say, is history. **Figure 1** show the structure of graphene derivatives namely graphite, graphene, graphene oxide and reduced graphene oxide.

The significant attention on graphene as a drilling-fluid additive has increased because of its Newtonian fluid behavior, low fluid loss, and formation of firm and stronger mudcake. The addition of graphene or graphene oxide in nano size can improve the control of fluid loss, the stability of shale, and lubrication.

The addition of graphene nanoparticles to drilling fluid has presented a significant surge in the proportion of dispersion, a reduction in torque, and an increase in drilling bits deprived of the destructive effects of the rheological properties of drilling mud. Because of its stability and small particle size, use of graphene nanoparticles is considered one of the better alternatives for fluid-loss control in drilling fluid.

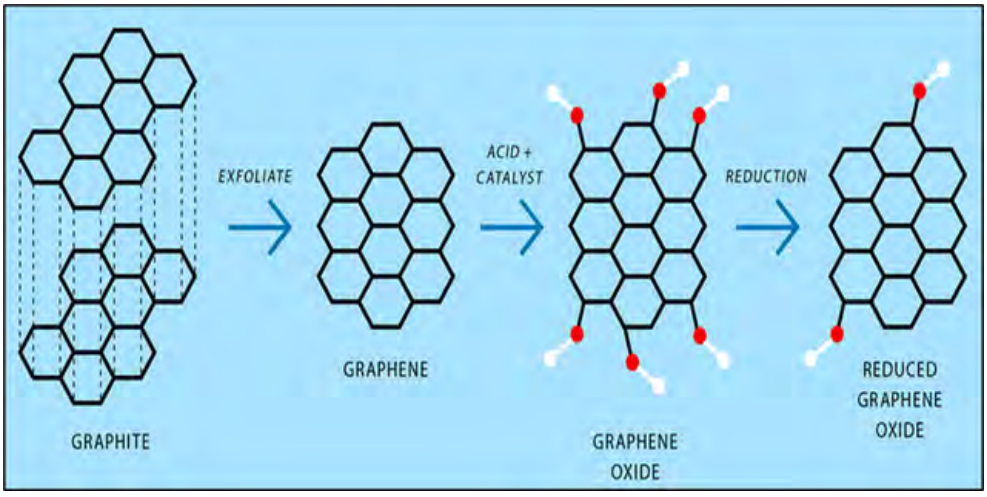


Figure 1: Structure of graphene derivatives.

RESEARCH HIGHLIGHT

Figure 2 shows the schematic of drilling operation processes.

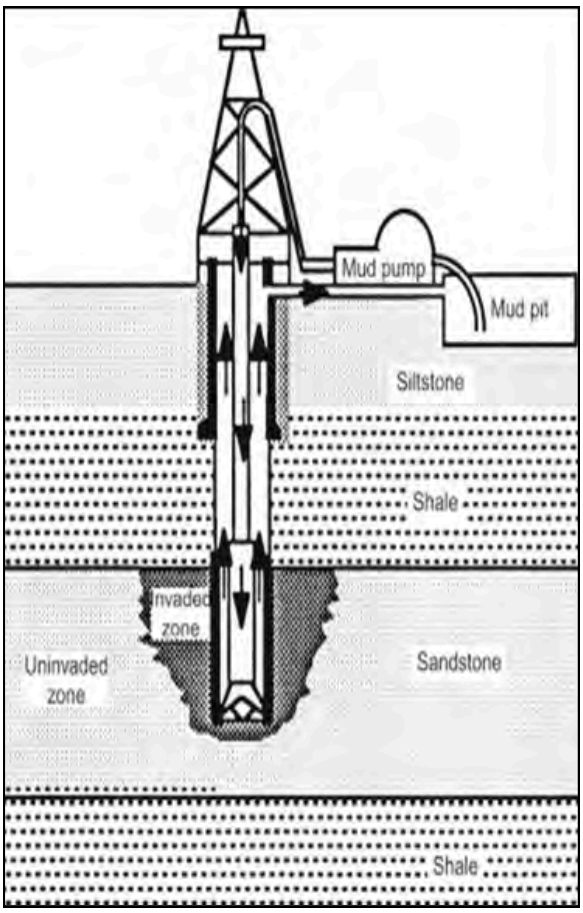


Figure 2: Schematic of drilling operation processes.

Literature also reports the advancement of aggregation and poor dissolution in well fluids with the addition of graphene. Graphene oxide may retain permeation and acts as a modified fluid-loss-control additive.

Furthermore, graphene enhances the rheological properties of drilling fluids at both low and elevated temperatures and pressures. Another drilling-related factor that seems to be overlooked is shale stability. The interaction of water with clay materials is common, which leads to swelling, thus slowing the circulation of drilling fluid.

It has been reported that graphene is able to improve shale stability. It serves as an excellent medium for improvement of shale inhibition. **Figure 3** shows schematic of producing reservoir rock along with drilling fluid, filter cake and mud filtrate.

Graphene is expensive. This is one of the main challenges for its application. Efforts are under way to generate sources of graphene from industrial waste. Such waste includes diesel vehicles, batteries, and many other carbonaceous waste materials.

Additionally, determining the quality or grade of the extracted graphene from these wastes is crucial. Many applications can be suitable for graphene-based material, from graphite oxide to graphene oxide to graphene oxide reduced until a higher quality of graphene is reached. It is applicable for various applications, including for composite material, biomedical material, waste treatment, electronics, medicine, energy, and membrane technology.

RESEARCH HIGHLIGHT

The minimum level of graphene quality required for drilling fluids may be unknown. Many researchers seem to use a higher graphene quality than is needed. Considering the high cost of graphene, studies on the lowest possible graphene quality that provide acceptable rheological drilling-fluid properties are highly recommended.

I hope you enjoy and benefit from this writeup. Feel free to contact me if you have any question or interested with the discussed topic.

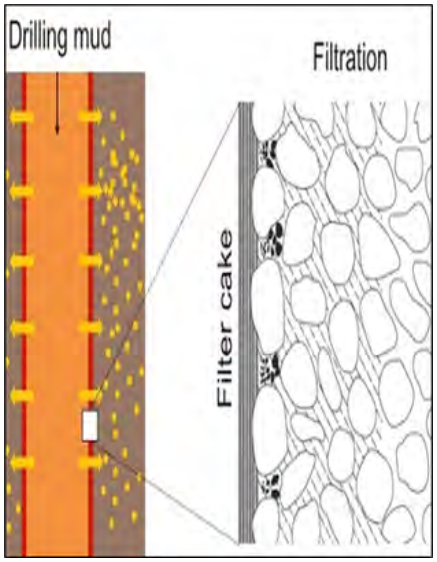


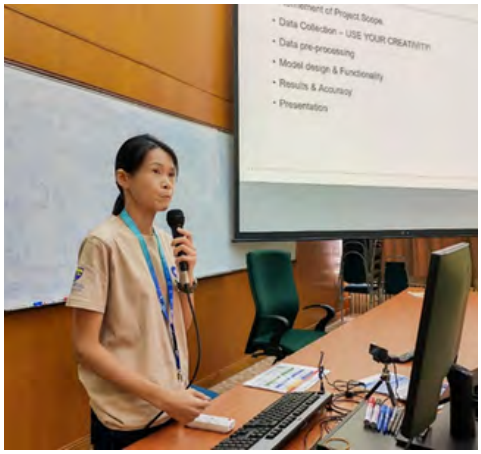
Figure 3: Drilling fluids, mud filter cake and mud filtrate.

RESEARCH ACTIVITIES

📚 A FIVE-DAYS NATIONAL PROGRAMME

Artificial Intelligence (AI) in Medicine Summer School

24–28 November 2025 | Kuala Lumpur — Universiti Malaya, through the Faculty of Engineering, successfully organised an Artificial Intelligence (AI) in Medicine Summer School, a five-day national programme aimed at strengthening interdisciplinary understanding and practical skills in the application of AI within healthcare.



Funded specially by the Ministry of Higher Education (MOHE), the programme brought together 100 participants from universities across Malaysia, representing diverse backgrounds in medicine, dentistry, pharmacy, applied health sciences, engineering, and computer science. This interdisciplinary mix fostered active interaction and collaboration, reflecting the multidisciplinary nature of real-world medical innovation.

Participants engaged in lectures, hands-on sessions, and group-based activities covering AI fundamentals, medical data handling, and clinical case studies.

Practical exercises using medical datasets enabled participants to apply theoretical concepts meaningfully, while discussions on ethics, bias, and regulatory considerations promoted responsible use of AI technologies in healthcare. A key highlight was the industry visit to the CelcomDigi AI Experience Centre, where participants experienced first-hand how artificial intelligence is embedded in everyday digital services, including intelligent network optimisation, and AI solution for agriculture, medical and lab services and other fields.

The programme was officially launched with officiation by the Dean of the Faculty of Engineering, Universiti Malaya, and concluded with a closing ceremony concluded by the Vice-Chancellor of Universiti Malaya, Prof. Dato' Seri Ir. Dr. Noor Azuan Abu Osman, reflecting strong institutional support for innovation-driven and future-ready education.

Headed by Dr Tham Lai Kuan as the Programme Lead, the AI in Medicine Summer School demonstrated Universiti Malaya's leadership in advancing practical and interdisciplinary AI education, empowering participants with relevant skills, awareness, and insights essential for healthcare innovation and broader digital transformation.

RESEARCH ACTIVITIES

URBAN MOBILITY TECHNICAL SEMINAR

National Urban Traffic Innovation Challenge 2025

13 December 2025 | Kuala Lumpur Universiti Malaya

The pitching session for the National Urban Traffic Innovation Challenge 2025 was held at DK4, Faculty of Engineering, Universiti Malaya, featuring five finalist university teams. Proposals were evaluated based on technical feasibility, scalability, and SDG alignment. The challenge was organised by the IATSS Forum Japan National Committee Malaysia, together with the Centre for Transportation Research UM, Department of Civil Engineering, and UM Smart Mobility Centre of Excellence.

Congratulations to all!

1st Place (RM1,000): UM

2nd Place (RM900): USM

3rd Place (RM800): UTP

Excellence Award (RM500): UM

Excellence Award (RM500): UKM

RESEARCH ACTIVITIES

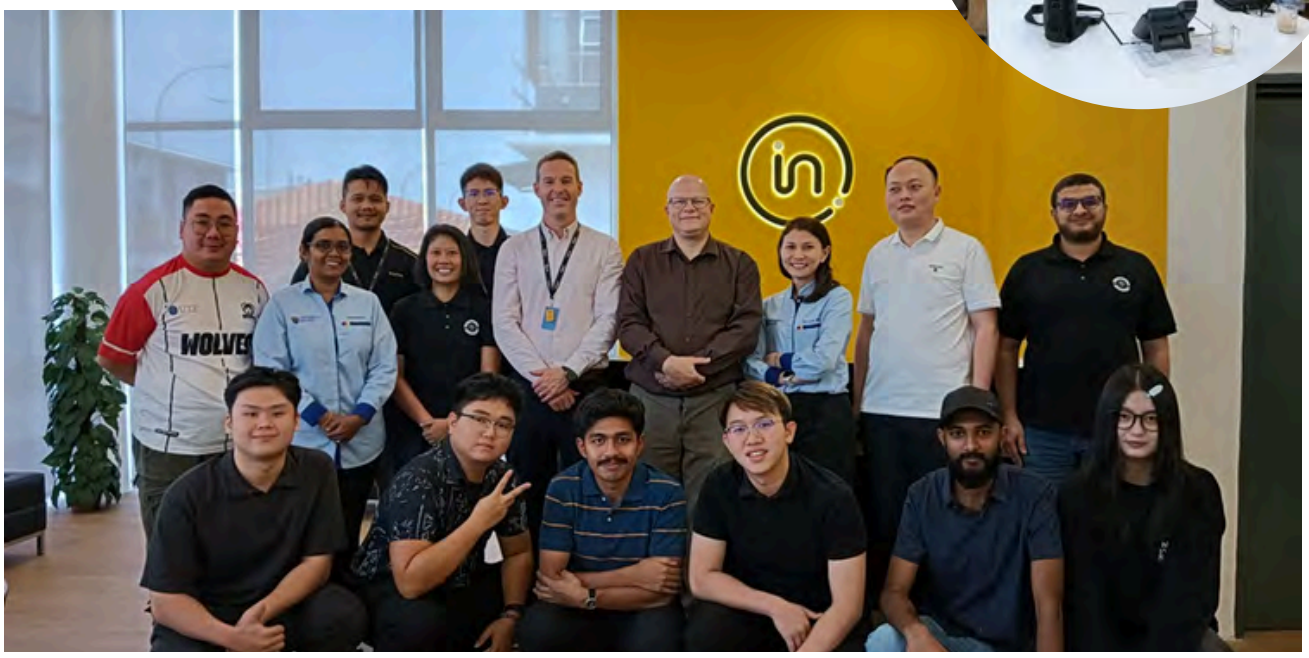
🤝INDUSTRIAL VISIT

🏭Intertek Malaysia Technology Centre (IMTC)

An industrial visit to Intertek Malaysia Technology Centre (IMTC) was conducted on 5 November 2025 for members of the Centre of Advanced Materials (CAM), with a focus on strengthening industry–academia collaboration in the field of failure analysis.

During the visit, participants engaged with Intertek technical specialists at the Failure Analysis Laboratory, gaining insights into industry-standard analytical techniques, instrumentation, and practical case studies. The session facilitated meaningful knowledge exchange on current industrial challenges and best practices in materials failure investigation.

The visit enhanced mutual understanding between academia and industry, identifying opportunities for future collaboration in research, testing services, consultancy, and postgraduate training. Overall, the engagement supported CAM's strategic objective to align academic expertise with industrial needs and promote impactful, application-driven research.



RESEARCH ACTIVITIES

🤝INDUSTRIAL VISIT

🏭 Bomatec (Malaysia) Sdn. Bhd.

📅 9 May 2025 (Friday)
📍 Taman Perindustrian Air Hitam, Klang

A collaborative meeting with Bomatec (Malaysia) Sdn. Bhd. was held to strengthen industry–academia engagement in Rare Earth Elements (REE) and advanced materials.

Discussions highlighted Bomatec's manufacturing capabilities, materials processing technologies, and key industrial challenges. Both parties explored potential collaboration in REE materials development, characterisation, testing services, and joint research initiatives.

This engagement aligns academic expertise with real-world industrial needs, laying the foundation for future collaboration and innovation.

RESEARCH ACTIVITIES

💻 TRAINING

ICP-OES Application Training Session

📅 Dates: 12th – 13th June 2025 (Thursday & Friday)
📍 Venue: Faculty of Science, Universiti Putra Malaysia

The ICP-OES Application Training Session, held on 12th – 13th June 2025, was successfully conducted at the Faculty of Science, Universiti Putra Malaysia. The session provided an excellent hands-on learning experience for all participants, focusing on both the theoretical and practical aspects of Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES).

Topics covered during the training included:
✅ Basic Sample Preparation (Acid Digestion)
✅ Instrument Parameter Setting
✅ Sample Measurement Procedures
✅ Semi-Quantitative and Quantitative Analysis
✅ Data Analysis and Interpretation

The training was led by a technical expert from China, who brought valuable insights to the session. The session was well-received, with active participation from researchers, lab personnel, and postgraduate students. It served as a solid foundation for participants engaged in elemental analysis and materials characterization, equipping them with essential practical skills and technical knowledge.

RESEARCH ACTIVITIES

WORKSHOP

One-Day Workshop on Corrosion

The One-Day Workshop on Corrosion was successfully conducted on 18 August 2025 (Monday) at The Cube, Level 2, Faculty of Engineering, following the rescheduling from its original date of 7 May 2025. The workshop ran from 8.00 am to 5.00 pm and attracted participation from researchers, engineers, technical staff, and postgraduate students.

The programme featured expert speakers Ir. Dr. Azzura Ismail, Dr. Nazatul Liana Sukiman, and Ir. Dr. Lee Chee Hong, who delivered insightful presentations on corrosion mechanisms, assessment techniques, and mitigation strategies relevant to engineering materials and structural applications. The sessions facilitated active engagement and knowledge exchange between participants and speakers.

Overall, the workshop enhanced participants' understanding of corrosion-related challenges and best practices in corrosion management, contributing to improved technical awareness and professional competency.

RESEARCH ACTIVITIES

COMPETITION

UM-Level Materials Lecture Competition 2025 (MLC2025)

The Materials Lecture Competition, part of the UM-Level Materials Lecture Competition 2025 (MLC2025), was successfully conducted on Tuesday, 26 August 2025, from 2:30 pm to 4:30 pm. Organised by the Centre of Advanced Materials, Faculty of Engineering, Universiti Malaya, the competition provided a platform for young researchers to showcase their research in materials and minerals in an engaging and effective presentation format.

Congratulations to the winners

Participants demonstrated strong technical knowledge, creativity, and communication skills, reflecting the high standards of research within Universiti Malaya. The event encouraged peer learning, enhanced presentation competencies, and fostered an interactive academic environment.

MLC2025 is open to participants aged 28 years and below (as of 1 July 2025), working with any type of materials or minerals. Winners are eligible for cash prizes up to RM500, and the top participant will represent Universiti Malaya at the National Materials Lecture Competition later this year.

The competition supports the development of research communication skills and highlights the university's commitment to advancing materials science research.

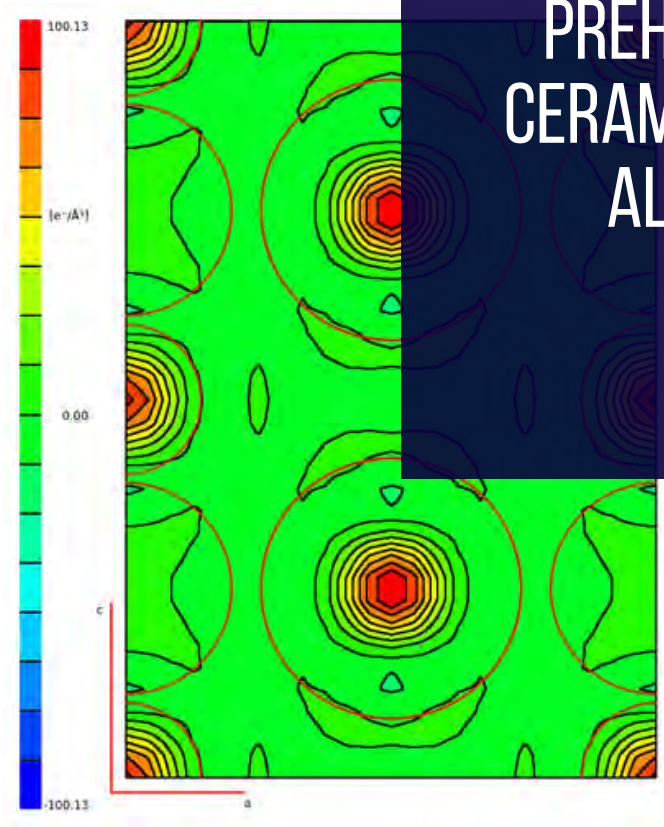
MEET OUR EXPERT

Prof. Dr. Hendrik Simon Cornelis Metselaar received his degree in Chemical Engineering from the University of Twente, where he also completed his PhD, specialising in the tribology of ceramic materials. He is currently a Professor in the Department of Mechanical Engineering and serves as the Head of the Centre of Advanced Materials, Faculty of Engineering.

His research interests encompass materials engineering, with a primary focus on ceramic materials and ceramic processing. He has also successfully led research initiatives in energy storage using phase change materials and maintains strong research interests in ceramic suspensions.

Prof. Dr. Metselaar has a long-standing research focus on calcium silicate–based materials for biomedical applications, with current work exploring the effects of rare earth element (REE) doping. He is also actively involved in REE recovery from waste materials and the valorisation of waste materials for advanced ceramic production, contributing to sustainable and circular materials development.

"FROM THE EARLIEST PREHISTORY TILL IR 5.0, CERAMIC MATERIALS HAVE ALWAYS BEEN THE ENABLERS"



MEET OUR RESEARCHERS

ASSOCIATE PROF. DR. BADRUL HISHAM BIN MOHAMAD JAN

Associate Prof Dr. Badrul Hisham Mohamad Jan (CEng, MIET, SPE), is a researcher and an associate professor attached to the Department of Chemical Engineering, University of Malaya (UM), Malaysia. He holds BS, MS, and PhD degrees in petroleum engineering from the New Mexico Institute of Mining and Technology.

Dr.Badrul is a two-time recipient of the Malaysia-Thailand Joint Authority (MTJA) CESS fund, with his current RM2.76 million project focusing on sand coagulation design to improve surface desander efficiency. His research areas include the development of Super Lightweight Completion Fluids (SLWCF) for underbalanced perforation and ultralow-interfacial-tension microemulsions for enhanced oil recovery. He received the 2016 SPE Distinguished Achievement Award for the Petroleum Engineering Faculty in the Northern Asia Pacific Region and has served on the JPT Editorial Committee for nine consecutive years. Dr. Badrul can be reached at *badrules@um.edu.my.*

DR.SHAHABUDDIN

UM Scientist Dr. Shahabuddin has developed a general mathematical formula to quantify the Hydrogen Readiness Level (HRL) - a nation-specific index measuring the maturity of a country's hydrogen economy.

This pioneering work reveals that NASA's Technology Readiness Level (TRL) framework, first introduced in the early 1970s, is insufficient to capture the complexity of hydrogen technologies and national preparedness.

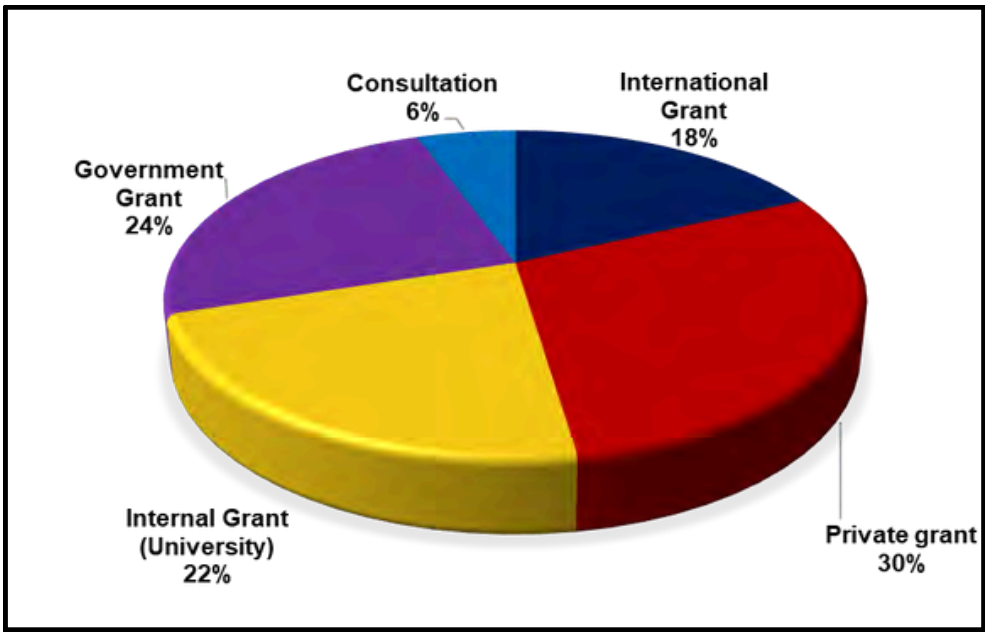
The HRL Index offers policymakers, industry leaders, investors, and researchers a clear roadmap to assess progress, identify gaps, and guide strategic investments toward a sustainable, hydrogen-powered future.

By benchmarking readiness through HRL, nations can plan their decarbonisation journey, align policy, technology, andmarket incentives, and foster collaboration and healthy competition toward net-zero emissions. Dr. Shahabuddin can be reached at *shahabuddin@um.edu.my*

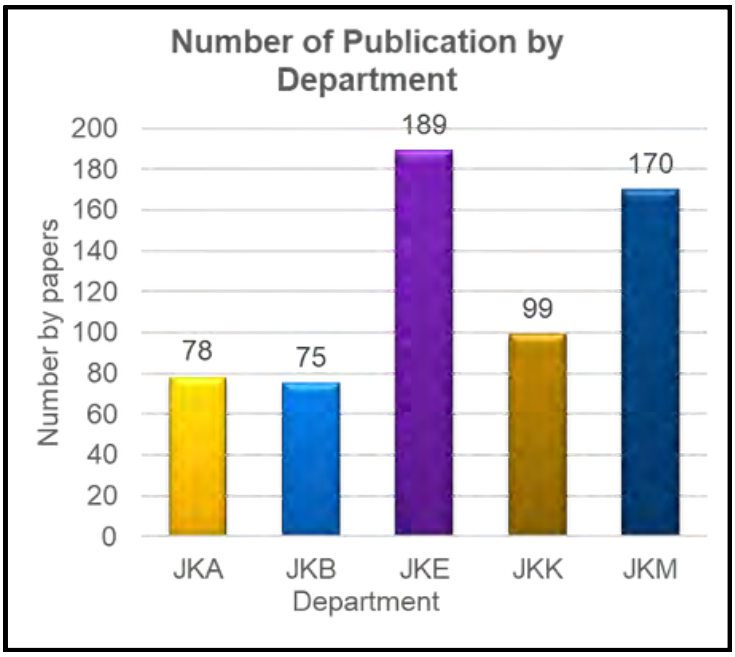
RESEARCH OUTPUTS AT GLANCE

A Snapshot of Faculty Research Performance

TOTAL RESEARCH GRANT RECEIVED
RM 14, 709, 907.41



*as of 12 December 2025



*as of 30 November 2025

TOP 2% SCIENTIST IN THE WORLD

MEET OUR ALUMNI

Ir. Tanapal Balaraman – Chief Electrical Engineer, JKR Malaysia

Graduating with a Bachelor of Electrical Engineering (Hons) from Universiti Malaya in 2004, **Ir. Tanapal Balaraman** has built an exemplary 19-year career in the Public Works Department (JKR) Malaysia, where he now serves as Chief Electrical Engineer under the Electrical Engineering Branch. He began his journey as an Electrical Engineer in JKR Pahang, leading electrical system design and supervision for major government facilities.

His expertise now spans Medium Voltage (MV), Low Voltage (LV), Extra Low Voltage (ELV) and ICT systems. Today, as Head of Design Team (Electrical), he oversees complex local and international projects — including Malaysia's Embassy Projects in Bangkok, Paris, Manila, Ankara and Rome — promoting innovation, safety and sustainability.

Engineering is a lifelong pursuit of purpose - building systems that empower people, and innovations that sustain progress.

📜 Professional Credentials

Ir. Tanapal's broad range of professional credentials reflects his technical mastery, leadership, and commitment to quality management excellence:

- Professional Engineer (P.Eng) – Board of Engineers Malaysia
- ASEAN Chartered Professional Engineer (ACPE) - ASEAN
- Certified Construction Project Manager (CCPM) – CIDB Malaysia
- Registered Project Manager (RPM) – PWD Malaysia
- Certified Lead Auditor (ISO 9001, ISO 14001, ISO 45001, ISO 37001) – SIRIM Malaysia
- Certified BIM Coordinator – CIDB Malaysia

🌍 Key Projects

Local & international government projects, including
Malaysia's Embassy developments in Bangkok, Paris, Manila, Ankara & Rome

🔬 Research & Publications

Focus: 4D BIM adoption in public infrastructure projects
Award-winning papers published in IJNRD (2023) and IJIRT (2025)
Best Presenter Awards – JKR BIM Day 2024 & JKR 6th Research Colloquium 2024

👷 Mentorship & Contribution

Trainer and lecturer in LV Electrical Design, Testing & BIM Awareness
International Guest Lecturer – Foundation University Islamabad (2024)
Author of key JKR electrical and BIM reference guidelines

ABOUT ENGINITIUM

Enginitium is the quarterly bulletin published by the Research Office at the Faculty of Engineering, Universiti Malaya. Its mission is to celebrate the achievements of our faculty members, particularly focusing on their research initiatives and contributions to knowledge and society.

This publication seeks to foster a vibrant culture of knowledge sharing and collaboration within our academic community. Through Enginitium, we aspire to inspire and inform, showcasing the impactful work being conducted at the Faculty of Engineering, Universiti Malaya.

Call for Contributions – Enginitium

We warmly invite all members of the Faculty of Engineering, Universiti Malaya to contribute to Enginitium. Whether you wish to share a research article, insights on recent developments in engineering, or updates on activities within your research team, we would be delighted to feature your work.

Your contributions will not only enrich the bulletin but also inspire and inform fellow researchers, academics, and industry practitioners.

Kindly submit your articles and updates via email to *fk_tdr@um.edu.my.* We look forward to receiving your valuable contributions.

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