

Young Persons'  
World Lecture  
Competition

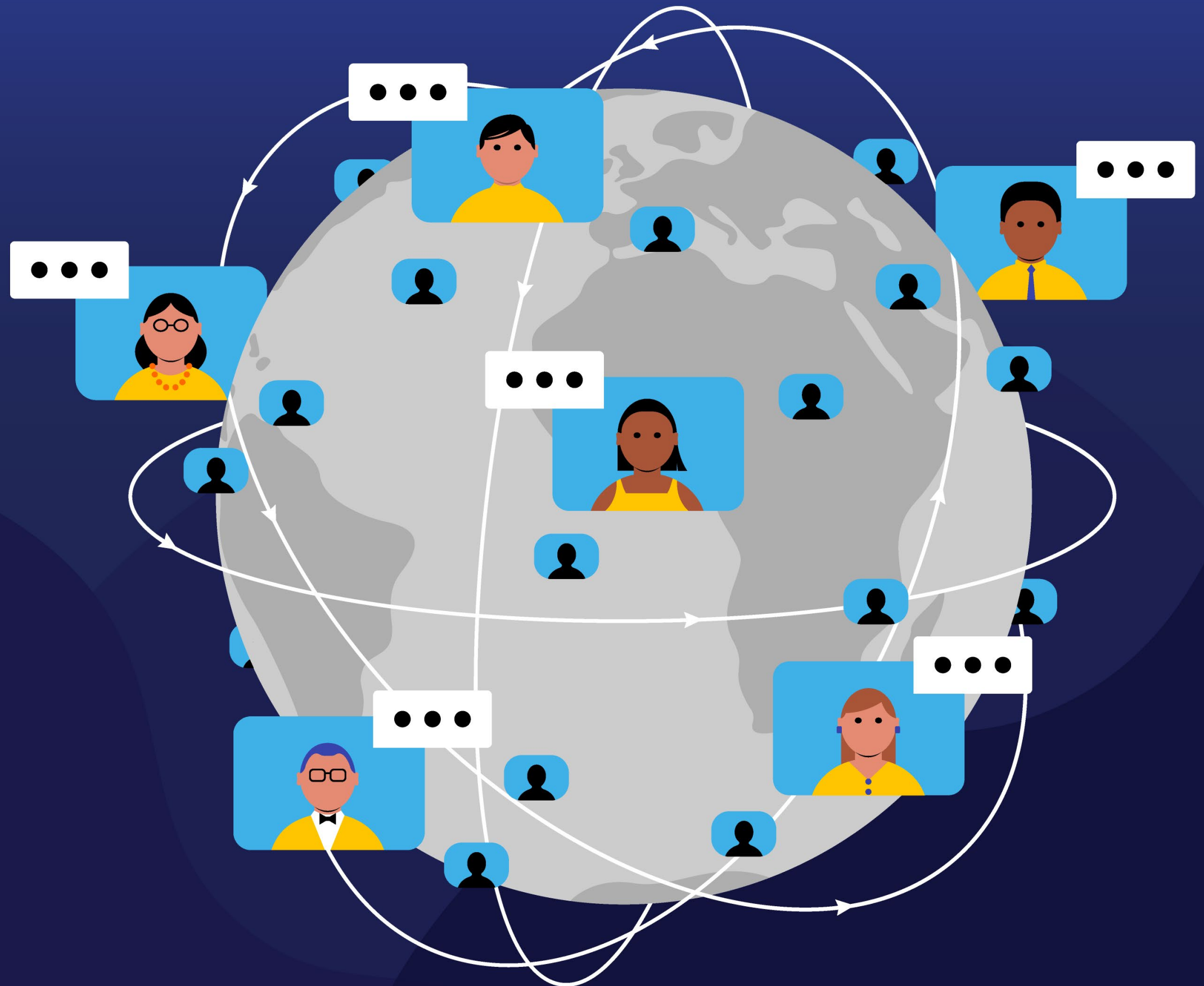


# ONLINE FINAL 2025

THURSDAY  
27 NOVEMBER  
12.00 GMT

#YPWLC2025

[BIT.LY/2025YPWLC](https://bit.ly/2025YPWLC)



## ORGANISING COMMITTEE

Efi Fragkou  
*Event organiser*

Tolu Dada  
*Design*

## SUPPORTED BY

Li Wang  
*China*

Abdul Hakim Bin Md Yusop  
*Malaysia*

Franklin To  
*Hong Kong*



## WELCOME

Welcome to the 2025 final of the Institute of Materials, Minerals and Mining (IOM3) Young Persons' World Lecture Competition.

Although this is said every year of the YPWLC, it is true that this flagship event is a personal highlight for me as the current President of IOM3. It is an amazing opportunity, not only for the contestants who get to showcase their skills and knowledge, but for the audience as well, I am confident we will all enjoy a series of high quality and entertaining presentations and leave feeling both better informed in a range of fascinating topics and confident in the capability of the next generation of materials, minerals and mining professionals. To be presenting today each of the competitors have already won local, regional and national stage competitions from countries and regions around the world. I would like to personally congratulate them all on behalf of IOM3 for their success so far and wish them the best of luck in this final stage of the competition. Though there can ultimately be only one winner, each of them should be proud of their impressive achievement in reaching this final and the skills they have honed and demonstrated along the way.

Although the content of the talks will no doubt be of the highest technical quality, we should not forget that the competition is predominantly conceived as a way of encouraging young materials, minerals and mining scientists and engineers to develop their communication and presentation abilities. The ability to break down complex technical information into an easily understandable message is an important and often overlooked skill. This skill will be needed more than ever to help fight off the growing misinformation we see on so many topics in our industries nowadays.

Today's competition is the twentieth international event and the fourth to take place virtually, with previous finals having taken place in the UK, Singapore, USA, South Africa, Malaysia, Brazil, Hong Kong, Ireland and Australia before moving online since 2020. While there are advantages to our in-person competitions, the ability to present virtually is a growing and much needed skill for this generation of scientists and engineers. I look forward to seeing how they convey their presentations through this format.

I'd like to thank everyone who has been involved in making this competition so successful. All those who voluntarily gave their time to organise heats and national finals, co-ordinated the competition and brought us together for this final, and our generous supporters.

Finally, I would like to thank our competitors, our judges and of course our audience. If you wish to have a go at scoring yourself, to compare with the decisions of the judges, then a simplified marking sheet has been included for you within this programme.

Good luck to all our competitors, I hope you are each able to perform to the very best of your abilities.

**Christine Blackmore** CEnv CSci FIMMM  
*IOM3 President*

## ORGANISED BY



## THE INSTITUTE OF MATERIALS, MINERALS & MINING

The Institute of Materials, Minerals and Mining (IOM3) is the professional body for the international materials, minerals and mining community. It promotes all aspects of materials science and engineering, as well as geology, mining, extraction metallurgy, minerals and petroleum engineering.

IOM3 plays an important role in the professional development of engineers and scientists. It provides information and library services, events and publications, and promotes the materials discipline to younger generations through various educational resources. IOM3 has strong links with other professional bodies and makes important contributions at Government and international levels in areas such as education and training, standards, test procedures, research programmes and environmental issues.

[www.iom3.org](http://www.iom3.org)

## ON BEHALF OF



## STUDENT & EARLY CAREER GROUP

The Student & Early Career Group (SEC) represents the views of student, younger and early career\* members to the Institute's Executive Board and Advisory Council. We aim to represent the diverse range of members by ensuring Advisory Council representatives cover the different disciplines, regions and career pathways of student and early career\* members.

Since the Group was founded in 1967 (as the Younger Members' Committee), we have developed a range of events to encourage networking and early career members' involvement with IOM3. Our greatest successes to date include the Young Persons' Lecture Competition, Matopoly, Art Lecture, Road to Chartership and Professional Development events, Future Materials Conference and Materially Challenged. While we have been successful in the past, we aim to provide more events in the future. These include regular informal networking opportunities, along with new skills seminars, conferences and regional events.

We also want to ensure that we are raising with Executive Board the major issues affecting younger members.

\* The Institute defines 'early career' as meaning someone who is, as of 1 September 2024 (and allows for career breaks, e.g. parental leave):

- within 10 years of the start of their first employment (or self-employment) in a materials, minerals or mining related role, or within 6 years of completing their PhD (in a relevant subject), whichever is sooner.

Note - the 10 years from the start of first employment would not normally include any apprenticeships (or equivalent training scheme).

[www.iom3.org/secc](http://www.iom3.org/secc)

# JUDGING PANEL

## Dr Ilija Rasovic MIMMM

Chair, Judging Panel | Chair, IOM3 SEC Group



Ilija is Associate Professor at the University of Birmingham. He earned his MEng in Materials Science from Corpus Christi College, Oxford, followed by a DPhil in Materials from St Cross College, Oxford. His primary research interests focus on fullerenes and supramolecular systems with particular application in biomedical contexts.

Ilija is an award-winning science communicator, having won IOM3's international Literature Review Prize in 2016 and finishing second in the Young Persons' World Lecture Competition in 2017, amongst receiving other best talk prizes at international conferences and scientific meetings. He is also currently Advanced Materials Engineer at P1 Graphene Solutions, having previously worked on placement at Jaguar Land Rover and as a CNC miller for Lesk Engineers.

Ilija is involved in numerous outreach and engagement activities as a STEM ambassador and is committed to both championing Materials Science as a subject and inspiring students of all backgrounds to pursue further study at university. He is a trustee of the newly formed charity, Break Off Labs, whose aim is to widen participation in STEM research.

## Dr Matthew Wadge MIMMM

Member, IOM3 SEC Committee



Dr Matthew Wadge is a Third Century Research Fellow (Proleptic Senior Lecturer) in Surface Engineering at Manchester Metropolitan University, having joined in November 2024 from the Advanced Materials Research Group at the University of Nottingham (UoN), where he led the Thin Films and Induction Melter Laboratories. He holds a First-Class BSc (Hons) degree in Biomedical Materials Science and a PhD in Materials Engineering and Materials Design (both UoN). He previously held the competitive post of EPSRC Doctoral Prize Fellow from 2020-21, also at UoN. His research primarily focusses on the production of thin film coatings and modification of surfaces via wet chemical and physical vapour deposition techniques, specifically magnetron sputtering, for a plethora of different applications, including biomaterials, energy storage, and water treatment.

He holds a number of voluntary and honorary positions, including being a STEM Outreach Ambassador, a Discover Materials Ambassador, as well as a National Expert and Committee Member for the British Standards Committee on Implants for Surgery (CH/150). Within IOM3, he is a Student & Early Career Committee (IOM3 SEC Committee) member and has been featured as part of the 'IOM3 Investigates...' podcast series. He holds several professional memberships, including Member of IOM3 (MIMMM), Fellow of the Institute of Biomedical Sciences (FIBMS), and Alumnus of the Armourers and Brasiers. He is an Early Career Advisory Board Member for the Surface and Coating Technology Journal and a member of the EPSRC Peer Review College. He has supervised over 25 Undergraduate/Masters students, and 5 PhD researchers (2 completions and 3 current). For his research, Matthew has received a number of honours and awards, most notably the 2024 IOM3 Silver Medal, being chosen as one of '15 under 30' by Materials World, National Finalist of the IOM3 Young Persons' Lecture Competition, as well as several conference presentation prizes, including the Best Oral Presentation Prize at the 2019 Future Materials Conference.

## Dr Michael Kenyon MIMMM

Vice-Chair, SEC Group



Michael studied for a PhD in Advanced Metallic Systems at the University of Manchester, investigating the evolution of dispersoids in Al-Mg-Si based automotive alloys with varying impurity levels; a project sponsored by Novelis. He now works for Positive Planet as a Principal Sustainability Consultant specialising in Life Cycle Assessments. Positive Planet believe businesses can be a catalyst for environmental and social change that lasts. With professional services including measurement, compliance, training, engagement and more across the sustainability spectrum, Positive Planet help businesses take real action to reduce their environmental footprint. Combining a career in both quantitative sustainability assessment, and materials science and research, Michael is supporting many businesses understand and reduce their environmental footprint.

Michael previously worked for Innoval Technology as Group lead for Sustainability & Knowledge transfer, a consultancy to the global aluminium industry, and has worked across many different material industries delivering LCAs for complex systems. He has worked across the automotive, aerospace and packaging sectors extensively among others. Working alongside universities and commercial partners, Michael finds collaborative projects particularly rewarding. Michael has been involved with many multi-year large scale publicly projects with the objective of improving the sustainability of materials.

Outside of work, you'll find Michael with a camera in his hand, focusing on landscape, animal and astrophotography. Michael has been a keen Table Tennis player for many years, playing across the country.

## Ollie Thomas

Event Co-ordinator | Member, IOM3 SEC Committee



Ollie is a DPhil student in the department of materials at the University of Oxford. Ollie is working with Dr R. House and Prof. Sir. P. Bruce on developing novel cathode materials for sodium-ion batteries using earth-abundant and sustainable materials.

Ollie completed his undergraduate master's in chemistry at the University of Durham, including a placement year at the CEA in Grenoble, France. Ollie is particularly interested in developing fundamental structure-property relationships in solid-state inorganic species and using this understanding to rationally design novel materials for a sustainable society rationally.

Ollie is passionate about ensuring that the voices of all scientists are heard and that the sciences are made accessible. To this end, Ollie has worked extensively with the royal society of chemistry and university governance bodies to improve the representation of early career scientists and provision for underrepresented groups such as those with disabilities. Ollie also regularly works on outreach and widening participation initiatives to encourage people into materials science.

Ollie is a keen cook and open-water swimmer. He enjoys occupying his spare time with crosswords, video games, and listening to fantasy audiobooks, not to mention napping because naps are the best!

# PROGRAMME

12:00	Login
12:10	Welcome & Introductions
12:15	2025 Young Persons' World Lecture Competition
	<b>Hamish Dow, UK</b> Lights, camera, action: Automated visual inspections of concrete structures
	<b>Kouer Zhang, Hong Kong</b> Closing the Loop: Transforming wastewater nitrate into sustainable fertilizer
	<b>Natasya Salsabiila, Malaysia</b> Aluminum Nitride Thin Film Deposition Using Industrial-Grade Sputtering System: A Uniformity Study
	<b>Xiaoxi Zeng, China</b> Study on the Preparation of Poly(arylene-ether-nitrile) Modified Carbon Fibers/Poly(ether-ether-ketone) Composites
13:35	Presentation of 2025 Video Competition shortlisted entries & announcement of winners
14:00	Results
14:30	End

\* time zone = GMT





## LIGHTS, CAMERA, ACTION: AUTOMATED VISUAL INSPECTIONS OF CONCRETE STRUCTURES

Early identification of defects in concrete structures is vital to ensuring their longevity and resilience. However, traditional visual inspections are expensive, inconsistent, labour-intensive, and dangerous.

Our invention, Adaptive Lighting for the Inspection of Concrete Structures (ALICS), is a new inspection platform: it is an automated, and robot-mountable concrete visual inspection device that uses lighting and artificial intelligence to detect, classify, quantify, and monitor concrete defects with unprecedented speed, accuracy, and precision.

ALICS's lighting-enhanced inspection method enables fast, targeted concrete defect repair and monitoring of concrete infrastructure, extending asset lifespans and reducing carbon-intensive new-build construction.

This presentation will showcase ALICS's lighting-enhanced inspection method and concrete defect detection abilities. Results from on-site deployment will also be presented, validating ALICS's methods in a real-world environment.



## HAMISH DOW UK

*Dr Hamish Dow is a Research Associate at the University of Strathclyde's Department of Civil and Environmental Engineering. His research investigates novel AI-based imaging methods for detecting and quantifying concrete structure defects. Hamish's lecture will explain how AI can be used for visual inspections, highlight innovative concrete inspection methods developed at the University of Strathclyde, and present real-world, Strathclyde-led, case studies demonstrating AI-driven inspection applications.*



## KOUER ZHANG HONG KONG

*Kouer Zhang is a PhD candidate in the Department of Mechanical Engineering at The Hong Kong Polytechnic University, with an MPhil from the same institution and a BEng in New Energy Science and Engineering from Xi'an Jiaotong University. Her research focuses on electrochemistry, energy conversion, and wastewater management, yielding impressive outputs of 13 journal papers and 4 patents.*

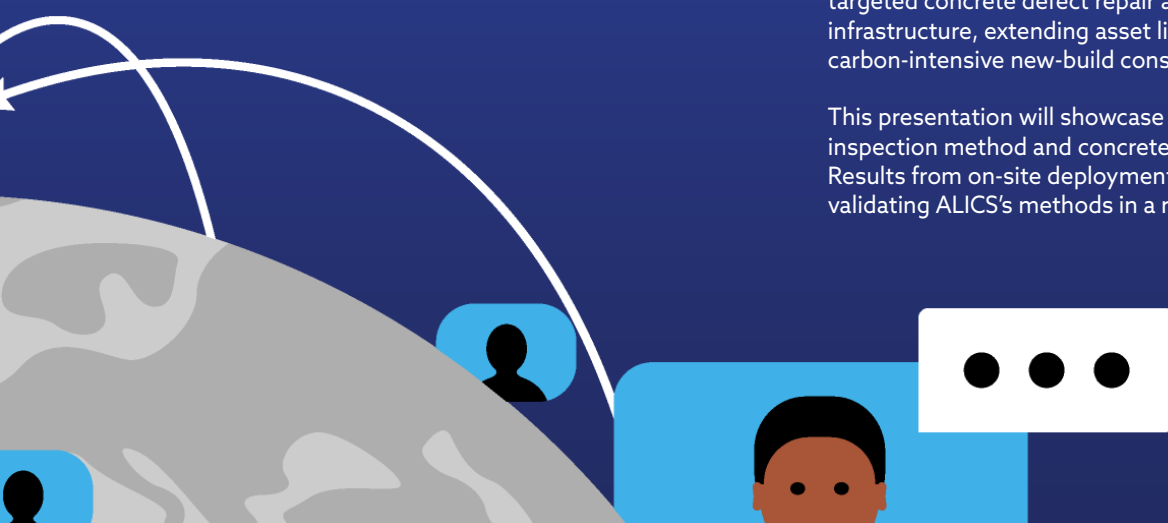
*Academically distinguished, she has won awards including 2025 Best Research Postgraduate Student and in 2024 she was the 3-Minute Thesis Competition Champion of PolyU Engineering Faculty. Beyond research, in 2025 she founded NanoPulse Technology Co., Ltd., served as a part-time athlete for Hong Kong's National Rowing Squad. Kouer has earned medals like the 2024 Asian Rowing Cup Bronze and the 2023 U23 Asian Rowing Championships Silver, excelling in both academia and sports.*

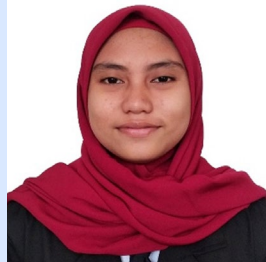


## CLOSING THE LOOP: TRANSFORMING WASTEWATER NITRATE INTO SUSTAINABLE FERTILIZE

Producing ammonia, a key ingredient in fertilizers, is traditionally relied on the energy-sensitive Haber-Bosch process. Imagine if we could make ammonia more sustainably, using electricity and wastewater nitrate instead. However, this process faces challenges from competing reactions, such as hydrogen evolution, which reduce efficiency.

Our solution is a specially designed nano-material catalyst made of copper-cobalt nanowires, grown directly on copper foam. Think of these nanowires as a team where cobalt sites start the nitrate reduction, and copper sites finish the job, guiding the reaction smoothly toward ammonia while blocking the unwanted hydrogen production. Using advanced in-situ characterization and computational tools, we have mapped out how this tandem mechanism works. Our catalyst delivers high efficiency and long-term stability, pointing the way toward greener, scalable ammonia production for the future.

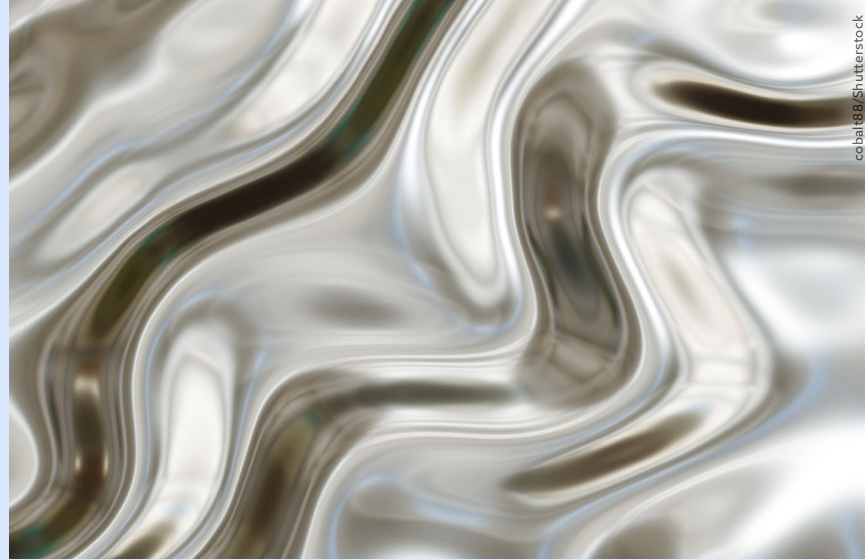




## NATASYA SALSABIILA MALAYSIA

Natasya Salsabiila is currently pursuing her PhD in Electrical Engineering at Universiti Tun Hussein Onn Malaysia (UTHM), where her research focuses on the scalable deposition of Aluminum Nitride (AlN) buffer layers using industrial-grade RF sputtering for Gallium Nitride (GaN)-based high electron mobility transistors (HEMTs). She previously earned her Master's and Bachelor's degrees in Electrical Engineering, both supported by competitive scholarships from the Malaysian Ministry of Foreign Affairs and the Indonesian Ministry of Education and Culture. Her academic interests span nanomaterials, sensors, and thin-film technology.

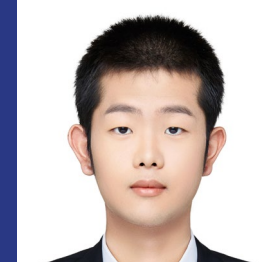
Throughout her journey, Natasya has actively engaged in national and international research platforms. She was awarded a consolation prize at the 2023 National Nanotechnology Innovation Research Project Competition (PIN) by MOSTI Malaysia and was recognized as Best Oral Presenter at the 2024 International Conference on Advanced Functional Materials and Devices (AFMD) organized by the Nanotechnology Research Centre, SRMIST, India.



## ALUMINUM NITRIDE THIN FILM DEPOSITION USING INDUSTRIAL-GRADE SPUTTERING SYSTEM: A UNIFORMITY STUDY

Aluminum Nitride (AlN) thin films are crucial for high-frequency and high-power electronics due to their high thermal conductivity, wide bandgap, strong piezoelectric response, and stability. One of the most promising techniques for depositing AlN is radio frequency (RF) magnetron sputtering, producing uniform and high-quality AlN films with strong adhesion. However, achieving consistent film quality on larger wafers, particularly using 12-inch industrial targets on 8-inch silicon wafers, remains challenging. Hence, this study investigates the effect of target and substrate rotation speeds on AlN film properties, including thickness, surface roughness, and crystalline quality. The influence of rotation dynamics on film uniformity across 2-, 4-, and 8-inch wafers is analyzed, alongside the underlying mechanisms of atomic flux distribution.

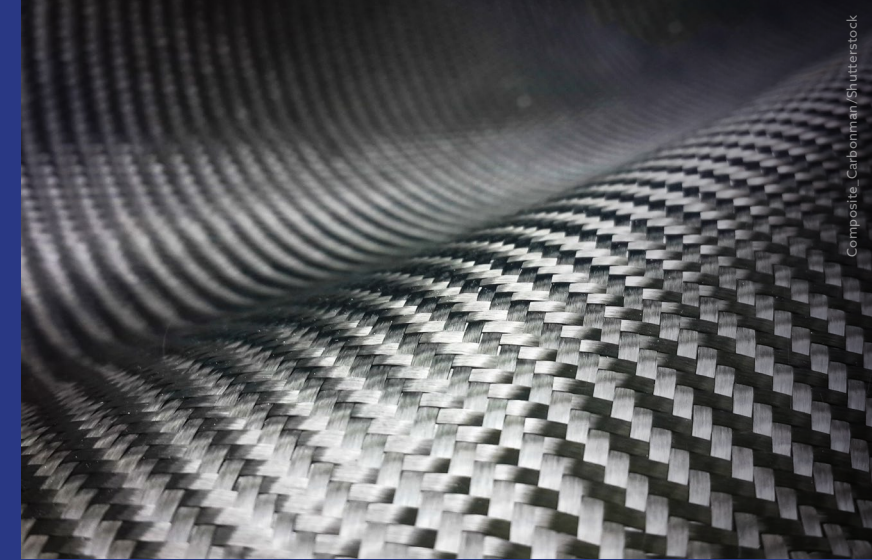
Optimizing these parameters provides a practical and scalable approach to enhance film uniformity on large wafers, bridging the gap between laboratory research and industrial fabrication and enabling more efficient, cost-effective production of advanced electronic devices.



## XIAOXI ZENG CHINA

Xiaoxi Zeng is a final year Joint BEng student in Polymer Materials Science and Engineering at Northwestern Polytechnical University and Queen Mary University of London, with a minor in Business Administration. His research focuses on interface engineering and multifunctional high performance polymer composites, particularly carbon fiber/PEEK systems. He has contributed to 3 journal papers and is the first author of a published article in *Journal of Materials Science & Technology* reporting a biphenyl-branched poly(aryl-ether-nitrile) strategy for enhancing CF/PEEK interfacial performance.

Xiaoxi has extensive experience in polymer synthesis, composite processing, and advanced materials characterization. He is also the developer of a registered software system for traffic flow measurement. Xiaoxi is the winner of the 2025 IOM3 Young Persons' Lecture Competition China final.



## STUDY ON THE PREPARATION OF POLY(ARYLENE-ETHER- NITRILE) MODIFIED CARBON FIBERS/ POLY(ETHER-ETHER- KETONE) COMPOSITES

The weak interfacial adhesion between carbon fibers and the poly(ether-ether-ketone) matrix limits the overall performance of CF/PEEK composites. This study introduces a biphenyl-branched poly(arylene-ether-nitrile) (BPEN) as a molecularly engineered interfacial compatibilizer. BPEN was synthesized through one-pot polycondensation and applied onto carbon fibers to form CF@BPEN/PEEK composites via powder-impregnation hot-pressing. The biphenyl and nitrile units of BPEN promote  $\pi$ - $\pi$  stacking and hydrogen bonding at the fiber-matrix interface, enhancing stress transfer and interfacial stability. The resulting composites exhibit improved mechanical integrity, thermal conduction, and electromagnetic shielding performance. This work demonstrates an effective molecular-scale strategy for achieving multifunctional, high-performance thermoplastic composites.



# YPWLC WINNERS



**Malaysia 2010**

Jason Mayers  
(Florida)



*Enhanced organic photovoltaic cell performance using transparent microlens arrays*



**Brazil 2011**

Mitali Kakran  
(Singapore)



*Graphene: The new wonder material!*



**London 2012**

Brian Weden  
(California)



*High performance impact-tolerant and abrasion-resistant materials: Lessons from nature*



**Hong Kong 2013**

Cornelis van Niekerk  
(South Africa)



*Novel techniques for in-situ laser alloying of AISI 410L stainless steel with nitrogen during laser cladding*



**US 2014**

Raphael Smith  
(South Africa)



*The design, construction and testing of a hermetically sealed breast platform for dual-modality mammography*



**Ireland 2015**

Kevin Doherty  
(Ireland)



*New thermal control material systems for interplanetary and geosynchronous spaceflight*



**Brazil 2016**

Li (Alan) Zhong  
(Singapore)



*Artificial corneal implants: A brighter future with advanced bioceramics*



**Australia 2017**

Vidya Chamundeswari  
Narasimhan (Singapore)



*Biodegradable scaffold systems for musculoskeletal tissue regeneration with sustained release of multiple bio-molecules*



**South Africa 2018**

Kyle Saltmarsh  
(Australia)



*Acoustic based condition monitoring in the resource industry*

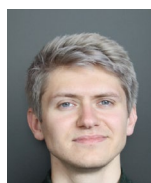


**London 2019**

Tamlyn Naidu  
(South Africa)



*Acid mine drainage remediation system using waste products from the steel manufacturing and sugar industries*



**London 2020**

Morgan Lowther  
(UK)



*Head, shoulders, knees and microbes: 3D printing better implants*



**London 2021**

Hannah Ramsay  
(Canada)



*Silver clusters: Small material, big potential*



**London 2022**

Rathosivan Gopal  
(Malaysia)



*Immobilisation of factor VII through polydopamine grafting of polycaprolactone membrane for cardiac bleeding*



**London 2023**

Lodewikus Vorster  
(South Africa)



*Cyclic potentiodynamic polarization testing of TIG welded 316L stainless steel for characterization of pitting corrosion*



**London 2024**

Sebasia Theresa Ramahlare  
(South Africa)



*Biodegradable Mulch Biofilms Potential Environmentally Friendly Alternative for Agricultural Mulching*



**I.M3** ADM3

**I.M3** EMM3

**I.M3** PRIDE

**I.M3** SEC

**I.M3** WIM3

# Join I.M3

No matter your career stage or level of experience, joining the IOM3 community can make a significant impact.

We are committed to connecting professionals across the materials, minerals, and mining sectors, and we support your growth every step of the way.

Find out more at  
[bit.ly/IOM3-Membership](https://bit.ly/IOM3-Membership)

## IOM3 member networks bring together people who may be in an under-represented group in our profession

We have a number of groups within IOM3 focussed on advocating for members - from supporting members at the start of their career to those who identify as LGBTQ+.

*Ably Different Member Group (ADM3) | Ethnic Minorities in Materials, Minerals & Mining (EMM3) | IOM3Pride Group | Student & Early Career Group (SEC) | Women in Materials, Minerals & Mining (WIM3)*

Find out more at  
[bit.ly/iom3communities](https://bit.ly/iom3communities)



**#WeAreIOM3**

Many disciplines. One community. Shaping the future.

# I.M3

## SEC Hub

**THE SEC  
CONTENT &  
RESOURCES  
GATEWAY**

[bit.ly/IOM3SEC\\_Hub](https://bit.ly/IOM3SEC_Hub)

## SCORECARD

Please feel free to use the score sheet to compare your assessment with that of the judges

Judging criteria	Max mark	United Kingdom	Hong Kong	Malaysia	China
Abstract	10				
Structure of lecture	25				
Standard of presentation	25				
Visual aids and physical examples	10				
Technical content	15				
Handling questions	15				
<b>Total</b>					
Lecture time (mins/sec)					
Penalty > 17/19 mins Penalty < 12/13 mins	-5/-10				
<b>Final Score</b>					

ORGANISED BY

**I·M3** Institute of Materials,  
Minerals & Mining

ON BEHALF OF



Young Person's World Lecture Competition