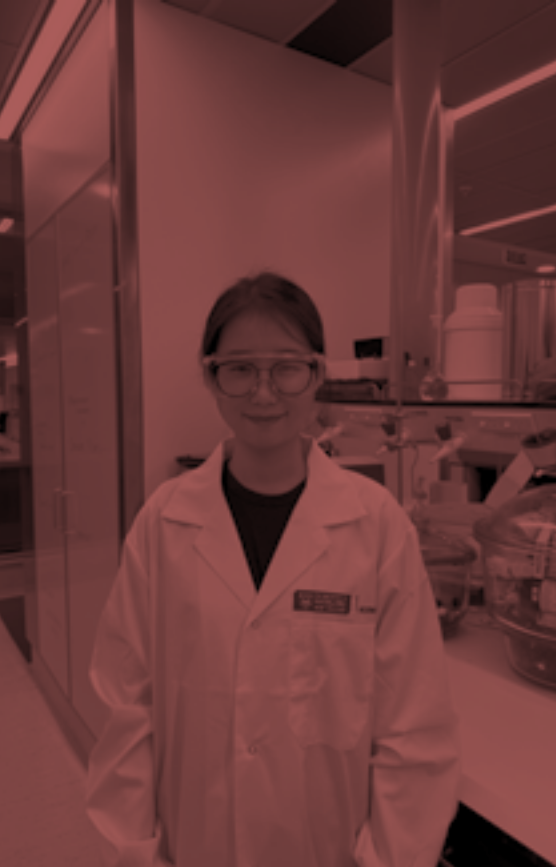


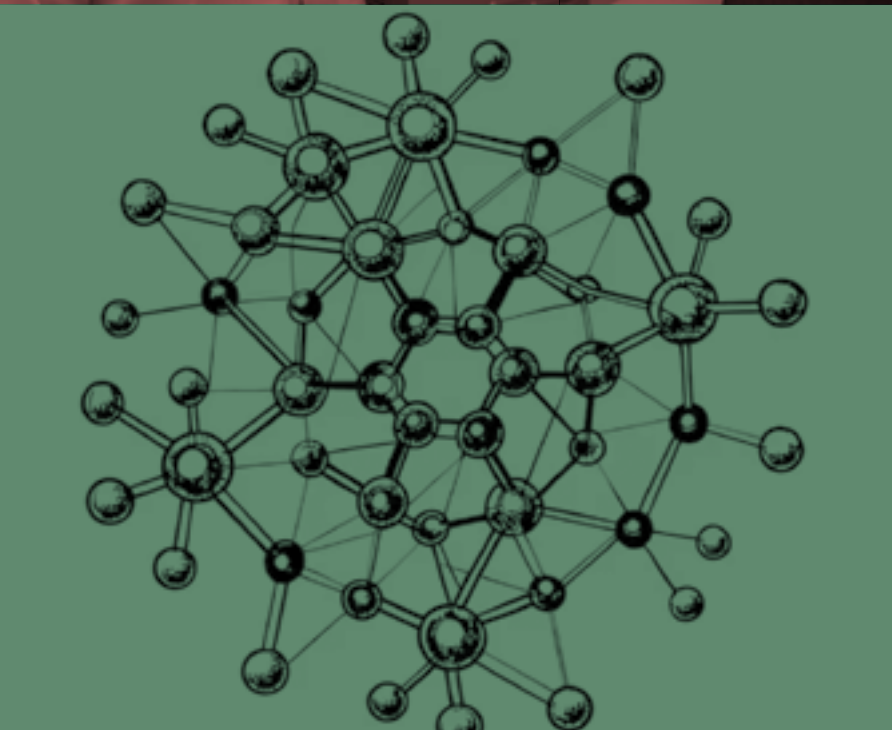


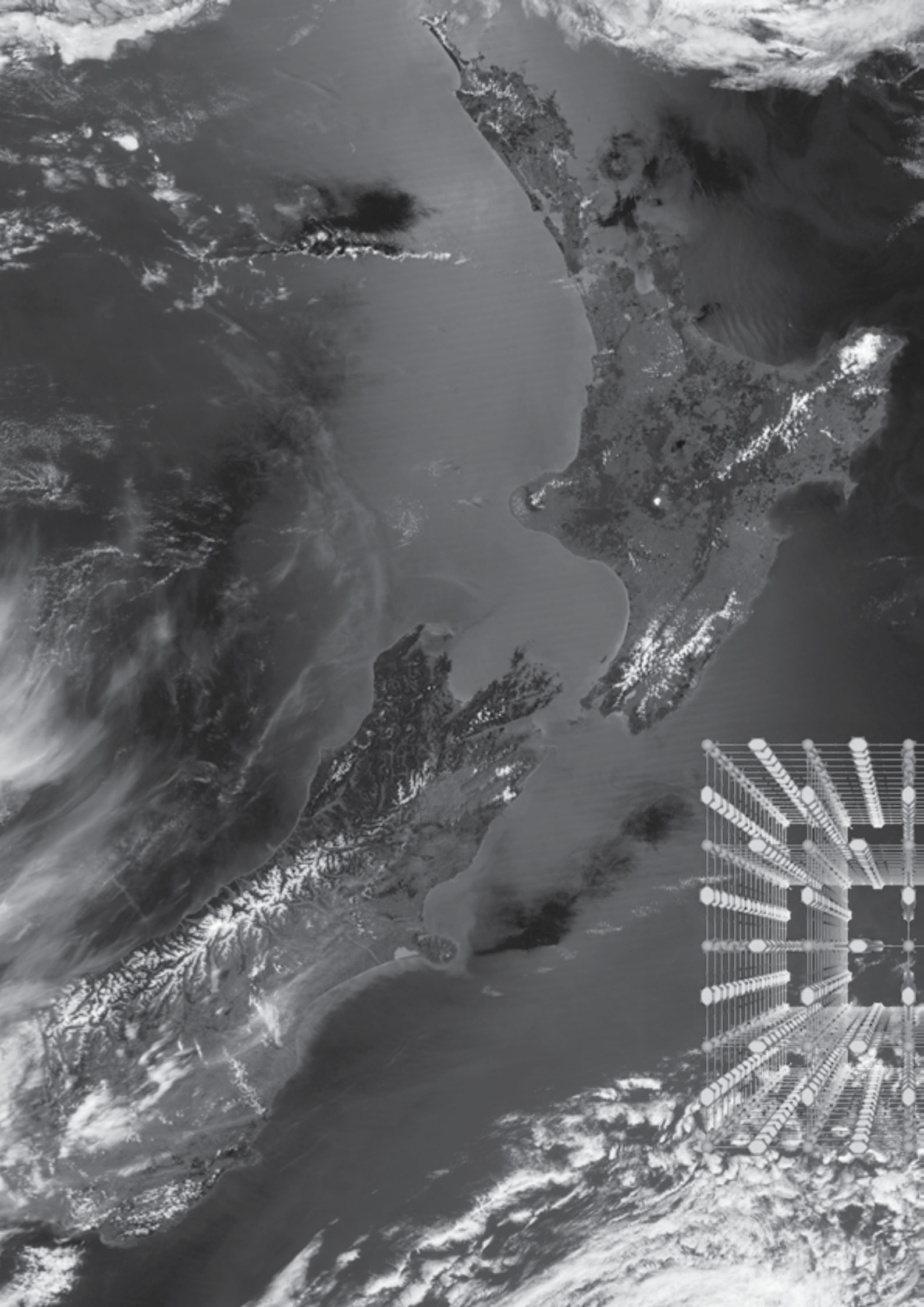
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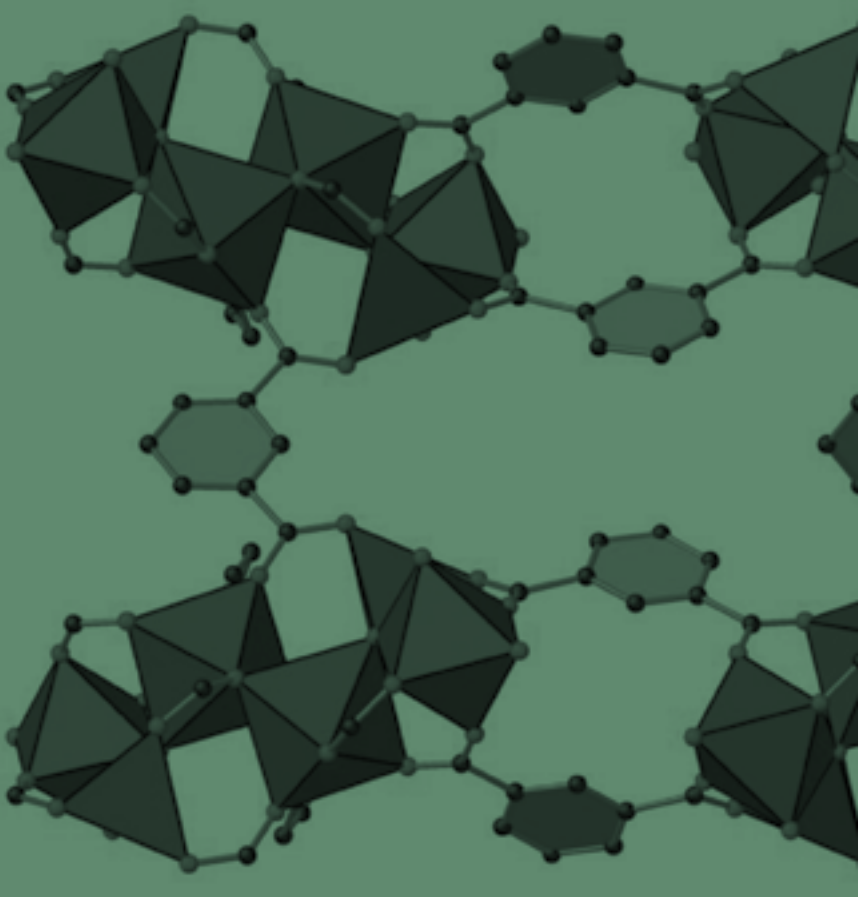
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* GNS Science became part of Earth Sciences
New Zealand on 1 July 2025)
<https://www.macdiarmid.ac.nz/about-us/>



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Nicola Gaston

DIRECTOR



It is a delight to share with you our 2025 annual report. Over the past year, our researchers led work across several fast-moving areas — including optimising nanostructured networks for brain-like performance, emulating biological systems, turning cow burps into clean energy and developing innovative solutions to tackle waterway pollution — demonstrating the Institute’s commitment to translating science into real-world impact.

In a recent conversation with an early career researcher, the Institute was described to me as “the opposite of an ivory tower” and I take real pleasure in that reputation. As this report makes clear in so many ways, we are delivering real value — from fundamental knowledge to technology, tools that people can use to make a positive impact in Aotearoa and the world.

New Zealand’s deep tech growth is driven by people who can take our world-class materials research and turn it into tangible results. Our CRISP programme and post-PhD internships with industry, government and deep tech companies, prepare our graduates with the tools, practical knowledge and connections to thrive beyond academia and deliver the impact New Zealand deep tech sector needs.

2025 also saw the launch of our C3 programme, strengthening researchers’ skills and networks, alongside seed funding that continues to drive commercially focused innovation. We supported the Cleantech Mission, connecting scientists, innovators, industry and funders, and celebrated the creativity and achievements of our emerging experts, including KiwiNet Award finalists and winners — demonstrating the power of collaboration and vision.

Our outreach and engagement continued to grow, through strengthened partnerships, regional engagement and alumni involvement. Highlights included collaboration with Tūhura Otago Museum, our AMN11 conference outreach, community activities on Rēkohu and teacher initiatives from Northland to South Otago — showcasing the Institute’s commitment to inspiring science across Aotearoa.

We welcomed our second cohort of PhD students, and have seen them launch their projects off the springboard of the first four years of research in our current programmes with immediate impact and growing momentum.

I am privileged to lead this amazing community, and I thank everyone in it for their mahi.

A handwritten signature in black ink, appearing to read "Nicola Gaston".

Hēmi Rolleston

BOARD CHAIR



It is my pleasure to present my fourth Chair's report. I continue to be inspired by the passion and calibre of everyone involved with the Institute, and by the outstanding research advancing our shared goals.

In September we welcomed Professor Sally Brooker to the Board as our Ōtākou Whakaihu Waka University of Otago representative. Professor Lucy Johnston also joined the Board in September, as the new representative from Te Whare Wānanga o Waitaha University of Canterbury. We said goodbye to Professor Margaret Hyland following her retirement from Te Herenga Waka Victoria University of Wellington. Margaret's contribution has been significant over more than two years, not just in what was achieved, but in the care, judgement and continuity she has brought to the Board's work over this time. We also farewelled Professor Richard Blaikie, who was the Institute's first Deputy Director from 2002 until 2007, and then Director from 2008 until 2011. He has represented Ōtākou Whakaihu Waka University of Otago on the Board since 2017. On behalf of the Board, I salute Richard for his leadership, resilience and dedication to the Institute over more than 23 years. This year, the Institute's researchers continued to push boundaries, translating science into real-world impact and ensuring our graduates leave with the skills, experience and

connections needed to thrive beyond the lab.

I'm especially proud of the Discovery Scholarship programme's success over six years and am as always grateful to co-sponsors Spirax Sarco and GNS Science for supporting these rangatahi as they progress in the sciences.

Finally, this is my last Chair report and closes my time on the Board as at 30 June 2026, having held various roles since 2017 as both a Callaghan Board member and independent Board member and as Chair since November 2021. It has been a huge privilege to serve the Institute and I am humbled by the opportunity. I am extremely proud of the mahi that the Institute has undertaken, and personally for me, the way that mātauranga Māori has been embedded seamlessly into the organisation

Whilst new challenges are on the horizon, so are new opportunities and I have no doubt the Institute will navigate the next chapter successfully. I invite you to read and celebrate the Institute's achievements in this 2025 annual report.

A handwritten signature in blue ink, which appears to read 'Hemi Rolleston'. The signature is fluid and cursive, with a long, sweeping underline.

TE MOANA NUIA KIWA

1.

This year in Te Moana Nui a Kiwa we celebrate new relationships and the national and international connections we are nurturing. We continue to develop connections with Māori community business, and we are focused on developing the careers of our Discovery Scholars and our early-career Als. Our partners continue to support our Discovery Scholarships, which are essential to the Discovery Programme and to the capacity and capability development of our scholars.

CELEBRATING CONTINUED SUCCESS FOR OUR DISCOVERY SCHOLARSHIP COMMUNITY

The Discovery Scholarship programme continues to be a key focus of our Te Moana-nui-a-Kiwa kaupapa — identifying, supporting, and championing Māori and Pacific students as they step into futures such as the physical, chemical and biological sciences, engineering, computing and mathematics, Māori sciences, and sustainability-related fields. In mid-December 2024 we closed applications for the 2025 round and were thrilled to receive around 90 applications. Following a competitive assessment process, 22 scholarships were awarded for 2025, spanning the full range of pathways our community needs:

- 10 × Te Huarahi Ki Mua Award – for previous Discovery recipients building to the next step
- 4 × Te Taumata Award – High Achiever Award
- 3 × Te Mātauranga Pūtaiao Award – Māori Science Award
- 3 × Te Kāinga Rua Award – Second Chance Learner Award
- 2 × Piki Ake Award – Step It Up Award

Our Discovery Scholars are succeeding academically and contribute meaningfully to research and communities through placements and internships that draw on both western and Māori scientific knowledge.

This year, Discovery Scholars Georgia-Rae Jones and Jade Hine Pounamu Tāwhiri Ruka undertook internships that exemplify this. Georgia-Rae's internship at Massey University of Wellington explored how NASA's space-based Earth observations (SBEO) and Geographic Information Systems (GIS) can strengthen Māori and Pacific capability in environmental monitoring. Her work reviewed Māori GIS initiatives, partnerships, and training pathways—highlighting both opportunities and barriers for long-term, Māori-led geospatial engagement. Through weekly hui with supervisor Professor Pauline Harris and Strategic Manager

Māori Kirsty Doyle, Georgia-Rae expanded her technical skills in GIS, while developing a deeper understanding of how these tools can be used to express tino rangatiratanga and support kaitiakitanga across iwi and hapū contexts.

Jade Ruka interned with GNS Science, contributing to several interdisciplinary environmental research projects involving sediment analysis, coastal erosion and the protection of culturally significant Māori sites. Her mahi included analysing sediment cores and particle sizes, participating in LiDAR mapping in Taranaki and creating a regional GIS map of Kaipara showing marae, urupā and coastal risk zones. Working alongside iwi representatives and supervisors Malcolm Arnot, Marcus Vandergoes, Jenny Black and Emeritus Investigator Diane Bradshaw, Jade connected field science with community priorities, gaining hands-on experience that combined geoscience and mātauranga Māori.

“Support and guidance by Māori for Māori, particularly in the research and science sector, is key to Māori success and innovation.”

— DISCOVERY SCHOLAR GEORGIA-RAE JONES

We also celebrate Discovery alumna Maia Horn, who represented Aotearoa New Zealand at the Ocean Citizen Summit in France, bringing a Māori voice to global conversations on ocean stewardship and Indigenous leadership. Read more at RNZ: <https://www.rnz.co.nz/news/national/545697/young-new-zealanders-head-to-france-for-ocean-citizen-summit>.

Across the year, we have maintained regular online catchups with current and past recipients, offering pastoral care, career conversations, and practical support. We acknowledge with gratitude the continued support of our co-sponsors—GNS Science's Aotearoa: Green Hydrogen Platform and Spirax Sarco—whose contributions expand what is possible for the programme.

These touchpoints allow us to respond quickly to needs, celebrate wins and connect Scholars to new opportunities.

“Collaborating with a diverse team was a privilege — this experience has fueled my interest in environmental conservation that integrates both scientific research and cultural perspectives.”

— DISCOVERY SCHOLAR JADE HINE POUNAMU TĀWHIRI RUKA

GLOBAL ACHIEVEMENT – MAIA HORN: OCEAN CITIZEN SUMMIT, FRANCE

Representing Aotearoa on the international stage, Discovery Scholar Maia Horn shared Māori perspectives on ocean stewardship and Indigenous leadership at the Ocean Citizen Summit in France. Read more at RNZ <https://www.rnz.co.nz/news/national/545697/young-new-zealanders-head-to-france-for-ocean-citizen-summit>

“Our Discovery Scholarship Programme is more than financial support — it’s about walking alongside our students throughout their journey. From pastoral care and career guidance to mentoring and advocacy, we provide holistic support that reflects the values of manaakitanga. We aim to help our scholars navigate the science ecosystem with confidence, nurturing their aspirations and empowering them to achieve their goals and become leaders in their fields.”

— STRATEGIC MANAGER MĀORI KIRSTY DOYLE

OUR INTERNSHIP IMPACT

Connecting science and community:

- Incorporating research community, offering practical, hands-on activities informed by both Māori science and Western science.
- Building technical capability in geospatial mapping and Earth observation
- Supporting iwi-driven projects on coastal protection and cultural heritage
- Creating bridges between science, policy, and Indigenous knowledge

INTERNATIONAL CONNECTIONS, COLLABORATIONS AND CELEBRATIONS

Our international mahi in 2025 deepened long-standing relationships and opened new doors for co-created research grounded in Indigenous values and world-class science.

Building on connections across the Pacific and the Northern Hemisphere, we continued to exchange knowledge on Earth observation, data sovereignty and materials research in ways that centre community priorities and equitable benefit sharing.

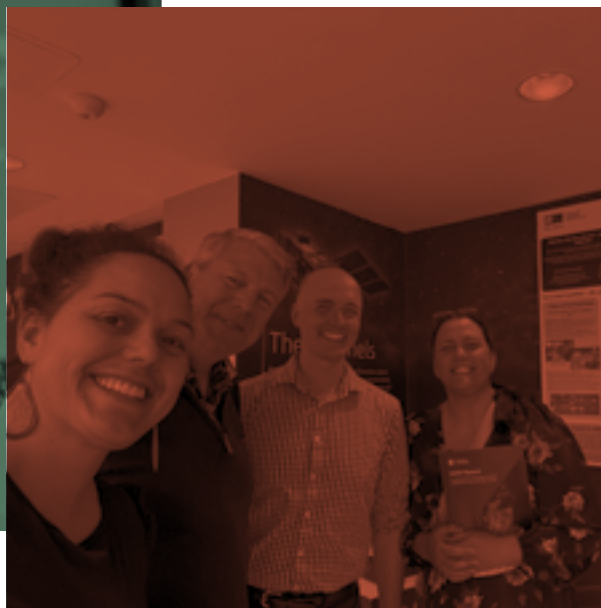
During our visit to the United Kingdom, we expanded connections through a series of institutional visits that discussed materials, aerospace and Māori knowledge research and engagement. At St Andrews University, we presented on Māori astronomy and Māori perspectives on aerospace. At Durham University, we connected with researchers on space, sustainability and ethical frameworks.

We also visited the Rutherford Appleton Laboratory (RAL) and were hosted by Dr Hugh Mortimer, Associate Director of the National Laboratories, and Andy Shaw, Director of Assimila. RAL is one of the United Kingdom's leading

centres for space science and technology, housing world-class research facilities such as the National Satellite Test Facility and large-scale vacuum chambers used to simulate the conditions of space. We toured several laboratories including the satellite test facilities, viewed the particle accelerator and their rooms for instrument assembly. We were also introduced to one of the Indigenous Australian students interning at RAL Space, which is part of a new partnership RAL has developed with the National Indigenous Space Academy in Australia.

The value of international engagement lies in creating pathways for collaboration, shared opportunities, and enduring partnerships. We look forward to continuing conversations with our new friends and colleagues as we explore and strengthen these relationships into the future.

These experiences culminated in a moment of deep significance at the University of Oxford, where our delegation, Chair Hēmi Rolleston, Director Professor Nicola Gaston, Deputy Director Māori Professor Pauline Harris and Strategic Manager Māori Kirsty Doyle attended the celebrations of the posthumous conferral of Mākereti Papakura's Master's degree. The posthumous graduation



Far left:
St Andrews
University
lecture -
Pauline Harris
sharing Māori
astronomy and
aerospace
research.

Left: Exploring
advanced
instrumentation
and
collaboration
opportunities
at RAL. From
left to right:
Kirsty Doyle,
Andy Shaw, Hugh
Mortimer and
Pauline Harris.



Margaret
Pattison
Staples-Browne
(née Thom, 20
October 1873
- 16 April
1930), more
commonly known
as Mākereti or
Maggie Papakura
(right), and
her book *The
Old Time Māori*
(above).



“Mākereti Papakura’s recognition at Oxford was a profoundly significant moment for Whakarewarewa Village — a celebration of Māori excellence, scholarship, and achievement not only for the village, but for Māoridom and all New Zealanders.”

DEPUTY DIRECTOR MĀORI PAULINE HARRIS

of Mākereti marked the formal recognition of her master’s research nearly a century after her passing. More than 300 people attended the ceremony and associated events, including representatives from her home Whakarewarewa Village and iwi Tūhourangi Ngāti Wahiao and Te Arawa, Oxford academics, and dignitaries from Aotearoa New Zealand. Mākereti, also known as Maggie Papakura, was a pioneering cultural guide from Whakarewarewa who became one of the first Māori women to study at the University of Oxford. Her thesis, *The Old-Time Māori*, was the first ethnographic work authored by a Māori scholar and provided an authentic account of Māori life, customs, and values. The event was both moving and historic,

symbolising a moment of recognition for Māori scholarship and the rightful place of Indigenous voices in academia. While in Oxford we also engaged with other academics and communities about the MacDiarmid Institute’s materials, Indigenous knowledge and educational opportunities.

We have partnered with the Whakarewarewa Village Charitable Trust since 2018 in which time we have developed programmes around education and research with them. Participating in the acknowledgement of Mākereti at Oxford was a humbling experience. We look forward to continuing our work with Whakarewarewa Charitable Trust.

Education and outreach remain at the heart of our kaupapa, connecting people of all ages with science, technology and mātauranga Māori.

Our 2025 programme has built bridges between research and community, offering practical, hands-on activities informed by both Māori science and Western science.

As part of Whakarewarewa's Winter Series, our team — Director Professor Nicola Gaston, Deputy Director Māori Professor Pauline Harris, Emeritus Investigator Diane Bradshaw and Strategic Manager Māori Kirsty Doyle — spent a day with local kaimahi, sharing stories about the Institute's research and its relevance to sustainable innovation. Participants built solar-powered model marae and hydrogen-fuelled cars, learning how renewable energy technologies can be woven with community values. The enthusiasm and warmth of the Whakarewarewa team made this exchange both joyful and inspiring.

In Ōtautahi Christchurch, we partnered with the Paihau - Robinson Research Institute, the Society of Māori Astronomy Research and Traditions (SMART) and Kia Whitingia Energy Collective, for an outreach event hosted by the Tāwhaki National Aerospace Centre. Rangatahi from local schools rotated through immersive STEMMM (Science, Technology, Engineering, Mathematics, and Mātauranga Māori) stations: exploring Māori astronomy inside the SMART planetarium dome, experimenting with

superconducting trains and launching bottle rockets. Discovery Scholars and our researchers facilitated the sessions, inspiring curiosity and confidence among our potential next generation of scientists and innovators.

Another collaborative effort by Pauline Harris, Kirsty Doyle, Juliet Nelson (PhD student) and Tohunga Ockie Simmonds, a respected member of the Society of Māori Astronomy Research and Traditions (SMART), was for a community-focused science engagement event in and around Raetihi in collaboration with the Paihau - Robinson Research Institute (including with PhD student Tane Butler) the group engaged with over 150 participants, including tamariki and rangatahi from local schools, as well as whānau and community members ranging from pēpi to kaumātua. Inside the inflatable SMART Dome, participants toured the night sky, learning about stars, planets and celestial movements. A series of hands-on physics activities encouraged curiosity, confidence and a deeper appreciation of how science connects to everyday life.

Inspiring our next generations is key to developing the future workforce in STEMMM. By weaving mātauranga Māori and hands-on science together, we nurture curiosity, creativity and confidence in our rangatahi — helping them see themselves as scientists, innovators, and knowledge holders. Through these connections, we are not only building future capability but also shaping a more inclusive and values-driven science ecosystem for Aotearoa and beyond.

Through these connections, we are not only building future capability but also shaping a more inclusive and values-driven science ecosystem for Aotearoa and beyond.

Tāwhaki hosted outreach session - Rulon Nutira and Julian Phillips (Tāwhaki), with Pauline Harris and Kirsty Doyle (right), alongside Juliet Nelson demonstrating the hydrogen car activities (far right).



ENGAGING WITH MĀORI BUSINESS

In 2025 we advanced a strategic priority: building an enduring relationship with Māori businesses. This year we attended the Federation of Māori Authorities (FOMA) Business Summit. Deputy Director Professor Pauline Harris, Strategic Manager Māori Kirsty Doyle, Deputy Director Associate Professor Natalie Plank and Board Chair Hēmi Rolleston attended the summit, meeting kanohi ki te kanohi with Māori business leaders across a variety of sectors. Our kōrero that we had at the summit with attendees focused on capability pipelines (rangatahi to internships to employment) and innovation opportunities.

Pauline and Hēmi also attended the Māori Kiwifruit Growers Incorporated Export Partnership with Zespri and Mr Apple in Dubai,

to better understand Māori business aims and aspirations with science, technology and innovation. The kaupapa was attended and supported by Te Arikinui Kuini Nga wai hono i te po (the Māori Queen), who led a delegation to meet with international dignitaries, including UAE Minister of Foreign Trade, Dr Thani bin Ahmed Al Zeyoudi.

We continue to discuss and explore the opportunities that the science and innovation sector can offer Māori businesses.



From left: Pauline Harris, Hēmi Rolleston, Natalie Plank and Kirsty Doyle at FOMA.



Pauline Harris and Hēmi Rolleston at the Māori Kiwifruit Growers Incorporated Export Hui in Dubai.

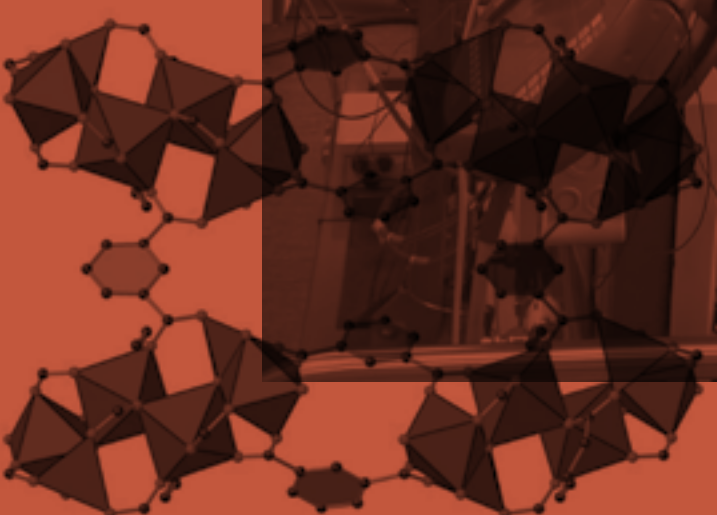
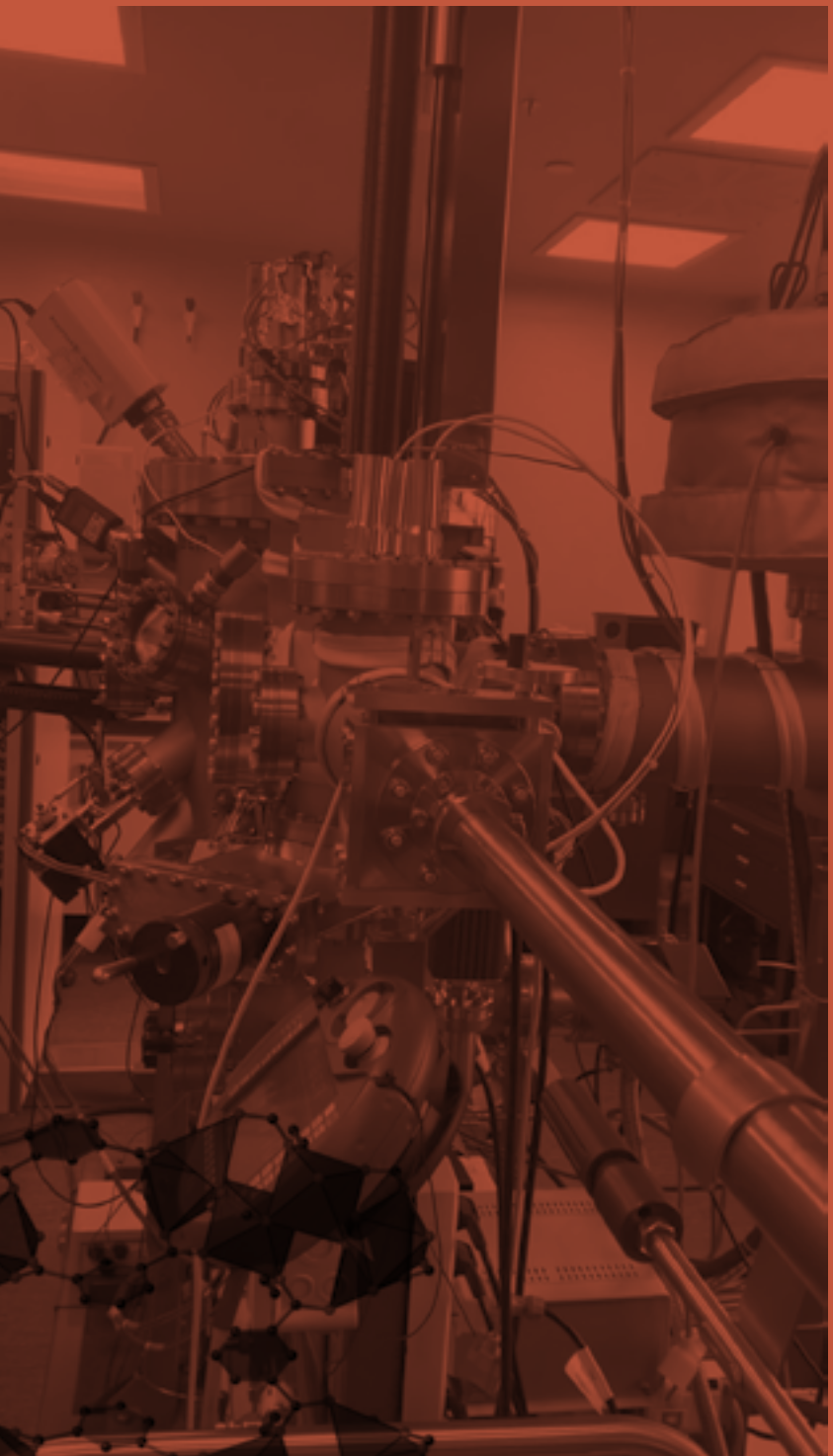
MĀORI CAPACITY AND CAPABILITY

Building Māori capacity and capability within the Institute remains a central focus of our Pūtaiao Māori research programme. This year, we have strengthened networks of Māori Principal and Associate Investigators, postgraduates and early-career researchers through dedicated hui, mentoring and shared research planning. These gatherings create vital spaces for whakawhanaungatanga — fostering collaboration, career development and collective approaches to research that centre mātauranga Māori and community impact. Alongside this, our Te Reo Māori

classes, offered across Levels 1 and 2, continue to draw strong participation from across the Institute. These sessions not only support language revitalisation but also deepen cultural understanding and strengthen relationships within our research whānau. Together, these initiatives embody our commitment to embedding Māori knowledge, values and leadership at every level of the Institute.

Kirsty Doyle (Strategic Manager Māori), Pauline Harris (Deputy Director Māori) Kannan Ridings (AI), Carlie Watt (PhD student), Alan King-Hunt (PhD student), Alyssa Thomas (PhD student), Raine Hananui (RA), Ocean Mercier (PI), Joseph Nelson (AI), Derek Kawiti (PI); absent Taniela Lolohea (attended, left for a plane).





OUT OF THE LAB

2.

Six years ago, we decided as a community what areas of science were best suited to our collective, multidisciplinary skill set. We asked where the fundamental knowledge gaps were, and how we could best make a difference.

With our second cohort of PhD students underway in 2025, we are seeing how much of a difference our collective ambition and aspiration for Aotearoa has made — and continues to make.

OPTIMISING NETWORKS FOR BRAIN-LIKE PERFORMANCE

Scientists working within a single lab consistently deliver remarkable discoveries. But when they make connections and collaborate with other scientists in other labs, whole new horizons can open up.

For two of our physicists working on nano-electronic devices, it has been a collaboration – first within the MacDiarmid Institute and now with an international lab – that has taken them a step closer to mimicking the human brain.

No computer can yet match the incredible energy-efficiency of human cognitive processing. And with worldwide demand for computing increasing almost exponentially, the more energy-efficient hardware becomes, the better. Our Future Computing research programme is focused on developing materials and technologies fit for a sustainable-energy future.

So how can a computer chip behave more like a brain? How about filling it with a complex network of nanoparticles, putting voltage across it, and seeing what brain-like behaviour emerges? That is, in essence, what Principal Investigator Professor Simon Brown of Te Whare Wānanga o Waitaha University of Canterbury (UC) has been experimenting with. Simon pioneered the understanding of nanoparticle behaviour and is now at the forefront of developments in neuromorphic computing – electronic devices inspired by the structure and function of the brain.

But what if nanowires instead of nanoparticles could behave similarly and contribute to the understanding of the processes at play? That's where Principal Investigator Associate Professor Natalie Plank of Te Herenga Waka Victoria University of Wellington (VUW) comes in. Natalie's been working on nanowire networks for biosensing purposes and now she's trying to encourage brain-like performance out of her devices too. She credits the inclusive research environment for this additional direction. "Simon is always opening doors saying, 'come on, let's try everything, let's work together'.

That kind of ethos is at the heart of the MacDiarmid Institute."

"Simon is always opening doors saying, 'come on, let's try everything, let's work together'. That kind of ethos is at the heart of the MacDiarmid Institute."

NATALIE PLANK

Both the particle-based and wire-based systems are showing promise for replicating aspects of biological computation. Unlike the tidiness required in standard electronics, Natalie describes her devices as like a messy bowl of spaghetti. Of course, there is careful crafting of such minute structures – each network is a fraction of a millimetre in size – but some chaos is desirable. The jumble of nanowires or particles then creates a self-assembled network consisting of billions of connections or junctions where interesting behaviour can occur. Like the network of neurons in our brains, these neuromorphic devices can be trained to perform analysis or pattern recognition tasks.

Progress in the labs at UC and VUW has seen hundreds of neuromorphic devices built. However, the absence of capability for memory has meant that any tasks requiring learning must be performed on a separate device, outside of the nano-network devices. Wanting to enhance their capabilities, Simon built a collaboration with scientists at the Laboratory of Physics and Chemistry of Nano-Objects at the University of Toulouse (UT), the National Institute of Applied Sciences and the National Centre for Scientific Research in France. The French team offered experience in making molecules which exhibit a specific kind of switching behaviour.

These French-made molecules sounded promising – like adding sauce to Natalie's tangled piles of spaghetti – they might just



“We can’t overlook how important it is to meet in person and for students to be exposed to different systems, it opens the mind to what’s possible.”

NATALIE PLANK



“Marissa was incredibly organised. She came to Toulouse with a carefully selected array of samples and showed how adding synaptic molecules was different for each kind of sample.”

SIMON BROWN

be the missing ingredient. Thanks to a 2023 Te Apārangi Royal Society Dumont d'Urville Catalyst Grant, Simon, Natalie and their PhD students, Sofie Studholme and Marissa Dierkes, have been working both here and in France with Jérémie Grisolia, Simon Tricard and other French colleagues to experiment with adding memristive (memory + resistor) molecules to nano-networks.

Memristors are known to have synapse-like properties, but finding molecules that can perform these functions required the expertise and hard work of Simon Tricard and his postdoc Felix Houard. The PhD students also carried out an impressive amount of work. As Simon reflects, "Marissa was incredibly organised. She came to Toulouse with a carefully selected array of samples and showed how adding synaptic molecules was different for each kind of sample." Already, the team have exciting results and plenty more data to work through.

One way to speed up the progress of the mind-bendingly microscopic experimental work is to simulate network behaviour. Simulations can narrow down the abundant combinations

"As scientists, we can get pretty excited about the details of the physics and chemistry at play in these devices, but actually, a lot of us do want to solve problems which impact the planet and protect ways of life for the future of our children."

NATALIE PLANK

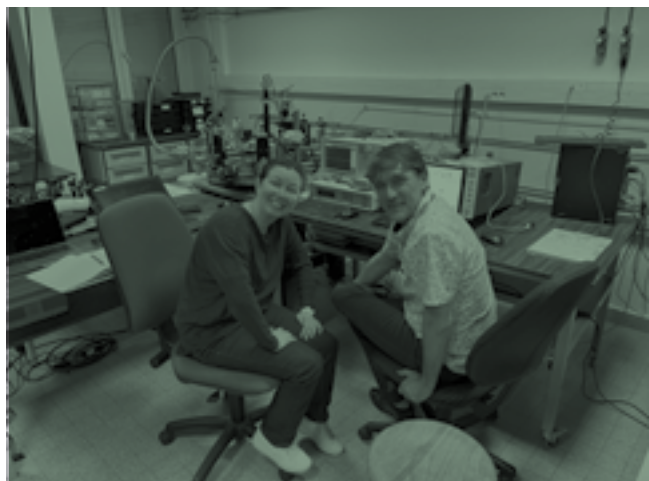
of network systems and molecules to explore. The researchers have a paper out in *Nanoscale Horizons* which describes how placing synapse-like molecules into their neuron-like networks can lead to controlled learning behaviour. The ability to learn and forget things adds to the richness of the electronic performance of these devices and signals the potential for new types of computation. These findings will direct further experimental work.

"By working together, we knew we could do something greater than the sum of our parts."

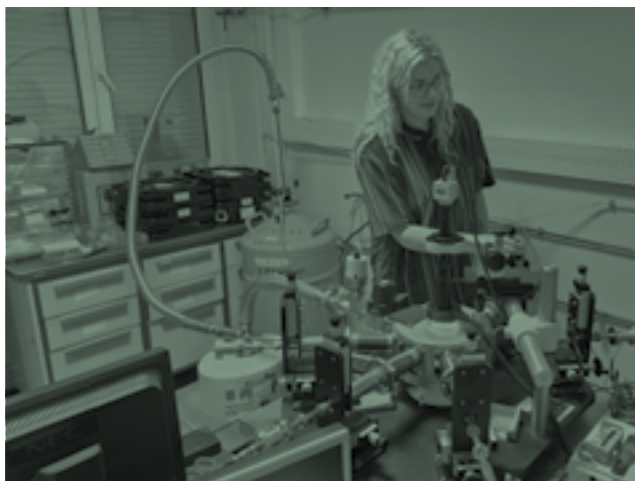
NATALIE PLANK

The benefits of these chips go beyond energy savings. They don't require extremely expensive equipment; they're small, lightweight, suitable for remote use without internet access and have so many potential applications it's hard to know exactly where they will find their niche in the real world. In Natalie's lab, there's already a design going through patent protection in anticipation of its usefulness. Natalie has her sights on the big picture, "As scientists, we can get pretty excited about the details of the physics and chemistry at play in these devices, but actually, a lot of us do want to solve problems which impact the planet and protect ways of life for the future of our children."

The Catalyst Grant was crucial to the success of this work. Kiwi researchers worked in French labs, and French researchers attended a special session of the International Conference on Advanced Materials and Nanotechnology in which 25 neuromorphic scientists met in Christchurch in February 2025. "We can't



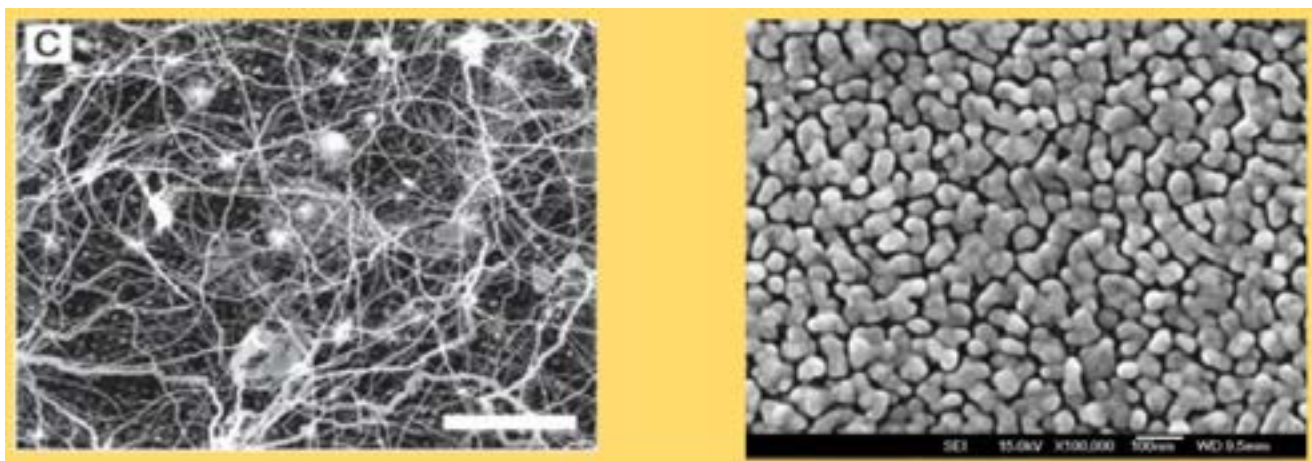
Natalie Plank and Jérémie Grisolia working in the lab at the University of Toulouse, France in September 2025.



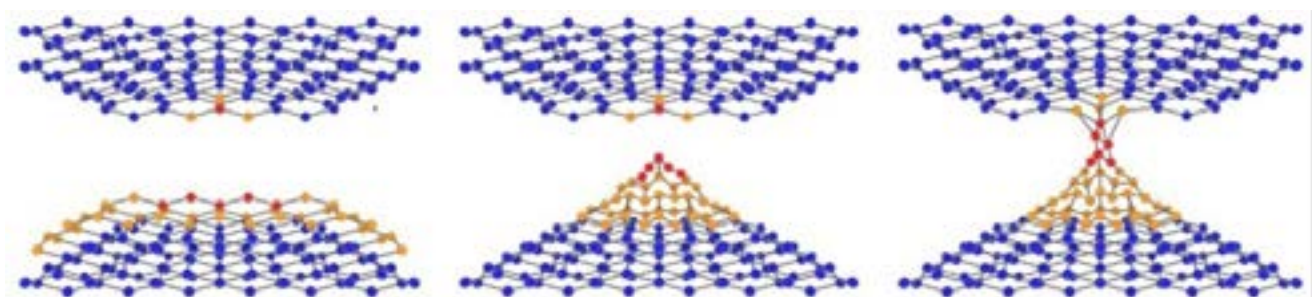
Marissa Dierkes working on her PhD research with the impedance spectroscopy machine at the University of Toulouse, France.

overlook how important it is to meet in person and for students to be exposed to different systems, it opens the mind to what's possible" says Natalie. The double meaning of 'network' in this project is not lost on the researchers – as they optimised their collaborative networks, the nano-networks improved in their brain-like capabilities. Natalie believes networking is crucial to the advancement of science, "By working together, we knew we could do something greater than the sum of our parts."

Monaghan, B. L., Heywood, Z. E., Studholme, S. J., Houard, F., Grisolia, J., Tricard, S., & Brown, S. A. (2025). Learning and spiking dynamics in brain-like nanoscale networks. *Nanoscale Horizons*, 10, 2475-2485. <https://doi.org/10.1039/D5NH00407A> pubs.rsc.org



Self-assembled networks of both nanowires (left) and nanoparticles (right) are being investigated for their potential to behave like the network of neurons and synapses in the human brain.

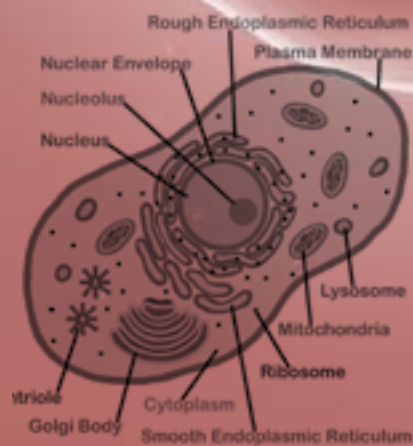
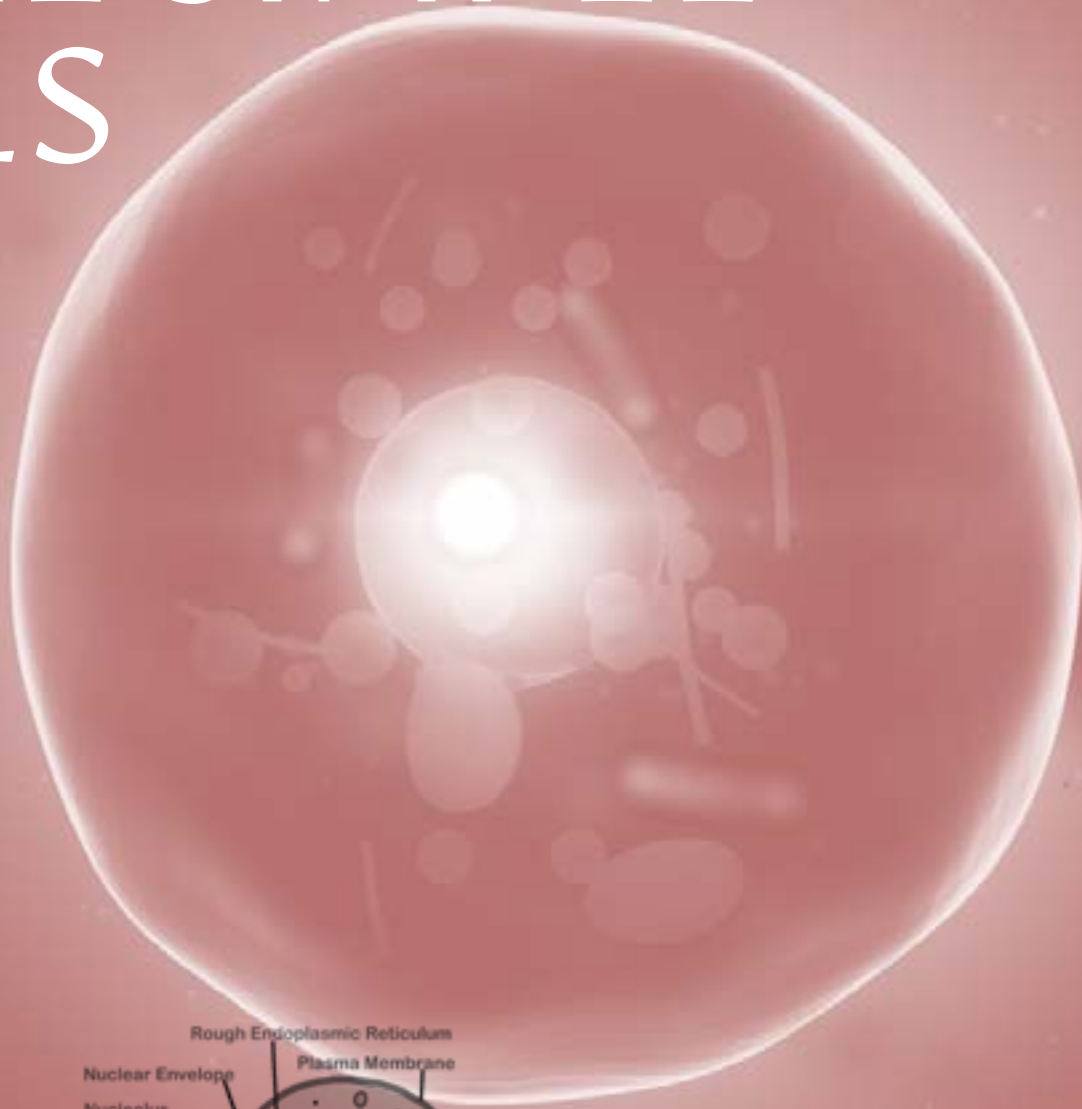


The gaps between nanoparticles (left) can be bridged partially (centre) or fully (right) in response to voltage applied across nano-networks, creating neuron-like spiking events that may be harnessed for computational purposes.



One of the devices made by the researchers (1cm by 1cm in size). A nanowire network sits in the centre (too small to see) and is overlaid by a film of memristive molecules. Gold electrodes extend outwards to contact pads around the edges and these can connect to external measurement devices. The base is a silicon wafer with an insulating silicon dioxide layer on top.

EMULATING BIOLOGY TO MAKE SIMPLE CELLS



In the hunt for chemical systems that can carry out multiple tasks efficiently, and reconfigure themselves for different purposes, the best inspiration comes from the biological cell.

Built from common elements and consisting mainly of water, our cells perform an impressive array of tasks: they can replicate and repair themselves, make new substances, communicate, and even move – all in a manner that is far more flexible and efficient than any human-made machine. These remarkable capabilities are what researchers are working to capture with potential outcomes of helping pollutants to break down, delivering medicines in a planned sequence, and running chemistry labs in a more environmentally friendly way.

“Biological systems can make and unmake things... how can we mimic some of that?”

Starting very simply, by exploring drops of one liquid in another liquid – like spheres of oil in a salad dressing – Principal Investigator Associate Professor Catherine Whitby of Te Kunenga ki Pūrehuroa Massey University, is interested in whether she can make multi-compartment droplets with components that can be reconfigured. “Biological systems can make and unmake things. They have some very simple building blocks, but they organise them into a remarkable arrangement of different kinds of materials. So, the overarching idea is, how can we mimic some of that?”

In another lab usually focused on organic electronics, Principal Investigator Professor

Jadranka Travas-Sejdic of Waipapa Taumata Rau University of Auckland has expanded her research to investigate how to initiate reactions in different sections of these simplified cells. “In biological cells there are organelles with different functions which respond to stimuli and communicate with each other. We wanted to create artificial cells with distinct components doing different tasks and then use cascade-type reactions to imitate those parts talking to each other.”

Jadranka and Catherine are part of the MacDiarmid Institute team working in the Reconfigurable Systems research programme which is focused on progress towards a zero-waste planet. They both emphasise that it is their PhD students who have been doing all the hard work in translating ideas into experiments and making exciting discoveries.

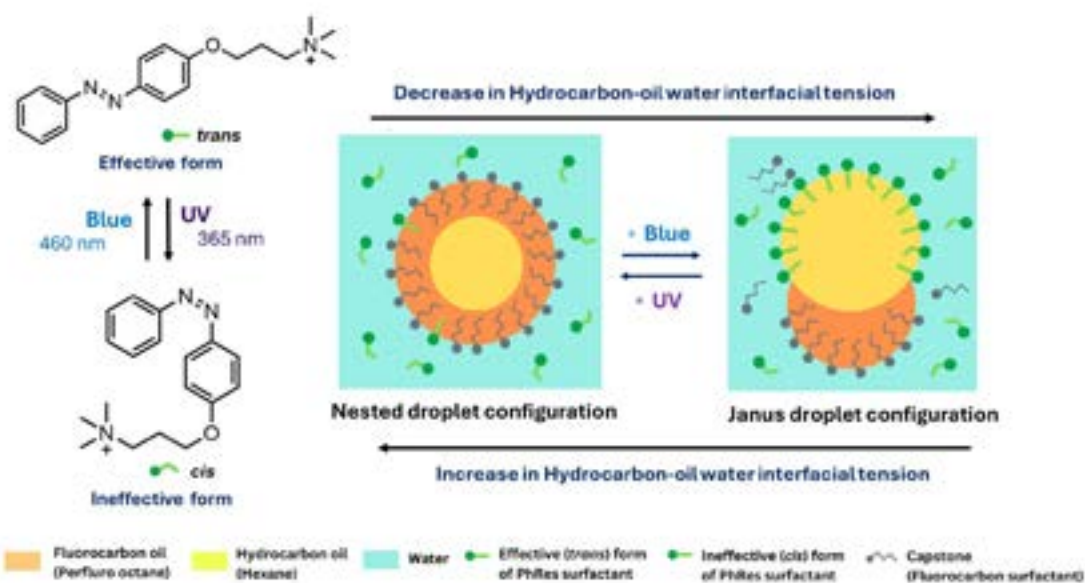
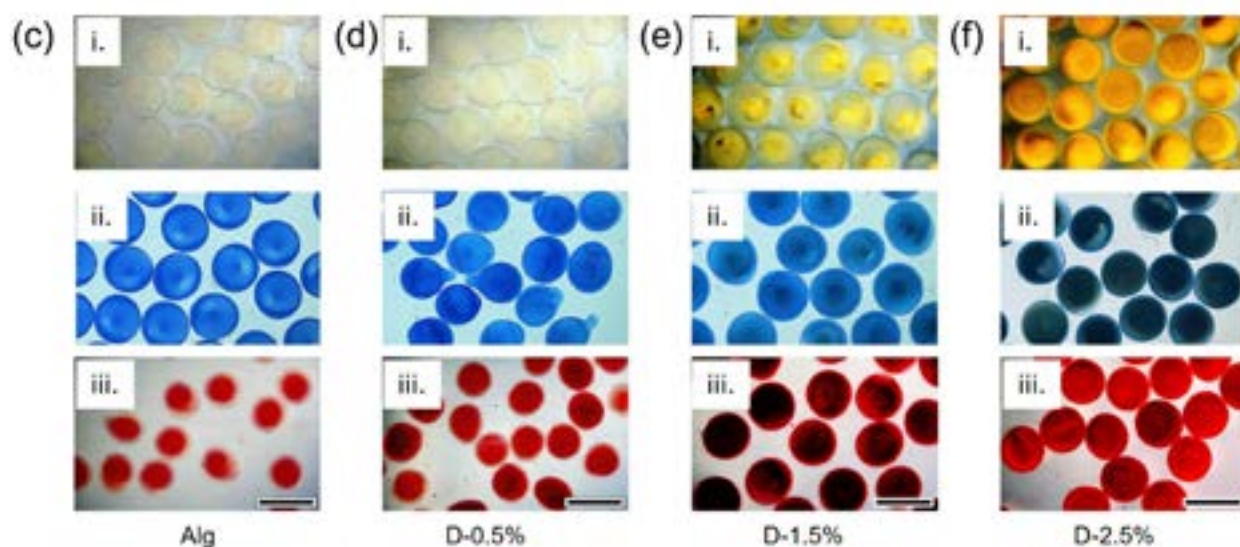
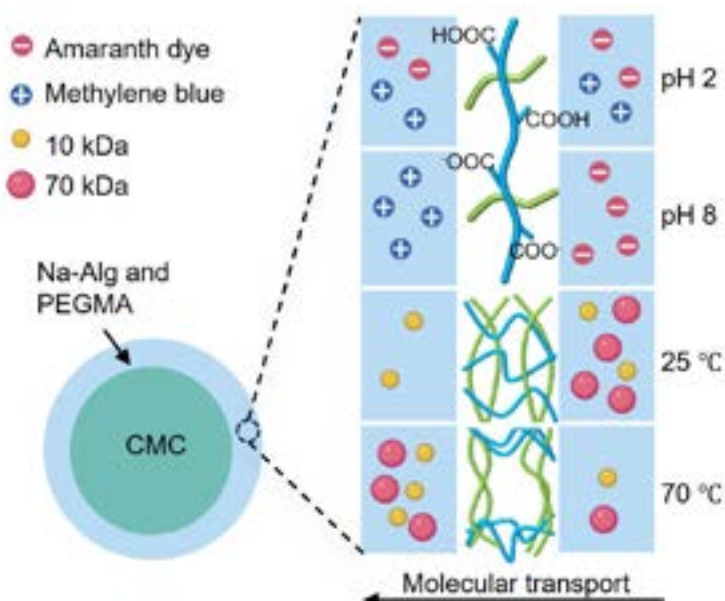
Already, Yang Hui (Jadranka’s PhD student) has made artificial cells that can admit different types of molecules through their external membrane just by varying pH and temperature. To make her simple cells, Yang Hui works with hydrogel capsules which are absorbent, jelly-like particles. The ones she’s made in the lab have a core of water and a shell of two different types of polymer networks enabling them to respond precisely to more than one environmental stimulus.

“Designing artificial cells is one thing but showing that you can control components within a ‘water in water in water’ system is quite challenging to achieve,” Jadranka says. The researchers have published their novel approach for making these tiny (400 micrometres to three millimetres in size) cell-like beads. The water-based design means the hydrogel capsules are compatible with biological systems and could be used for environmental sensing and monitoring.

Below left:
Braydon
Nikolaison
and Shivangi
Chourasia.
Photo / David
Wiltshire,
Massey
University.

Below right:
Yang Hui and
Jadranka Travas-
Sejdic.





“Immediately, there are potential applications in green chemistry because, by doing sequential reactions within a single small system, you are saving time and minimising waste.”

JADRANKA TRAVAS-SEJDIC

Yang Hui has gone on to work out how to carry out different reactions in each of two different compartments within the hydrogel capsules. She says there’s been a lot of troubleshooting, persistence and innovation to get to this point. “But I’m pleased we’ve been able to control not only the movement of molecules, but also the sequence of reactions within the capsule – I think that’s very cool.” The work has just been published in the Chemical Engineering Journal and Jadranka says of this progress, “Immediately, there are potential applications in green chemistry because, by doing sequential reactions within a single small system, you are saving time and minimising waste.”

Meanwhile, Shivangi Chourasia (Catherine’s PhD student) is developing reconfigurable emulsions which can change their shape and structure in response to external stimuli such as light or temperature. Emulsions consist of liquids that don’t usually mix but, for example, heating can cause two liquids to mix into a single phase, while cooling re-establishes multiple internal droplets. Light irradiation can also cause shape changes through variations in tension at the boundaries between different liquids.

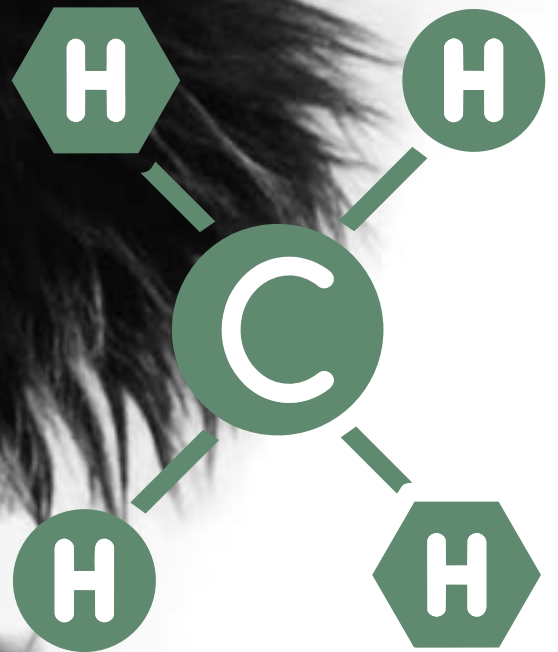
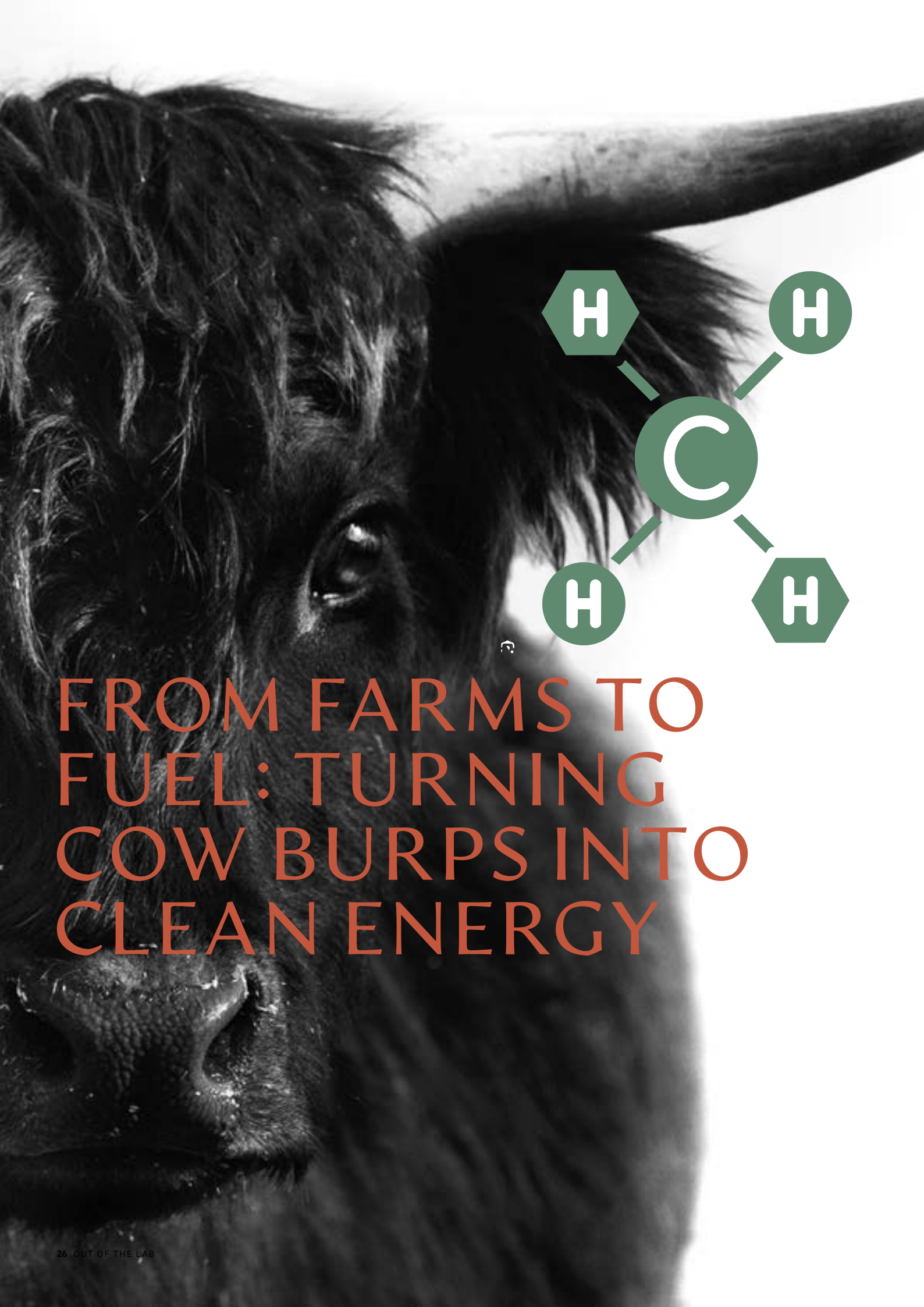
Shivangi’s research looks at how adding tiny, solid particles to these emulsions influences the shape and behaviour of droplets. Known as Pickering emulsions when particles are added, these mixtures can be reconfigured under different stimuli – something Shivangi is working out how to control. Currently, she is trialling particles with different properties to see how they influence the stability of the emulsions. Shivangi’s emulsions could be used for sensing enzyme activity in healthcare applications, for multi-stage drug delivery or as self-adjusting lenses in phone cameras and microscopes.

And what will the hydrogel capsules be used for? Jadranka and Yang Hui are currently working on the possibility of programmable pollutant remediation. With capsules acting like miniature porous sponges, they could soak up various types of pollutants and degrade them inside different compartments with specially chosen catalysts. Jadranka explains they’re currently working at the proof-of-concept level and would ultimately collaborate with engineers to figure out the best uses for these materials.

The PhD students agree that working on cell-like behaviour from different perspectives has enabled them to learn from each other and make their projects more interesting. They are both grateful to be part of the MacDiarmid Institute. As Yang Hui says, “I’m very happy to be a MacDiarmid Institute PhD student because they organise a lot of fantastic activities which have given me opportunities to talk to different people, learn about other projects, and even some history and Māori culture. Shivangi and I have also been able to attend various symposia and a student conference in Melbourne.”

Internationally, there is research on artificial cells from various perspectives, but Catherine believes some real novelty has arisen in this project because of the diversity of expertise she and Jadranka have brought together and by being part of an organisation of material scientists who can advise on magnetism or electronics or other fields. “Being part of the MacDiarmid Institute gave us the opportunity to learn about each other’s work, identify overlaps, come up with new ideas and slowly build what’s turned into a fantastic collaboration.” Jadranka agrees, “We cannot emphasise enough the role of the MacDiarmid Institute in this work. It really is an organisation that facilitates the free exchange of ideas and ability to learn from others.”

The researchers are adamant that collaboration has been the making of the project, as Catherine describes, “You need a certain critical mass to be able to step out of your comfort zone, head into new areas, and do the kind of exploratory research necessary for making discoveries. The collaboration through the MacDiarmid Institute has given us the capacity and funding to do that. And it brought two fantastic PhD students into the project who have added immense value.”



FROM FARMS TO FUEL: TURNING COW BURPS INTO CLEAN ENERGY



Aotearoa New Zealand's agricultural sector faces a climate dilemma as herds of livestock emit methane, a greenhouse gas 28 times more potent than carbon dioxide.

The government in September scaled back its 2050 methane reduction emissions targets, but at the same time said it would commit \$400 million to developing methane-cutting technology. This has added impetus to the work of MacDiarmid Institute researchers who are tackling the methane issue from both ends — capturing the potent gas at the source and converting it into valuable products for the future.

MacDiarmid Institute Principal Investigator and Te Herenga Waka Victoria University of Wellington (VUW) Senior Lecturer Dr Luke Liu is tackling the tricky issue of capturing methane from farms, where it is diffuse and mixed with other gases.

“It’s not like going to a gas plant and trying to extract the methane,” he says. “When you’ve got lots of livestock all over a farm, that becomes a big challenge.”

METHANE, MOFS AND MILKING SHEDS

To address this, Luke and his colleagues are pioneering advanced porous materials called metal-organic frameworks (MOFs) that selectively trap methane from the low concentrations found in farm environments like milking sheds, barns and cattle feedlots.

“Fundamentally, it is a materials performance and design problem because there are so many MOFs out there, but none that can capture methane in the way we need for our agricultural emission concentrations,” Luke says.

Blending computer simulations, machine learning and experimental chemistry, the MacDiarmid Institute team can rapidly identify and test new MOF materials with the aim of turning dairy shed ventilation systems into methane scrubbers. While cows belch significant amounts of methane as they graze on pasture in paddocks, Luke estimates that a significant amount of methane can be captured when they are brought in for milking, or while housed in shelters or covered feedlots.

TURNING METHANE INTO USEFUL BYPRODUCTS

Once methane is captured, what next?

That’s where the work of Professor Alex Yip, MacDiarmid Institute Associate Investigator and Principal Investigator of the Laboratory for Energy and Environmental Catalysis at Te Whare Wānanga o Waitaha University of Canterbury (UC), kicks in.

“If you can give me methane, I can convert it to something else that’s useful. But that’s a big if,” says Alex, who specialises in catalysis, the process of speeding up the rate of a chemical reaction by using a catalyst, a material that drives the reactions but, crucially, isn’t itself consumed in the process.

“In this context, we’d aim to turn the methane, our feedstock material, into methanol, a liquid fuel that is transportable,” says Alex.

Methanol is desirable because it easily stores the carbon from methane in a stable and portable form — a kind of ‘carbon immobilisation’. The process involves a couple of key steps: the first is steam reforming, where methane reacts to produce a blend of gases, including hydrogen. The second step is catalysis to transform those gases into methanol. Alex’s team is also experimenting with dry reforming, where they react methane with CO₂, tackling two climate problems at once.

Alex’s laboratory focus is on designing and optimising these catalysts so that the conversion is efficient and robust.

CATALYSTS THAT LAST FOR YEARS

“Finding the right formulation of a catalyst that is stable and has good enough longevity for methane is the technical challenge,” Alex points out.

The goal is for catalysts to remain active for years in industrial settings. Recent advances have seen lab catalysts perform for hundreds of hours, equating to around two years of industrial

use, inching closer to the durability required for commercial uptake.

Neither researcher underestimates the logistical challenges of deploying catalyst technology on farms. Can't devices be attached to cows, a gas-capturing version of the Halter collars used by farmers to herd their cows remotely?

Alex notes that wearable methane-capturing devices face practical hurdles, including animal welfare and product quality.

"It's more than just building a device to put a tube in a cow," says Alex. "There is animal behaviour associated with this, which we haven't had to think about before."

Still, one Aotearoa start-up, 28toZero, is developing just such a wearable device based on technology licensed from Lincoln Agritech. Pioneering MacDiarmid Institute work in catalyst design could underpin the innovation that the Government's funding is designed to stimulate.

ANTIQUATED AND ENERGY-HUNGRY

Meanwhile, MacDiarmid Institute Principal Investigator, VUW Professor Franck Natali, is tackling another greenhouse gas contributor that goes hand in hand with farming — ammonia, which is a key component in the production of nitrogen fertiliser.

"The problem with ammonia is that the current process itself, the Haber-Bosch method, is antiquated, energy-hungry and dirtily reliant on fossil fuels," explains Franck, a physicist and materials scientist.

"I was inspired by the opportunity to apply advanced materials concepts to try and decarbonise this process."

The project's genesis lies in a serendipitous discovery. Franck's team was studying how to make new semiconductor materials when it noted that one of the compounds being used was unexpectedly reacting with nitrogen, under low-pressure conditions, and virtually at room temperature.

"This suggested that our materials could help reduce the massive energy input necessary to run the Haber-Bosch process," Franck says.

"It wasn't a planned chemical discovery. It was a materials physics discovery that unlocked a pathway to pursue."

The researchers believe the lanthanide-based catalysts they have developed could significantly improve the ammonia productivity and energy efficiency of the Haber-Bosch process. With 500 million tonnes of ammonia produced worldwide each year, incorporating the catalysts into a new generation of ammonia plants has the potential to make meaningful reductions in CO₂ emissions.

THE POWER OF THE MULTI-DISCIPLINARY APPROACH

The three researchers stress the importance of multi-disciplinary collaboration, which is embodied in the MacDiarmid Institute's approach. As a synthetic chemist, Luke harnesses the power of computational prediction and materials chemistry, while Alex, as a chemical engineer, works closely with coordination chemists to mastermind effective catalysts.

And as a physicist Franck comes from the world of semiconductors, but with the help of his colleagues, is making breakthroughs in the realm of chemistry.

"This institutional framework, which encourages high-risk, curiosity-driven research and facilitates technology transfer, is vital for translating complex 'deep tech' materials science discoveries into scalable, commercial climate solutions," he says.

Groundbreaking Aotearoa science undertaken at the MacDiarmid Institute is staking out a future that enables our agricultural sector to continue feeding the world while tackling its thorny emissions challenges.



MOFS - TRUE PLATFORM TECHNOLOGY

It's not every year that a Nobel Prize aligns with a research area where New Zealand has real expertise, or that resonates so strongly with the work happening in our own labs.

The 2025 Nobel Prize in Chemistry was awarded to international researchers Professors Susumu Kitagawa, Richard Robson and Omar M. Yaghi for the development of metal-organic frameworks (MOFs). The award was not only an incredible celebration of a breakthrough area of chemistry but also shone a light on New Zealand's active and internationally connected role in MOF research.

MacDiarmid Institute researchers have been part of the global MOF community for years, contributing to advances in materials for clean energy, gas capture and environmental applications, and collaborating with each of the three Nobel laureates.

"What a moment for those of us who love MOFs!" says Principal Investigator Professor Shane Telfer. "It's not every day that they grab the headlines, but they sure have today" Principal Investigator Professor Paul Kruger agrees. "MOFs are a true platform technology. Where you add value is when you combine another material's properties into a MOF to affect change by combining new properties into a porous framework. These can be built upon by many different disciplines. MOFs are phenomenal. We're only limited by our imagination."

"What a moment for those of us who love MOFs!"

SHANE TELFER

successfully utilised MOFs in various applications, including carbon capture (e.g., Captivate Technology), the semiconductor industry, gas masks capable of breaking down toxic gases, and, most recently, water harvesting from desert air, which is now on the verge of commercialisation."

Luke says MOFs are still central to MacDiarmid Institute research.

"We're currently targeting greenhouse gasses, using MOFs along with other materials to catch CO₂ from air and waste streams and design new catalysts that will transform this

Principal Investigator and Catalytic Architectures research programme leader Dr Luke Liu said the impact of MOFs had already transformed from basic research to real life. "Several companies have



Nobel laureate Professor Kitagawa in Luke Liu's lab.

captured CO₂ into green fuels using renewable energy inputs."

The announcement was all the more special because of the strong links between each of the awardees and the Institute. Shane and Paul have decades-long links with Professors Richard Robson, Susumu Kitagawa and Omar Yaghi, and all three laureates were in Auckland in 2018 for the MOF Symposium that Shane organised. Plus Professor Kitagawa was here in 2024 for our regular iCeMS symposium.

WHAT ARE MOFS?

As Professor Olof Ramström, member of the Nobel Committee for Chemistry said, the 2025 Nobel Prize for Chemistry is "a story full of holes, but with enormous capacity to absorb all your attention."

To understand how MOFs work, Shane says, you need look no further than your kitchen sponge. "The pores in your kitchen sponge are the same size as a water droplet. That's why your sponge works. The pores in MOFs can be made the same size as gas molecules. That's how they absorb gasses."

Shane's start-up company Captivate Technology is based on a patented MOF — MUF-16 — an adsorbent that reduces CAPEX and OPEX costs for carbon dioxide capture from gas streams. Captivate Technology is currently targeting greenhouse gasses, using MOFs along with other materials to catch CO₂ from air and waste streams and design new catalysts that will transform this captured CO₂ into green fuels using renewable energy inputs.



WEAVING SOLUTIONS: HOW TWO MACDIARMID INSTITUTE PROJECTS ARE HELPING TACKLE WATERWAY POLLUTION

From harakeke-woven filters to light-driven chemistry, MacDiarmid Institute researchers are reimagining how Aotearoa New Zealand can clean its waterways through innovations that unite modern materials science and Māori knowledge.

It's among the greatest environmental challenges facing Aotearoa: how to clean up waterways degraded by agricultural runoff, industrial waste and legacy pollution. Now, two innovative MacDiarmid Institute-supported projects, grounded in Pūtaiao Māori (Māori science), are delivering sustainable solutions.

The two cross-disciplinary initiatives – one centred on a native plant, the other on cutting-edge photochemistry – sit within the Institute's Pūtaiao Māori research programme.

For PhD student Jaye Barclay (they/them, he/him), the research is helping further unlock the potential of harakeke, a taonga that has long bound Māori culture and the natural world.

Jaye's project aims to use the revered traditional resource as a powerful, sustainable water filter capable of stripping out ions of heavy metals like copper and zinc, using muka – a prepared fibre of harakeke.

The work, which began at Te Herenga Waka Victoria University of Wellington's (VUW) Paihau - Robinson Research Institute and has since moved to Te Whare Wānanga o Waitaha University of Canterbury (UC), builds on the team's earlier success in proving harakeke's ability to filter bacteria.

"As part of tranche 1 of the project, we have been developing and characterising a harakeke membrane for water filtration of particulate contaminants and heavy metals," Jaye explains.

The goal: to create a filter that can be grown and produced locally, even in one's own backyard.

The key lies in the muka's natural makeup: it's rich in cellulose, a material of growing interest for its adsorbent properties.

"Cellulose has abundant hydroxyl groups, which have high affinity for adsorbing cations like copper and zinc."

By chemically processing the muka, or by stripping out its wax and lignin, Jaye's team can produce a purer cellulose suitable for forming a fibrous substrate.

This holds the potential to replace the synthetic plastic material that makes up the bulk of many modern filtration membranes with an accessible alternative that's more cost-efficient and environmentally friendly.

Making the membrane locally, Jaye adds, offers a step towards addressing systemic inequality, particularly in rural areas.

"Producing our own membranes in-house is a meaningful step towards dismantling some of the financial obstacles to water security."

Working at the intersection of materials science and pūtaiao Māori means treating harakeke not just as a raw material, but as a taonga (treasure). This demands a strong commitment to respecting the plant's mauri (life force) through adherence to tikanga (customs).

"Harvesting in appropriate conditions, performing karakia before harvest, and extracting muka the traditional way using a mussel shell are all ways that we show respect for the plant."

These practices are learned from kairaranga (weavers) and kaitiaki (guardians).

Mātauranga also informs the science itself. Over centuries, Māori have developed dozens of harakeke cultivars with unique properties.

PhD researcher Jaye Barclay cleaning up the pā harakeke at Rātā, holding a large fan of the local cultivar of muka-rich harakeke. Pictured with colleagues who assisted with the mahi. Photo / Kirstine Bruce.



University of Canterbury PhD researcher Jaye Barclay traditionally extracts muka (harakeke fibre) using a mussel shell. Photo / Emma Dobbie.

University of Canterbury student Emma Dobbie, working alongside PhD researcher Jaye Barclay, harvests harakeke for fibre extraction and adsorption testing. Photo / Jaye Barclay.

“Consideration of mātauranga for different cultivars is therefore important to select materials that will produce the best-performing technology.”

Another of the project’s strengths is its cross-disciplinary links, bringing together chemical engineering, chemical sciences and pūtaiao Māori.

The team is moving swiftly. Fourth-year student Emma Dobbie has completed preliminary adsorption tests, and new PhD student Caihong Chen will commence work in December to continue investigating methods to improve muka adsorption.

For Jaye, whose journey to reconnect with their Māoritanga (Māori identity) continues, the research has been deeply meaningful.

“The personal connection I have developed with harakeke as a plant is just one benefit that I have received working across materials science and pūtaiao Māori,” Jaye says.

“It’s also helped me contextualise myself as a researcher, define my own research values, and connect to my cultural identity and whakapapa.”

A “TWO-FOR-THE-PRICE-OF-ONE” SOLUTION

At UC, PhD researcher Sarah Polson is pursuing another novel way to cleanse water, with an added benefit: renewable energy production.

The research targets waterways with elevated organic contaminant levels, often associated with intensive agriculture, with Sarah highlighting that there are many lakes around the country - including Canterbury - where

elevated nitrate concentrations are an enduring issue.

The project’s scientific goals are intrinsically linked to its kaupapa: ensuring the research is relevant and beneficial to the local communities and mana whenua.

It involves using organic pollutants as materials in the water that, when broken down by the photocatalysts, promote the production of hydrogen gas from water.

This results in both renewable energy and clean water, or what Sarah calls a “two-for-the-price-of-one” solution. Green hydrogen created from the process, for instance, can be used as a fuel source for transport or energy storage for back-up power.

“This would help tremendously in working towards the goal of a low emissions economy, while also improving the environment,” Sarah says.

Knowing the potential positive impact of her project motivates her to always think ahead, she says.

“Even when there are challenges with synthesis or making model systems to test the photocatalysts, there is always a bigger picture to aspire to.”

Sarah, a former primary school teacher, also draws inspiration from outreach events, which reminded her that science is about “play – and that we should never stop being curious and playful”.

That outlook is vital when facing the inevitable

technical challenges of a new PhD, such as working with a prototype reactor to measure gas production while ensuring the only quartz reaction vessel doesn't break.

As with Jaye's programme, collaboration has been central to the project.

Sarah's supervisor, Associate Professor Vladimir Golovko, who is an Associate Investigator with the MacDiarmid Institute, has helped connect her with others across the Institute, including Te

Kunenga ki Pūrehuroa Massey University-based Principal Investigator, Professor Pauline Harris, who will join her supervisory team to provide guidance around the kaupapa.

Sarah is also hoping to work with more Māori scientists focused on the health of our lakes and rivers.

"No one person can know everything," she says, "and having the ability to connect, consult, and listen to others' ideas and perspectives is often the key to moving projects forward."

Pūtaiao Māori Programme Leader Professor Pauline Harris says the team wants to see a truly collective approach to healing Papatūānuku.

"Our waterways sustain our lives, and we must work together to find solutions that will restore the health of our rivers and lakes. It is incredibly important that we support our researchers and students to develop their expertise and build pathways that connect research with iwi Māori.

"Nā tō rourou, nā taku rourou, ka ora ai te iwi.
With your food basket and my food basket, the people will thrive.

"This whakataukī reflects the heart of our approach: while we may make progress individually, it is through collaboration that we move from simply surviving to truly thriving. Working together strengthens our ability to address pollution and safeguard our environment for future generations."



PhD researcher Sarah Polson alongside the X-ray Photoelectron Spectroscopy (XPS) system at the School of Physical and Chemical Sciences, Te Whare Wānanga o Waitaha University of Canterbury. Photo / Sarah Polson.

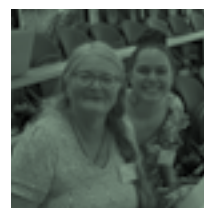
ANNUAL SYMPOSIUM 2025

Hosted at Waipapa Taumata Rau University of Auckland in November, our annual symposium in 2025 was one of the largest we've held in recent years, attended by well over 200 Investigators, early career researchers and students.

The event started with an alumni evening (featured in 'Into the future'), followed by a full day of talks from a wide range of Institute members and invited speakers. Professor Sir Peter Gluckman spoke to the Institute about challenges currently facing the science sector. Dr Mike Dickison gave a lightning talk on the use of Wikipedia as a science outreach tool, while Professor Zhiping Lai, visiting from King Abdullah University of Science and Technology, spoke about novel direct lithium extraction technologies designed to selectively recover battery-grade lithium from low-grade brines. The programme also featured eight talks

from students and early career researchers from across the Institute's four research programmes, as well as presentations from the Institute's deputy directors with regard to their respective portfolios: Professor Pauline Harris (Māori), Associate Professor Natalie Plank (Commercialisation and Industry Engagement) and Associate Professor Anna Garden (Outreach and Education).

The second day of the symposium gave our Investigators the opportunity to meet up within their programmes and hear about ongoing projects and work towards meeting the Institute's research plan objectives. The MacDiarmid Emerging Scientists Association (MESA) also met up separately on this day to discuss their plans for the future and look back at everything they achieved in 2025 (see 'Into the future' for further details).



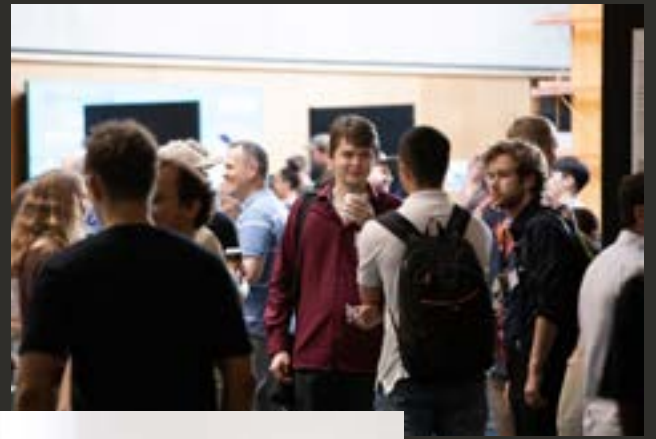
Above: Diane Bradshaw with Kirsty Doyle.

Right: Attendees at the MacDiarmid Institute annual symposium 2025.

Left: Derek Kawiti opening the symposium.









GROWING AND EVOLVING OUR INVESTIGATOR COMMUNITY

We welcomed 13 new Investigators this year — 12 Associate Investigators (AIs) and one Principal Investigator (PI). Several longstanding AIs took on PI roles and will now lead our most recent scientific projects together with PhD students. At the same time, several former PIs moved to Emeritus status, in which capacity they remain an active part of our research community and network.

NEW ASSOCIATE INVESTIGATORS

Thomas Bennett
Joe Chen
Owen Curnow
Rosalyn Falconer
Alex Hamilton
Paul Hume
Freddy Lyzwa
Sarah Masters
Ciaran Moore
Kai Sellschopp
Ziyun Wang
Shanghai Wei

NEW PRINCIPAL INVESTIGATORS

Jack Chen
Shen Chong
Matthew Cowan
Erin Leitao
Luke Liu
Kim McKelvey
Ocean Mercier
Daniel Sando
Viji Sarojini
Jami Shepherd

NEW EMERITUS INVESTIGATORS

Diane Bradshaw
John Kennedy
Duncan McGillivray
Carla Meledandri
Uli Zuelicke

“This is an incredible team of people that I am deeply honoured to lead. But more importantly, they are the scientific leaders Aotearoa needs.”

DIRECTOR NICOLA GASTON





GATHERING MOMENTUM: OUR 2025 PROGRAMME MEETINGS

Our annual programme meetings took place in mid-April, with over 150 Investigators, postdocs, research assistants and students coming together for a rich week of science and connection. It was fantastic to meet our new Investigators and hear about their research, and to work together as an Institute on plans for the next tranche and how we will move our research forward. A recurring theme in conversations

was how full the sessions were — extra chairs being brought in almost became a motif of the week. The slightly staggered schedule and overlapping meetings also meant researchers could join sessions outside their own research programmes and learn more about each other's work. We came away with a strong sense of community and real excitement for the road ahead.

Associate Investigators Ben Mallett, Joseph Nelson and Muhammad Hanif speaking at the Institute's research programme meetings in April 2025.

WOMEN AND GENDER MINORITIES NETWORK REPORT 2025

We began 2025 with two events held alongside AMN11 to celebrate diverse genders in STEM. The first was a panel held at Tūranga (Christchurch Library), a public event to celebrate Women and Gender Minorities in STEM. The panel included researchers and students from various academic and industry backgrounds, including Jaye Barclay, Professor Jenny Malmström, Associate Professor Julie Karel, Sydnee Koia, Winter Zakaria and Dr Jami Shepherd, and discussed the challenges of being a minority gender in STEM, as well as sources of inspiration and motivation to continue doing the hard mahi and advice for those setting out on their own journeys.

The following morning, many conference attendees participated in IUPAC's (International Union of Pure and Applied Chemistry) Global Women's Breakfast event. We were very fortunate to have Professor Frederique Vanholsbeeck from Waipapa Taumata Rau

University of Auckland (UoA) speak about her experiences championing diversity in STEM spaces. The breakfast was co-hosted by the New Zealand Institute of Chemistry.

In July, we said farewell to our inaugural Network Chair, Jaye Barclay (he/they, Ngāti Apa, Ngāti Hauiti, Te Āti-Haunui-a- Pāpārangi), and welcomed new Chair, Akshita Mogaveera. Akshita organised a Women and Gender Minorities Breakfast event at the MacDiarmid Institute's annual symposium event at Tāmaki Makaurau Auckland in November where she also delivered a session to raise awareness about the network so that individuals can fully utilise the resource to share concerns, ideas, suggestions and feedback and help the community grow stronger.



Women and Gender Minorities in STEM panel celebrating International Day of Women and Girls in Science February 2025, Tūranga (Christchurch Library).



IUPAC's Global Women and Gender Minorities breakfast at AMN11 conference February 2025, Christchurch.



MI Women and Gender Minorities breakfast at the MI annual symposium November 2025. Introduction session to MI Women and Gender Minorities at MI annual symposium November 2025.



SCIENCE COMMUNICATION RETREAT

We held a Science Communication Retreat in October at Te Whare Wānanga o Waitaha University of Canterbury's (UC) Cass Field Station, about 30km from Arthur's Pass. 33 of our students, postdocs and Investigators attended from around the country. Attendees were given presentations on "Getting it done! Writing tips from start to finish" by Associate Investigator Dr Kai Sellschopp, "Scientific Graphics" by Associate Investigator Dr Baptiste Auguié and "Writing a Journal Abstract" by Principal Investigator Dr Daniel Sando. These were punctuated by writing sessions that followed the Pomodoro technique.

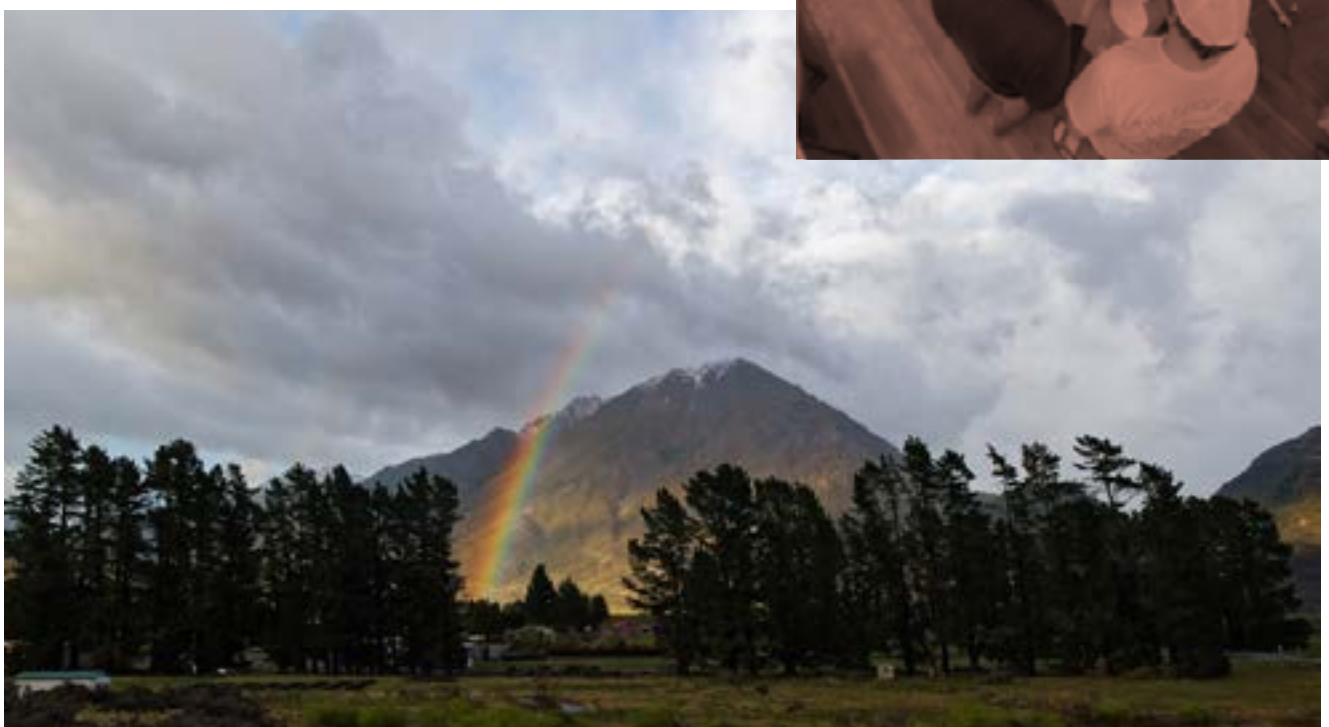
Feedback has been extremely positive. Overall satisfaction was rated as 4.8/5.0, and

testimonial highlights included: "(doing) 2hr of pomodoro produced the same output as some days I sit at my desk all day," "Everything was really well organised, from transport to accommodation and meals. The schedule was flexible enough to balance focused work and relaxation. Even when the weather changed plans, things were handled smoothly."

Importantly, the confidence level of the students regarding their scientific writing before and after on a scale of 1 ('not confident') to 5 ('very confident') on average went from 3.6/5.0 before the retreat, to 4.5/5.0 after the retreat.

Attendees of
the Science
Communication
Retreat at Cass
Field Station,
October 2025.

Opposite:
Drawing
by Poppy
Mahoney.



AMN11 CONFERENCE

The 11th International Conference on Advanced Materials and Nanotechnology (AMN11), held 9 - 13 February 2025 in Ōtautahi Christchurch, was a strong success and received excellent feedback from participants. The biennial international conference (the largest in the Southern Hemisphere in the year it is run) welcomed 459 attendees, including five plenary speakers and 18 keynote speakers. More than 200 delegates travelled from overseas, with the largest contingents coming from Australia, South Korea, Germany, Taiwan and the United Kingdom, underscoring the event's global reach and reputation.

A highlight of the programme was the Tech Tasters session, held on the Tuesday evening, which showcased five innovative start - ups. Speakers included Dr Barry Prince (Fabrum), Fin McIntyre (Dual Axis Spin "Curve" coating), Dr Megan Danczyk (Aspiring Materials), Dr Debbie Munro (Munro Medical) and Alaina Pitt (OpenStar Technologies). The session was made possible through the generous support of primary sponsor InFact Limited. With over 100 registered attendees, the event created a vibrant atmosphere for networking and discussion, successfully connecting graduates with employers, fostering collaboration opportunities and engaging potential investors.

Plenary speakers, Tech Tasters, Women and Gender Minorities panel, and AMN11 Outreach.

Another highlight was the extensive AMN11 outreach programme we ran in partnership with Tūhura Otago Museum. Led by Dr Marijn Kouwenhoven and based at Tūranga, Christchurch Central Library, the programme engaged the community through a weekend Pop-up Nano and Materials Science station (80 visitors), 'People Like Me' workshops for secondary students (60 participants) and a panel celebrating women and gender minorities in STEM (40+ attendees). It also featured a public lecture (supported by the University of Canterbury and ChristchurchNZ) by Nobel Laureate Professor Mounqi Bawendi (MIT), attended by over 400 people, exploring the origins, development and applications of quantum dots over nearly four decades.

The conference attracted broader public interest as well, with RNZ featuring an interview with plenary speaker Professor Roisin Owens (University of Cambridge) on her research into the gut-brain axis. In parallel, Principal Investigator Professor Simon Brown convened a high-profile symposium on unconventional computing.

NEW PHD STUDENTS JOINING THE INSTITUTE IN 2025

Our new PhD students come from all over the world and from within Aotearoa NZ. Here's what some of them said about why they had chosen to join us:



Javad

I hold a Bachelor's degree in Chemical Engineering from Iran University of Science and Technology and a Master's degree in Chemical Engineering (Transport Phenomena and Gas Separation) from Sharif University of Technology. I have several years of experience working in the oil and gas industry and in research institutes. I want to use real-world materials like MUF-16 to meaningfully reduce CO₂ emissions, one of the most urgent challenges of our time, and to help create a better future for all.

“I want to use real-world materials like MUF-16 to meaningfully reduce CO₂ emissions.”

JAVAD



Emma

I have a Bachelor of Engineering with Honours in Chemical and Process Engineering from the University of Canterbury. My PhD extends my Honours research on landfill-gas separation, focusing on factors that influence the separation performance of a fluidised-bed adsorption column.



Sara

My Master's degree in Marine Chemistry is from the Khorramshahr University of Marine Science and Technology. Believing that science should serve people, I chose the MacDiarmid Institute to develop smart materials that can directly impact environmental and biomedical problems.



Lotte

I did my undergrad study in applied physics at The Hague University of Applied Sciences, and then a graduation internship at Te Herenga Waka Victoria University of Wellington (VUW). The internship at VUW made me even more enthusiastic about the combination of disciplines within Associate Professor Natalie Plank's lab, so I decided to do my PhD with her at VUW as well.

“Believing that science should serve people, I chose the MacDiarmid Institute to develop smart materials that can directly impact environmental and biomedical problems.”

SARA



Sarah

I completed my Master of Science (Honours) in Chemistry at the University of Canterbury. For my PhD I'm using advanced analytical techniques to characterise new catalytic nanomaterials to remove organic pollutants from water systems, with the additional benefit of producing green hydrogen.



Megha

I completed my Bachelor's degree at Mahatma Gandhi University, Kerala, India, and a Master of Science programme in Chemistry at Sant Longowal Institute of Engineering and Technology in Punjab, India. I wanted to undertake a PhD to deepen my expertise in chemistry and contribute to the development of sustainable technologies through my research.



Benyamin

I have a Bachelor's degree in Chemical Engineering from Isfahan University of Technology and a Master's degree in Chemical Engineering from the University of Tehran. I'm doing my PhD to contribute to scientific solutions that support a cleaner, more sustainable future for our planet and to grow within a world-class scientific community.

**Deepanshi**

I completed my undergraduate studies at Hemvati Nandan Bahuguna Garhwal University and earned my M.Tech degree from the Indian Institute of Technology Delhi. I am motivated to pursue a PhD here to explore materials at a deeper level and contribute to innovative device concepts that can drive future deep-tech applications.

**Alan**

I did a BA with Honours and a Master of Arts in Māori Studies at Te Herenga Waka Victoria University of Wellington. With the dedicated Māori leadership, support, and expertise, doing a MacDiarmid-funded PhD focusing on creating equitable opportunities for Māori in materials sciences is a once-in-a-lifetime opportunity. I'm very grateful to represent a social sciences kaupapa within a traditionally material sciences sector.

**Paridhi**

I did my undergraduate degree in Microbiology from Osmania University, India, and my Master's from the University of Leeds, UK, in Food Biotechnology. I am passionate about developing new skills in designing systems that can help drive a smarter and sustainable future.

**Nasim**

I hold a Master's degree in Biophysics from the University of Tehran, and a Bachelor's degree in Cellular and Molecular Biology from the University of Guilan. I'm motivated to explore how biological assemblies can inspire the next generation of sustainable materials.

“I love being on the frontier of technology and innovation and doing a PhD with the MacDiarmid Institute allows me to do this.”

JOEL

**James**

I completed a Bachelor of Science (Honours) majoring in Physics at Victoria University of Wellington. The MacDiarmid Institute aligns with my goals of conducting novel and practically useful research for the betterment of humankind.



Tane

I studied my Master's in Physics at Victoria University of Wellington. I'm motivated to pursue a PhD with the MacDiarmid Institute to advance fundamental understanding of MnTe altermagnetism, and contribute to next-generation spintronic technologies.

“I want to pursue a PhD with the MacDiarmid Institute to turn fundamental materials science into practical solutions, especially new materials that can capture and convert CO₂.”

YIWEI



Rong Ma

I completed my undergraduate studies at Taiyuan University of Technology, earning a Bachelor's degree in Optical Engineering. The research culture, environment, and doctoral training method here resonate strongly with me and the project closely matches my research interests.



Ashton

I completed my Bachelor of Science with Honours in Chemistry at the University of Canterbury. I am motivated to pursue a PhD because I want to challenge myself through the pursuit of research that could potentially benefit the environment.



Adam

I completed my undergraduate studies at the University of Auckland, earning a Bachelor of Science with majors in Physics and Mathematics. I am driven to undertake my PhD by the opportunity to contribute to the emerging field of artificial intelligence while expanding my skills in research and development.

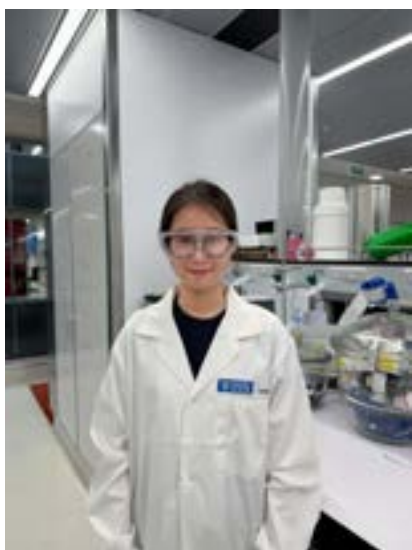


Joel

I did a BSc (Hons) in Biological Sciences at the University of Canterbury. I love being on the frontier of technology and innovation and doing a PhD with the MacDiarmid Institute allows me to do this.

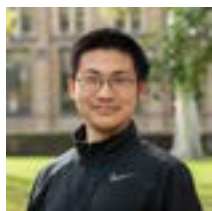
“I’m doing my PhD to contribute to scientific solutions that support a cleaner, more sustainable future for our planet.”

BENYAMIN



Yidan

I hold a Bachelor of Science from Shaanxi University of Technology and a Master of Science from Yan'an University. My PhD explores peptide-based piezoelectric materials, and my research group's interdisciplinary strengths offer the perfect platform for my research.



Yiwei

I come from a theoretical chemistry background. I completed my Bachelor of Science (Chemistry) and Master of Science (Chemistry) (with distinction) at the University of Melbourne. I want to pursue a PhD with the MacDiarmid Institute to turn fundamental materials science into practical solutions, especially new materials that can capture and convert CO₂.



Kayla

I studied a BSc(Hons) in Chemistry at Otago University. I'm thrilled to be doing my PhD within the MacDiarmid Institute, becoming part of an incredibly enthusiastic network of researchers around NZ.



Arta

I have a Bachelor of Chemical Engineering and a Master of Chemical Engineering - separation processes degree from Azad University in Tehran. My motivation comes from wanting to explore sustainability much more intricately, and the MacDiarmid Institute opens the door for me to be creative in my PhD journey.



Caihong

I have a Master's degree in Textile Science and Engineering from Zhejiang Sci-Tech University. I'm pursuing this PhD to create environmentally friendly, high-performance materials that support sustainable solutions for industry and for the environment.



Kilian

I did my undergrad at the University of Canterbury, completing a Bachelor of Electrical and Electronic Engineering. A PhD at the MacDiarmid Institute provides an opportunity to develop further my research expertise in advanced materials.



Sana

I have a Master's of Science in Physics from COMSATS University, Lahore. I am pursuing a PhD to apply low-frequency Raman spectroscopy to understand and support the evaluation and design of new functional materials.



Supriya

I completed my Master's in Organic Chemistry at Mangalore University and have industry experience as an R&D chemist. I'm deeply motivated to work with the MacDiarmid Institute and excited to start my PhD on developing heterogeneous electrocatalysts.



Lionel

I did my undergrad studies in France, in CYTech, a study semester in Japan and a 10-month internship in Canada to finish my Master's degree, studying organic chemistry and biochemistry during these years. I discovered the MacDiarmid Institute thanks to my supervisor Associate Professor Jack Chen. He told me about all the opportunities I could get from joining him in a PhD and I accepted as soon as I could!

“I’m motivated to explore how biological assemblies can inspire the next generation of sustainable materials.”

NASIM



S raphine

I did my undergraduate study at the University of Canterbury doing a Bachelor of Science majoring in Chemistry, minoring in Physics. Undertaking a PhD with the MacDiarmid Institute allows me to contribute to materials science research while learning from a network of materials researchers across New Zealand.

2025 AWARDS

Thomas Bennett, Matthew Cowan and Shane Telfer – University of Canterbury and Massey University
Dalton Horizon Prize - Pioneers in Hybrid Glass Research team (Royal Society of Chemistry (UK))

Nathaniel Davis – Victoria University of Wellington
Easterfield Medal (New Zealand Institute of Chemistry)

Renwick Dobson – University of Canterbury
Elected Fellow of the Royal Society of New Zealand

John Kennedy – Earth Sciences New Zealand
Elected Fellow of the Royal Society of New Zealand

Eric Le Ru – Victoria University of Wellington
2025 Dan Walls Medal (New Zealand Institute of Physics)

Ben Mallett – Victoria University of Wellington
Ara Ake Breakthrough Innovator Award (KiwiNet Research Commercialisation Awards)

Aaron Marshall – University of Canterbury
Pickering Medal (Royal Society Honours Awards)
BNZ Researcher Entrepreneur (KiwiNet Research Commercialisation Awards)

Franck Natali – Victoria University of Wellington
Te Tohu mō te Whaihua i te Mātai Ahupūngao – Physics Impact Award (New Zealand Institute of Physics)

Geoff Waterhouse – University of Auckland
Elected Fellow of the Royal Society of New Zealand

Cameron Weber – University of Auckland
International Emerging Researcher Award (Thieme Chemistry Journals Awards)

2025 FUNDING SUCCESSES

Please note that we have only listed MacDiarmid Institute investigators, even on grant applications led by other researchers.

2025 MARSDEN STANDARD GRANTS

Mat Anker – Victoria University of Wellington
“The Next Generation of High-Density Data Storage Materials for Data Centres”

Courtney Ennis – University of Otago
“Could New Zealand’s offshore energy source have played a role in the origin of life?”

Nicola Gaston, Franck Natali* and **Charlie Ruffman*** – University of Auckland and Victoria University of Wellington
“More than skin deep: understanding the native oxide of gallium”

Keith Gordon* – University of Otago
“Could New Zealand’s offshore energy source have played a role in the origin of life?”

Michele Governale* and **Uli Zuelicke*** – Victoria University of Wellington
“Exploring hidden patterns in the coldest matter in the universe”

Prasanth Gupta and **John Kennedy*** – Earth Sciences New Zealand
“Developing a New Zealand catalyst to produce green ammonia from air, water, and renewable electricity”

Pauline Harris* – Massey University
“Interstellar Asteroids, Black Holes and the Big Bang”

Geoff Jameson* – Massey University
“Innovative shape-shifting drugs to fight drug resistance in cancer”

John Kennedy and **Simon Granville*** – Earth Sciences New Zealand and Victoria University of Wellington
“Unlocking Waste Heat: Advancing Thermomagnetic Generators for Sustainable Energy”

Ziyun Wang, Geoff Waterhouse* and **Prasanth Gupta*** – University of Auckland and Earth Sciences New Zealand
“Producing Green Ammonia from Air and Water at Ambient Conditions Using Plasma and Renewable Electricity”

Shanghai Wei, Aaron Marshall* and **Tilo Söhnel*** – University of Auckland and University of Canterbury
“Mechanistic insights into high-performance sustainable batteries”

2025 MARSDEN FAST START GRANTS

Ciaran Moore* – University of Canterbury
“Light Signals: A New Communication System for Monitoring New Zealand’s Remote Environments and Enhancing Safety”

2025 FELLOWSHIPS

Geoff Waterhouse – University of Auckland
“Metal single-atom catalysts” – Hood Fellowship

Kannan Ridings – University of Auckland
Ngā Motu Whakahā – Research Fellowship

2025 MBIE ENDEAVOUR FUNDING

Chris Bumby – Victoria University of Wellington
“Next generation ore: towards sustainable mining for regional prosperity and societal resilience”
Endeavour Research Programme

Shen Chong* – Victoria University of Wellington
“Solar Spectral Engineering for Energy Efficient and Enhanced Growth of High-Value Algae”
Smart Ideas Grant

Simon Granville* – Victoria University of Wellington
“An on-chip microwave circulator for scalable quantum computing”
Smart Ideas Grant

Aaron Marshall and **Steven Matthews*** – University of Canterbury and University of Auckland
“Highly active low-cost electrodes: Exploiting the non-obvious interactions during plasma spray coating”
Smart Ideas Grant

Volker Nock – University of Canterbury
“3D-printed Bioscaffolds for Directional Neurite Outgrowth after Spinal Cord Injury”
Smart Ideas Grant

Volker Nock and **Renwick Dobson*** – University of Canterbury
“Capillary devices for on-site diagnostics in diverse settings”
Endeavour Research Programme

* Contributing as an AI

Jadranka Travas-Sejdic and **Renwick Dobson*** – University of Auckland and University of Canterbury
“Microfluidic devices driven by capillary action as a new diagnostic platform”
Endeavour Research Programme

* Contributing as a Key Researcher

2025 MBIE CATALYST FUNDING

Simon Granville - Victoria University of Wellington
“Rare-earth nitride p-Josephson junctions as elements in superconducting quantum logic circuits”
Catalyst: Strategic - Quantum Technologies Aotearoa

Paul Hume – Victoria University of Wellington
Interface Materials Informatics platform for virtual screening of next generation organic solar cell devices”
Catalyst: Strategic - e-Asia Joint Research Programme

Volker Nock – University of Canterbury
“A point-of-need test for invasive myrtle rust threatening plant species”
Catalyst: Seeding General

Daniel Sando – University of Canterbury
“Low Symmetry Ferroelectric Thin Films for Nanoscale Integrated Electro-Optic Modulators”
Catalyst: Seeding JSPS - Joint Research Projects Programme

Jami Shepherd – University of Auckland
“Advancing lymphatic assessment with next-generation imaging and sensing devices”
Catalyst: Seeding General

Cameron Weber – University of Auckland
“Linking solvent structure to function to design a new biomolecule purification platform”
Catalyst: Seeding General

Alex Yip – University of Canterbury
“Next-generation zeolite oxygen concentrator: a lifecare solution for COPD patients”
Catalyst: Seeding General

2025 DOMESTIC FUNDING – OTHER

Catherine Bishop – University of Canterbury
“Industrial Development of Spinodal Copper Nickel Alloy”
Masters Project Funding

Jami Shepherd – University of Auckland
“Ultrasonic Laundry Washing Research”
Fisher & Paykel Appliances - RA funding

Geoff Waterhouse – University of Auckland
“Rechargeable metal-air batteries”
Philanthropic Donation

Cameron Weber – University of Auckland
“Linking solvent structure to function to design a new biomolecule purification platform”
“Exploring interfaces in deep eutectic solvents”

Shanghai Wei – University of Auckland
“AI-Based Prediction of Latent Electricity Asset Failures After Extreme Weather Events”
Vector Funded Applied Doctorates Scheme project

Geoff Willmott – University of Auckland
“Inertial Microfluidics”
Private sector contract

2025 INTERNATIONAL FUNDING

Cameron Weber – University of Auckland
“Exploring interfaces in deep eutectic solvents”
Lund Get Started Grant

2025 UNIVERSITY INTERNAL FUNDING

David Barker – University of Auckland
“Exploration of fungal specific cell penetrating peptides for antifungal drug delivery”
Faculty of Science Research Development Fund

Nathaniel Davis - Victoria University of Wellington
Glove box
CAPEX

Vladmir Golovko – University of Canterbury
DSO support

Alex Hamilton - Victoria University of Wellington
Te Parahia Contestable Fund

Marcus Jones – Auckland University of Technology
“A photonic tool for ultrasensitive analyte detection”
FHES small grant

Jonathan Kitchen – Auckland University of Technology
“New Zealand Hydrogen Symposium Research Event Funding”
Faculty Research Development Fund

Steven Matthews – University of Auckland
“Novel coatings to promote mussel spat settlement to turbocharge NZ aquaculture”
University of Auckland FRDF Staff Research Fund

Ciaran Moore – University of Canterbury
“Towards ubiquitous renewable energy: exploring fabrication techniques for low-cost, eco-friendly and transparent solar cells”
Faculty of Engineering Strategic Research Grant

Joseph Nelson – Lincoln Agritech

“Biodegradable fungal batteries leveraging New Zealand’s unique microbiome”

(Lincoln Agritech Strategic Investment Fund - Research)

“Uncovering opportunities for computational materials discovery (CMD) in Aotearoa”

Volker Nock – University of Canterbury

“Can Lab-on-a-Chip and hydrogels tell us the true role of the cytoskeleton in plant infection by pathogenic oomycetes?”

“Simple analysis of iron levels for at-risk patients”

“Enhancing Plant Immunity Against *Phytophthora capsici* through Tripartite Interaction with *Bacillus* spp. in a Microfluidic System”

BIC Seed Grants

Kannan Ridings - University of Auckland

University of Auckland Physics Department funding

Charlie Ruffman - Victoria University of Wellington

“Hydrogen evolution on transition metal nitrides”

Research Establishment Grant

Daniel Sando – University of Canterbury

“Optical properties of perovskite oxide films”

CAPEX

Jami Shepherd - University of Auckland

“Physics-informed radiomics for cardiac fibrosis assessment using ultrasound”

“Multimodal imaging and sensing for lymphoedema prevention and treatment”

Transdisciplinary Ideation Fund

Tilo Söhnel - University of Auckland

“Design of Hybrid Perovskites: The Role of Delocalized Organic Cations as Templating Agents for Next Generation Solar Cell Materials”

“Design and Development of Low-cost and High-performance Electrocatalysts for Seawater Rechargeable Batteries”

Research Development Fund

INTO THE MARKET PLACE

3.

The past year marked the launch of the C3 programme, equipping investigators with skills and networks to advance their research. Seed funding continues to support commercially focused teams, enabling exploration into new areas and projects. We proudly supported the Cleantech Mission, with Treks across the motu connecting innovators, scientists, industry and funders. There is much to celebrate — from the creativity of our emerging experts to the recognition of KiwiNet Award finalists and winners — showcasing the power of collaboration and vision.

INDUSTRY OUTREACH

Industry outreach activities aim to bring companies, researchers and students together to develop and enhance working relationships. When companies know who to turn to with their R&D challenges, and researchers know which companies employ graduates and value fundamental research, the economic dividends start to flow.

We ran on-site engagements at start-up, scale-up and commercial locations in partnership with the Cleantech Mission in 2025. These experiences expose our researchers and early-stage start-ups to later-stage companies and corporates. Under the banner of Cleantech Treks, these visits bring together top-performing entrepreneurs with key players across the commercial landscape, including banks, venture capital firms, early- and late-stage innovators, service providers, corporates and the support ecosystem.

In July, together with ChristchurchNZ and Cleantech Mission partners, we co-hosted a Cleantech Trek in Ōtautahi Christchurch. 40 people explored some of the region's most innovative Cleantech companies:

- University of Canterbury (UC) based sites of -
 - Zincovery – sustainable recycling of zinc from industrial arc furnace dust.
 - Ternary Kinetics – developing liquid organic hydrogen carrier fuel options for heavy transport.
- Aspiring Materials – green critical materials extraction for low CO₂ raw materials supply chains.
- Fabrum – developing bespoke cryocooler and gas compression systems for international markets for over 20 years.
- Christchurch Airport - site of the Kowhai Park renewable energy development with 300 hectares of solar energy and a hydrogen storage facility under development. Christchurch Airport have an impressive sustainable technology infrastructure development plan out to 2050 that takes into account the need for innovation in sustainable aviation and logistics.

We hosted a Cleantech Trek to Tāmaki Makaurau Auckland commercial and research sites in early December, where research entrepreneurs, founders, investors, banks and service providers got to see the full spectrum of early-to-late-stage

technology development. This Cleantech Trek was co-hosted by the MacDiarmid Institute, Auckland Council and Ara Ake under the umbrella of the NZ Cleantech Mission. The delegates got to hear from the following research and commercial teams:

- Associate Professor Erin Leitao
- Associate Professor Cameron Weber
- Dot Ingredients
- Entropeak
- Environmental Decontamination Limited
- EV Maritime
- Resident companies of Outset Ventures - Future House
 - Avertana
 - Futurity Bio Ventures
 - Neocrete
 - Saprotech

We co-hosted an International Cleantech Trek to the Cleantech Forum Asia in May, supporting our innovators in gaining the insights, capital and connections needed to enter the thriving Southeast Asian markets. Singapore, Aotearoa New Zealand's second-largest source of foreign direct investment, serves as a sophisticated hub for accessing the region and is showing a growing appetite for green economy solutions.

We travelled with the following companies and co-hosted an investor event with NZTE (New Zealand Trade and Enterprise) where companies met investors from seven international funds:

- Cetogenix – converts complex organic waste into valuable, renewable resources, advancing defossilisation in the Waste-to-X market.
- Mushroom Material – created an eco-friendly alternative to polystyrene using mycelium and agricultural waste.
- Tasmanlon – commitment to safety, sustainability, and scalability is reshaping the future of energy storage.
- OpenStar – founded to build a levitated dipole reactor using the new technology that has developed in the 20 years since LDX.
- NILO – solving two global problems: diverts plastic waste from landfilling, incineration or ending up in the ocean; creates an adhesive from that plastic waste to replace urea formaldehyde a known carcinogen used in the global wood fibre board market.
- Allegro Energy – the cleanest, safest energy storage on the market.



Cleantech
Trek Auckland
visiting
Environmental
Decontamination
Limited.



Cleantech Trek
Christchurch
visiting Fabrum.

Openstar receiving APAC
Cleantech 25 award at Cleantech
Forum Asia.



OpenStar
presenting with
international
fusion energy
experts at
Cleantech Forum
Asia 2025.



Cleantech Trek Christchurch
visiting Aspiring Materials.



Cleantech
Trek Auckland
visiting EV
Maritime.

SUPPORT FOR COMPANY ACCESS TO SUSTAINABLE RESEARCH SOLUTIONS

Following an approach by Globex Engineering for a concrete replacement in a high specification engineered construction component, we were able to identify multiple research groups working on relevant potential solutions. Research from Te Wānanga Aronui o Tāmaki Makau Rau Auckland University of Technology (AUT), Earth Sciences New Zealand (formerly GNS Science), Te Herenga Waka Victoria University of Wellington (VUW) and Waipapa Taumata Rau University of Auckland (UoA) and a private specialised R&D company located in the UoA Newmarket Innovation Precinct were all presented to Globex for consideration and further confidential engagement.

The intellectual property under development in these research groups approached decarbonisation and durability of cement and concrete materials from different technical perspectives and Globex has since selected a shortlist of options to work with on the final solution for their commercial client. This product has the potential to replace up to 16,000 tonnes of traditional cement per year through Australasia with a global market size over 350,000 tonnes annually.

"Our engagement with the researchers at the MacDiarmid Institute has been a genuine catalyst for innovation at Globex. Having direct access to front-line materials science is a practical advantage that has benefited us

and our clients on multiple projects. Our initial discussions on this decarbonisation project have resulted in two new products: one focused on low-carbon cement alternatives, and a second involving a completely novel design for structural components that eliminates cementitious materials entirely. At Globex we work across a large variety of markets and product types. Working with the Institute is a vital bridge to the deep, specialist expertise we need to solve complex design challenges for our clients."

"Our engagement with the researchers at the MacDiarmid Institute has been a genuine catalyst for innovation at Globex."

AARON HOLMES

SENIOR ENGINEERING LEAD

TECHWEEK EVENTS

This year's Techweek events were held in Tāmaki Makaurau Auckland and Ōtepoti Dunedin, with themes of:

- Science driving commercial growth for advanced manufacturing – Dunedin event
- New momentum for publicly funded R&D – Auckland event

The events brought together research entrepreneurs and companies to build and strengthen the networks that underpin successful commercial R&D in Aotearoa. The Tāmaki Makaurau Auckland event was hosted by Principal Investigators, Associate Dean Research Faculty of Science Professor Geoff Willmott, and Associate Dean Research Faculty of Engineering and Design, Professor Jenny Malmström at Waipapa Taumata Rau University of Auckland (UoA). The Ōtepoti Dunedin event was hosted by Deputy Director Associate Professor Natalie Plank and opened with a formal Ōtākou Whakaihu Waka University of Otago (UoO) welcome from Emeritus Investigator and former Director Professor Richard Blaikie.

Hosting company exhibits was a highlight of the event with stimulating conversations about graduate employment, R&D partnerships, the Applied PhD scheme and commercial dynamics for deep tech start-ups.

Our Techweek collaborators, who helped with hosting and communications around the events, were:

- Faculty of Science, UoA
- Faculty of Engineering and Design, UoA
- Startup Dunedin
- Otago Innovation Limited
- Te Whai Ao Dodd-Walls Centre
- New Zealand Product Accelerator
- Return on Science and Momentum Committees
- University of Canterbury Biomolecular Interaction Centre
- MacDiarmid Emerging Scientists Association



Jenny Malmström and Geoff Willmott at the Techweek event in Tāmaki Makaurau Auckland.



Jami Shepherd with Fisher and Paykel's Kayne Alward speaking at the Tāmaki Makaurau Auckland Techweek event.



Anna Garden speaking at Ōtepoti Dunedin Techweek event.



Richard Blaikie and Natalie Plank opening the Dunedin Techweek event.

Our exhibitor companies were:



C3



“The C3 programme helped me understand the key considerations and decision-making required when commercialising university technology. We were paired with an advisor who provided valuable mentorship and was a regular sounding board as we navigated the start-up process, technology transfer, and early investor relationships. The programme’s timing was ideal for our project, as we progressed from filing a provisional patent to securing our first investment while participating. I also found that my professional network expanded significantly through the contacts made during the programme, which I expect will be one of the most valuable long-term outcomes.”

JAMI SHEPHERD, C3 PARTICIPANT

The inaugural Commercial Crystallisation Cohort (C3) programme brought together research teams from across the Institute to lay the groundwork for developing commercial applications of their discoveries.

Throughout this year, five teams have experienced regular advisory meetings with experienced specialists from aligned technology, investment and market areas. Quarterly workshops provided best practice approaches to intellectual property development, market validation, team development, business models and capital strategy. Through peer review and regular guidance and report back sessions, the cohort have made excellent progress towards becoming investor ready. The final workshop will present the projects to investors for further guidance and feedback ahead of potential capital raises in 2026.

“The C3 programme brings an important complementary perspective to the researchers’ technical excellence; mentors and support to help the teams see their innovation in a commercial light, and understand the needs and challenges of the journey of bringing technology to market.”

MICHAEL LAKEMAN, PRINCIPAL, ROCK STACK, C3 ADVISOR

“We are delighted that McDiarmid has established the Seed Fund and the C3 programme. These stand out amongst other project and skills development programmes through the focus on what is most relevant for materials science, to support their developing projects towards commercialisation outcomes. My participation in one of the C3 workshops was very rewarding.”

ELA ROMANOWSKA, SENIOR COMMERCIALISATION MANAGER, WELLINGTON UNIVENTURES

THE PROJECTS SUPPORTED ON THE INAUGURAL C3 PROGRAMME:

- A Green chemistry process for solvent- and additive-free polymerisation of acrylates. Led by Associate Professor Erin Leitaio
- Carbon nanotube based artificial neural network devices - novel semiconductor chips for edge computing. Led by Associate Professor Natalie Plank and Marissa Dierkes
- Singlet Fission Enhanced Perovskite Solar Cells - A printable material layer for next generation solar panels for more efficient electricity capture. Led by Associate Professor Nathaniel Davis
- Multidimensional Reservoir Computing - hardware system for fast and efficient training of machine learning models. Led by Dr Jami Shepherd and Professor Simon Brown
- Scalable cryogenic memory technology for superconducting and quantum computing. Led by Professor Ben Ruck and Dr Simon Granville.

KIWINET AWARDS

Our research entrepreneurs benefit from strong connections to wider commercialisation support networks including KiwiNet and Return on Science. This year three researchers and an affiliated start-up company were named finalists in the KiwiNet Awards, with two of them winning their respective categories. Their success highlights their incredible leadership in excellent science-driven commercial projects and companies.

WINNERS

- Professor Aaron Marshall, winner of the BNZ Researcher Entrepreneur Award, exemplifies the blend between fundamental science excellence and commercial acumen needed to drive sustainability and the global energy transition. Beyond founding two start-ups, Aaron has played a pivotal role in shaping the commercial success of multiple ventures, offering scientific insights that have fuelled the growth of numerous deep tech companies. His leadership continues to inspire academic and entrepreneurial peers as well as students across UC, the Institute and the wider commercialisation partner network ecosystem.
- Dr Ben Mallett, winner of the Ara Ake Breakthrough Innovator Award, is an outstanding science entrepreneur, who has actively sought and supported commercial endeavours since his time as a PhD student. As one of the co-founders of the CHIASMA Wellington branch, he has already generated a legacy of commercial and industry impact well beyond his immediate research group. Ben's co-founding of the aerospace propulsion company JxB marks the next stage of that impact, building on a world first technology demonstration mission to the International Space Station (ISS) and a fully operational laboratory prototype thruster.

FINALISTS

- Dr Michel Nieuwoudt, finalist for the BNZ Researcher Entrepreneur Award, is the founder of melanoma diagnostic company Luminoma. Michel is a standout research entrepreneur who combines creativity, technical excellence and strong people skills to solve important problems and deliver real-world impact across multiple industries.
- Zincovery, finalists for the AJ Park Commercialisation Impact Award, have achieved remarkable progress under the leadership of Jonathan Ring (CEO), Aaron Marshall (co-founder) and their team. Zincovery has raised over NZ\$20 million in funding, enabling several major milestones, including signing commercial agreements worth over NZ\$500 million, building a fully functional pilot plant with 10 tonne-per-year zinc capacity, and beginning work on a 1,000 tonne-per-year demonstration facility in Ōtautahi Christchurch – the largest of its kind in Aotearoa.



Left: Aaron Marshall, 2025 winner of the BNZ Researcher Entrepreneur Award.

Right: Ben Mallett, 2025 winner of the Ara Ake Breakthrough Innovator Award.



DEEP TECH NETWORK



Our Deep Tech Network brings together research entrepreneurs for peer-to-peer advice, support and sharing of resources. Researchers consistently value the opportunity to engage with peers who have already experienced the journey of building a science-based start-up. Likewise, experienced founders also derive value from staying up to date with the research environment and opportunities to participate (e.g. in the Applied PhD Scheme) in collaborative R&D.

One of our highlights was a lunch event in partnership with Deborah Walls from Wellington NZ, where Greg Overton and Mireia Marques gave a lively and informative overview of the Research and Development Tax Incentive (RDTI) scheme. Our event had around 40 attendees from a range of Wellington-based companies exploring R&D opportunities. The scheme exists for those pushing beyond existing knowledge in science or technology, doing Core R&D - missing out on RDTI means leaving value on the table. The RDTI customer engagement team offers free, tailored support to help assess eligibility and navigate the application process.

Below and top right: Ōtepoti Dunedin Deep Tech Breakfast.



The network gets together across Tāmaki Makaurau Auckland, Pōneke Wellington, Ōtautahi Christchurch and now also Ōtepoti Dunedin on a regular basis. The Ōtepoti Dunedin breakfast series has had the good fortune to have Emeritus Investigator Dr Carla Meledandri volunteer to host these. Carla brings together the technical perspectives of a past founder with tenacious dynamism, some of the key ingredients needed for our Aotearoa companies to thrive in deep tech.



Left: Greg Overton addressing attendees at Deeptech Network lunch event held in partnership with WellingtonNZ.



Right: Ōtautahi Christchurch Deep Tech Network Christmas function.

MI
founded
in 2002



MACDIARMID INSTITUTE AFFILIATED START-UPS

37 start-up companies have been founded or led by MacDiarmid Institute research entrepreneurs and alumni since the Institute began in 2002. Three of these have been acquired by international companies. 24 of the pre-revenue companies continued to thrive in the tough 2025 operating and capital raising environment.

A strong IP development pipeline led to the formation of seven companies in 2025, founded by Institute alumni and researchers ranging from early-career scientists to Professors.

Ten of the companies raised a combined NZ \$38.2 million capital investment during the year, with \$17.2 million of this being from international investors.

Despite particularly challenging capital market conditions, this level of capital raising demonstrates the strong value proposition that advanced materials research in New Zealand offers to both the local economy and global markets.

In 2025, Institute affiliated start-up companies (n = 13) reported the following outcomes:

- \$18 million invested in research and development, with 33% of expenditure occurring offshore
- 166 full-time equivalent (FTE) employees, representing 23% growth over the year
- 33% of employees holding PhD-level qualifications, including founders
- 38 employees who are MacDiarmid Institute alumni
- 42 patent families underpinning their technologies, ranging from 1 to 12 per company
- Two additional patents granted during the year

Fifteen companies have indicated the intention to raise capital in 2026, and of these:

- Eight will be seed rounds
- Seven are post-seed rounds
- Twelve are at TRL three through to five
- Three are at or above TRL7

Potential investors with an interest in deep tech and Cleantech are invited to contact our Commercial and Industry Engagement team for confidential introductions to companies aiming to raise capital.

INDUSTRY PARTNERSHIPS AND COMMERCIAL PROJECTS

The high risk associated with early-stage research on cutting edge technologies for commercial purposes can be mitigated by working with trusted scientists who understand the commercial perspective and metrics for success.

MacDiarmid Institute researchers located in five Universities undertook 34 commercial projects ranging from industry funded PhDs through to rapid turnaround technical feasibility and analytic projects. Clients ranged from New Zealand and internationally owned multinationals through to early-stage start-ups developing technology in the following industrial sectors:

- Electricity and energy
- Superconducting motors
- Metals and minerals processing and recycling (including critical minerals)
- Biophotonics
- AI and machine learning
- Surgical Equipment Manufacturing
- Petrochemicals
- Animal health
- Dairy industry
- Electronics equipment and advanced manufacturing
- Marine coatings
- Human health and fertility

These commercial projects were led by seventeen researchers, each of whom has established robust working relationships with the partner companies on which to build further enhancements to New Zealand's productivity.

COMMERCIAL SKILL BUILDING

The Commercial Skill Building seminar series offers researchers and deep tech companies the chance to hear from experts and service providers in a range of technical, commercial and strategic fields to enhance capability. We have hosted speakers from local and international groups to share their insights with our researchers and wider networks, sharing access to this valuable content free of charge via KiwiNet, Return on Science, NZPA, Dodd Walls Centre and others. Examples include:

- Scaling Risks and Insights from Manufacturing & Supply Chain.
- Understanding insurance in deep tech start-ups, in advance of needing it.
- Sustainability toolbox for start-ups.

PATENTING AND INVENTION DISCLOSURES

Institute research entrepreneurs submitted three invention disclosures to their Technology Transfer Offices, filed nine patent applications and secured one patent grant.

PATENT APPLICATIONS

Inventors*	Patent title	Patent number
Aaron Marshall	Integrated solutions for upgrading liquid fuel infrastructure and operations	2025901829
	Adaptive multi-fluid storage and distribution assembly	2025901828
	Process and apparatus for alcohol-based hydrogen generation and byproduct recovery	2025901827
	System for segregated storage and controlled dispensing of multiple liquids	2025901826
Natalie Plank and Marissa Dierkes	Device and device arrangement for artificial neural network comprising same, and methods for forming same	AU2024902116
Jami Shepherd and Simon Brown	Data processing system and method	
Chris Bumby, Bavinesh Maisuria	Fluidised bed reactor	AU 2025904564
Nathaniel Davis	Singlet Fission Perovskite	

PATENTS GRANTED

Chris Bumby	Superconducting switch	US12439833B2, JP7747629B2
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* Only the MacDiarmid Institute inventors on each patent are named here.

INTO THE
COMMUNITY 4.

In 2025 the MacDiarmid Institute strengthened its outreach and education by deepening partnerships, expanding regional engagement and involving our alumni network. Our collaboration with Tūhura Otago Museum delivered an inspiring outreach programme alongside AMN11 and a week of community activities on Rēkohu Chatham Islands. We supported regional initiatives from Northland to Taranaki and, with alumni, worked with teachers from Auckland to South Otago. We are grateful to our wider Institute whānau for enabling such extensive engagement across the motu.

DISCOVERYCAMP AND NANOCAMP

From 19-23 January, our annual DiscoveryCamp hosted nine Māori and Pacific Island Year 12 and 13 students at Te Whare Wānanga o Waitaha University of Canterbury (UC) in Ōtautahi Christchurch.

Ten Year 12 and 13 students gathered the same week for our annual NanoCamp at Ōtākou Whakaihu Waka University of Otago (UoO) in Ōtepoti Dunedin.

The DiscoveryCamp academic programme covered an introduction to nanotechnology, and sessions on silicon wafer photolithography, dye-sensitized fruit-based solar cells, nano-chemistry, microfluidics, microbiology and more. The evenings held a wide range of social activities such as attending Surf School at

Sumner Beach, bowling and an escape room. One of our colleagues from Whakarewarewa Living Village also joined the camp to support the students.

The NanoCamp programme included sessions on silver nanoprisms, superconductivity, molecular crystal growing, making solar cells, microplastics and more. There were also talks on astrochemistry and a talk on 'How Light Exerts Force on Matter (and What We Can Do With It)' by Professor Alejandro Fainstein, visiting from Bariloche Atomic Centre, Argentina. The students enjoyed various social activities in the evenings, including laser tag, ten-pin bowling and an extremely well-timed visit to St Clair Beach during the best weather of the week.



QUOTES FROM DISCOVERYCAMP ATTENDEES

“DiscoveryCamp made me realise the excitement within all the sciences, which really encouraged my consideration in studying more than one science for university as a Pasifika student.”

“Even if you think you have your future planned out, this camp might just change your perspective, and your future.”

“It was empowering to be surrounded by other young Māori and Pasifika students who shared my enthusiasm for science.”

“From the silicon wafer photolithography activity to the tissue engineering and cultivated meat, I enjoyed learning about everything.”

“As a young Māori wahine in science fields, it was incredibly inspiring and empowering.”

“This camp showed me that there are no cultural/ethnic limits to what a Pasifika student can achieve in science, and that really solidified my decision to pursue science in the future.”

“This experience will stay with me for life, not only in the confidence it gave me, but also the connections I made, the hands-on science I was able to explore and the fun I had.”

“I can say this camp was nothing short of life-changing.”

QUOTES FROM NANOCAMP ATTENDEES

“NanoCamp 2025 opened my eyes to some of the astounding things that you can do with science and was the perfect place to meet amazing, like-minded people.”

“Building a small hydrogen-powered car was a highlight — it was cool to see how a concept I had read about worked in practise and how it could be scaled up for larger transport systems.”

“I had no idea that the sort of technology that we were able to experiment with even exists.”

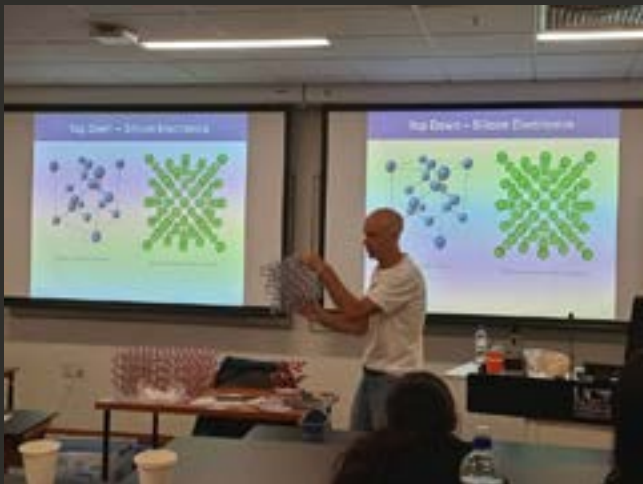
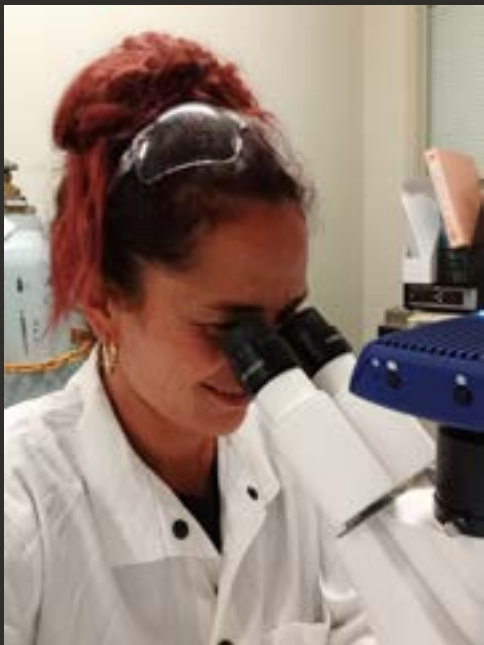
“I was able to really find my passion for chemistry and decide it was what I wanted to do with my life.”

“From silver nanoprisms to transmission electron microscopes and superconductors, NanoCamp was filled with awe-inspiring and unique experiences that I will remember for many years to come.”

“The whole week was filled with unique and mind-blowing information.”



DiscoveryCamp attendees with camp organiser Martin Allen, and Investigators Diane Bradshaw and Vladimir Golovko.





NanoCamp attendees with camp organiser Anna Garden, with chaperones Elkhansa Elbashier and Sam McIntyre and with Keith Gordon.





LOWERING BARRIER TO ENGAGEMENT TO OUTREACH FOR INVESTIGATORS

Our class sets of hydrogen, solar and wind powered kits (including toy cars for races) and kits to make dye-sensitised solar cells have been a big success so far. The kits support the Institute's kaupapa of materials for sustainability and also reduce the workload of individual Investigators in planning and

resource gathering for outreach activities. They have been used widely by Deputy Directors Associate Professor Anna Garden, Professor Pauline Harris and Strategic Manager Māori Kirsty Doyle, as well as other Investigators.

INTERNATIONAL YEAR OF QUANTUM SCIENCE AND TECHNOLOGY

Aotearoa New Zealand was the first place in the world to commemorate the International Year of Quantum Science and Technology (IYQ). We kicked off the public celebrations for IYQ with the MacDiarmid Institute public lecture on 15 January: 'A Century of Quantum Mechanics: How 100 Years of Quantum Mechanics changed our perspective on reality.'

University of Illinois theoretical physicist Professor Gordon Baym spoke about his part in the history of the world's most successful and mysterious description of reality, drawing on his expertise in condensed matter, the physics of elementary particles and the formation of neutron stars in supernova explosions. His fellow University of Illinois colleague Professor Smitha Vishveshwara described how advances in quantum physics have required imaginative leaps, and in turn have inspired creative works.

The public lecture took place as part of the ICAM Week of Science 2025 (convened by the Institute in Pōneke Wellington, 13-17 January). The ICAM (Institute for Complex and Adaptive Matter) conference was organised by various Institute members including Associate Investigator Dr William Holmes-Hewett and Principal Investigator Professor Michele Governale, and brought together an exceptional group of scientists from across the globe to discuss emergent behaviours at the frontiers of soft matter and quantum materials.

Various Institute members were part of the Aotearoa steering committee for the International Year of Quantum Science and Technology, and were involved in curating the website and some public events. Also, in honour of the International Year of Quantum Science and Technology, we pulled together a few of our Sci Fi / Sci Fact podcast episodes that relate to quantum science and technology.



INTERNATIONAL YEAR OF
Quantum Science
and Technology

SPONSORSHIP OF UC STUDENTS TO VISIT TONGA TO DELIVER OUTREACH RESOURCES

We supported two of our Te Whare Wānanga o Waitaha University of Canterbury (UC) based students to travel to Tonga for outreach delivery. The trip was a collaboration between Associate Investigator Dr Taniela Lolohea and Principal Investigator Dr Matthew Cowan. Taniela has established an ongoing relationship with a local high school to establish a science and technology centre and support the professional development of teachers, and Matt has developed a water quality education resource, Pacific H2O. Taniela and Matt teamed up to deliver a project at a high school related to nitrate monitoring in water in Tonga.



“This trip to Tonga was enriching both professionally and personally. It allowed us to adapt our workshop to a new cultural setting, overcome challenges, and witness the school students’ enthusiasm and curiosity firsthand.”

PHD STUDENT SHALLU VERMA



OUR PEOPLE IN ACTION WITH TŪHURA OTAGO MUSEUM

The MacDiarmid Institute science engagement coordinator at Tūhura Otago Museum, Dr Marijn Kouwenhoven, continued to weave MacDiarmid Institute content into her local outreach programme throughout the year and was always willing to take our PhD students with her, including a visit to Araiteuru Marae to deliver the Museum's Silver Science project, using the hydrogen fuel cell kits. These Silver Science workshops are designed to engage older members of the public with new and exciting science topics such as hydrogen energy. The Museum's climate change and Antarctica-focused science showcase travelled to Samoa from 31 March – 12 April, and included the What Can We Do? section, featuring panels and interactives related to work being done by members of the Institute (e.g., solar cells and solar concentrators, MOFs, and better batteries).

Marijn has left the Museum to take up a teaching fellow position at Ōtākou Whakaihū Waka University of Otago (UoO). She has been an incredible asset for us, and has developed significant science engagement content related to Institute activities (e.g. Far From Frozen showcase, pop-up nanoscience workshop), wrapped Institute content into other Tūhura activities (e.g. Tūhura Tuarangi, space science expo), coordinated AMN outreach programs, enthusiastically attended our symposia and has delivered Institute content to many hundreds of children in Aotearoa and the Pacific. We thank our friend Marijn for all her mahi and wish her all the very best in her new role.

Lekshmi
Dinachandran and
Ashley Stewart
at Pātaka Ora at
Araiteuru Marae.



TARGETED SUPPORT FOR SCIENCE TEACHERS

One of our medium-term goals is to offer targeted support for science teachers. After consultation in 2024, we have chosen two key ways to support teachers in 2024/2025: (i) increased attendance at teacher conferences, including presentations and workshops, and (ii) the creation of a set of short videos that cover a diverse range of careers to highlight roles that benefit from physical sciences training.

One of the strongest advantages of being a long-lived Centre of Research Excellence (CoRE) is the extensive network of alumni that we have built and continue to support and keep in touch with. Drawing from our networks, we are creating videos profiling people who are alumni from our partner institutions who have graduated with a Bachelors or Masters degree in chemistry or physics and what their current job entails.

Following on from our support for the ChemEd BioLive teachers conference in 2024, in July we engaged with the SciCon teachers conference in Ōtepoti Dunedin — the biennial secondary science teachers' conference. We staffed an exhibition booth where we presented draft career videos and provided other resources (e.g. buckyballs and photochromic bead explainers).

As part of the SciCon teachers conference, our UoO-based researchers opened their labs for SciCon. The group of 24 teachers on the fully subscribed tour said they were “blown away” with everything they saw and heard and said they couldn’t wait to pass on all they learnt to their students.

At the request of secondary school science teachers, we attended the Clutha District Careers Expo in Balclutha to showcase diverse pathways with science degrees to students from schools throughout the Clutha region, including from Tapanui, Lawrence and the Catlins. We really enjoyed the chance to interact with both students and teachers from the district and look forward to the connections that have arisen from this event. We also participated in the Waipapa Taumata Rau University of Auckland (UoA) Teacher’s Day in November, sharing safe and cheap nanochemistry experiments suitable for high school students.



THE NEW ZEALAND INTERNATIONAL SCIENCE FESTIVAL

In collaboration with Tūhura Otago Museum, we ran two Renewable Energy workshops and a Pop-up Renewable Energy Science Station over four days at the New Zealand International Science Festival (NZISF) in Ōtepoti Dunedin in July. In our fully subscribed Renewable Energy workshops, 30 people in each workshop built their own dye-sensitised solar cell using blackberries, and raced hydrogen-powered cars where the hydrogen was generated in situ from the electrolysis of water. In the Pop-up Renewable Energy Science Station, we

demonstrated wind turbines and solar panels, as well as showed off our rotating metal organic framework (MOF) model and making the ever-popular folding buckyballs. However, the stars of the show were our hydrogen fuel cell-powered cars. Kids as young as two (as well as "big kids") split water to make hydrogen and used this to race their own cars. The pop-up station was held in the Festival Hub, which was host to around 1400 members of the public.



PhD student Sam McIntyre featured in Dunedin NZ's ad for the NZ International Science Festival and All Blacks test in Ōtepoti Dunedin in July.



JOINT OUTREACH TRIP TO RĒKOHU CHATHAM ISLANDS

6-14 OCTOBER

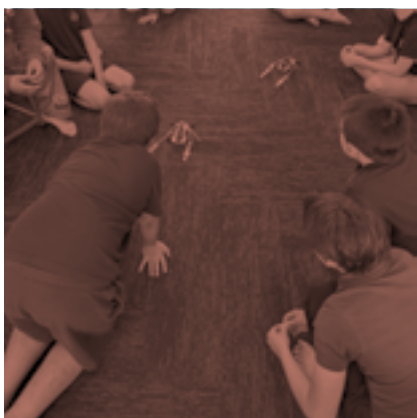
At the beginning of October, we joined a small but enthusiastic team of scientists and science communicators on an outreach trip to the Chatham Islands (Rēkohu/Wharekauri, population around 700). The Institute has visited the Chatham Islands previously (in 2022), as part of the Festival of Science. We were eager to go back, in recognition of the value of repeat outreach visits, especially in more remote communities.

Deputy Director Associate Professor Anna Garden represented the Institute and joined others from Tūhura Otago Museum, the Dodd-Walls Centre and the MBIE Research Programme Solar Tsunamis. It was a full and varied programme with full-day school visits including whakawhanaungatanga at the two schools on the main island (9 and 54 students), pub talks and talks at the council chambers, a pub quiz (27 people), a short-film screening, a science showcase and two community pop-up science days (86 visitors). Anna's talk at the pub titled "What would we do without oil?!" was well-received by the 35 patrons. We were fortunate to stay at the beautiful Kōpinga Marae (Moriōri), where we also had the chance to learn more about the history of the Chatham Islands.

The real highlights were the community science days. The whole team was struck by the depth of engagement from the visitors, with most families staying for over two hours with us, interacting with our science demos with kids showing their families what they had learned the previous days at school. Liquid nitrogen ice-cream and hydrogen bubbles were highlights, with one child commenting that they had only ever seen a video of these. Many families stayed on to share cups of tea and for their kids to play with friends. We were also gifted three fresh crayfish as a thank you.

The benefits of a joint team were evident in that we could pool resources for shared costs, invest more time overall with the schools, run more activities and embed more into the community. We were also able to contribute to the costs of boat travel, meaning we could take approved chemicals that could not go by air.

We thank the community of the Chatham Islands for welcoming us for a week, and particularly the Hokotehi Moriōri Trust. We also thank the crew of RSV Evohe for safe passage for us and our gear.



Above and centre: Driving
hydrogen cars at Te One
School;
Right: Anna Garden giving
pub talk at Hotel Chatham.



TAURANGA STEMFEST

Our researchers and students showcased materials science at Tauranga STEMfest in September: Principal Investigator Matthew Cowan (Te Whare Wānanga o Waitaha University of Canterbury), Associate Investigator Martyn Coles (Te Herenga Waka Victoria University of Wellington - VUW), and students Shivangi Chourasia (Te Kunenga ki Pūrehuroa Massey University) and Mereana Rooy (VUW). STEMfest is a pop up style event attended by over

10,000 participants. The development of physical resources has paid off, as shown by the incredible interest that kids aged from 5-15 (and their parents!) showed in being able to assemble their own fuel cell to power hydrogen cars across the floor in between the legs of passersby. The audience was extremely diverse, and the only constant was the genuine and charmingly naïve enthusiasm and interest shown by the children.

Matthew Cowan
(above) and
Martyn Coles
(right) at
Tauranga
STEMfest.

“It was a wonderful
experience engaging
with the kids.”

PHD STUDENT SHIVANGI CHOURASIA.



INTO THE FUTURE

5.

The future of New Zealand's expanding deep tech sector depends on a tech-savvy workforce with world-class scientific expertise. Our graduates enter this sector having worked alongside leading researchers, bringing both research capability and the communication skills needed to translate discoveries into real-world impact. Through our Career and Relevant-to-Industry Skills Programme (CRISP), students gain practical insights in a range of workshops including: landing a first high-impact job; project management; and product development. Our post-PhD internship programme further embeds graduates in deep tech companies, government and industry, providing valuable real-world experience and paving the way to their futures.



OPENING DOORS: GRADUATE INTERNSHIPS ACROSS AOTEAROA

We funded a further five of our graduates into internships with industry and government in 2025

Intern	Employer	Project topic
Tony Booth	MBIE	Quantum Technologies
Navjot Kaur Kahlon	Futurity Bio-Ventures Limited	Research Chemist Intern Contributing to the LIMA™ Product Development
Dana Stone	The New Zealand Institute for Bioeconomy Science (BSI, formerly Scion) and startup company Loopback	From waste to wear: Sustainably Jewellery from Natural Pigments and Biodegradable Dyes
Yuhka Uda	Dennisson Technologies	Enhancing The Mechanical Properties of Liquid Crystal Elastomer Actuators Using Interpenetrating Polymer Networks (IPNs)
Amin Yusuf	Climate Change Commission	Working on the National Adaptation Plan Progress Assessment, and helping with the National Climate Change Risk Assessment

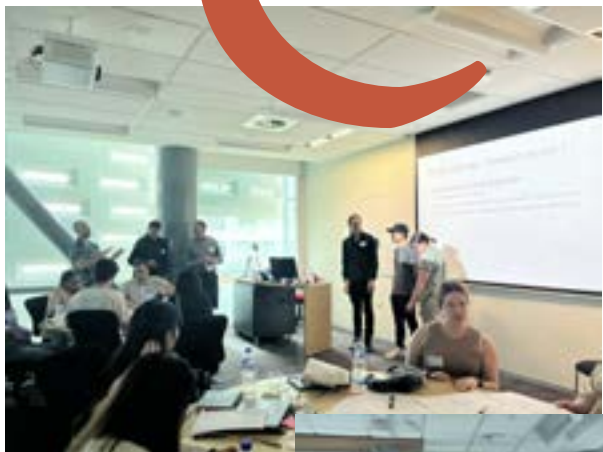
“Navjot has been a real asset to our team, and we have benefitted greatly from her internship. So much so, that we have offered her a full-time position here at Futurity.”

GARETH BECKERMANN, CTO FUTURITY BIO-VENTURES

“This experience has been deeply enriching — strengthening my understanding of applied green chemistry and reinforcing my aspiration to contribute to New Zealand’s clean technology future.”

NAVJOT KAUR KAHLOH ON HER INTERNSHIP WITH FUTURITY BIO-VENTURES LIMITED

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GROWING CAREERS BEYOND RESEARCH

A selection of photos from the CRISP workshops held in Pōneke Wellington in April and Tāmaki Makaurau Auckland in November.

Our ongoing Careers and Relevant-to-Industry Skills Programme (CRISP) team ran five full-day sessions — two in April and three in November.

- Creating Personal Impact in the Workplace Facilitated by Lisa Allen
- Project Management Skills for Your Future Career Facilitated by David Stokes
- Product Development Lifecycle Facilitated by Jonathan Price, Neville Seagar and Steve Thornborough
- Landing Your First High-Impact Job Facilitated by Julian Lambert and Tony De Barr
- Hackathon Facilitated by Danny Cheng (CTO of DeepKnowledge ML consultancy), Geoff Weal (Research Support Specialist at REANNZ), Sara Bilal (Data&AI Specialist and Quantum Ambassador) and Charlie Ruffman (Senior Research Fellow, computational chemistry at Te Herenga Waka Victoria University of Wellington).

These sessions are hugely popular with over 120 students, RAs and postdocs attending the workshops throughout the year. This is a testament to the planning and input that the CRISP committee (including the student reps) and the facilitators put into the co-design of the sessions. The knowledge gained and skills developed will undoubtedly serve everyone well as they complete their projects. A big thank you to everyone involved.



GLOBAL YOUNG SCIENTISTS SUMMIT (GYSS) 2025

We nominated Te Kunenga ki Pūrehuroa Massey University-based PhD student Cynthia Andriani to attend the GYSS Summit in Singapore and in January. Cynthia's nomination was accepted by GYSS, and she travelled to the Summit where she met, amongst others, Nobel Prize winner Professor Steven Chu (pictured below with Cynthia).



2025 MESA REPORT

Building on the success of last year, the MacDiarmid Emerging Scientists Association (MESA) has further increased the number of events run across the country, with 29 events held to date.

This year, we found that casual catch-ups over coffee, tea or even bubble tea gained the most attraction in bringing our members together and fostering networking. Each centre has run at least two of these, along with one to two workshops focusing on soft and hard skills. The workshops ranged from X-ray diffraction to Python for data analysis, as well as oral and visual communication. Additionally, some of our members from Te Papaioea Palmerston North and Pōneke Wellington had the chance to visit Marama Labs, a start-up company originating from the Raman Laboratory at Te Herenga Waka Victoria University of Wellington (VUW).

This year's bootcamp was back in the North Island at a camp in Taupō. The theme encompassed material characterisation spanning NMR, XRD, Raman, synchrotron, and neutron science.

One of our goals this year was to boost our social media presence, which we can happily say we have achieved. We have created 133 posts, resulting in a 280-follower increase across all our platforms. A special thanks to our social

media reps for doing an exceptional job with posts covering all our events.

Another goal was to boost engagement at our events, as previous years' engagement had been a small percentage of the total number of members based at each of our centres. Across all our events up to November, we have had 397 attendees, which is the highest attendance in the last four years. We hope that all our members who attended were able to learn new skills or expand their scientific network, and we look forward to seeing you continue to engage with us next year!

This would not have been possible without all our amazing centre representatives and executive committee members organising and running these events for our members to enjoy. Thank you for all your hard work throughout the year. We hope you managed to gain something from the role.

Thanks for an amazing year!



MARCO VAS
MESA CO-CHAIR



CAMPBELL TIFFIN
MESA CO-CHAIR



MESA committee
at the
MacDiarmid
Institute annual
symposium.

MESA COMMERCIALISATION REPORT 2025

MacDiarmid Emerging Scientists Association's (MESA) Commercialisation and Industry Engagement (CIE) representatives, Ghadir Dahalan of Te Kunenga ki Pūrehuroa Massey University (Massey) and William Sheard of Waipapa Taumata Rau University of Auckland (UoA), have relished their year in the role.

Together with Winter Zakaria, Ghadir and William supported the design of CRISP workshops alongside MacDiarmid Institute programme meetings and the annual symposium. The design of November's Landing Your First High Impact Job workshop was led by Ghadir and William, coordinating facilitators and alumni to provide students with information and practical experience in finding a career in industry.

Ghadir organised a panel discussion on the importance of commercialisation in science. With support from Dr Sean McKay (Massey Ventures), Alan Hucks (KiwiNet), Dr Steve Taylor (Fonterra) and Chelsea Hirst (Sprout Agritech), the panel provided valuable insights into the challenges and opportunities of bringing scientific innovations to market. Ghadir also arranged a site visit to Marama Labs, giving students a first-hand look at the opportunities available to those pursuing a career in R&D.

Ghadir and William both had the opportunity to attend the annual KiwiNet Awards in Auckland. Along with Auckland's Techweek celebrations and later Cleantech Trek, Ghadir and William enjoyed meeting with deep tech entrepreneurs, investors and academics from all over New Zealand. In addition, Ghadir attended the NEXUS Summit, a valuable experience that deepened her understanding of the evolving field of commercialisation in science.

In 2026, Ghadir and William are moving on to other opportunities and look forward to seeing the next CIE representatives flourish in the role.

The image shows two handwritten signatures in black ink. The signature on the left is 'Ghadir Dahalan' and the signature on the right is 'William Sheard'.

INTO THE METRICS

5.

Financials

	2024	2025
Income		
CoRE Funding	\$6,400,000	\$6,400,000
Surplus Carried forward	\$2,066,898	\$19,802
2026 budget allocated for use in 2025		\$635,000
Total Income	\$8,466,898	\$7,054,802
Salaries and salary related costs		
Directors and Principal Investigators	\$1,069,555	\$778,936
Associate Investigators	—	—
Post-Doctoral fellows	\$663,818	—
Research/Technical assistants	\$663,419	\$114,486
Others	\$623,798	\$600,793
Total Salaries & Salary-related costs	\$3,020,590	\$1,494,215
Other Costs		
Overheads	\$1,911,787	\$671,441
Project Costs	\$2,330,502	\$1,009,124
Travel	\$108,732	\$173,475
Postgraduate students	\$1,020,430	\$3,751,170
Equipment depreciation/rental	\$55,055	\$7,319
Subcontractors	—	—
Extraordinary expenditure	—	—
Total Other Costs	\$5,426,506	\$5,612,529
Total CoRE Expenditure		
Total Expenses	\$8,447,096	\$7,106,744
Net Surplus/(Deficit)	\$19,802	-\$51,942

At a glance

Headcounts by category

Emeritus Investigators	30
Principal Investigators	33
Associate Investigators	52
Students	392
Postdoctoral researchers and research assistants	83
Total	590

Peer reviewed research outputs by type

Journal articles	389
Book chapters	8
Conference papers	12
Total	409

Board, executive, staff and students

GOVERNANCE REPRESENTATIVE BOARD

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University of Otago

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Distinguished and Mellor Professor
University of Otago

Will Charles

Executive Director, Technology Development,
UniServices
University of Auckland

Professor Ray Geor

Pro Vice-Chancellor College of Sciences
Massey University

Professor Margaret Hyland

Deputy Vice-Chancellor Research
Victoria University of Wellington

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Deputy Vice-Chancellor Research and
Innovation
University of Canterbury

Blanche Morrogh

Independent Director
Kai Ora Honey

Marny Reakes

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University of Otago

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Massey University

Associate Professor Natalie Plank

Deputy Director Commercialisation and
Industry Engagement, MacDiarmid Institute
Victoria University of Wellington

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Science Executive Representative, MacDiarmid
Institute
University of Canterbury

*Partial year

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Physics of energy materials, condensed matter

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Porous materials

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Radboud University, Netherlands
Artificial cells

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Deputy Director, Administrative Director, Group
Leader of WPI-MANA
Deputy Director of International Center for
Young Scientists (ICYS)
Professor at the University of Tsukuba
National Institute for Materials Science (NIMS)
International Center for Materials
Nanoarchitectonics (MANA)
University of Tsukuba, Japan
Surface physics and chemistry, nanotechnology,
nanobioscience

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Harvard University, United States of America
Chemistry of renewal energy

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Faculty
University College London, United Kingdom
Nanomaterials

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of Inorganic Chemistry and Institute of
Nanotechnology
Karlsruhe Institute of Technology, Germany
Molecular materials

Professor Michelle Simmons

Director, Australian Research Council Centre
of Excellence for Quantum Computation and
Communication Technology
Laureate Fellow
Scientia Professor of Physics
University of New South Wales, Australia
Quantum computing, condensed matter physics

Professor Matt Trau

Professor of Chemistry, University of
Queensland
Deputy Director and co-founder,
Australian Institute for Bioengineering and
Nanotechnology
University of Queensland, Australia
Nanoscience, nanotechnology, and molecular
diagnostics

Dr David Williams

Chief Research Scientist and Laboratory
Manager, Hitachi Cambridge Laboratory
University of Cambridge, United Kingdom
Materials for computing

SCIENCE EXECUTIVE

Professor Nicola Gaston

Director, MacDiarmid Institute
University of Auckland

Associate Professor Anna Garden

Deputy Director Outreach and Education,
MacDiarmid Institute
University of Otago

Professor Pauline Harris

Deputy Director Māori/Māori Research
Representative/Research Programme Leader:
Mātauranga Māori
Massey University

Associate Professor Natalie Plank

Deputy Director Commercialisation and
Industry Engagement, MacDiarmid Institute
Victoria University of Wellington

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Associate Investigator Representative
University of Canterbury

Dr Simon Granville

Research Programme Leader: Future Computing
Victoria University of Wellington

Professor Derek Kawiti*

Principal Investigator Representative
Victoria University of Wellington

Professor Paul Kruger*

Principal Investigator Representative
University of Canterbury

Dr Luke Liu*

Research Programme Leader: Catalytic
Architectures
Victoria University of Wellington

Professor Jenny Malmström

Research Programme Leader: Reconfigurable
Systems
University of Auckland

Dr Elke Pahl*

Associate Investigator Representative
University of Auckland

Dr Daniel Sando*

Principal Investigator Representative
University of Canterbury

Professor Shane Telfer*

Research Programme Leader: Catalytic
Architectures
Massey University

Professor Charles Unsworth*

Principal Investigator Representative
University of Auckland

Marco Vás

MESA Co-Chair
University of Auckland

Cambell Tiffin

MESA Co-Chair
University of Canterbury

Jaye Barclay*

Women and Gender Minorities Network Chair
University of Canterbury

Akshita Mogaveera*

Women and Gender Minorities Network Chair
Victoria University of Wellington

* Partial year.

EX-OFFICIO**Kirsty Doyle**

Strategic Manager Māori, MacDiarmid Institute
Victoria University of Wellington

Gabrielle Holmes

Programme Manager, MacDiarmid Institute
Victoria University of Wellington

Kevin Sheehy

Commercialisation and Industry Engagement
Manager, MacDiarmid Institute
Victoria University of Wellington

Rosie Wayte

Institute Manager, MacDiarmid Institute
Minute-taker
Victoria University of Wellington

Vanessa Young

Strategic Engagement and Communications
Manager, MacDiarmid Institute
Victoria University of Wellington

MACDIARMID EMERGING SCIENTISTS ASSOCIATION (MESA) 2025

Marco Vás

Co-Chair
PhD student
University of Auckland

Campbell Tiffin

Co-Chair
PhD student
University of Canterbury

Elouan Hay-Fourmond

Secretary
PhD student
University of Otago

Soongseok Yoon

Treasurer
PhD student
University of Canterbury

Christina Howat

Social Media Representative
PhD student
University of Canterbury

Panchami Hirave

Social Media Representative
PhD student
University of Otago

William Sheard

Commercialisation and Industry Representative
PhD student
University of Auckland

Ghadir Dahalan

Commercialisation and Industry Representative
Junior scientist
Massey University

Winter Zakaria

Diversity, Equity and Inclusion Representative
PhD student
University of Canterbury

Cynthia Andriani

Centre Representative
PhD student
Massey University

Shivangi Chourasia

Centre Representative
PhD student
Massey University

Branwen Hastings

Centre Representative
Masters student
University of Auckland

Edin Liu

Centre Representative
PhD student
Victoria University of Wellington

Jacob Lewis

Centre Representative
Masters student
University of Otago

Mitchell Nascimento

Centre Representative
Postdoc
University of Auckland

Brijesh Patel

Centre Representative
PhD student
Robinson Research Institute

Kayla Prendergast

Centre Representative
PhD student
University of Otago

Kaveh Rahmani

Centre Representative
PhD student
University of Canterbury

Leah Sammon

Centre Representative
PhD student
University of Canterbury

Qurat Ul Ain

Centre Representative
PhD student
Victoria University of Wellington

PRINCIPAL INVESTIGATORS (33)

Martin Allen
Sally Brooker
Simon Brown
Chris Bumby
Jack Chen*
Shen Chong*
Matthew Cowan*
Anna Garden
Nicola Gaston
Keith Gordon
Michele Governale
Simon Granville
Pauline Harris
Derek Kawiti
Paul Kruger
Erin Leitaio*
Luke Liu*
Jenny Malmström
Aaron Marshall
Kim McKelvey*
Ocean Mercier*
Franck Natali
Volker Nock
Natalie Plank

Ben Ruck
Daniel Sando*
Viji Sarojini*
Jami Shepherd*
Shane Telfer
Jadranka Travas-Sejdic
Geoff Waterhouse
Catherine Whitby
Geoff Willmott
* Indicates appointed as PI in 2025

ASSOCIATE INVESTIGATORS (52)

Mathew Anker
Baptiste Augue
David Barker
Thomas Bennett*
Catherine Bishop
Margaret Brimble***
Philip Brydon
Peng Cao
Joe Chen*
Kai Chen
Martyn Coles
James Crowley
Owen Curnow*
Nathaniel Davis
Renwick Dobson
Courtney Ennis
Rosalyn Falconer*
Christopher Fitchett
Robin Fulton
Petrik Galvosas
Vladimir Golovko
Prasanth Gupta
Alex Hamilton*
Muhammad Hanif
William Holmes-Hewett
Paul Hume*
Patricia Hunt
Geoff Jameson
Marcus Jones
Roshan Khadka***
Jon Kitchen
Taniela Lolohea
Nigel Lucas**
Freddy Lyzwa*
Ben Mallett
Sarah Masters*
Steven Matthews
Ciaran Moore*
Joseph Nelson
Michel Nieuwoudt
Elke Pahl
Kannan Ridings
Charlie Ruffman
Kai Sellschopp*
Tilo Söhnle
James Storey**
Charles Unsworth**
Ziyun Wang*
Cameron Weber
Shanghai Wei*
Ben Yin
Alex Yip

* Indicates appointed as AI in 2025

** Indicates shift in status from PI to AI

*** Indicates left Institute in 2025

EMERITUS INVESTIGATORS (30)

Maan Alkaisi
Richard Blaikie
Diane Bradshaw**
Penny Brothers
Ian Brown
Bob Buckley
Sally Davenport
Laura Domigan
Juliet Gerrard
Simon Hall
Shaun Hendy
Justin Hodgkiss
Jim Johnston
Tim Kemmitt
John Kennedy**
Eric Le Ru
Ken MacKenzie
Andreas Markwitz
Duncan McGillivray**
Carla Meledandri*
Jim Metson
Roger Reeves
Mike Reid
Craig Rofe
Cather Simpson
Jeff Tallon
Richard Tilley
David Williams
Grant Williams
Ulrich Zuelicke**

* Indicates appointed as EI in 2025

** Indicates shift in status from PI to EI in 2025

PROFESSIONAL STAFF

Kirsty Doyle

Strategic Manager Māori, MacDiarmid Institute
Victoria University of Wellington

Gabrielle Holmes

Programme Manager, MacDiarmid Institute
Victoria University of Wellington

Kevin Sheehy

Commercialisation and Industry Engagement
Manager, MacDiarmid Institute
Victoria University of Wellington

Rosie Wayte

Institute Manager, MacDiarmid Institute
Victoria University of Wellington

Vanessa Young

Strategic Engagement and Communications
Manager, MacDiarmid Institute
Victoria University of Wellington

MacDiarmid Institute students in 2025

MASTERS (50)

Alessio	Luca	University of Canterbury
Allen	Martin	Massey University
Anane	Timothy	Massey University
Anderson	Liam	Victoria University of Wellington
Arnerich	Olivia	University of Auckland
Beauchamp	William	University of Canterbury
Bishop	Haig	University of Canterbury
Carlisle	Adam	University of Canterbury
Carter	Jodi	Victoria University of Wellington
Chen	Haotian	University of Auckland
Chew	Chris	University of Auckland
Doyle	Laura	Robinson Research Institute
Du	Linjie	University of Auckland
Fung	Thomas Man Yui	University of Auckland
Geng	Zhifei	University of Auckland
Gilchrist	Jake	University of Otago
Hastings	Branwen	University of Auckland
He	Jing	Massey University
Heywood	Jayden	University of Otago
Jin	Daniel	University of Auckland
Johnson	Hemi	University of Canterbury
Khanal	Kritika	University of Canterbury
Kuang	Ze	University of Auckland
Kumar	Munintra	University of Auckland
Lewis	Jacob	University of Otago
Li	Chengyue	University of Auckland
Li	Mingze	University of Auckland
Li	Shouyang (Julius)	University of Auckland
Linton	Manfred	University of Auckland
Liu	Boshen	University of Auckland
McKellar	Thomas	University of Canterbury
Patel	Om	Auckland University of Technology
Porter-Rawiri	Teremoana	Victoria University of Wellington
Quan	Bu	University of Auckland
Quigley	Angus	University of Canterbury
Rex	Angelique	Massey University
Rivera-Chambost	Valentina	Victoria University of Wellington
Santos	Michelangelo	University of Canterbury
Senthilkumaran	Yukeshveer	University of Auckland
Sergeant	Madison	University of Canterbury
Stevens	Rebecca	University of Otago
Taylor	Jamie	University of Auckland
Tuck	Matthew	University of Auckland
Wang	Yuxin	University of Auckland
Wilson	Benjamin	University of Canterbury
Wilson	Courtney	University of Auckland
Xie	Haotian	University of Auckland
Zhang	Xinyu	University of Auckland
Zhang	Xinyue (Rebecca)	University of Auckland
Zheng	Haoning (Steven)	Massey University

PHDS (342)

Abeysekera	Gayana	University of Canterbury
Acheson	Chris	Victoria University of Wellington
Adams	Ryan	University of Canterbury
Aguilar	Clouie Justin	University of Auckland
Aitken	Mackenzie	University of Canterbury
Aleslami	Sahra Sheikh	University of Auckland
Alidoust Ghatar	Azizeh	Victoria University of Wellington

Andarini	Rizki Putri	Victoria University of Wellington
Andriani	Cynthia	University of Auckland/Massey
Antony	Irene	University of Canterbury
Anvari	Rezvan	University of Canterbury
Appletree (previously Smith)	Lun (Mark)	University of Auckland
Arnerich	Olivia	University of Auckland
Arul	Mohana	Massey University
Asad	Humna	Victoria University of Wellington
Auer	Bernhard	Massey University
Bagheri	Payman	Massey University
Bailey	Elise	University of Auckland
Bandi	Bhanumathi	Auckland University of Technology
Barclay	Jaye	University of Canterbury
Barrera Morelli	Josefina Andrea	University of Auckland
Baserisalehi	Farzaneh	University of Canterbury
Basharat	Sumaira	University of Auckland
Bashir	Nimra	Victoria University of Wellington
Batra	Adit	Victoria University of Wellington
Battley	Andrew	University of Auckland
Begzaad	Sangar	Victoria University of Wellington
Birchall	Finn	University of Canterbury
Biswas	Nandita	University of Auckland
Boer	Lotte	Victoria University of Wellington
Booth	Tony	Robinson Research Institute
Booth-Richards	Callista	University of Auckland
Bottom	Samantha	University of Auckland
Bowler	Keely	University of Auckland
BOYD	Ashton	University of Canterbury
Britton	Emma	University of Canterbury
Bryant	Devon	University of Auckland
Butler	Tane	Victoria University of Wellington
Buzas Stowers-Hull	André	Massey University
Cahyanto	Harry	University of Canterbury
Cai	Yichao	Auckland University of Technology
Carleton	Daniel	Auckland University of Technology
Carlisle	Nicholas	University of Canterbury
Chalmers	Mitchell	University of Otago
Chan	Sanutep	Victoria University of Wellington
Chegeni	Mohsen	Victoria University of Wellington
Chen	Caihong	University of Canterbury
Chen	Litong	University of Auckland
Chittora	Paridhi	Massey University
Chourasia	Shivangi	Massey University
Chung	Stephen	University of Auckland
Cools	Kilian	University of Canterbury
Cowlishaw	Isabel	University of Auckland
Cutfield	Samuel	University of Auckland
Dahalan	Ghadir	Massey University
Data	Shailja	University of Auckland
Dayananda	Thakshila	Massey University
Deas	Robert Ian	University of Auckland
DeMonte	Kieran	University of Otago
Dias	Bimali	University of Auckland
Weththasinha		
Dierkes	Marissa	Victoria University of Wellington
Dinachandran	Lekshmi	University of Otago
Ding	Muge	University of Auckland
Ding	Zhenfa	University of Auckland
Dobson-Waitere	Aaria	Victoria University of Wellington
Donahue-Boyle	Erin	University of Auckland
Donaldson	Marryllyn	Massey University
Doran	Conor	University of Auckland

Du	Linjie	University of Auckland	Kneisel	Kiersten	Victoria University of Wellington
Du	Xinzhan	University of Auckland	Koia	Sydnee	University of Canterbury
Duodo	John	University of Auckland	Kuduva	Vishnu	University of Auckland
Ebardo	Irelie	Victoria University of Wellington	Janarthanan		
Elbashier	Elkhansa	University of Otago	Kumar	Aditi	Victoria University of Wellington
Eldiven	Askin	University of Canterbury	Kumar	Supriya	University of Otago
Emeny	Chrissy	University of Canterbury	Lamba	Saurabh	University of Auckland
Farajzadeh	Zahra (Gisoo)	Massey University	Le	Vu Nam	University of Auckland
Ferreira	Duan	University of Auckland	Leedham	Emily	University of Auckland
Fontein	Danica	Victoria University of Wellington	Li	Yingxin	University of Auckland
Francis	Tait	University of Otago	Li	Zoey	University of Auckland
Gale	Kathryn	Victoria University of Wellington	Liang	Yidan	University of Auckland
Gao	Zihang	University of Auckland	Lin	Chao Yang (Sunny)	Victoria University of Wellington
Gater	Anastasia	University of Auckland	Lin	Crystal Yongqi	University of Auckland
Gearing	Hayden	University of Auckland	Lin	Rolland	University of Auckland
George Koshy	Ben	Victoria University of Wellington	Liu	Jiawei	University of Auckland
Ghasemi	Mohammad	Massey University	Liu	Shuyue	University of Auckland
Gholamipour	Sara	Auckland University of Technology	Liu	Tianzhao	University of Canterbury
Gilbert	Malachy	University of Auckland	Liu	Tingting	University of Auckland
Gisich	Alla	Victoria University of Wellington	Liu	Wenwen (Edin)	Victoria University of Wellington
Gito	Donn Adam	University of Auckland	Liu	Yuge	University of Auckland
Glukhova	Stefania	Victoria University of Wellington	Lopes Cavalcante	Larissa	University of Otago
Gordon	Hugo	University of Auckland	Lu	Ruihu	University of Auckland
Grant	Mason	University of Auckland	Luo	Dong	Massey University
Grant-Mackie	Emily	University of Auckland	Ma	Chao	University of Auckland
Gudala	Vinay	Victoria University of Wellington	Ma	Rong	Victoria University of Wellington
Gunarathna	Madushan (Dharmika)	Victoria University of Wellington	Mahdinia	Saeideh	University of Auckland
			Maisuria	Bavinesh	Victoria University of Wellington
Haack	Alexander	University of Otago	Manayath Mary Das	Dona	University of Auckland
Harris	Samuel	University of Otago	Manners	Sarah	University of Canterbury
Harris	Shikeale	Massey University	Marchant-Ludlow	Rhys	University of Canterbury
Hasannasab	Maede	University of Auckland	Maroof	Sana	University of Otago
Hay-Fourmond	Elouan	University of Otago	Maslin	Thomas	University of Canterbury
He	Qishu	University of Otago	Matheson	Brodie	Massey University
He	Shujun	University of Auckland	Mathew	Romina Marie	Auckland University of Technology
Henderson	Logan	University of Canterbury	Mathew	Sneha	Auckland University of Technology
Hesabirad	Maryam	Massey University	Matich	Olivia	Auckland University of Technology
Hibbert	Seth	University of Canterbury	Matinong	Andrea	Massey University
Hirave	Panchami	University of Otago	Matthewman	Emma	University of Auckland
Hou	Jacob	University of Canterbury	Matthews	Brooke	University of Canterbury
Howat	Christina	University of Canterbury	Mautner	Ira	University of Auckland
Hu	Hongfei	University of Auckland	McClea	Glen	University of Canterbury
Hu	Zhixuan	Victoria University of Wellington	McIntyre	Finn	University of Canterbury
Huang	Alston	University of Auckland	McIntyre	Sam	University of Otago
Hunt	Liam	University of Auckland	McKenna	Liam	Victoria University of Wellington
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Igala Withanage	Ridmi Nisansi	Auckland University of Technology	Mogaveera	Akshita	Victoria University of Wellington
Ijadi Maghsoodi	Arta	University of Auckland	Mohammadian	Benyamin	Victoria University of Wellington
Islam	Atif	Victoria University of Wellington	Garmejani		
Jangodaz	Elnaz	Massey University	Montoya Mejia	Jessica Rocio	University of Canterbury
Jena	Kumar (Debajyoti)	University of Auckland	Mountfort	Hamish	University of Canterbury
Jia	Zong Hao (Bill)	University of Auckland	Mujuni	Viator	Victoria University of Wellington
Jin	Ang	University of Canterbury	Mulimbayan	Francis	University of Auckland
Johns	Ashleigh	University of Canterbury	Murphy	Thomas	University of Auckland
Johnson	Hemi	University of Canterbury	Murugan	Sri Varshini	Victoria University of Wellington
Joshy	Elma	Victoria University of Wellington	Narashima Moorthy	Ashwin Sidharth	University of Canterbury/GNS
Kabiri	Rayhaneh	Victoria University of Wellington			
Kalan	Jude	University of Canterbury		Neha	Auckland University of Technology
Kan	Wen-Fa (Regis)	University of Auckland	Neiman	Alex	University of Canterbury
Kandel	Ashok	University of Canterbury	Nelson	Juliet	University of Auckland
Kaniyadan Baiju	Sajith	University of Canterbury	Ngata-Aerengamate	Te Amohaere	Victoria University of Wellington
Kasim	Johanes Kevin	University of Auckland			
Kim	Alex	University of Auckland	Nieke	Philipp	University of Auckland
Kim	Irene	University of Auckland	Nom	Jorden	University of Canterbury
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King-Hunt	Alan	Victoria University of Wellington	Omeje	Kingsley	Victoria University of Wellington

O'Reilly	Andrea	Victoria University of Wellington	Stevenson	Sarah	Victoria University of Wellington
Ornob	Akid	University of Auckland	Stone	Madeline (Dana)	University of Canterbury
Ortega	Lionel	Auckland University of Technology	Studholme	Sofie	University of Canterbury
Otter	Sam	Victoria University of Wellington	Subramani	Vikashini	University of Auckland
Owens	Adrian	Auckland University of Technology	Sullivan	Jovarn	University of Canterbury
Palekkodan	Thesleema	University of Otago	Sun	Xin	University of Auckland
Palpal-latoc	Dennise	University of Auckland	Swamy	Azekah	Victoria University of Wellington
Pambudi	Agung	Victoria University of Wellington	Sweet	Tylah	Victoria University of Wellington
Park	Luke Hyung-Keun	University of Auckland	Takoko	Mere	Victoria University of Wellington
Patel	Brijesh	Victoria University of Wellington	Tan Fui Jie	Angie	University of Canterbury
Patel	Hamesh	University of Auckland	Thomas	Alyssa	Victoria University of Wellington
Patel	Hamza	University of Auckland	Thuruthel	Megha	University of Auckland
Patel	Sahil Dineshbhai	University of Auckland	Kuriakose		
Patel	Shae	Victoria University of Wellington	Tian	Chengcai	University of Otago
Patel	Suraj	Massey University	Tiffin	Campbell	University of Canterbury
Pearce	Joseph	Victoria University of Wellington	Titheridge	Laura	University of Canterbury
Peou	Patrick	University of Auckland	Treacher	Eddyn (Ned)	Victoria University of Wellington
Petters	Ludwig	Massey University	Tregurtha	Joel	University of Canterbury
Phillips	Ella	University of Auckland	Trewick	Edward	Victoria University of Wellington
Phutela	Vidhi	University of Canterbury	Trlin	Hamish	University of Canterbury
Pileggi	Willow	University of Canterbury	Truong	Chi Minh	University of Auckland
Polson	Sarah	University of Canterbury	Tsui	Loksze (Vicky)	University of Canterbury
Porritt	Harrison	University of Auckland	Uda	Yuhka	University of Auckland
Porteous	Luke	Victoria University of Wellington	Ul Ain	Qurat	Victoria University of Wellington
Poudel	Pitambar	University of Canterbury	Van Dongen	Joshua	Auckland University of Technology
Prendergast	Kayla	University of Otago	van Koughnet	Kiri	Victoria University of Wellington
Prendergast	Peter	University of Canterbury	Vas	Marco	University of Auckland
Punzalan	Jervae	University of Otago	Vaseghi	Reza	Massey University
Qicheng	Zhang	University of Auckland	Bakhshayesh		
Raghavan	Harikrishnan	University of Canterbury	Vashisth	Gourav	University of Otago
Rahmani	Kaveh	University of Canterbury	Vaso	Christian	University of Auckland
Ramezani	Ghazaleh	Victoria University of Wellington	Vella	Joe	University of Auckland
Rasheed	Mohammad Zarar	Victoria University of Wellington	Verleijdsdonk	Bert	Massey University
Reihani	Nasim	University of Auckland	Vincent	Emma Jane	University of Auckland
Remoto	Peter	University of Otago	Walker	David	University of Canterbury
Ritchie	Logan	University of Auckland	Wan	Shuo	University of Auckland
Roake	Quentin	Victoria University of Wellington	Wang	Jing	University of Auckland
Rodgers	Maria	Victoria University of Wellington	Wang	Tony	University of Auckland
Rokni	Mahsaalsadat	University of Auckland	Wang	Xingyu	University of Auckland
Rosli	Zulfitri Danial (Fitri)	University of Auckland	Wang	Xiu	University of Auckland
Ruch	S��raphine	University of Canterbury	Wang	Yuan	University of Auckland
Sammon	Leah	University of Canterbury	Wang	Yuan	Victoria University of Wellington
Sarkar	Debolina	University of Canterbury	Wang	Zehua (Carls)	Victoria University of Wellington
Schnuriger	Josef	University of Auckland	Wang	Zhuoyue (Joy)	University of Canterbury
Schonberger	Szofia	Massey University	Watt	Carlie	University of Auckland
Schuurman	Joel Chris	University of Canterbury	Webb	Joshua	University of Auckland
Senadheera	Yethmini	University of Auckland	Webster	Claire	University of Auckland
Shahid	Huma	University of Canterbury	Whaanga	Arna	Massey University
Shao	Yiwei	University of Canterbury	Williamson	Joey	Victoria University of Wellington
Sheard	William	University of Auckland	Wilson-Rooy	Mereana	Victoria University of Wellington
Shehzad	Qayyum	Massey University	Wislang	Kate	University of Canterbury
Shi	Shuotong	University of Auckland	Withanage	Prasadini	Massey University
Shiraz	Fathumma Rizana	University of Auckland	Wong	Jie Long Jerome	Massey University
Shumilov	Nikita	Victoria University of Wellington	Wong	Peter	University of Auckland
Silk	Ryan	University of Auckland	Wu	Tianyuan (Daniel)	University of Canterbury
Singh	Shivangi	University of Canterbury	Xiao	Yuzhou	Victoria University of Wellington
Singh	Varinder	University of Otago	Xie	Luyang	University of Auckland
Sinhari	Apurba	University of Auckland	Xu	Kristen	University of Auckland
Smith	Caitlin	University of Auckland	Yang	Hui	University of Auckland
Smith	Finnian	Victoria University of Wellington	Yang	Kourtney	University of Auckland
Smith	George	Victoria University of Wellington	Yellapurkar	Ishita	University of Auckland
Smith	Nicholas	University of Otago	Yi	Cindy	University of Auckland
Sobhana Joy	Midhuna	Victoria University of Wellington	Yoon	Soongseok	University of Canterbury
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Spellauge	Tillmann	University of Auckland	Yu	Kaijin	University of Auckland
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Stevens	James	Victoria University of Wellington	Yusuf	Aminu	University of Canterbury

Zafar	Salma	Victoria University of Wellington
Zakaria	Amir (Winter)	University of Canterbury
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Zare	Alireza	Victoria University of Wellington
Zeng	Chunyan	University of Canterbury
Zhang	Aicheng	University of Auckland
Zhang	Hongliang (Ryan)	University of Auckland
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Zhang	Siyao	Victoria University of Wellington
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Zhou	Meiling	University of Auckland
Zhurenkov	Kirill	University of Auckland
Zulfiqar	Anam	University of Otago

MacDiarmid Institute postdoctoral researchers and research assistants in 2025

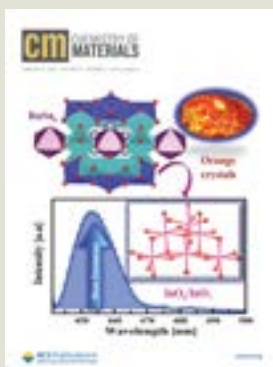
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Ding	Xiaobo	University of Auckland
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Glasson	Judith	University of Auckland
Hall	Kelsi	University of Canterbury
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Nascimento	Mitchell	University of Auckland
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Ogilvie	Olivia	University of Canterbury
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Sheridan	Hannah	University of Auckland
Smit-Colbran	Benjamin	University of Auckland
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Smith	Nicholas	University of Auckland
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Sun	Yiling	University of Canterbury
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Yick	Samuel	University of Auckland
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Pulickal	Delsa	University of Auckland
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Scott	Chad	University of Auckland
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Stephens	Emily	Victoria University of Wellington
Tillett	Zac	University of Canterbury
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Journal covers



Abdelbassit, M. S., Ren, Z., Yick, S., Sun, K., **Wang, Z.** & **Söhnel, T.**

Discrete Ru(Sn)6 Octahedra
Encapsulated in Oxoindate
Channels: RuSn6In6O16 with
Highly Ordered In/Sn Sites.

Chemistry of Materials **37**, 912–924
(2025)

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AUTHORS	TITLE	PUBLICATION TITLE
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Rahim, F.A.M., Salleh, W.M.N.H.W., Ghani, N.A., Salihu, A.S., Arzmi, M.H. & Barker, D.	Syzydyerin A, a new unusual C-methylated chalcone isolated from the leaves of Syzygium dyerianum (King) Chantar. & J.Parn	<i>Zeitschrift für Naturforschung - Section C Journal of Biosciences</i> (2025)
Li, P., Mao, Y., Shin, H., Yang, Q., Cheng, X., Li, Y., Li, K., Yu, H., Mulder, R., Pang, W.K., Jin, H., Zhao, Y., Zheng, Z., Finch, E., Hearn, K., Jia, B., Waterhouse, G.I.N., Wang, Z. & Ma, T.	Tandem amine scrubbing and CO ₂ electrolysis via direct piperazine carbamate reduction	<i>Nature Energy</i> (2025)
Singh, V., Robb, M.G. & Brooker, S.	Testing mixed metal bimetallic, and monometallic, cryptates for electrocatalytic hydrogen evolution	<i>Dalton Transactions</i> 54 , 3165-3173 (2025)
Steel, T.R., Stjärnhage, J., Riisom, M., Bloomfield, H.O., Herbert, C.D., Jamieson, S.M.F., Astin, J.W., Söhnle, T. & Hartinger, C.G.	The Chemistry of Anticancer Mononuclear and N-Bridged Dinuclear 8-Aminoquinoline Half-sandwich Metal Complexes	<i>Chemistry - A European Journal</i> 31 (2025)
Jarghouyeh, M.M., Nourbakhsh, A., Mirsattari, S.N., Nezamzadeh-Ejhieh, A. & MacKenzie, K.J.D.	The effect of nano additives modified by functionalized groups on the physical and mechanical properties of alumina-carbon-based refractories	<i>Diamond and Related Materials</i> 155 (2025)
Fan, Z.Y., Mucalo, M., Kennedy, J. & Yang, F.	The potential of high-entropy alloys as catalyst materials in water-splitting application	<i>International Journal of Hydrogen Energy</i> 134 , 64-83 (2025)
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Craig, A.J., Cording, A.P., Gilmer, S.C.L., Henneveld, J.S., Gai, S., Harker, O.H., Lucas, N.T. & Hawkins, B.C.	The Synthesis of Cyclopropyl-Fused Tetrahydrofurans from Vinylcyclopropanes	<i>Asian Journal of Organic Chemistry</i> 14 , e70110 (2025)
Lang, A., Ye, C., Chen, C., McHugh, L.N., Shaw, E.V., Dejoie, C., Lampronti, G.I., Constantinou, M., Evans, R.C., Bennett, T.D. & Dutton, S.E.	Thermally Stable Binary Two-Dimensional Hybrid Organic-Inorganic Perovskite Glasses	<i>Chemistry of Materials</i> 37 , 8809-8821 (2025)
Agarwal, P., Svirskis, D. & Nieuwoudt, M.K.	Thermodynamic and spectroscopic evaluation of the eutectic mixture of myristic acid and the local anaesthetics, bupivacaine and ropivacaine	<i>RSC Pharmaceuticals</i> 1 , 296-304 (2025)
Čikeš Botić, M., Marijan, S., Radan, M., Novak, I., Glumac, M., Pilkington, L.I., Odak, Z., Barker, D. , Reynisson, J. & Čikeš Čulić, V.	Thieno[2,3-b]pyridines as a Novel Strategy Against Cervical Cancer: Mechanistic Insights and Therapeutic Potential	<i>International Journal of Molecular Sciences</i> 26 (2025)
Winkler, R. & Zülicke, U.	Time inversion symmetry in the Dirac and Schrödinger-Pauli theories	<i>Physics Letters, Section A: General, Atomic and Solid State Physics</i> 558 (2025)

Asadova, N., Achouri, K., Arjas, K., Augu��, B., Aydin, R., Baron, A., Beutel, D., Bodermann, B., Boussaoud, K., Burger, S., Choi, M., Czajkowski, K.M., Evlyukhin, A.B., Fazel-Najafabadi, A., Fernandez-Corbaton, I., Garg, P., Globosits, D., Hohenester, U., Kim, H., Kim, S., Lalanne, P., Le Ru, E.C. , Meyer, J., Mun, J., Pattelli, L., Pflug, L., Rockstuhl, C., Rho, J., Rotter, S., Stout, B., T��rm��, P., Trigo, J.O., Tristram, F., Tsitsas, N.L., Vall��e, R., Vynck, K., Weiss, T., Wiecha, P., Wriedt, T., Yannopapas, V., Yurkin, M.A. & Zouros, G.P.	T-matrix representation of optical scattering response: Suggestion for a data format	<i>Journal of Quantitative Spectroscopy and Radiative Transfer</i> 333 (2025)
Jia, Z.H., Pilkington, L.I. & Barker, D.	Total Synthesis of the Furofuran Lignans Sumatranin A-D and the Proposed Structure of Sumatranin H	<i>Journal of natural products</i> 88 , 563-576 (2025)
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Sun, X., Barker, D. & Travas-Sejdic, J.	Transient degradable electronics enabled by systems of conducting polymers and natural biopolymers	<i>Journal of Materials Chemistry C</i> (2025)
Misiuk, K., Nowak, S., Blaikie, R. , Sommers, A. & Lowrey, S.	Transport of water droplets on metallic topographic gradients under forced vibration	<i>Physics of Fluids</i> 37 (2025)
Barnes, A.E., Lambie, S. & Gaston, N.	Trends in the electronic and geometric structures of doped two-dimensional quasi-hexagonal C60	<i>Physical Chemistry Chemical Physics</i> (2025)
Nguyen, A.T.A., Khakre, Y., Avishai, A., Kawakami, M., Ennis, C. & Marinescu, S.C.	Tunability of Nickel Benzenehexathiolate Electrocatalysts for the Hydrogen Evolution Reaction	<i>ACS Applied Materials and Interfaces</i> 17 , 52090-52101 (2025)
Zhang, C., Zhang, J., Jiao, Z., Lum, Y. & Wang, Z.	Tuning Eley-Rideal Mechanism in Electrochemical Acetylene Semi-Hydrogenation	<i>Angewandte Chemie - International Edition</i> (2025)
Yusuf, A.H., Golovko, V.B. & Masters, S.L.	Tuning the Energy Levels of Adamantane by Boron Substitution	<i>Molecules</i> 30 (2025)
Rokni, M., Lambert, M. & Leitao, E.M.	Tuning the properties of polysulfides using functionalised cardanol crosslinkers	<i>Polymer Chemistry</i> 16 , 3138-3145 (2025)
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Fu, H.-G., Gao, X., Wang, H.-J., Waterhouse, G.I.N. & Xu, J.	Two-Dimensional Supramolecular Organic Framework with Tunable Morphology and Luminescence Cascade-Enhanced Properties	<i>ACS Materials Letters</i> 7 , 746-753 (2025)
Kumar, A., Chen, B.-H., Lin, C.-Y., Shumilov, N.A., Davis, N.J.L.K. , Chao, Y.-C., Chu, L.-K., Li, C.-F., Huang, Y.-C., Yang, S.-D., Price, M.B., Hume, P.A. , Hodgkiss, J.M. & Chen, K.	Ultrafast Transient Electroabsorption Illuminates Additive Effects for Enhancing Non-fullerene Photovoltaic Devices	<i>Journal of Physical Chemistry Letters</i> 16 , 10703-10711 (2025)
Li, C., Qin, P., Peng, G., Waterhouse, G.I.N. , Shang, L. & Zhang, T.	Ultrafine Pt-based high-entropy alloy nanooctahedra deliver enhanced methanol oxidation reaction activity and durability	<i>Matter</i> (2025)
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Zhao, J., Huang, S., Zhao, Y., Cui, C., Zhang, Y., Lin, H., Zhao, C., Dai, W., Liu, Z., Song, X. & Cao, P.	Ultra-stable solid-state lithium metal batteries with ferroelectric oxide-enhanced PVDF-based hybrid solid electrolytes	<i>Journal of Materials Chemistry A</i> 13 , 9347-9356 (2025)
Mao, Y., Wang, Z. & Waterhouse, G.I.N.	Understanding light olefin selectivity during Fischer-Tropsch syntheses over zeolites: A DFT exploration of the key role of ketene intermediates	<i>Journal of Environmental Chemical Engineering</i> 13 (2025)
Sharma, S.K., Girdwood, M.L., Arif, T., Pearcy, A.C., Tiffin, C.M., Marshall, A.T. & Bumby, C.W.	Understanding the effect of roasting on vanadium speciation in steel slags and impact on leaching	<i>Hydrometallurgy</i> 232 (2025)
Huang, Y., Williams, S., Heo, T.W., Marshall, A. , Wood, B., Kennedy, J. , Metson, J., Woo, M.W. & Liu, J.	Understanding the impact of the gas diffusion layer structure on catalyst utilization in the PEM water electrolyzer	<i>Next Energy</i> 8 (2025)
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Yadav, B., Chahar, D., Kahlon, N. K., Weber, C.C. & Venkatesu, P.	Understanding the relationship between deep eutectic solvent polarity and the structural integrity and stability of hemoglobin: A balance between hydrophobicity and hydrophilicity	<i>International Journal of Biological Macromolecules</i> 321 , 146238 (2025)

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Cornelio, J., Wagner, I., Otter, S., Chen, K., Hodgkiss, J.M. & Telfer, S.G.	Unraveling Energy Transfer Dynamics and Exciton Diffusion in Multicomponent Metal-Organic Frameworks	<i>ACS Applied Energy Materials</i> 8 , 3951-3962 (2025)
Sester, C., Liu, Y., Sen, A. & Hodgkiss, J.M.	Using Disulfide DNA to Enhance Control over DNA Self-Assembled Monolayer Surface Coverage and Reduce Impedance Signal Drift	<i>Langmuir</i> 41 , 6603-6611 (2025)
Ek, M., Cheong, S., Cairney, J., Tilley, R.D. & Persson, I.	Using In Situ TEM to Understand the Surfaces of Electrocatalysts at Reaction Conditions: Single-Atoms to Nanoparticles	<i>Advanced Functional Materials</i> (2025)
Ritchie, L., Pahl, E. & Anderson, I.	Van der Waals-driven network restructuring explains time-dependent piezoresistivity in soft nanocomposites	<i>Computational Materials Science</i> 259 (2025)
Murali, S.S., Kumar, A., de Clercq, D.M., Janiseck, C., Weal, G.R., Wagner, I., Chen, K. , Nielsen, M.P., Schmidt, T.W., Hodgkiss, J.M. & Hume, P.A.	Visible light photo-switching in a conformationally-strained electron acceptor via a dual singlet-triplet mechanism	<i>Chemical Science</i> 16 , 21489-21497 (2025)
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Chien, W.-H.C., Liu, H.-A., Lin, J.-X., Liao, W.-H., Chang, Y.-Y., Hu, C.-K., Lee, J.-S., Granville, S. , Chen, J. & Hsu, H.-S.	Volatile and Non-Volatile Dual-Function Electrically Controlled Ultraviolet Magneto-Optical Effect in TmIG/Pt	<i>Advanced Electronic Materials</i> 11 (2025)
Manners, S.H., van Leeuwen, K.A., Gaw, S., Panicker, K., Gill, S., Dhami, M.K., Warden, N., Dobson, R.C.J. , Fedrizzi, B. & Stott, M.B.	Volatile sulfur compounds in New Zealand Sauvignon blanc: An inter-regional survey	<i>Food Chemistry</i> 495 (2025)
Zhang, C. & Wang, Z.	Voltage- and pH-driven evolution of multi-pathway C-C coupling in CO ₂ electroreduction on copper	<i>Chemical Science</i> 16 , 20978-20989 (2025)
Isnaini, M.D., Jongsomjit, B., Yip, A.C.K. & Phisalaphong, M.	Waste-derived CaO from green mussel shells as a highly stabilized and superior sorbent for cyclic CO ₂ capture	<i>Cleaner Engineering and Technology</i> 26 (2025)
He, Q., Morison, S., Prados-Martin, L., McAdam, C.J., Brooks, H.J.L., Gordon, K.C. , Lim, K.S. & Crowley, J.D.	Water-Soluble Cobalt(III)-Polypyridyl Complexes: Synthesis, Structures and Properties	<i>European Journal of Inorganic Chemistry</i> (2025)
Yang, J., Leitao, E.M. , Nascimento, M.A., Christopher, T.D., Söhnle, T. , Chen, T., Gahan, L.R. & Blackman, A.G.	Werner Complexes Can Still Surprise: The Chelated O ₂ BOH ₂ - Ligand	<i>Inorganic Chemistry</i> 64 , 13415-13421 (2025)
Howell, Y., Blaikie, R. & Lowrey, S.	Wetting of soap bubbles on topographic surfaces	<i>Journal of Colloid and Interface Science</i> 677 , 1014-1021 (2025)
Lei, Z., Wang, J., Hui, B., Si, H., Liu, Z., Zhao, C., Cao, P. , Yu, D. & Huang, S.	α-Sr ₂ SiO ₄ :Ce ³⁺ , Dy ³⁺ , Na ⁺ phosphors with abnormal thermal quenching properties for solid-state lighting applications	<i>Journal of Luminescence</i> 277 (2025)
Sun, X., Chan, E.W.C., Shiraz, F.R., Zhu, B. , Yang, J., Matura, K., Sarojini, V., Tekoglu, S., Barker, D. & Travas-Sejdic, J.	ε-Poly-L-lysine-graft-oligo(3-hexylthiophene) Copolymers as Antibacterial and Biodegradable Polymer Electronics	<i>Advanced Science</i> (2025)

Book chapters

AUTHORS	CHAPTER TITLE	BOOK TITLE	PUBLISHER
Griffey, E. & Nieuwoudt, M.	Beautiful Experiments: Reading and Reconstructing Early Modern European Cosmetic Recipes	<i>Embodied Experiences of Making in Early Modern Europe: Bodies, Gender, and Material Culture</i>	Routledge
C. Wood, B., Fjellvåg, H., Rowberg, A. J. E., Witman, M. D., Wood, B. C., Kang, S. Y., Heo, T. W., Li, S., Alvares, E., Jerabek, P., Song, Y. & Sellschopp, K.	Computational studies of metal-hydrogen systems as hydrogen storage materials	<i>Metal Hydrides for Hydrogen-Based Energy Storage, Volume 1: Fundamentals</i>	Elsevier
He, Z., Zhang, S., Yin, L., Hayat, M.D. & Cao, P.	Cu-TiO ₂ Nanocomposite Coatings Prepared from Sol-Enhanced Electrodeposition#	<i>Materials, Manufacturing Processes and Devices</i>	World Scientific
Fang, F., Futter, J., Hutchinson, E., Leveneur, J. & Kennedy, J.	Enhanced Thermal Conductivity of Nanofluids Made of Metal Oxide Nanostructures Synthesized by Arc Discharge Method	<i>Materials, Manufacturing Processes and Devices</i>	World Scientific
Evans, P.G., Sando, D. & Valanoor, N.	Introduction	<i>X-Ray Scattering Techniques for Epitaxial Oxide Thin Films</i>	Springer
Whitby, C.P.	Recent Advances in Controlling Emulsion Stability	<i>Emulsions: From Single Interfaces to Applications</i>	Routledge
Zhang, T., Ye, J., Arul, R., Yang, T., Wang, Y., Yue, X., Schaefer, M., Simpson, C., Nieuwoudt, M.K. , Huang, S., Wei, S. & Gao, W.	Surface-Enhanced Raman Scattering (SERS) by Ag Nanoparticles on Anodized TiO ₂ -X Nanotubes	<i>Materials, Manufacturing Processes and Devices</i>	World Scientific
Zhang, T., Liu, Y., Christopher, T.D., Huang, S., Yang, T., Huang, Z., Gao, W., Söhnel, T. & Cao, P.	The Influence of Co-doping Strontium and Zirconium on Structure and Ionic Conductivities of Li ₆ +yLa ₃ -ySryNbZrO ₁₂ Solid Electrolytes	<i>Materials, Manufacturing Processes and Devices</i>	World Scientific

Conference papers

AUTHORS	TITLE OF CONFERENCE PAPER	TITLE OF PROCEEDINGS
Gaikwad, V., Heffernan, B., Lapthorn, A., Cateley, R., Hyndman, A. & Reeves, R.	Characteristic Variations Between Commercial GaN HEMTs at Cryogenic Temperatures Down to 4K	<i>IEEE Southern Power Electronics Conference, SPEC</i>
Gliese, F., Pearce, M.G.S., Wadsworth, A., Siamaki, M., Storey, J. , Lumsden, G., Thrimawithana, D.J., Badcock, R., Roth-Stielow, J. & Neuburger, M.	Characterization and Control of a Superconducting Homopolar Motor with Cryogenic GaN Inverter for Electric Aircrafts	<i>2024 IEEE Energy Conversion Congress and Exposition, ECCE 2024 - Proceedings</i>
Larsen, T., Kim, S., Kennedy, J. & Liu, J.	Improving PEM Hydrogen Electrolyser Efficiency using AC Excitation	<i>2024 IEEE Energy Conversion Congress and Exposition, ECCE 2024 - Proceedings</i>
Matthews, S. , Tangtrakulcharoen, P. & Berger, L.-M.	Characterisation of HVOF and shrouded plasma sprayed Cr3C2-CoNiCrAlY Coatings – Feedstock, as-sprayed and equilibrium heat treated coatings	<i>Thermal Spray 2025 - Sustainable Innovations in Thermal Spray Technology: Pioneering A Greener Future, Proceedings from the International Thermal Spray Conference and Exposition</i>
Huang, Z., Xue, B., Zhang, M., Rooney, J.S., Gordon, K.C. & Killeen, D.P.	Designing New Data Augmentation Functions for Fish Spectral Data by Genetic Programming	<i>GECCO 2025 Companion - Proceedings of the 2025 Genetic and Evolutionary Computation Conference Companion</i>
Suter, M., Moore, C.P. , Gostomski, P., Carere, C.R. & Ladin, D.	Low-Concentration Methane Measurement in a Dairy Barn Environment	<i>2025 IEEE Region 10 Symposium: Innovations in Technology: Shaping the Future, TENSYP 2025</i>
Zhou, Y., Chen, G., Xue, B., Zhang, M., Rooney, J.S., Lagutin, K., MacKenzie, A., Gordon, K.C. & Killeen, D.P.	Machine Learning for Raman Spectroscopy-Based Cyber-Marine Fish Biochemical Composition Analysis	<i>Lecture Notes in Computer Science</i>
Sun, Y., Tayagui, A., Garrill, A. & Nock, V.	Microfluidic Platform for High-Resolution Imaging of Oomycete Spores Exposed to Osmotic Stress	<i>IEEE International Conference on Micro Electro Mechanical Systems (MEMS)</i>
Bishop, C.M. , Ford, K.T., Takaloo, A.V., Marshall, A.T. & Watson, M.J.	Molten Oxide Electrolysis for Production of Technology-Critical Metals	<i>Minerals, Metals and Materials Series</i>
Shahid, H., Chen, L., Alkaisi, M. & Moore, C.P.	Performance Enhancement and Stability of Chitosan-Doped TiO2 Electron Transport Layers for Perovskite Solar Cells	<i>2025 IEEE Region 10 Symposium: Innovations in Technology: Shaping the Future, TENSYP 2025</i>
Huang, C.-C., Hsieh, C.-Y., Chen, B.-H., Chen, K. & Yang, S.-D.	Sub-80 fs High-Repetition Rate Transient Grating Photoluminescence Spectroscopy Using Two Types of Nonlinear Pulse Compressors	<i>2025 Conference on Lasers and Electro-Optics, CLEO 2025</i>
McGifford, E., Arnal, R.D. & Chen, J.P.J.	Towards Fabrication of a Capacitive Micromachined Ultrasonic Transducer Array at the University of Canterbury	<i>2025 IEEE Region 10 Symposium: Innovations in Technology: Shaping the Future, TENSYP 2025</i>

Keynote and invited speaker addresses 2025

NAME	DETAILS
Simon Brown	Plenary speaker at the 5th International Symposium on Emerging Memory and Computing (ISMC), Sofia, Bulgaria, 3-6 June 2025. “Brain-like computing with networks of nanoparticles”
Chris Bumby	Keynote speaker at the AusIMM NZ Annual Conference 2025, Queenstown, New Zealand, 24-26 August 2025. “Beyond dig-and-ship: The potential for onshore value-add processing of NZ’s critical mineral resources”
Martyn Coles	Keynote speaker at the 2nd International Conference on Main Group Synthesis and Catalysis (ICMGSC-2025), Thiruvananthapuram, India, 13-16 February 2025. “AluminyI Anions as a Platform for the Synthesis Of Bimetallic Al–{M} Complexes”
Erin Leitaο	Plenary speaker at OZOM 15 (RACI conference), Brisbane, Australia, 22-25 June 2025. “Combining sulfur with silicone: a route to recyclable silicone vitrimers”
Steven Matthews	Keynote speaker at the Symposium on Emerging Materials and Innovation in Thermal Spray, Melbourne, Australia, 1-3 December 2025. “Thermally Induced Metallurgical Processes in WC-CoCr Thermal Spray Coatings as a Function of Carbide Dissolution”
Geoff Waterhouse	Plenary speaker at the 2025 Chinese Academy of Engineering (CAE) Symposium on Engineering Science and Technology & 12th International Symposium of Food Science-Promoting Beautiful Countryside & Accelerating Development of Agricultural Products Processing and Storage, Changsha, China, 9-11 August 2025. “Smart Utilization of Nanotechnology in Food Safety Assessment” Plenary speaker at the 3rd Cross Strait and Hong Kong Macao Traditional Chinese Medicine Technology Innovation Conference, Zhengzhou, China, 12-14 August 2025. “Emerging Advances in Surface Enhanced Raman Spectroscopy for Food Safety Monitoring”
Cameron Weber	Keynote speaker at the 10th Congress on Ionic Liquids, Perth, Australia, 17-21 November 2025. “Rethinking the implementation of ionic solvents for organic reactivity: Consideration of green chemistry principles”
Geoff Willmott	Keynote speaker at MicroTAS, Adelaide, Australia, 2-6 November 2025. “1-2-3: Controlled, Particle-By-Particle Analysis of Colloidal Mechanics and Interactions”



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