School of Chemistry

Report 2021

UNSW SYDNEY

2021 School of Chemistry Annual Report,
The University of New South Wales

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Australia

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1 HEAD OF SCHOOL REPORT

COVID Year, Mk II.

2021 started so promisingly. The Northern Beaches outbreak of late 2020 seemed behind us.

Face-to-face teaching laboratories had resumed and Honours and PhD projects were proceeding apace. But on June 26th, the NSW government started imposing lockdowns when it was clear that the Delta outbreak had gotten out of control. For the rest of the year, most of us were working from home, with the small cohort of people allowed on campus to keep the research fires smoldering worked under quite restrictive conditions.

The 2021 lockdowns felt different to the 2020 ones.

The 2021 lockdowns felt different to the 2020 ones. They were stricter and longer-lasting, and imposed differently on different parts of the city. If the 2020 lockdowns were a bit "novel", the 2021 lockdowns were draining on resilience and mental health. Honours students were less prepared than in 2020 as the lockdown occurred in the prime research time of mid-year – just when most were sufficiently skilled up to gather the best data. Undergraduate laboratory education was becoming increasingly problematic as students entered their second year of inadequate laboratory experience. In 2020, researchers utilized the work-from-home time effectively, producing the highest

number of research papers in the history of the School. But the research backlog had largely been written up by 2021, so the number of research papers will likely drop back down again in 2022.

Despite the challenges of COVID, there were some stunning achievements in the School. The foremost was the establishment of the RNA Institute, led by Professor Pall Thordarson, a collaboration across the Faculties of Science, Medicine and Engineering. There is no doubt that the emergence of mRNA vaccines during the pandemic has raised the public and government awareness of RNA technology for disease treatment and the RNAi has been set up to explore such treatment across a wide spectrum of disease.

Scientia Professor Justin Gooding was awarded the RACI Applied Research Medal as well as the ANSTO Eureka Prize for Innovative use of Technology, Professor Tim Schmidt was the recipient of the RACI Physical Chemistry Medal and Scientia Professor Martina Stenzel was honoured with the IUPAC Distinguished Women in Chemistry or Chemical Engineering award.

The School launched its new website in July, on the Drupal 8 platform. A lot of work went into the development and construction of the website and I thank the entire teaching team for re-building all the teaching material and student advice and all the researchers for updating their research profiles – the School webpages will be far better than the old site. Deep thanks to Vanessa Gotting who coordinated the entire project. Almost as soon as we launched, we were told that the whole UNSW website would be moving across to a new underpinning architecture in 2022, but I know that all the hard work will not be wasted and will be transported across to the new platform.

From a staff perspective, there has been some movement in the School Executive. Associate Professor Jason Harper took over as Deputy Head of School from Professor Pall Thordarson when he became Director of the RNAi. Shortly thereafter, I was asked to be acting Deputy Dean (Education) from September for 6-months to cover maternity leave for Alison Beavis. I remained Head of School, which would not have been possible without off-loading many of the HoS responsibilities to other members of the School Executive. In particular, I thank Jason Harper, who, as brand-new Deputy Head, took over a large fraction of Head of School duties.

There was also quite a lot of staff change through the year. We welcomed into the School: Dr. Jeffrey Black (Associate Lecturer), Trinah De Leon (Teaching Support Officer), Barbara Macejova (Finance), Dr. Sina Jamali (DECRA Fellow), Patrick Sells (Manager, ITTC), Dr. Nicholas Konstandaras (Health and Safety Advisor) and Dr. Elysha Williams (Research Laboratory Manager). Changing positions in the School were Dr. Joshua Peterson (Research Laboratory Manager, now RNA Institute Manager), Donavan Marney (Manager, ITTC, now Faculty of Science Business Development Manager), and leaving the School were Dr. Vinicius Goncales (Lecturer), Dr. Kim Lapere (Senior Lecturer) and Michael Gandy (Student Support Manager).

The most impactful staffing change, however, was the announcement that Professor Ian Jacobs (Vice-Chancellor) was stepping down and returning to the UK for personal reasons. At the end of the year, Professor Attila Brungs was announced as the new Vice-Chancellor, starting in the new year. Attila was VC of UTS, an alumnus of UNSW, and a graduate in industrial chemistry! The last two VCs have been in medicine and business and it will be interesting to see the difference that a scientist/ engineer might make in the strategy and operation of the university.

Stayed tuned for next year's report!

Professor Scott Kable

2 STAFF

School of Chemistry Committees

Committee Chair

Professor Scott Kable

School Executive Committee

Prof Scott Kable *(Chair)*
Scientia Prof Justin Gooding
Scientia Prof Martina Stenzel
Prof Tim Schmidt
A/Prof Jason Harper
A/Prof John Stride
Dr Toby Jackson

Committee Chair

Professor Tim Schmidt

Research Committee

Prof Tim Schmidt *(Chair)*
Prof Scott Kable
Prof Les Field
Prof Naresh Kumar
Prof Chuan Zhao
A/Prof Jon Beves
Dr Junming Ho
Dr Nicole Rijs
Dr Christopher Hansen

Committee Chair

Associate Professor John Stride

Teaching Committee

A/Prof John Stride *(Chair)*
Dr Scott Sulway *(Deputy Chair)*
Prof Scott Kable
A/Prof Neeraj Sharma
Dr Ron Haines
Dr Shannan Maisey
Dr Junming Ho
Dr Siobhan Wills
Dr Nancy Talavera
Trinah De Leon

Committee Chair

Dr Vihn Nguyen

Postgraduate Committee

Dr Vihn Nguyen *(Chair)*
A/Prof Alex Donald
A/Prof Suzanne Neville
Prof Richard Tilley
A/Prof Jason Harper
Dr Albert Fahrenbach
Dr KM Mohibul Kabir
Dr Chris Medcraft
Dr Anna Wang
Dr John Doan
Ms Sheree Munro

Committee Chair

Dr Laura McKemmish

Outreach Committee

Dr Laura McKemmish *(Chair)*

Prof Scott Kable

Prof Pall Thordison

A/Prof Graham Ball

A/Prof Kris Killian

Vanessa Gotting

Committee Chair

Dr Josh Peterson

School HS Consultation Committee

Dr Josh Peterson *(Chair)*

A/Prof Luke Hunter *(Deputy Chair)*

Prof Scott Kable

Prof Pall Thordarson

Dr Toby Jackson

Dr Martin Peeks

Dr Don Jun Kim

Dr Nicholas Konstandaras

Dr Nancy Talavera

Dr Clare Sullivan

Mr Svetislav Videnovic

Mr David Jacina

Dr Ahmed Ahmed

Shanmugarajah Balachandran

Tracey Clay *(Faculty representative)*

Student Representatives:

Jiaxin Lian

Samantha Miles

Yangfang Wu

Committee Chair

Dr Ruth Thomas

Chemistry Equity, Diversity and Inclusion Committee

Dr Ruth Thomas *(Chair)*

Prof Scott Kable

Scientia Prof Justin Gooding

Scientia Prof Martina Stenzel

Prof Pall Thordarson

A/Prof Neeraj Sharma

Dr Shannan Maisey

Dr Laura McKemmish

Dr Martina Lessio

Dr Anna Wang

Dr Dong Jun Kim

Dr Toby Jackson

Anne Ayres

Vanessa Gotting

Student Representatives:

Lori Jacobs

Parisa Moazzam

Theo Stack

Academic Staff

Associate Professor
Graham Edwin Ball

BSc (Hons), PhD, University of Sheffield, UK

Professional Activities:

- Member, Royal Australian Chemical Institute

Research:

- Chemical and biological applications of NMR spectroscopy.
- Characterisation of chemical reactive intermediates, especially organometallics.
- Elucidation structures of inorganic molecules (e.g., metal hydrides) using NMR spectroscopy
- Investigations of drug-DNA interactions.
- Chemical transformations of CO2
- Applications of computational chemistry

PhD Students:

- Jane Jung
- Dejan Mizdrak
- Christopher Pracey
- James Watson

Associate Professor
Jonathon Beves (ARC Future Fellow)

BSc (Hons I), MSc, The University of Sydney, PhD, The University of Basel

Professional Activities:

- Member, Royal Australian Chemical Institute
- Member, Royal Society of Chemistry
- NSW Representative, RACI Inorganic Division

Research:

- Supramolecular chemistry
- Transition metal chemistry
- NMR

PhD Students:

- Fayaz Ali Larik
- Ray DiNardi
- Lucy Fillbrook
- Varsha Gopalakrishnan
- Samina Rasheed
- Laura Wimberger

Honours Students:

- Anna Douglas

Dr Jeffrey Black

BSc (Nanotechnology), PhD UNSW

Professional Activities:

- Online Content Coordinator, School of Chemistry

Research:

- Using ToF-SIMS to probe chemical changes to surfaces under tribological conditions including using ionic liquid lubricants.
- Student perception of digital assessment

Associate Professor
W. Alexander Donald
(Scientia Fellow)

BSc Seattle University, PhD University of California, Berkeley

Professional Activities:

- Vice President, Australian and New Zealand Society for Mass Spectrometry
- Associate Editor (Handling Editor), Journal of Enzyme Inhibition and Medicinal Chemistry
- Editorial Board, Trends in Analytical Chemistry
- Editorial Board, Expert Opinion on Therapeutic Patents
- Editorial Board, Journal of Enzyme Inhibition and Medicinal Chemistry

Research:

- Fundamental and applied mass spectrometry, including top-down protein analysis
- Single cell chemical analysis by mass spectrometry
- Carbonic anhydrases
- Ambient pressure methods for forming, focusing, separating and detecting ions

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Postdoctoral Fellows:

- Dr Ezaz Ahmed
- Dr Giang Nguyen

PhD Students:

- Ezaz Ahmed
- Merryn Baker
- Jack Bennet (MPhil)
- Susannah Brown
- Lisa Hua
- Xiaojing Huang
- Renee Kwon
- Hyun Eui (Peter) Lee
- Qinwen Liu (MPhil)
- Alireza Mashouf
- Chi Phuong
- Melissa Sam
- Mohammad Taiiki
- Diana Zhang

Honours Students:

- Jerome Batten *(co-supervised with Dr Mohib Kabir)*
- Jeunesse Beltran
- Brian Iskandardinata
- Manatsu Nose

Dr Albert Fahrenbach

BSc (Hons) Indiana University, PhD Northwestern University

Professional Activities:

- President, UNSW Chemical Society
- Assistant Director, Australian Centre for Astrobiology
- Member, International Society for the Study of the Origin of Life
- Member, Royal Australian Chemical Institute
- Lead Seminar Organizer for NASA Astrobiology's Prebiotic Chemistry and Early Earth Environments Consortium (PCE3)
- Founded CHEM2701, Chemical Origins of Life
- Secured Oxford Chemistry Primer textbook contract with Oxford University Press
- Keynote Speaker. Towards Self-Organizing Prebiotic Reaction Networks. Pacifichem Online 2021
- Grant Reviewer: European Research Council

Research:

- Prebiotic Chemistry with a Focus on RNA
- Engineering Radiolytically Driven Reaction Networks
- Investigating RNA-Peptide Noncovalent Chemistry
- Understanding the Thermodynamics of Nonenzymatic RNA Replication

Postdoctoral Fellows:

- Dr Christine Poon

PhD Students:

- Abdur Rehman Adil (Co-supervisor)
- Luke Marshall, MPhil (Co-supervisor)
- Grace Maynard (Co-supervisor)
- Luke Steller (Joint-supervisor)
- Quoc Phuong Tran

Honours Students:

- Tejaswi Senthilkumar

Professor
Leslie David Field
B.Sc (Hons), Ph.D, D.Sc University of Sydney

Professional Activities:

- Fellow, Australian Academy of Science
- Fellow, Royal Australian Chemical Institute
- Fellow, Royal Society for Chemistry
- Fellow, Royal Society of NSW
- Member, American Chemical Society
- Judge for the Australian Museum Eureka Prize for Scientific Excellence
- Judge for the Prime Minister's Prizes for Science, Chief Scientists Office
- Member, Physical Science Panel – Hong Kong Research Grants Commission of the Hong Kong Government

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Research:

- Organometallic chemistry of coordinated dinitrogen
- Nitrogen fixation
- C-H Bond activation and functionalisation
- Organometallic chemistry of carbon dioxide
- Applications of NMR spectroscopy in organic & organometallic chemistry
- Transition metal catalysis in organic synthesis
- Organometallic polymers and new materials
- Electron conduction through organometallic frameworks

Postdoctoral Fellows:

- Dr Hsiu Lin Li

PhD Students:

- Stephen Cameron
- Silviu Dobrota
- Surabhi Naik
- James Watson (with A/Prof. Graham Ball)

Honours Students:

- Andrew Aslanidis

Dr Vinicius Romero Goncales
BSc, PhD, University of Sao Paulo, Brazil

Research:

- Wearable Sensors

Scientia Professor
J. Justin Gooding
B.Sc. (Hons) UniMelb, D. Phil (Oxon)

Professional Activities:

- Founding Co-Director, Australian Centre for NanoMedicine
- Inaugural Editor-in-Chief, *ACS Sensors*
- Founding co-Director, New South Wales Smart Sensing Network (NSSN)
- Handling editor for *Journal of Chemical and Biological Interfaces.* Member of the editorial board of the journals Electrochemistry Communications, Electroanalysis, Sensors, Nanobiotechnology, Sensors and Actuators B, Sensor Letters, Journal of Nanoeducation, Analyst, Chemical Sciences, Biosensors, Aggregate, Exploration
- Referee for the journals Nature Materials, Nature Nanotechnology,Nature, Science, Nature Communications, Journal of the American Chemical Society, Analytical Chemistry, Langmuir, Journal of Physical Chemistry B., Electroanalysis, Electrochemistry Communications, Biosensors Bioelectronics, Nucleic Acids Research, The Analyst, Chemical Communications.

Research:

- Modified surfaces for controlling surface interactions with cells for biomaterials applications (with Professor Katharina Gaus, Medicine UNSW).
- Nanoparticle based biosensors labelling and detection in for medical diagnostics (with Professor Richard Tilley, Chemistry, UNSW).
- Detection of microRNA (with Professor Maria Kavallaris, Australian Centre for NanoMedicine).
- The immobilisation of homogeneous catalyst on surfaces (led by Professor Barbara Messerle, Sydney University).
- Nanoparticle architectures for electrocatalysis (with Professor Richard Tilley, Chemistry, UNSW).

Postdoctoral Fellows:

- Dr. Padmavarthy Bakthavathsalam
- Dr. Tania Benedetti
- Dr. Eric Du
- Dr. Jasper Fried
- Dr. Lucy Gloag
- Dr. Sina Jamali
- Dr. Jiaxin (Lily) Lian
- Dr. Agus Poerwoprajitno
- Dr. Vinoth Rajendran
- Dr. Cong Vu
- Dr. James Webb
- Dr. Yanfang Wu
- Dr. Ying Yang
- Dr. Lin Zhu

PhD Students:

- Ashkan Abdibastami
- Saifal Alam
- Yosef Armin
- Danielle Bennett
- Dongfei (Phoebe) Chen
- Hsiang-Sheng (Johnson) Chen
- Xueqian Chen
- Thanh Hoang Phuong Doan
- Kim Duong
- Shreedhar Gautum
- Azhry Mohd Ghazali
- Daniel Hagness
- Sharmin Hoque
- Jacinta Houng
- Farhat Ikram
- Nilou Jamshidi
- Qinyu Li
- Kevin Mariandry
- Milad Mehidpour
- Parisa Moazzam
- Munkhshur Myekhlai
- Chidinma Oluigbo
- Peter O'Mara
- Agus Poerwoprajitno
- Zeno Ramadhan
- Matthew Sims
- Sam Somerville
- Panthipa Suwannakot
- Cong Vu
- Johanna Wordsworth
- Sa Xiao

Dr Ronald Stanley Haines

B.Sc. in Pure and Applied Chemistry, Ph.D. UNSW

Professional Activities:

- First Year Chemistry Laboratory Coordinator
- School of Chemistry IT Coordinator
- Member, School of Chemistry Teaching Committee

Research:

- Chemical kinetics - the influence on reaction mechanisms of ionic liquids as solvents.
- Chemical education - assessment and instruction in undergraduate Chemistry laboratories.

PhD Students:

- Andrew Hsieh
- Kenny Liu

Dr Christopher Hansen

(ARC DECRA Fellow)

B.NanotechAdv (Hons), PhD, University of Wollongong

Professional Activities:

- Organised and chaired the RACI Physical Chemistry Division's 'Physical Chemistry Summer Festival'

Research:

- Chemical Reaction Dynamics and Spectroscopy
- Atmospheric Chemistry
- Interstellar and extra-terrestrial photochemistry

PhD Students:

- Joshua Thomson

Honours Students:

- Matthew Taylor

Associate Professor
Jason Brian Harper

B.Sc., University of Adelaide, B.Sc. (Hons), Ph.D. Australian National University

Professional Activities:

- Deputy Head of School, School of Chemistry
- Deputy Director of Teaching, School of Chemistry
- Titular, Division III (Organic), International Union of Pure and Applied Chemistry
- Member, IUPAC Subcommittee on Structural and Mechanistic Organic Chemistry
- Editor, Chemical Physics
- Serial Co-editor, Advances in Physical Organic Chemistry
- Handling and Associate Editor, Frontiers in Chemistry
- International Advisory Board, ChemPlusChem
- Guest editor ACS journals (Journal of Organic Chemistry) special issue (Solvation Effects in Organic Chemistry)
- Reviewer for national funding bodies and promotion applications: Australia, Canada
- Ph.D. Examiner: Australia, New Zealand, Pakistan
- President and Treasurer, Southern Highlands Conference on Heterocyclic Chemistry
- Fellow, Royal Australian Chemical Institute
- Member, American Chemical Society
- Member, Royal Society of Chemistry
- Director, Systems Chemistry Australia

Research:

Application of physical organic chemistry to understanding organic processes, including:

- The development of an understanding of ionic liquids as novel reaction media, and their application.
- The examination of the chemical and physical properties of N-heterocyclic carbenes
- The investigation of novel NMR spectroscopic methods for monitoring reaction kinetics
- Analysis of the mechanisms of action of novel lubricants.

PhD Students:

- Alicia Evans
- Andrew Hsieh
- Kenny Liu
- Daniel Morris
- Benjamin Smit-Colbran

Honours Students:

- Yije (Jeffrey) Gao

Dr Junming Ho

BSc, UWA, BSc (Hons), PhD ANU

Professional Activities:

- Editor, Chemical Data Collections (Elsevier)
- ARC grants assessor
- Treasurer, Association of Molecular Modellers of Australasia

Research:

- Computational chemistry
- Physical organic chemistry
- Biomolecular simulations

PhD Students:

- Junbo Chen
- Wanutcha Lorpaiboon
- Gabriella Marcolin (MSc)
- Isolde Sandler
- Mackenzie Taylor
- Minzhi Wang

Honours Students:

- Haedam Mun

Associate Professor
Luke Hunter

BSc (Advanced) (Hons), PhD, The University of Sydney, Graduate Certificate in University Learning and Teaching, UNSW

Professional Activities:

- Regular reviewer of journal articles and grant applications

Research:

- Optimisation of diverse bioactive compounds through stereoselective fluorination
- Design of DNA-targeted anticancer drugs
- Design of neuroprotective agents for the treatment of stroke
- Identifying inhibitors of telomerase through virtual high-throughput screening
- Efficient, safe methods for synthesising aryl-SF5 compounds

Postdoctoral Fellows:

- Dr Caspar de Bruin-Dickason

Honours Students:

- Yuki Suzuki

PhD Students:

- Mohiminul Adib
- Julia Chov
- Grace Constable
- Samantha Miles
- Nicole Richardson
- Patrick Ryan
- Glen Surjadinata
- Daniel Weissberger

Dr Sina Jamali (ARC DECRA Fellow)

BSc, MSc Amirkabir University of Technology,
PhD University of Wollongong

Professional Activities:

- Associated Editor, Frontiers in Sensors (specialty section of Electrochemical Sensors)
- Member, Topical Advisory Panel of Reactions, an MDPI published journal
- Guest editor, Metals (IF=2.35) for a special issue on "Surface Modification of Metallic Biomaterials"
- Member, International Society of Electrochemistry, Bioelectrochemistry division

Research:

- Electroanalytical chemistry, biosensor, biomaterials

Dr K.M. Mohibul Kabir
(ARC DECRA Fellow)

BSc (Hons), MSc, Electrical & Electronic Engineering, Islamic University of Technology, Bangladesh, PhD Applied Chemistry, RMIT

Professional Activities:

- Member, School of Chemistry Postgraduate Research Committee
- Panel member, Postgraduate students' annual progress reviews
- Panel member, Honours thesis and viva

Research:

- Development of high-resolution ion mobility spectrometry for chemical separation
- Microscale sensor development for volatile biomarker detection
- Mentoring research students working in different projects including (i) ion mobility spectrometer and (ii) ion focussing instrument, and (iii) volatile organic compound analysis for disease diagnosis and forensic applications.

PhD Students:

- Ezaz Ahmed (Co-supervisor)

Honours Students:

- Jerome Batten

Professor
Scott Henderson Kable

B.Sc. (Hons), (Griffith), Grad. Dip. Business Admin. (QUT)
PhD (Griffith)

Professional Activities:

- Fellow, Royal Australian Chemical Institute
- Fellow, Royal Society of NSW

Research:

- Atmospheric chemistry and modelling
- Photochemical reaction dynamics
- Spectroscopy of free radicals

Postdoctoral Fellows:

- Dr Klaas Nauta

PhD Students:

- Jyoti Campbell
- Lorrie Jacob (Masters)
- Maria Perez-Pena
- Blair Welsh

Honours Students:

- Joshua Thomson

Associate Professor
Kris Kilian
BS, MS University of Washington, PhD UNSW

Professional Activities:

- Theme Lead, Biomedical & Health Theme, School of Materials Science and Engineering
- Co-Director, Australian Centre for NanoMedicine
- Associate Editor, Journal of Biomedical Materials Research Part A
- Associate Editor, Scientific Reports

Research:

- Biomaterials design
- Hydrogel chemistry
- Mechanochemistry and mechanobiology
- Cell, tissue and organoid engineering
- Model tumour microenvironments.

Postdoctoral Fellows:

- Dr Sylvia Ganda
- Dr Chantal Kopecky
- Dr Zihao Li

PhD Students:

- Jake Ireland
- Gagan Jalandhra
- Kang Lin
- Yiling Liu
- Thomas Molley
- Stephanie Nemec
- Ashley Nguyen
- Vina Putra
- Md. Shariful islam
- Pallavi Srivastava

Honours Students:

- Chavinya Ranaweera
- Mark Richardson
- Theo Stack
- Zeheng Zhao

Dr Dong Jun Kim (ARC DECRA Fellow)

BSc, Materials Science & Engineering, Yonsei University, South Korea, PhD, Materials Science and Engineering, Korea Advanced Institute of Science and Technology, South Korea

Research Activities:

- Energy storages
- Rechargeable batteries
- Artificial molecular machines

Postdoctoral Fellows:

- Dr Ji Eun Wang

PhD Students:

- Xinchen Dai
- Christopher Lee

Professor
Naresh Kumar

BSc (Hons 1), MSc, Punjab Agricultural University, India
PhD University of Wollongong, Australia

Professional Activities:

- School representative for Industry Enterprise
- Member, Royal Australian Chemical Institute
- Member, American Chemical Society
- Member International Society of Heterocyclic Chemistry
- Chair, RACI (NSW) Natural Products Chemistry Group
- Member, RACI Bioactive Discovery and Development Group
- Assessor, ARC Discovery projects
- Assessor, ARC Future Fellowship applications
- Research project evaluation for Auckland Medical Research Fund, and Cancer Society of New Zealand
- Reviewer, Academic Research Fund applications, Nanyang Technological University, Singapore
- PhD thesis examiner for national and international universities
- Referee for Tetrahedron Letters, Tetrahedron, Organic and Biomolecular Chemistry, Bioorganic Chemistry, Bioorganic and Medicinal Chemistry Letters, European Journal of Medicinal Chemistry, Journal of Organic Chemistry, ACS Omega, Journal of Medicinal Chemistry, Biofouling, Langmuir, Biomaterials, and Acta Biomaterialia

Research:

- Design and synthesis of novel antimicrobial agents including quorum-sensing inhibitors and antimicrobial peptide mimics
- Design and synthesis of novel anticancer agents
- Development of synthetic methodologies for the preparation of biologically important natural products and their analogues
- Heterocyclic chemistry
- Novel antimicrobial biomaterials

Postdoctoral Fellows:

- Dr Vina Aldilla
- Dr Renxun Chen
- Dr Rajesh Kuppusamy
- Dr Daniel Wenholz

PhD Students:

- Ghayah Bahatheg
- Katrina Brownie
- Sudip Chakraborty
- Valerio Falasca
- Xiaoming Fu
- Satyanaryana Gadde
- Zijian Hong (MPhil)
- John Jones (MPhil)
- Sun Jun
- Maryam Mirabediny
- Phuoc Lin Dan Nguyen
- Eloise O'Brien (MIR)
- Robert Rourke
- Shekh Sabir
- Sandy Yang
- Cheng Yao
- Tsz Tin Yu

Honours Students:

- Lindy Nguyen
- Romano Do Rosario

Dr Martina Lessio

B.Sc, M.Sc Universitá degli Studi di Torino (Italy), M.A, Ph.D Princeton University

Professional Activities:

- Member, Royal Australian Chemical Institute

Research:

- Computational chemistry and materials science for sustainability applications
- Computational homogeneous and heterogeneous catalysis
- Simulation of porous materials for water remediation applications
- Computational surface science for art conservation

PhD Students:

- Fabio Colasuonno
- Claudia Cox
- William Huang (MPhil)

Honours Students:

- Vivien Li
- Jierui Zhang

Dr Shannan Maisey

BSc (Hons), BCom, PhD, UWA, Grad Certificate – University Learning and Teaching, UNSW

Professional Activities:

- Member, Royal Australian Chemical Institute (NSW) Chemical Education group
- Director of 1st Year Chemistry, UNSW

Research:

- Assessment and Feedback in chemistry education
- Skill development in university STEM programs

Dr Laura McKemmish

BSc (Adv, Hons), The University of Sydney, PhD ANU

Professional Activities:

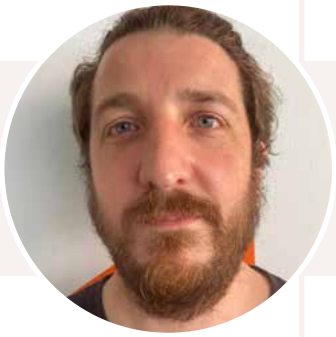
- Secretary, Royal Australian Chemical Institute PhysChem Division
- Coordinator, SciX Summer School
- Chair, UNSW Chemistry Outreach and Marketing Committee

Research:

- Benchmarking of quantum chemistry methodologies for vibrational frequency calculations
- High-throughput approaches in quantum chemistry
- Evaluation of small diatomic and polyatomic molecules as potential astrophysical probes of proton-to-electron mass variation over cosmological time

PhD Students:

- Anne-Maree Syme
- Juan Trujilo Zapata



Dr Christopher Medcraft

(ARC DECRA Fellow)

BSc (Hons), PhD, Monash

Professional Activities:

- Member, Royal Australian Chemical Institute
- Member, Royal Society of Chemistry

Research:

- Identifying and quantifying the formation of greenhouse gases from HFOs using microwavespectroscopy

Professor and Dean of Graduate Research

Jonathan Charles Morris

BSc (Hons) UWA, PhD ANU

Professional Activities:

- Dean of Graduate Research
- Fellow, Royal Australian Chemical Institute
- Member, American Chemical Society.
- Referee for ACS, RSC, Wiley and Elsevier Journals.

Research:

- Total synthesis of biologically active natural products
- Design of inhibitors of kinases that regulate alternative splicing [with Emenda]
- Applications of the Diels-Alder reaction to the synthesis of biologically active molecules
- Design of phosphatase activators (with Dr Matt Dun and Dr Nikki Verrills, University of Newcastle)
- Medicinal chemistry

Postdoctoral Fellows:

- Dr Iliya Dragutinovic
- Dr Tom Hawtrey

PhD Students:

- Tess Mutton
- David Neale
- Matthew Petersen
- Quantao Sun

Honours Students:

- Georgina Chiu
- Oscar Girgis-Cook

Associate Professor
Suzanne Neville (ARC Future Fellow)

BSc (Hons), PhD, The University of Sydney

Research:

- Molecular sensing in porous materials
- Molecule-based switches
- Pyrite decomposition for battery materials

Postdoctoral Fellows:

- Dr Christopher Didier
- Dr Lida Ezzedinloo

PhD Students:

- Manan Ahmed
- Ashley Brennan
- Monica Hibberd (MSc)
- Hamish McDougall (MSc)
- Luonan Xu

Dr Vinh Nguyen (ARC Future Fellow)

B.Eng (1st class Hons) UNSW, Ph.D ANU

Professional Activities:

- Member, Royal Australian Chemical Institute

Research:

- Synthetic methodology

PhD Students:

- An Huy Dinh
- Son Hoai Doan
- Emily Jacobs
- Eloise O'Brien (MPhil)
- Domenic Pace
- Sujlesh Sharma
- Tuong Anh To
- Nhan Nu Hong Ton

Honours Students:

- Jasnoor Mann
- Bonnie Pu

Dr Martin Peeks (UNSW Scientia Fellow)

MChem, St Andrews, DPhil, Oxford

Professional Activities:

- Member, Royal Australian Chemical Institute
- Member, Faculty of Science Sustainability Working Group
- Referee for several journals and funding agencies

Research:

- Functional organic molecules and physical-organic chemistry

PhD Students:

- Stephen Bortolussi
- David Bradley
- Bethany Hiller

Honours Students:

- Nicholas Lynch

Dr Nicole Rijs (ARC DECRA Fellow)

BSc (Hons), PhD, University of Melbourne

Professional Activities:

- DAAD Research Ambassador
- Committee member, Australian and New Zealand Society for Mass Spectrometry (ANZSMS)

Research:

- Gas Phase Ion Chemistry
- Mass Spectrometry
- Electrospray mechanisms
- Ion-Mobility
- DFT
- Supramolecular
- Modelling gas phase structure and reactivity

Postdoctoral Fellows:

- Dr Lida Ezzedinloo

PhD Student:

- Olivia Rusli
- Oscar Lloyd Williams
- Meng Yuan Zhang (MPhil)

Professor
Timothy Schmidt

BSc (Hons) The University of Sydney, PhD Cambridge

Professional Activities:

- Review Editor, Frontiers in Astronomy and Space Science
- Member, Pacifichem Organizing Committee - Misconceptions in Astrochemistry: A Chemist's Guide
- Editorial Board, Journal of Photonics for Energy
- Member, International Advisory Committee - International Conference on High Resolution Molecular Spectroscopy

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Research:

- Excitonics
- Astrochemistry
- Electronic Structure

Postdoctoral Fellows:

- Dr Jessica Alves
- Dr Jiale (Phliip) Feng
- Dr Benjamin Laws
- Dr Thilini Ishwara
- Dr Shyamal Prasad

PhD Students:

- Damon de Clercq (joint with Chem. Eng.)
- Cameron Dover
- Zachary Levey
- Rosina Pelosi

Honours Students:

- Benjamin Tran

Associate Professor
Neeraj Sharma (ARC Future Fellow)
B Advanced Science (Hons 1), PhD The University of Sydney

Professional Activities:

- Member, National Committee for Crystallography (NCCr), Australian Academy of Sciences
- Member, Beamline Advisory Panel (BAP) - Australian Synchrotron, Advanced Diffraction & Scattering (ADS)
- Member, Program Advisory Committee - X-ray Absorption Spectroscopy (XAS) Beamline
- Director & Founder, Australian Battery Society

Research:

- Fundamental research and materials discovery for the next generation of batteries including sodium- and potassium-ion batteries and lithium-sulfur batteries
- Recycling and sustainably producing batteries
- Scaffolding layered electrode materials
- Tuning negative thermal expansion to produce zero thermal expansion materials
- Using and understanding electrochemically-activated solid state synthesis
- In situ studies of materials and processes
- Structural investigations using neutron and X-ray scattering

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Postdoctoral Fellows:

- Dr Henrik Andersen
- Dr. Uttam Mittal

PhD Students:

- Emily Cheung
- Lisa Djuandhi
- Michael Fenech
- Conrad Gillard
- Jennifer Stansby
- Matthew Teusner
- Jimmy Wu

Honours Students:

- Ivan Johan
- Liam McKinlay

Scientia Professor
Martina Heide Stenzel

MSc, University of Bayreuth, Germany
PhD University of Stuttgart, Germany

Professional Activities:

- Co-Director, ARC Training Centre for Chemical Industries
- Fellow, Australian Academy of Science
- Fellow, Royal Australian Chemical Institute
- Editor in chief, RSC Journal Materials Horizon
- Scientific Advisory Board of Angewandte Chemie
- Member, editorial board of the journals Macromolecular Bioscience, Macromolecular Rapid Communications, Biomacromolecules, Polymer Chemistry, Journal of Materials Chemistry B and Acta Biomaterialia, ACS Biomaterials Science and Engineering
- Chair, National Chemistry Committee of the Australian Academy of Science.

Research:

- New polymer materials for drug delivery
- Self-assembly of polymers into nano-objects such as cylindrical micelles, vesicles, spherical micelles and other structures
- Nanoparticles for enzyme stabilization
- Nanoparticles with proteins or sugars to generate bioactive nanoparticles with high affinity for cancer cells
- Macromolecular ligands for metal complexes and their use in cancer therapy
- Investigation into the interaction of nanoparticles with cancer cells in 2D and in 3D multicellular spheroids

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Postdoctoral Fellows:

- Dr Cheng Cao
- Dr Mitch Nothling
- Dr Radhika Raveendran
- Dr Chin Ken Wong

PhD Students:

- Henry Foster
- Sylvia Ganda
- Zifei Han
- Vo,Yen Hoang
- Nidhi Joshi
- Yee Khine
- Yimeng Li
- Tian Linqing
- Jordan Lovegrove
- Russul Mamdooh
- Daniele Melodia
- Marzieh Monfared
- Ahmed Mustafa
- Farazi,Shegufta Nasrin
- Nidhi Rana (MPhil)
- Aneeqa Safdar
- Evelyn Szabo
- Guannan Wang
- Yiping Wang
- Sandy Wong
- You Dan Xu
- Lin Zhang
- Li,Zihao
- Master of Industrial Research Students:
- Leo James
- Samuel Selvadoss
- Callan Wear

Honours Students:

- Furkan Kilic
- Jack May
- Sofia Lorentzen Van Buuren

Sir Fraser Stoddart

Nobel Laureate

BSc, PhD, University of Edinburgh, FRS, FRSE, FRSC

Professional Activities:

- Professor of Chemistry and Head of the Stoddart Mechanostereochemistry group, Northwestern University, Illinois, USA
- Head of research laboratory, Tianjin, China
- Fellow, Royal Society of New South Wales
- Member, European Academy of Sciences and Arts
- Member, National Academy of Sciences, USA
- Member, American Academy of Arts and Sciences
- Honorary Fellow, Royal Society of Edinburgh, UK
- Honorary Fellow, Royal Society of Chemistry, UK

Research:

- Artificial molecular machines
- Functional materials

PhD Students:

- Christopher Lee

Associate Professor
John Arron Stride

BSc (Hons.) Ph.D. (Chemistry), University of East Anglia, UK

Professional Activities:

- UNSW AINSE Delegate

Research:

- Molecular magnetism
- Nanostructured materials
- Molecular dynamics
- Photo-active devices
- Porous framework materials

Postdoctoral Fellows:

- Dr Zhichen (Jeffrey) Yan

PhD Students:

- Jason Holland
- Md Habibur Rahaman
- Asya Tawfiq (MSc)

Dr Scott Andrew Sulway

MChem (Hons), Ph.D, University of Manchester, P.G.C.E. Secondary Science (Chemistry), Manchester Metropolitan University

Professional Activities:

- Member, School of Chemistry Teaching Committee

Research:

- Lanthanide coordination chemistry
- Magnetic interactions of lanthanide complexes

PhD Students:

- Jarrod Robert Thomas

Honours Students:

- Cameron Marcus Gould
- Emily Alexandra Murray-Nobbs

Professor
Pall Thordarson

BSc. Chemistry, University of Iceland, PhD Chemistry, University of Sydney

Professional Activities:

- Director, UNSW RNA Institute
- Leader, RNA Bioscience Alliance (NSW Vice-Chancellor's Committee)
- President-Elect and Board member Royal Australian Chemical Institute.
- Editorial board member – Commissioning Editor, the Australian Journal of Chemistry.
- Editorial board member, ChemSystemsChem (Wiley).
- Editorial board member, Cell Physical Science – Cell Press (Elsevier)
- Co-Chair, International Symposia on Macrocyclic and Supramolecular Chemistry (ISMSC) in Reykjavik, Iceland
- Member, Royal Australian Chemical Institute, The American Chemical Society, The Royal Society of New South Wales, The Icelandic Chemical Society, Society of Porphyrins and Phthalocyanines (SPP), The Australian Microscopy and Microanalysis Society and the Marie Curie Fellowship Association
- Member, Australian Research Council (ARC) College of Experts

Research:

- RNA therapeutics and industry
- Systems Chemistry
- Origin of life (pre-biotic chemistry)
- Self-assembled gels for biomedical applications and electroactive displays.
- RNA – peptide interactions.
- Non-linear interactions in supramolecular chemistry

Postdoctoral Fellows:

- Dr Aaron Kennedy
- Dr Hsiu Lin Li

PhD Students:

- Abdur Rehman Adil
- Fayaz Ali
- Karrar Al-Latef
- Changzhuang Bai
- Chelsea Forest
- Toby Funston (MIR – Master of Industrial Research)
- Han Han
- Luke Marshall (MPhil)
- Grace Maynard
- Keerthana Nakka

Honours Students:

- Anika Moller
- Joel Rivers

Professor
Richard Tilley
MChem Oxford, PhD Cambridge

Professional Activities:

- Member of the Editorial Board, Chemistry of Materials and ChemNanoMat

Research:

- Electron Microscopy
- Nanoparticle catalysts and biomedical imaging agents

Postdoctoral Fellows:

- Dr Lucy Gloag
- Dr Agus Poerwoprajitno

Honours Students:

- Liam Barrera PhD Students:
- Ashkan Abdibastami
- Hong Thien Kim Duong
- Azrhy Mohd Ghazali
- Farhat Ikram
- Qinyu Li
- Kevin Mariandry
- Chidinma Oluigbo
- Zeno Rizqi Ramadhan
- Sa Xiao

Dr Anna Wang

(ARC DECRA Fellow and UNSW Scientia Fellow)

BSc (Adv, Hons) The University of Sydney, MSc & PhD Harvard University

Professional Activities

- Pacifichem, Host and organiser for 2 sessions
- Assistant Director, Australian Centre for Astrobiology
- Co-Chair, Science Early Career Academic Network

Research:

- Digital holographic microscopy
- Building protocells
- Astrobiology and origins of life
- Membrane self-assembly
- Membrane biophysics
- Surface and colloidal science

PhD Students:

- Daniel WK Loo
- Lauren Ann Lowe
- Siddharth Rawat

Dr Siobhan Wills

BSc, PhD, UWA

Professional Activities:

- Committee member, Royal Australian Chemical Institute, Chemical Education Division
- Co-lead, Digital assessment and student feedback community of practice

Research:

- Chemical Education
- Digital assessment
- Assessment literacy
- Student engagement
- Students' metacognition and creativity

Professor
Chuan Zhao (ARC Future Fellow)
MSc, PhD Northwest University

Professional Activities:
- Chair of Electrochemistry Division, Royal Australian Chemical Institute
- Future Fellow, Australian Research Council
- Fellow, Royal Society of New South Wales
- Fellow, Royal Society of Chemistry
- Fellow, Royal Australian Chemical Institute

Research:
- Electrochemical energy conversion and storage

Postdoctoral Fellows:
- Dr Kamran Dastafkan
- Dr Chen Jia
- Dr Yibing Li
- Dr Quentin Meyer

PhD Students:
- William Adamson
- Muhammad Ibrar Ahmed
- Karin Ching
- Haocheng Guo
- Chen Jia
- Shiyang Liu
- Chengli Rong
- Zhen Shi
- Zhen Su
- Qian Sun
- Shuhao Wang
- Sicheng Wu
- Ni Yan
- Xiao Yang
- Tingwen Zhao

Honours Students:
- John Sharples
- Xinyi Zhang

Academic Staff Awards

Scientia Professor Justin Gooding

National Health & Medical Research Centre
Level 3 Investigator Award

Australian Museum
ANSTO Eureka Prize for Innovative Use of Technology

Spiers Memorial Lecture
Faraday Discussions 233, Next Generation Nanoelectrochemistry.

The Royal Australian Chemical Institute
Applied Research Medal.

UNSW Vice Chancellor's Award
Excellence in Promoting Industry Engagement in Higher Degree Research from the University of New South Wales.

Elsevier Biosensors and Bioelectronics
Runner-up for the best paper at the World Biosensor Congress

Emeritus Professor D. Brynn Hibbert

International Union of Pure and Applied Chemistry
Conferred as Emeritus Professor at the 2021 General Assembly

Dr Shannan Maisey

UNSW Dean of Science Staff Excellence Award
Equity, Diversity and Inclusion

Dr Laura McKemmish

UNSW Faculty of Science Equity Diversion and Inclusion Award
Coordinator of the SciX high school outreach program

Dr Nicole Rijs

UNSW Dean of Science Staff Excellence Award
Career Advancement.

Professor Timothy Schmidt

The Royal Australian Chemical Institute
Physical Chemistry Division Medal

Scientia Professor Martina Stenzel

International Union of Pure and Applied Chemistry
2021 Distinguished Women in Chemistry or Chemical Engineering Award

Staff

ADMINISTRATION

Head of School
Professor Scott Henderson Kable

Deputy Head of School
Professor Pall Thordarson *(January – September)*

A/Prof Jason Harper *(September -)*

Director of Research
Professor Tim Schmidt

Director of Teaching
A/Prof John Stride

Deputy Director of Teaching
A/Prof Jason Harper *(January - September)*

Dr Scott Sulway *(September -)*

Director of Strategy / SHARP
Scientia Professor Justin Gooding

Industry and International
Professor Naresh Kumar

Postgraduate Coordinator
A/Prof Suzanne Neville

Post Graduate Coordinator – Reviews and Completions
A/Prof Alex Donald

Post Graduate Coordinator – Admissions and Scholarships
Dr Vinh Nguyen

Honours Coordinator
A/Prof Neeraj Sharma

Director of First Year
Dr Shannan Maisey

Second Year Undergraduate Coordinator
Dr Scott Sulway *(January - September)*

Dr Siobhan Wills *(September -)*

Third Year Undergraduate Coordinator
Dr Junming Ho

First Year Laboratory and IT Coordinator
Dr Ron Haines

Outreach and Marketing Director
Dr Laura McKemmish

HS Consultation Committee Chair
Dr Josh Peterson *(January - September)*

A/Prof Luke Hunter *(September -)*

On-line Coordinator
Siobhan Wills

Demonstrator Training
Dr Scott Sulway

Tutorial Coordinator
Dr Siobhan Wills

Medicinal Chemistry Program Coordinator
A/Prof Luke Hunter

Nanotechnology Program Coordinator
Professor Chuan Zhao

ITTC Director
Scientia Professor Martina Stenzel

ITTC Coordinator
A/Prof Jon Beves

Website Coordinator
Vanessa Gotting

Scholarship & Prizes Coordinator
A/Prof Jon Beves

Seminar Coordinators
Drs Dong Jun Kim and Chris Medcraft

Teaching Fellows Coordinator
Dr Siobhan Wills

Talented Students Program Coordinator
A/Prof Neeraj Sharma

Chemical Society President
Dr Albert Fahrenbach

TEACHING STAFF

Nobel Laureate and Visiting Professor of Chemistry
- Sir Fraser Stoddart

Scientia Professors
- Justin Gooding – NHMRC Leadership Fellow
- Martina Stenzel – ARC Laureate Fellow

Professors
- Les Field
- Scott Kable
- Naresh Kumar
- Jonathan Morris
- Tim Schmidt
- Pall Thordarson
- Richard Tilley
- Chuan Zhao

Associate Professors
- Graham Ball
- Jon Beves
- Alex Donald
- Jason Harper
- Luke Hunter
- Kris Kilian
- Suzanne Neville
- Neeraj Sharma
- John Stride

Senior Lecturers
- Junming Ho
- Shannan Maisey
- Vinh Nguyen

Lecturers
- Jeffrey Black
- Albert Fahrenbach
- Vinicus Goncales
- Ron Haines
- Dong Jun Kim
- Laura McKemmish
- Martin Peeks
- Nicole Rijs
- Scott Sulway
- Siobhan Wills

DECRA Fellows
- Dr Christopher Hansen
- Dr Sina Jamali
- Dr Mohibul Kabir
- Dr Dongjun Kim
- Dr Anna Wang

Conjoint Associate Professor
- Ginancarlo Pascali, BSc Pisa, Ph.D. Lecce

Conjoint Lecturer
- John Doan, BSc Ph.D, USyd

FELLOWS

Emeritus Scientia Professor
- Michael Nicholas Paddon Row, BSc Lond, PhD ANU, CChem, FRSC, FRACI

Emeritus Professors
- Roger Bishop, BSc St And., PhD Camb., CChem, FRSC, FRACI
- David St. Clair Black, M.Sc. Syd., Ph.D. Camb., AMusA, CChem, FRACI, AO
- Ian Dance, M.Sc. Syd., Ph.D. Manc., CChem, FRACI, FAA
- David Brynn Hibbert, BSc PhD Lond., CChem, MRSC, FRACI
- Ronald Postle PhD Leeds

Honorary Senior Lecturer
- Dr Joseph John Brophy, BSc, PhD DSc UNSW, DipEd Monash, CChem, FRAC

Honorary Associate Professors
- Stephen Boyd Colbran, BSc (Hons), PhD, Otago
- Gavin Edwards, BSc (Hons), PhD (Monash)
- James Hook, BSc UNSW, PhD ANU
- Roger Read, BSc PhD Syd., DIC Lond., CChem, FRACI
- Laurence Wakelin, BSc (Hons) Uni Kent, PhD Cambridge, FRSC, FRACI, FRSN

Professorial Visiting Fellows
- Amar Flood, Indiana University
- Sergei Glavatskih, KTH Royal Institute of Technology
- Margaret Harding, Board Chair of: NSW Circular, Australian National Imaging Facility
- Meredith Jordan, USYD
- Barbara Messerle, USYD
- MaryKay Orgill, University of Nevada, Las Vegas
- Mark Rutland, KTH Royal Institute of Technology

Visiting Fellows
- Henrik Andersen, Technical University of Denmark
- Tony Breton, University of Angers, France
- Philip Coghlan, Principal – i-Chem Consulting
- Liam Delvin, Consultant
- Miroslav Dvorak, Czech Technical University, Prague
- Dr Alex Falber, Algae Enterprises Ltd, Victoria, Australia
- Simon Fielder, Principal Chemist, Memjet Technology
- Liang Jiang, Pritzker School of Molecular Engineering, University of Chicago
- Adnan Mohammed, University of Kerbala, Iraq
- Sandra Nurtilla
- Silvia Flavia Rodrigues de Oliveira
- Vittoria Pischedda, Universite Claude Bernard Lyon
- Reyne Pullen, USYD
- David Sammut, Principal DCS Technical
- Lisa Stevens, LisaJStevens & Associates, Health and Safety Consultants

Adjunct Professor
- Adam Georgius

Adjunct Associate Professor
- Renate Griffith

Adjunct Senior Lecturer
- Natalie Chapman, Managing Director, gemaker
- Rumei Chang
- Christopher Garvey, Lund University, Sweden
- Amanda Hayes, NSW Smart Sensing Network
- Fabio Lisi, University of Tokyo
- Joso Raymond

Adjunct Lecturer
- Adam Martin, Macquarie University
- Alexander Soeriyadi, Co-Founder & CEO of LLEAF Pty Ltd
- Robert Utama, Lead Product Manager, Inventia Life Science

PROFESSIONAL STAFF

School Manager
- Dr Toby Jackson

Administrative Support
- Anne Ayres, Teaching Support Officer
- Trinah De Leon, Teaching Support Officer
- Vanessa Gotting, Project Officer, BA (History) UNSW
- Sheree Munro, Postgraduate Administrator

Finance Management & Reporting Analyst
- Aftab Hossein (Jan – March)
- Lucy Sun (March -)

Health & Safety Advisor
- Dr Nicholas Konstandaras

IT Specialist Technology Support Officer
- Ray Arnhold

Laboratory Managers
- **Teaching Laboratories:** Dr Nancy Talavera, BSc (Hon), PhD Adel
- **Research Laboratories:** Dr Joshua Peterson, BSc Chem Eng Washington, PhD USYD (Jan-Nov)

  Dr Elysha Williams, PhD UNSW (Nov -)

Technical Officers
- Dr Majid Asnavandi, PhD UNSW
- Mr Hitendra Gopal
- Mr David Jacyna
- Dr Mehran Bolourian Kashi, PhD UNSW
- Dr Clare Sullivan, BSc PhD, UTS
- Dr Ruth Thomas, PhD UNSW
- Dr Warren Truong, PhD UNSW
- Mr Svetislav Videnovic, BChemEng, Sarajevo

3 RESEARCH

Director of Research Report

2021 turned out to be more challenging than 2020, with our labs cut back to 10% occupancy for several months.

No doubt productivity was reduced, but we emerged intact. Nevertheless, with the opportunity to write, we had another excellent year in terms of research outputs, grants awarded, and research achievements. The highlight of the year was the establishment of the UNSW RNA Institute, which came off the back of tireless efforts by Professor Pall Thordarson to establish such facilities. The UNSW RNA is established with a $25 million investment from UNSW as part of a collaborative, RNA Bioscience alliance between NSW universities.

This was also another great year for research fellowships.

This was also another great year for research fellowships. Two DECRA Fellowships were awarded. Dr Felix Rizzuto and Dr Wesley Dose will both take up positions in the school in 2022. Felix will work on Biomimetic catalysis for sustainable polymer syntheses, and Wesley will set up a research program in sodium ion batteries.

The School continues to attract a large amount of external grant funding. Projects worth in excess of $11m were commenced in 2021. We were awarded five ARC Discovery Project Grants (led by Dr Chris Hansen, Professor Scott Kable, Scientia Professor Justin Gooding, Professor Chuan Zhao and A/Prof. Jon Beves). These grants span atmospheric chemistry and reaction dynamics, clean hydrogen, protein binding and molecular transport.

The School's industry engagement continues to gather momentum. We welcomed our first embedded enterprise in the school, *Psylo,* who will work on new drug leads and collaborate with A/Prof. Luke Hunter. Professor Naresh Kumar engaged with *Noxopharm* to research the Design and Synthesis of New Isoflavone Structures. Professor Jonathan Morris continues to work with *Emenda Therapeutics Ltd* on the development of CLK and SRPK1 inhibitors. Scientia Professor Gooding is working with *Nutromics IP Pty Ltd* on Smart Sensor & Deep Learning Behavioural Engine for Personalised Health Monitoring.

The 2021 AROC process identified 310 research outputs (306 journal articles), which is slightly ahead of 2020. The outstanding quality of these outputs is exemplified by our continued excellent performance in the Nature Index. We are the clear leader in Australia. The Nature Index tracks high quality research outputs. In the period ending November 2021, UNSW published 126 articles in top chemistry journals, including an astonishing 20 *Angewandte Chemie* and 18 *JACS* papers.

In December 2021, we published an article in *PNAS,* led by 2020 University Medallist Jasmin Borsovszky. The work, featuring Professors Schmidt and Kable, and Drs Hansen and McKemmish, was a collaboration between UNSW, MIT and U. Florida, which showed why a comet tail is never green while the head often is. This was reported in the *New York Times,* and 125 other news outlets.

In the QS subject rankings, UNSW Chemistry was ranked 66in the world (up 5) and 5th in the country. In the ARWU subject rankings, UNSW Chemistry rocketed up from 122 to 103 in the world, and is now 2nd in the country.

Professor Tim Schmidt
Director of Research

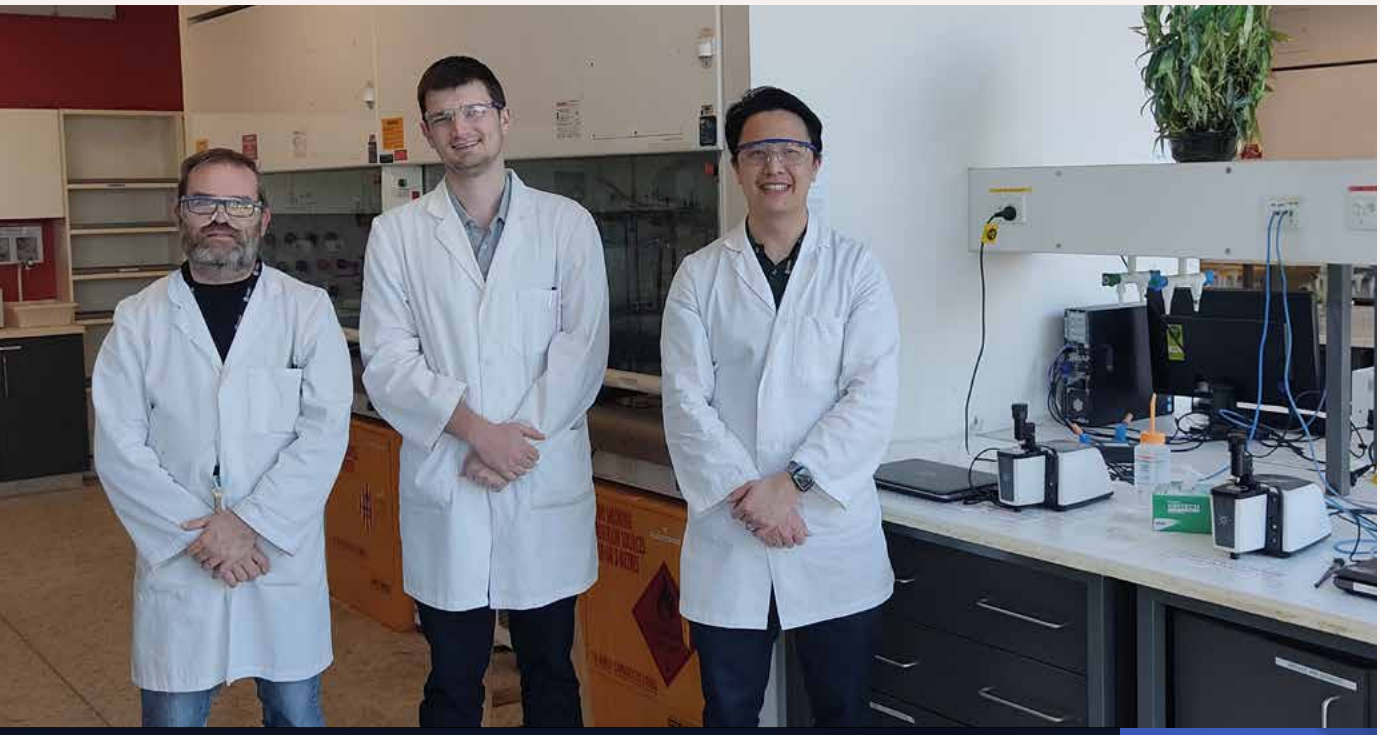
LEAF – Towards Net Zero

Laboratory Efficiency Assessment Framework (LEAF) developed by University College London, aims to offer standards and guidance to the science and research communities to achieve net-zero carbon emissions by 2050.

The program was piloted in 23 different institutions in over 230 laboratory groups in the UK and Ireland in 2018-2020 giving researchers and technical staff guidance and targeted actions to reduce the impacts of their labs with an easy to use framework to improve environmental sustainability. Although reducing carbon emissions was the major aim, it was estimated that participating laboratories saved, on average, £3,600 (AUD $6,238.00) over the two-year pilot as well as eliminating 2.9 tonnes of carbon dioxide equivalent (tCO2e).

Chemistry Teaching lab 262 achieved a bronze award, and the Lessio lab a silver award.

In 2021 UNSW conducted a pilot of the LEAF program as a joint initiative of the Faculty of Science Sustainability Working Group and the Sustainability Unit of Estate Management. Drs Martina Lessio and Martin Peeks from the School of Chemistry were among the first of the Australasian research and teaching community to participate in the international rollout. Under their leadership Chemistry Teaching lab 262 achieved a bronze award, and the Lessio lab a silver award. The Lessio lab is one of the few computational groups to pursue and achieve this award worldwide.



Members of the successful LEAF team: Mr David Jacina, Dr Martin Peeks and Dr Warren Truong in Lab 262. Absent from the photo are Dr Martina Lessio, Dr Nancy Talavera and Dr Clare Sullivan.

Actions taken in these labs to reduce their carbon footprint include:

- **Waste audits to confirm that substances are disposed of to the appropriate waste streams**
- **Introducing sustainability into lab on-boarding and off-boarding processes**
- **Adjusting lighting and, where appropriate, turning equipment off when not in use**
- **Keeping fumehood sashes low**
- **Proper record-keeping and sample tracking, to reduce unnecessary duplication of effort.**

LEAF is now used in 54 institutions worldwide and the framework has proven to be effective without detrimental impact on the quality or progress of the science. The online program is intuitive and simple and researchers and technicians have welcomed the opportunity that LEAF provides to up-skill and demonstrate their sustainability progress in an understandable way for funding bodies, students and other partners.

Congratulations to Martina, Martin and all involved for leading the way at Chemistry UNSW towards a better future.

4 TEACHING

Director of Teaching Report

I stepped into the role of Director of Teaching with my predecessor's best wishes and his promise to 'be around when needed' – thank you Jason Harper for being true to your word and helping all of us through another highly disrupted year.

Back in January 2021 we were facing the very real problem of having disparate student bodies

2021 was to be a year in which we waved goodbye to the pandemic and looked forward to a return to normal. We all now know that this did not quite eventuate and the whole year was spent learning to live with the virus as vaccinations were rolled out and community behaviours were modified.

Back in January 2021 we were facing the very real problem of having disparate student bodies – those able to access face-to-face classes, when permitted, and those unable to attend due to being locked out or in isolation. The School of Chemistry took a novel approach to dealing with this – the rapid roll-out

of specifically badged online-only classes. We all recognised that whilst online laboratory classes are better than nothing, they are a very poor replacement for the real thing and that by enabling students to continue in their progressions regardless of the impacts of the pandemic, we risked serious institutional harm and even potential health or safety hazards if we were to graduate less-skilled students.

At the height of lockdowns, when every student was forced fully online, adjustments were made to subsequent course content and the whole cohort was brought up to speed together – we have seen that this resulted in outcomes consistent with long term student performance. However, learning to live with COVID meant that we had to learn to live with some students being in face-to-face classes, with others in the same course, locked out. By giving the fully-online students a so-called '5-badged' alternative to their course (course codes carry a '5' as the second digit), we are able to identify and manage their progression as they return to face-to-face classes. Around a dozen such courses were rapidly passed through University committees that now allow us to run such courses whenever needed – enrolment in said courses is by School approval and only for those students unable to attend face-to-face classes throughout a given term.

The time and effort put in by all teaching-related staff in getting us through these testing times, is greatly appreciated…

Other absences (due to COVID-infection or the need to isolate) have been managed through special considerations, just as any regular illness is managed. This has stood the test of time as being a smart move early on in the management of the fallout from the pandemic and will be maintained until such a time that we can retire them. We pride ourselves that we have been able to accommodate students across the board, by either '5-badged'courses or alternate course enrolments and we feel that if we can persist in our return to campus approach, we will be able to avoid a significant generation of COVID-students. The time and effort put in by all teaching-related staff in getting us through these testing times, is greatly appreciated, from the casuals that man our labs and tutorials, through the admin and technical staff who enable the wheels to turn, to academic staff who have just got things done – thank you.

The need to move to widespread online delivery of content has led to major shift in mindset across the sector, with some universities even killing off formal lectures altogether. The School of Chemistry has no desire to move that far, but we do recognise some of the advantages of using high-quality online learning tools – notably the flexibility that it offers to students and potentially the ability to streamline content delivery. It is however a steep learning curve for much of the current teaching staff – for many, it requires a complete rewriting of the rule book of their careers. The School is moving increasingly

to online delivery of core course content, but will persist with face-to-face laboratories and tutorials whenever possible; this is likely to be a transition that will take several years to perfect, but we commenced moving that way in 2021.

The times they are a changing.

The final piece of the online puzzle is the re-modelling of assessment – the University has committed to not returning to large face-to-face exams held at Randwick Racecourse and so we, at School level, have been tasked with finding solutions. Once again, staff have stepped up and shown remarkable resilience – we now have functional, workable, somewhat water-tight methodologies in place to detect any misuse of the exam platform by students. Online non-invigilated exams provide great temptation to bypass traditional exam protocols and the School has attempted to stay one step ahead of student temptation, whilst fostering a culture in which students are less inclined to 'do the wrong thing'. It is commendable and somewhat reassuring that the vast majority of our student body appear to just do the exam – study the material, attempt the questions in the given time and submit their answers – with little (if any) suggestion of active wrongdoing. Online examinations will continue to evolve, potentially with a University-wide solution rolled out in time, the School is committed to assisting with this necessary transition along with changes to content delivery – *the times they are a changing.*

As I look back on my first year as the Director of Teaching, I am heartened by the professionalism of my colleagues – both within the School (the Teaching Committee have been amazing) and Faculty-wide, but also by the resilience of our students. Many of them were robbed of high school and university experiences, locked out of the country or unable to return home to see loved ones and yet they have shown up, engaged, showed flexibility and understanding and have even learned some chemistry. Thank you all.

Associate Professor John Stride
Director of Teaching

First Year Chemistry

2021 continued to be a tumultuous year for 1st year chemistry teaching at UNSW.

The pandemic continued to restrict our teaching and learning activities to the online domain across all 3 terms and created disruption for those activities that we had returned to in person format. The opportunity to provide hands on experience in laboratory classes has been sorely missed for the past 2 + years, though there is a silver lining in the feedback from students with respect to the learning activities established by Dr Ron Haines to replace lab classes. The highlight for student being the opportunity to engage deeply with course material in a supported and slower paced environment.

The opportunity to provide hands on experience in laboratory classes has been sorely missed...

With the increased emphasis on remote and digital learning moving forward, we have worked on increasing the volume and quality of digital resources available for students across our first-year courses. Under the tutelage of the school's teaching internship coordinator, Dr Siobhan Wills, our PG teaching interns developed digital resources for self-directed revision in CHEM1001, CHEm1831, CHEM1A and CHEM1B and these additions have been recognized in positive written feedback by students in experience evaluations.

In our last report we noted the substantial development of the CHEM1B 'threshold' style materials. Throughout 2021 Dr Jeffrey Black worked on refining and substantially expanding the core question bank and these resources are now engaged across all CHEM1B courses. Dr Black has also been instrumental in overcoming the challenges for the remote delivery of 1B courses in digital drawing capacity for chemical structures and mechanisms and 3-D visualization. In collaboration with Dr Wills and myself we have established learning and assessment activities that challenge students to actively draw and manipulate molecules and reaction schemes.

Looking to the future, we were fortunate enough to be awarded a university grant for curriculum review and this will take place in 2022. We will use this funding in first year chemistry to critically evaluate the core syllabus across first year with particular attention to constructive alignment, assessment design with an eye to developing differentiated pathways depending on prior knowledge.

Dr. Shannan Maisey 1st Year Coordinator

We were fortunate enough to be awarded a university grant for curriculum review ...

Honours Program

The School of Chemistry runs the research-intensive Honours Program for students that have typically majored in Chemistry via a Bachelor of Science or Bachelor of Advanced Science degree (or dual degrees), Bachelor of Medicinal Chemistry and Bachelor of Nanoscience.

Each program is subtly different tailoring to the needs of the degree program. Furthermore, as a School we are open to students with a major in Chemistry or related discipline in other degree programs, such as the Bachelor of Environmental Science, or coming to UNSW from other institutions.

Each program is subtly different tailoring to the needs of the degree program.

In 'Chemistry' Honours an entire year is spent on a research project in collaboration with a member of the academic staff. In addition, students undertake a series of chemistry short modules delivered by experts in the field and by visiting researchers via the Howard endowment. In 'Medicinal Chemistry' Honours students can choose year-long research projects in either the School of Chemistry or with academic staff in the Pharmacology section of the School of Medical Sciences, and they undertake a short discipline-specific module over the year. In 'Nanoscience' Honours the research project comprises 80% of the year and can be undertaken in the Schools of Chemistry, Physics or Materials Science and Engineering.

A big thank you to all of my colleagues for engaging with the Honours program...

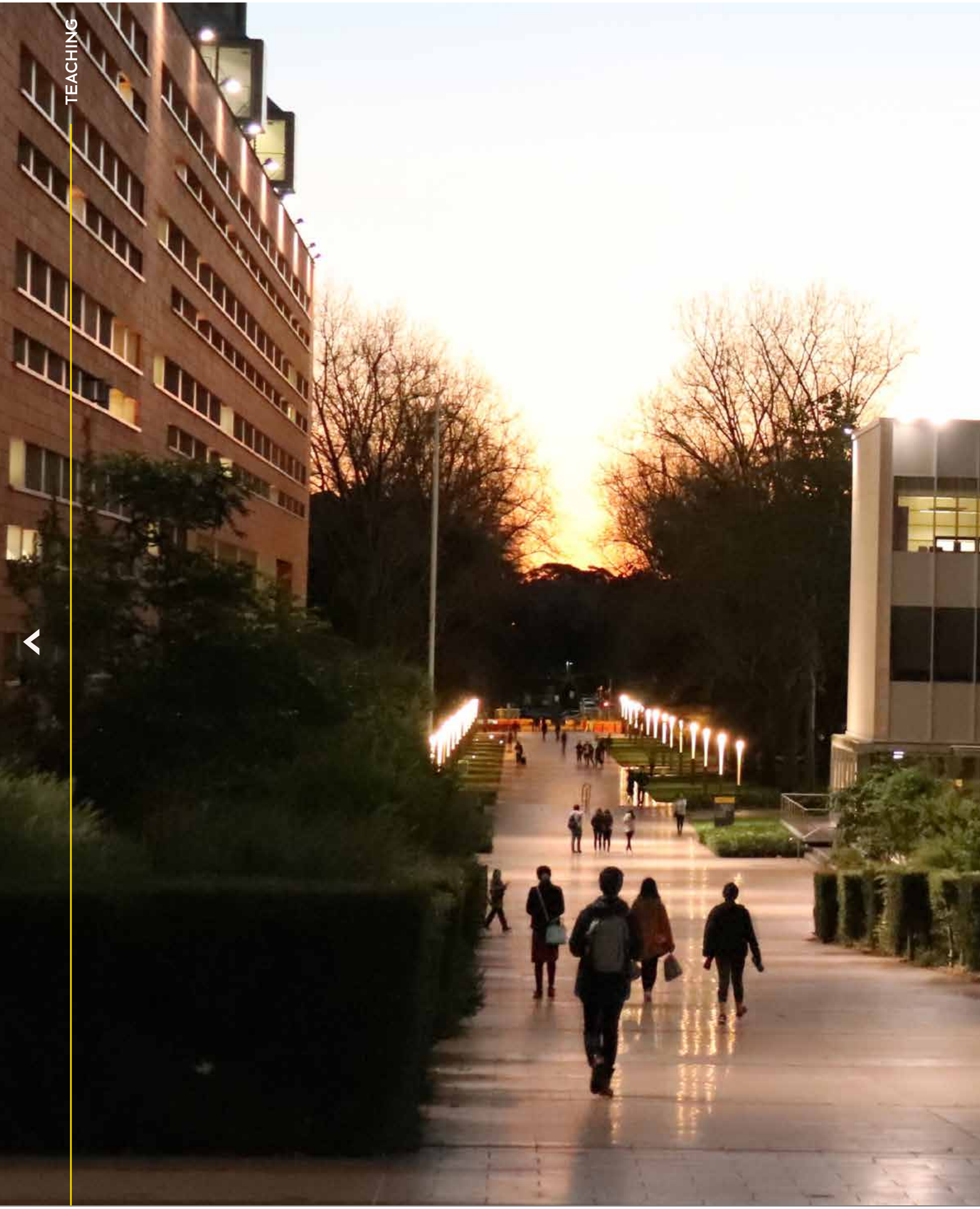
In 2021, 20 students completed Chemistry, 13 completed Medicinal Chemistry and 2 completed Nanoscience Honours programs. This includes the T2 and T3 2020 and T1 2021 Honours starters. Oscar Girgis-Cook (Medicinal Chemistry, T1, 2021) received the University Medal for his outstanding performance. Anna Douglas was awarded the Angyal Prize for the best performance in a Chemistry Honours, with Michael Lord awarded the Nanoscience Prize for best performance in Nanoscience Honours and Oscar Girgis-Cook the Cavill Prize for the best performance in a Medicinal Chemistry Honours. Congratulations to all our graduating students – well done!

2021 was a challenging year featuring a cohort that undertook research with the backdrop of COVID-19 and an extended lockdown in Sydney. The students and supervisors handled the ever-changing conditions with incredible tenacity, working in a safe and supportive manner wherever possible. The research went on and the projects were presented superbly. We used video conferencing for all seminars and oral defence assessments and this worked incredibly well. It is great that these students were able to undertake research in these trying circumstances.

The chemistry Honours coursework modules were all presented online and have been designed to be presented in a similar or hybrid manner for the foreseeable future. These modules are now designed to run yearly providing clear options for students.

Finally, a big thank you to all of my colleagues for engaging with the Honours program, from supervising students to assessing their presentations and thesis. To the students well done and enjoy the future – hopefully with lots of chemistry in there.

Associate Professor Neeraj Sharma
Honours Coordinator



Postgraduate Research Report

2021 proved to be another challenging year for post graduate research students in the School.

There were very few international RTP and UIPA scholarships being offered this year due to a combination of the pandemic lockdown and financial difficulties across the entire Australian university sector. Domestic scholarships were affected in a different manner with UNSW able to offer more scholarships than there were eligible candidates.

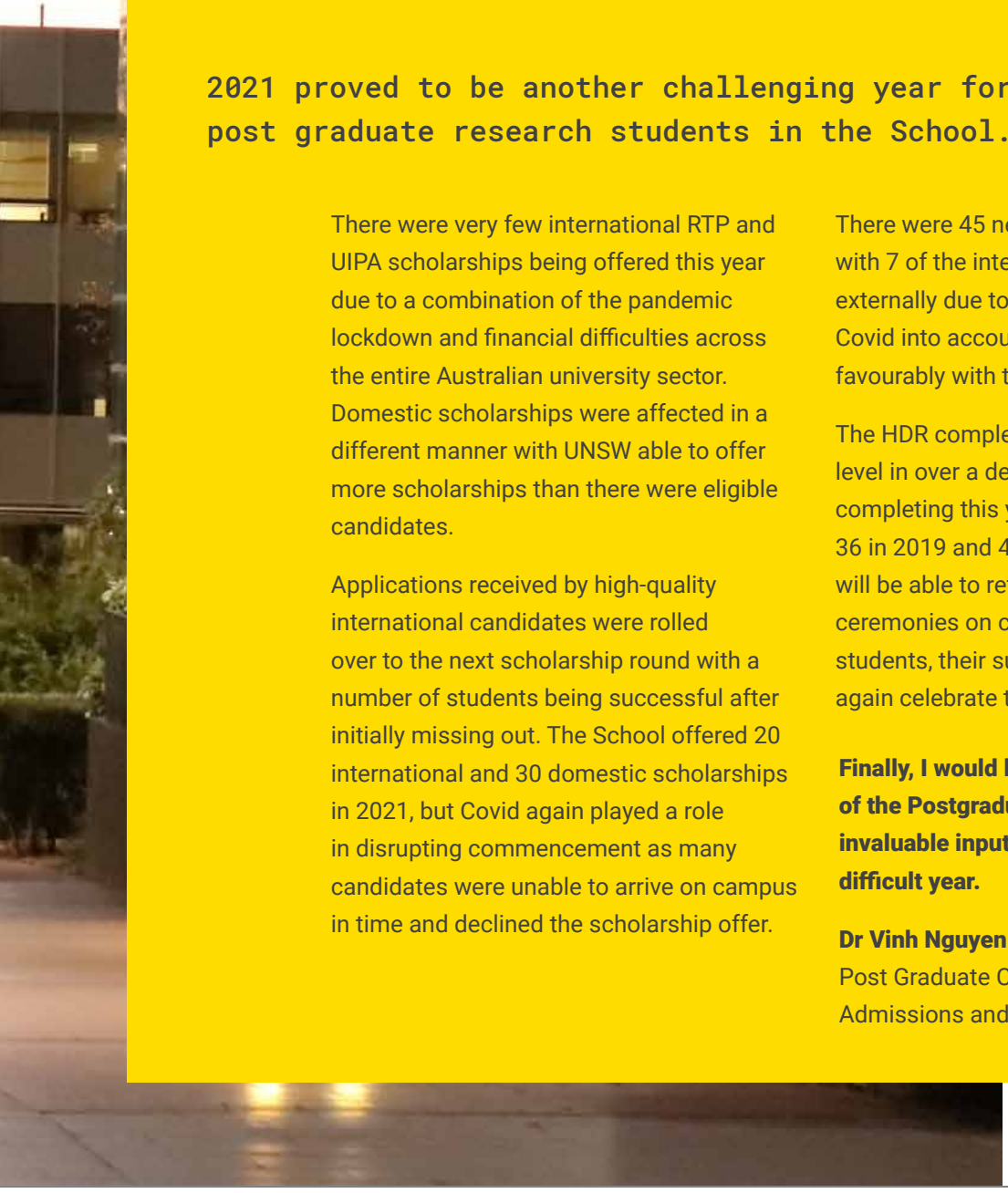
Applications received by high-quality international candidates were rolled over to the next scholarship round with a number of students being successful after initially missing out. The School offered 20 international and 30 domestic scholarships in 2021, but Covid again played a role in disrupting commencement as many candidates were unable to arrive on campus in time and declined the scholarship offer.

There were 45 new HDR enrolments in 2021 with 7 of the international students enrolled externally due to travel restrictions. Taking Covid into account, this number compares favourably with the previous 2 years.

The HDR completion rate is at its highest level in over a decade with 44 students completing this year, up from 29 in 2020, 36 in 2019 and 42 in 2018. Hopefully UNSW will be able to return to holding graduation ceremonies on campus in 2022 so that students, their supervisors and families can again celebrate their achievements.

Finally, I would like to thank all members of the Postgraduate Committee for their invaluable input and support throughout a difficult year.

Dr Vinh Nguyen
Post Graduate Coordinator
Admissions and Scholarships



Graduating Students:

The following PhD. students graduated in 2021:

Student	Research Area	Supervisor
Matthew Mudge	Aryldixanthene and Xanthene Scaffolded Ligands for Metal Complexes and Catalyses	A/Prof. Graham Ball / A/Prof. Steve Colbran
Ezaz Ahmed	High performance ion formation, separation, and focusing at ambient pressure for mass spectrometry	A/Prof. Alex Donald
Qinwen Liu (MPhil)	Pulsed nanoelectrospray ionization mass spectronomy	A/Prof. Alex Donald
Yosef Armin	Next generation of electrical cellular biosensor combined with high-resolution fluorescence microscopy	Scientia Prof. Justin Gooding
Dongfei (Phoebe) Chen	Applying Dispersible Electrodes Sensing System to Early Cancer Diagnostics	Scientia Prof. Justin Gooding
Hsiang-Sheng (Johnson) Chen	The Effect of The Degree of Ordering of Alloy Catalysts to Electrocatalysis	Scientia Prof. Justin Gooding
Sharmin Hoque	Electrochemical biosensor for multiplex detection of microRNA related to leukemia	Scientia Prof. Justin Gooding
Milad Mehidpour	The synthesis and evaluation of magneto-plasmonic nanoparticles for biosensing applications	Scientia Prof. Justin Gooding
Parisa Moazzam	Ultrasensitive Biosensors for Quantification of Multiple Immune Checkpoint Inhibitor Biomarkers from Blood, Plasma and Serum with Investigation of Protein Corona Formation and its Implications	Scientia Prof. Justin Gooding
Munkhshur Myekhlai	Bimetallic Branched Nanoparticles with a Tunable Branch Number, Surface Facets and Composition for Enhanced Oxygen Evolution Reaction Electrocatalysts	Scientia Prof. Justin Gooding
Peter O'Mara	Understanding the cascadic electroreduction of CO2 on nanoparticles with enzyme-like architecture	Scientia Prof. Justin Gooding
Agus Poerwoprajitno	Faceted Branched Nanoparticles for Improved Activity and Stability in Electrocatalysis	Scientia Prof. Justin Gooding
Cong Vu	Active Targeting of Cancer Cells by the Shape of Nanoparticles	Scientia Prof. Justin Gooding
Blair Welsh	The Road Less Travelled: Unusual Reaction Mechanisms of Formaldehyde	Prof. Scott Kable
Lorrie Jacobs (MSc)	Exploring the Photolysis Pathways of Acetone in the Troposphere	Prof. Scott Kable
Iliya Dragutinovic	Design and Synthesis of Novel Bicyclic Heterocycles for the Inhibition of Splicing Kinases	Prof. Jonathan Morris
Jack Duncan	Development of Chemical Scaffolds for Kinase Inhibition Through Scaffold Hopping and Rational Design	Prof. Jonathan Morris
Elham Morteza Gholizadeh	Photochemical upconversion of sub-band gap photons for bifacial silicon solar cells	Professor Timothy Schmidt
Emily Cheung	Diffusion in modified solid-state ionic conductors for energy applications: structure and dynamics	A/Prof. Neeraj Sharma
Conrad Gillard	Electrochemical phase evolution and modification of tetradymite-type and anti-PbO-type layered metal chalcogenides	A/Prof. Neeraj Sharma
Jennifer Stansby	Developing Modified Layered Oxides for Sodium Battery Applications	A/Prof. Neeraj Sharma

Student	Research Area	Supervisor
Jimmy Wu	Environmentally conscious approaches to producing viable electrode materials for use in future lithium- and sodium-ion batteries	A/Prof. Neeraj Sharma
Russul Ridha Mamdooh Al-Nakashli	Cellular uptake of nanoparticles with different drug loading efficiency in 2D and 3D cancer cellular models	Scientia Prof. Martina Stenzel
Sylvia Ganda	Self-assembled Biodegradable 2D Platelet Particles and Their Journey Inside the Cells	Scientia Prof. Martina Stenzel
Yee Yee Khine	Surface Modified Cellulose Nanomaterials: A Source of Non-Spherical Nanoparticles for Drug Delivery	Scientia Prof. Martina Stenzel
Yimeng Li	Trehalose-based Glycopolymers in Infection Treatments	Scientia Prof. Martina Stenzel
Guannan Wang	3D printing of carbon nanomaterials reinforced nanocomposites with a novel visible light photoinitiator system	Scientia Prof. Martina Stenzel
Yiping Wang	Synthesis of Single Enzyme Nanoparticles for Enzyme Stabilization	Scientia Prof. Martina Stenzel
Sandy Wong	Carbohydrate Induced Self-Assembly of Curcumin Nanocapsules as Drug Carriers for Breast Cancer Therapy	Scientia Prof. Martina Stenzel
You Dan Xu	Development of protein-polymer bioconjugates for anticancer therapy	Scientia Prof. Martina Stenzel
Lin Zhang	Development of Polymer-coated Upconverting Nanoparticles for Drug Delivery	Scientia Prof. Martina Stenzel
Luke Marshall (MPhil)	Rationally Designed Peptide Receptors for Investigating RNA Recognition Module Proteins	Prof. Pall Thordarson / Dr Albert Fahrenbach
Ali Alinezhad Chamazket	Direct Growth of Highly Strained Pt Islands on Branched Ni Nanoparticles for Improved Hydrogen Evolution Reaction Activity	Prof. Richard Tilley
Hsiang-Sheng Chen	The Effect of Degree of Ordering of Alloy Catalyst to Electrocatalysis	Prof. Richard Tilley
Jiaxin Lian	A transparent platform for cell capture and single cell isolation of circulating tumour cells	Prof. Richard Tilley
Munkhshur Myekhlai	Bimetallic Branched Nanoparticles with a Tunable Branch Number, Surface Facets and Composition for Enhanced Oxygen Evolution Reaction Electrocatalysts	Prof. Richard Tilley
Agus Poerwoprajitno	Faceted Branched Nanoparticles for Improved Activity and Stability in Electrocatalysis	Prof. Richard Tilley
William Adamson	Design of Non-precious Transition Metal Electrocatalysts for Electrochemical Water Splitting in Alkaline Media	Prof. Chuan Zhao
Kamran Dastafkan	Modulating Surface and Interface Chemistry for Advancing Electrochemical Water Splitting	Prof. Chuan Zhao
Chen Jia	Rational Design of Carbon-based Catalysts for Efficient Electroreduction of Carbon Dioxide	Prof. Chuan Zhao

Outreach and Marketing Report

Chemistry outreach in 2021 started tentatively with some online and in-person events. First, in January, we welcomed 18 students for an online week-long Chemistry research experience as part of the popular and well-received Faculty SciX program.

Within the SciX chemistry projects, we had two computational chemistry projects in recognition of the online format:

1 Computational Infrared Spectroscopy for Astrochemistry and Other Applications:

Infrared spectroscopy can help find aliens on remote worlds, model the global warming potential of new compounds and much more. Aliens are out there (probably). But how will we find them? Probably by finding unexpected molecules produced by life – called biosignatures – in their planet's atmosphere using infrared astronomical spectroscopy. Ozone-destroying chemicals are being replaced by new gases, but will these cause global warming? How can we determine if a country is violating international agreements and burning too many fossil fuels? Are cars producing harmful pollutants? Infrared spectroscopy (Module 8, HSC Chemistry) is an essential tool to answer these and many other questions regarding our planet and universe.

PhD students Anna-Maree Syme and Juan Zapata Trujillo led this project for 11 students with Dr Laura McKemmish as academic lead.

2 Computational simulations of new materials for water purification:

Climate-change driven extreme weather conditions, population growth, and increasing levels of pollution are making clean water scarcity a compelling challenge of our age. In this scenario, developing cost-effective technologies for water purification is a top scientific priority. Computational chemistry offers an unprecedented opportunity to efficiently develop new materials that can target specific contaminants in polluted water.

PhD student Claudia Cox led this project for 7 students with Dr Martina Lessio as academic lead.

Analytical Chemistry Experience

In April, we piloted a new 2-hour Analytical Chemistry experience for nine Year 12 students from rural backgrounds. The day included four 30-minute mini workshops where students were rotated between the following:

- Chromotography and mass spectrometry, including looking at our gas and liquid chromatography mass spectrometers (i.e. GCMS and LCMS instruments)
- Demonstration of UV/visible spectroscopy in modern teaching instrumentation
- Tour of our state-of-the-art Nuclear Magnetic Resonance (NMR) research facilities
- Ask a Scientist informal Q&A session

This experience was extremely well received by the participating students and future events for rural students are being developed.

UNSW Future Student's Experience Day

Also in April, Chemistry supported UNSW Future Student's Experience Science Day with two physically distanced workshops for 50 students.

Targeted at Year 12 high school students, the UNSW Experience Day enabled prospective students to experience firsthand the range of degree and student life opportunities on offer in their preferred area of study through inspiring and engaging sessions, while also promoting the benefits of degree flexibility, double degrees and the broader UNSW student experience.

Delivered by students for students, the event focused on establishing a tangible connection to place and community through hands-on workshops on campus and close engagement with academics, current students and recent alumni. Attendees got the opportunity to 'be a student for a day' and experience UNSW's collective difference through workshops, a keynote talk, a student/alumni panel, and collaboration with their peers.

RACI Titration Competition

In June, we held the in-person heats and finals of the RACI Titration Competition. Eighty-four students from across the state vied for a place in the highly competitive field.

Shortly afterwards, the delta wave of COVID19 pandemic hit causing the cancellation of all other in-person 2021 events.

Open Day and Information Day were delivered online, with a recorded "Studying Chemistry" welcome video featuring Dr Anna Wang and student Lauren Lowe. Chemistry students participated in online events, including Sam Miles contribution to CSIRO's Virtual Work Experience program.

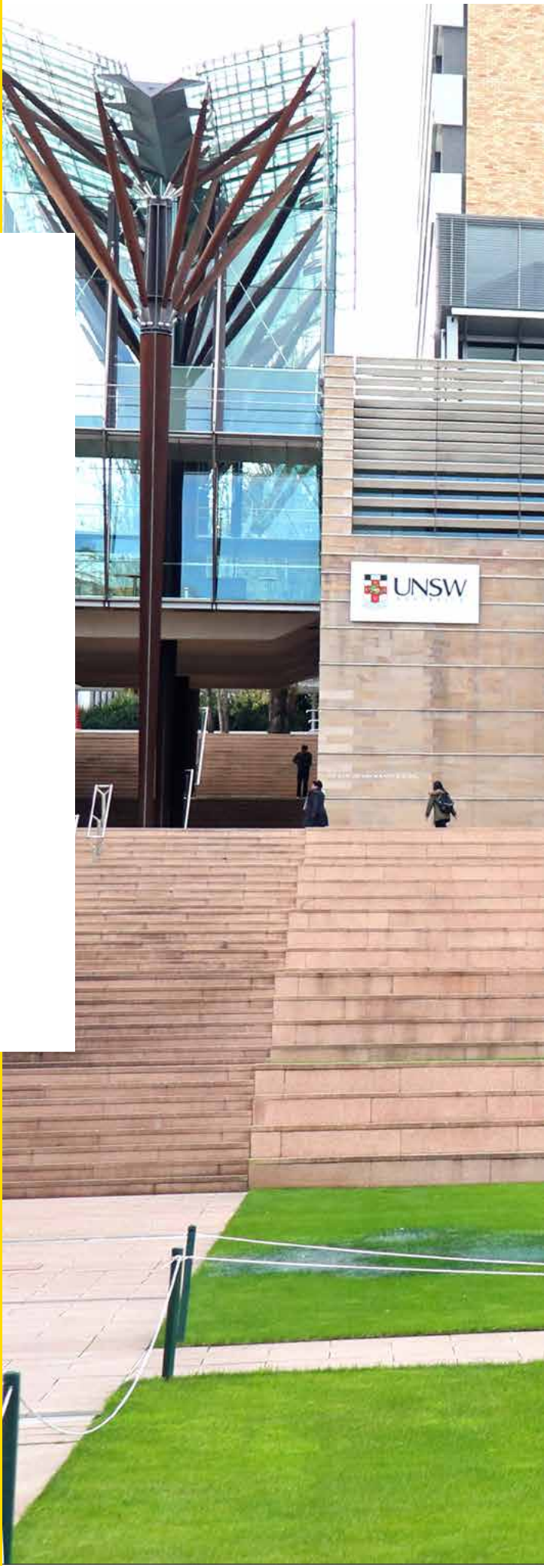
We look forward to welcoming future students onto campus again, interacting with them personally and encouraging their research into the many fields of chemistry.

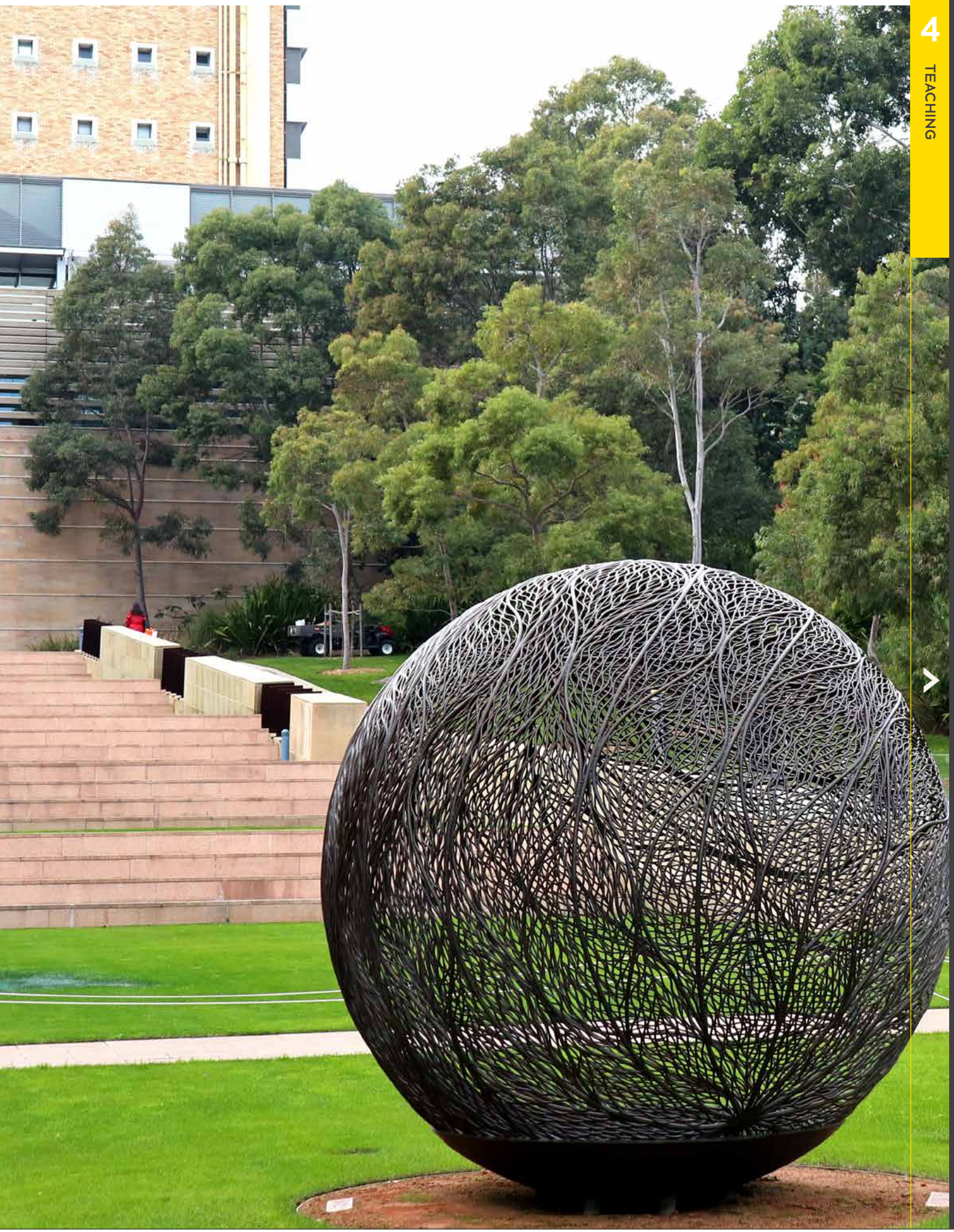
Dr Laura McKemmish
Outreach & Marketing Coordinator

UNSW Chemical Society (CHEMSOC)

The UNSW Chemical Society (formerly the Sydney Technical College Chemical Society, founded 1913)) assists in the organisation of the School Seminar Series, a weekly program of talks from distinguished academics around Australia and the world.

In addition, the society organises a number of prestigious, endowed lectureships each year. Unfortunately, due to Covid CHEMSOC was unable to organise any guest lecturers to attend UNSW for the endowed lectures, but hopes to resume all lectureships in 2022.





5 STUDENTS

SOCS President Report

The current Students of Chemistry Society was elected at the AGM in April 2021.

We have continued to contribute to the School culture through social events and acted as a valuable communication point between the School and its students.

Firstly, I would like to thank the SOCS executive for persevering through such challenging times. They are as follows:

President	Kenny Liu
Treasurer	Patrick Ryan
Secretary	Grace Maynard
Social Director	Jack Bennett
Merchandising Officer	Lisa Hua
Arc Delegate/Grievance Officer	Stephen Bortolussi
Publicity Officer	Yiling Liu
Undergraduate Representatives	Elysse Choy Anika Moller Sue Vo

This executive cohort started their term by assisting with the running of the School of Chemistry 2nd year poster sessions, which importantly were the first face to face poster sessions that had been run since the beginning of the COVID-19 pandemic. Following this, a seminar reception was hosted on the behalf of the UNSW Chemical Society, building on an already strong relationship between SOCS and ChemSoc.

It was not long after this that once again, the lockdown in response to increasing COVID-19 cases in New South Wales prevented further activity by SOCS. This unfortunately prevented many plans for the rest of the year, including the return of trivia night, planned undergraduate study sessions, and most notably, the annual ChemBall event which had been delayed since 2020. I would like to personally thank Jack Bennett for following through with maintaining lines of communication with our venue, L'Aqua, on our behalf in order to be able to host ChemBall as soon as possible.

I'd also like to extend a special thank you to Professor Scott Kable and the School of Chemistry for their continued support of SOCS both through consultation and financial contributions.

Once again, I'd like to sincerely thank the 2021 executive team for all their hard work and perseverance during these challenging, uncertain times.

Kenny Liu
SOCS President 2021

Undergraduate Student Prizes

Honours Prize Winners

The Angyal Prize

Best performance in Honours Chemistry

Lisa Hua

The Cavill Prize

Best performance in Honours Medicinal Chemistry

Jack Bennett

The Nanoscience Honours Prize

Best performance in Honours Nanoscience

Sam Sommerville

Third Year Prize Winners

The School of Chemistry Prize

and

School Medal for best performance in Level 3 Chemistry

Lucia Chen

Medicinal Chemistry Prize

Best performance in Level 3 Medicinal Chemistry

Anika Moller

The RACI Analytical Chemistry Group Prize

Best performance in Level 3 Analytical Chemistry

Jasnoor Mann

The University of New South Wales Chemical Society Dwyer Prize

Best performance in Level 3 Inorganic Chemistry

Lucia Chen

The Bosworth Prize

and

Medal for best performance in Level 3 Physical Chemistry

Armando Perri

The University of New South Wales Park Pope Prize

Meritorious performance in Level 3 Chemistry courses

Anika Moller

Second Year Prize Winners

The School of Chemistry Prize

and

School Medal for best performance in Level 2 Chemistry

Raymond Li

Howard Prize Level 2 Inorganic Chemistry

Raymond Li

Howard Prize Level 2 Organic Chemistry

Zhiyuan Zhang

Howard Prize Level 2 Physical Chemistry

Zhiyuan Zhang

The University of New South Wales Chemical Society George Wright Prize

Meritorious performance in Level 2 Chemistry Courses

Zhiyuan Zhang

Year 10 Prize Winner

The School of Chemistry Prize

For Excellence and Enthusiasm in Chemistry for Year 10 students – Sydney Girls High School

Jeslyn Yu

Postgraduate Prize Winner and Scholarships

Don Craig Memorial Prize

For academic excellence in a research project in the area of Crystallography

Haocheng Guo

Paddon- Row Scholarship

For the highest ranked commencing local PhD student

Lisa Hua

Black Scholarship

For the highest ranked commencing international PhD student

Xiaojing Huang

Teaching Fellows

- MERRYN BAKER
- DOMENIC PACE
- MICHAEL FENECH
- PATRICK RYAN
- SAM MILES
- KRISTINE TOLENTINO
- SURABHI NAIK
- LAURA WIMBERGER

6 SCHOOL

Publications

Below are a sample of publications by academic staff from the School of Chemistry in 2021. For the full list of publications please see Appendix A.

A/Prof Graham Edwin Ball

Rowell, K.N.; Thomas, D.S.; Ball, G.E.; Wakelin, L.P.G. "Molecular dynamic simulations of diacridine binding to DNA: Indications that C6 diacridine can bisintercalate spanning two base pairs." *Biopolymers* 2021, *112*, e23409. https://doi.org/10.1002/bip.23409

A/Prof Jonathon Beves

L. Wimberger, S. K. K. Prasad, M. D. Peeks, J. Andréasson, T. W. Schmidt, J. E. Beves*, Large, Tunable, and Reversible pH Changes by Merocyanine Photoacids, *J. Am. Chem. Soc.* 2021, *143*, 20758–20768

L. L. Fillbrook, J.-P. Günther, G. Majer, W. S. Price, P. Fischer*, J. E. Beves*, Comment on "Using NMR to Test Molecular Mobility during a Chemical Reaction" *J. Phys. Chem. Lett.* 2021, *12*, 5932–5937

F. A. Larik, L. L. Fillbrook, S. S. Nurttila, A. D. Martin, R. P. Kuchel, K. Al Taief, M. Bhadbhade, J. E. Beves,* P. Thordarson*, Ultra-low molecular weight photoswitchable hydrogelators, *Angew. Chem. Int. Ed.*, 2021, 60,6764 –6770.

Emeritus Professor Roger Bishop

Chan IYH, Bhadbhade MM, Bishop R, Threefold helical assembly via hydroxy hydrogen bonds: the 2:1 co-crystal of bicyclo[3.3.0] octane-*endo*-3,*endo*-7-diol and bicyclo[3.3.0]octane-*endo*-3,*exo*-7-diol, Acta Crystallographica, Section E Crystallographic Communications, E77, 270-276 (2021)..

Emeritus Professor David St Clair Black

Somphol, K., Kumar, N. and Black, D. StC., Synthesis of some triindolyl dimethanes and tetraindolyl trimethanes, *Heterocycles*, 102, 274-289 (2021).

Sabir, S., Suresh, D., Subramoni, S., Das, T., Bhadbhade, M., Black, D. StC., Rice, S. A. and Kumar, N., Thioether-linked dihydropyrrol-2-one analogues as PqsR antagonists against antibiotic resistant *Pseudomonas aeruginosa*, *Bioorg. Med. Chem.*, 31, 115967 (2021).

Guha, S., Gadde, S., Kumar, N., Black, D. StC. and Sen, S., Orthogonal syntheses of γ-carbolinone and spiro[pyrrolidinone-3, 3']indole derivatives in one pot through reaction telescoping, *J. Org. Chem.*, **86**, 5234–5244 (2021).

Dr Jeffrey Black

B. Munavirov, J. J. Black, F. U. Shah, J. Leckner, M. W. Rutland, J. B. Harper and S. Glavatskih, The effect of anion architecture on the lubrication chemistry of phosphonium orthoborate ionic liquids, *Scientific Reports*, 2021, **11**, 24021. (Joint first author).

Dr Joseph Brophy

Palá-Paúl J, Copeland LM, Brophy JJ. The Essential Oil Composition of *Trachymene incisa* Rudge subsp. *incisa* Rudge from Australia. *Plants*. 2021; 10(3):601. https://doi.org/10.3390/plants10030601

Doran, J.C., Macdonell, P.F., Brophy,, J.J. and Davis, R. *Eucalyptus bakeri*: a potential source species for eucalyptus oil production in the subtropics. *Australian Forestry*, 84:4, 182-190 (2021). Published DOI: 10.1080/00049158.2021.1973225 (2021)

Emeritus Professor Ian Dance

Dance, I. (2021) Structures and reaction dynamics of N_2 and H_2 binding at FeMo-co, the active site of nitrogenase, *Dalton Transactions 50*, 18212-18237.

A/Prof W. Alexander Donald, Scientia Fellow

Multiplexed Screening of Thousands of Natural Products for Protein–Ligand Binding in Native Mass Spectrometry, GTH Nguyen, JL Bennett, S Liu, SE Hancock, DL Winter, DJ Glover, Journal of the American Chemical Society 143 (50), 21379-213874

Hydrogen peroxide signaling via its transformation to a stereospecific alkyl hydroperoxide that escapes reductive inactivation, RF Queiroz, CP Stanley, K Wolhuter, SMY Kong, R Rajivan, N McKinnon, Nature communications 12 (1), 1-17

Protein–Small Molecule Interactions in Native Mass Spectrometry, JL Bennett, GTH Nguyen, WA Donald, Chemical Reviews

Dr Albert Fahrenbach

H. J. Cleaves II, A. C. Fahrenbach. Book Chapter: "The Emergence of Life", In Biological Science: Exploring the Science of Life. A. Snape, Ed. Oxford University Press, 2021.

Z. Adam, A. C. Fahrenbach, S. M. Jacobson, B. Kacar, D. Yu. Zubarev. Radiolysis Generates a Complex Organosynthetic Chemical Network. Sci. Rep. 2021, 11, Article Number 1743.

Scientia Professor J. Justin Gooding

J.R.C. Junqueira, P.B. O'Mara, P. Wilde, S. Dieckhöfer, T.M. Benedetti, C. Andronescu, R.D. Tilley, J.J. Gooding, W. Schuhmann*, Combining nanoconfinement in Ag core/porous Cu shell nanoparticles with gas diffusion electrodes for improved electrocatalytic carbon dioxide reduction, *ChemElectroChem* 8 4848-4853 (2021).

M. Mehdipour, L. Gloag, J.X. Lian, R.D. Tilley*, J.J. Gooding*, Synthesis of strongly magnetic gold-coated zero-valent iron core-iron oxide shell nanoparticles with superparamagnetic behaviour, *Chem. Comm.* 57 13142-13145 (2021).

V.T. Cong, R.D. Tilley, G. Sharbeen, P.A. Phillips, K. Gaus, J.J. Gooding*, How to exploit different endocytosis pathways to allow selective delivering of anticancer drugs to cancer cells over healthy cells, *Chem. Sci.* 12 15407-15417 (2021).

Dr. Ronald Stanley Haines

Gilbert, A.; Haines, R. S.; Harper, J. B.*: "The effects of using an ionic liquid as a solvent for a reaction that proceeds through a phenonium ion", *Journal of Physical Organic Chemistry*, 2021, *34*, e4217. doi: 10.1002/poc.4217 [COVER ARTICLE]

Dr Christopher Hansen (DECRA Fellow)

Crane, S. W., Nonadiabatic Coupling Effects in the 800 nm Strong-Field Ionization-Induced Coulomb Explosion of Methyl Iodide Revealed by Multimass Velocity Map Imaging and Ab Initio Simulation Studies, *The Journal of Physical Chemistry A* 125, 9594-9608.

Zhao, Y., et al., Rotational and nuclear-spin level dependent photodissociation dynamics of H_2S, *Nature Communications* 12, 1-10.

Hansen, C. S., et al., Ultraviolet photodissociation of gas-phase transition metal complexes: dicarbonylcyclopentadienyliodoiron (II), *Molecular Physics* 119, e1813343.

A/Prof Jason Brian Harper

Sandler, I.; Harper, J. B.; Ho, J.*: "Explanation of Substituent Effects on Enolization of *b*Diketones and *b*-Ketoesters", *Journal of Chemical Education*, 2021, *98*, 1043-1048. doi: 10.1021/acs.jchemed.0c01076

Gilbert, A.; Haines, R. S.; Harper, J. B.*: "The effects of using an ionic liquid as a solvent for a reaction that proceeds through a phenonium ion", *Journal of Physical Organic Chemistry*, 2021, *34*, e4217. doi: 10.1002/poc.4217 [COVER ARTICLE]

Rohlmann, P.; Watanabe, S.; Shimpi, M.; Leckner, J.; Rutland, M. W.; Harper, J. B.; Glavatskih, S.*: "Boundary lubricity of phosphonium bisoxalatoborate ionic liquids", *Tribology International*, 2021, *161*, 107075. doi: 10.1016/j.triboint.2021.107075

Emeritus Professor D. Brynn Hibbert

D.B. Hibbert, E.-H. Korte, U. Örnemark, Metrological and Quality Concepts in Analytical Chemistry (IUPAC Recommendations 2021), *Pure Appl. Chem.* 2021, 93(9), 997–1048.

Kuselman, I.; Pennecchi, F. R.; Silva, R. J. N. B. d.; Hibbert, D. B.: IUPAC/CITAC Guide: Evaluation of risks of false decisions in conformity assessment of a multicomponent material or object due to measurement uncertainty (IUPAC Technical Report). *Pure Appl. Chem.* 2021, **93**, 113–154.

Pennecchi, F. R.; Kuselman, I.; Di Rocco, A.; Brynn Hibbert, D.; Sobina, A.; Sobina, E.: Specific risks of false decisions in conformity assessment of a substance or material with a mass balance constraint – A case study of potassium iodate. *Measurement* 2021, **173**, 108662. doi: 10.1016/j.measurement.2020.108662

Invited Presentations

Metrology and the law: presenting chemical measurements to the courts. in IUPAC/CITAC Web-seminar "Metrology, Quality and Chemometrics - Correlation of Test Results and Mass Balance Influence on Conformity Assessment", 21 Jan 2021, from 14:00 to 16:00 UTC (Coordinated Universal Time). Recorded and published on YouTube. https://iupac.org/event/metrology-quality-and-chemometrics/ .

The units chemists use: IUPAC and the mole. in "Enabling FAIR Publication, Exchange, and Reuse of Chemistry Data" American Chemical Society Fall meeting, Monday, 23rd August 2021.

Dr Junming Ho

Jakob D. E. Lane, Stuart N. Berry, William Lewis, Junming Ho & Katrina A. Jolliffe 2021, 'Diaminomethylenemalononitriles and Diaminomethyleneindanediones as Dual Hydrogen Bond Donors for Anion Recognition', The Journal of Organic Chemistry, vol. 86, no. 7, pp. 4957–4964, doi:10.1021/acs.joc.0c02801

Isolde Sandler, Jason B. Harper & Junming Ho 2021, 'Explanation of Substituent Effects on the Enolization of β-Diketones and β-Ketoesters', Journal of Chemical Education, doi:10.1021/acs.jchemed.0c01076

Isolde Sandler, Junbo Chen, Mackenzie Taylor, Shaleen Sharma & Junming Ho 2021, 'Accuracy of DLPNO-CCSD(T): Effect of Basis Set and System Size', The Journal of Physical Chemistry A, doi:10.1021/acs.jpca.0c11270

A/Prof Luke Hunter

G Surjadinata, L Hunter, L Matesic, G Pascali, Analytical-scale synthesis of aryl-SF4Cl via flow microfluidic technology, Journal of Flow Chemistry 11 (2), 107-115

NL Richardson, LJ O'Malley, D Weissberger, A Tumber, CJ Schofield, N Jones, L Hunter, Discovery of neuroprotective agents that inhibit human prolyl hydroxylase PHD2, Bioorganic & Medicinal Chemistry 38, 116115

A Lawer, L Hunter, Controlling γ-Peptide Helicity with Stereoselective Fluorination, European Journal of Organic Chemistry 2021 (7), 1184-1190

Dr Sina Jamali (DECRA Fellow)

L Wang, AK Tieu, S Lu, S Jamali, G Hai, HH Nguyen, S Cui, Sliding wear behavior and electrochemical properties of binder jet additively manufactured 316SS/bronze composites in marine environment, Tribology International 156, 106810

M Razizadeh, M Mahdavian, B Ramezanzadeh, E Alibakhshi, S Jamali, Synthesis of hybrid organic–inorganic inhibitive pigment based on basil extract and zinc cation for application in protective construction coatings, Construction and Building Materials 287, 123034

SS Jamali, D Mills, An assessment of intrinsic noise of pseudo-reference electrodes and instrumental noise to enable reliable electrochemical noise measurements in situ on organically coated metal, Electrochimica Acta 398, 139279

Dr K.M. Mohibul Kabir (DECRA Fellow)

J.D. Zhang, M.J. Baker, Z. Liu, K.M.M. Kabir, V.B. Kolachalama, D.H. Yates, W.A. Donald, Medical diagnosis at the point-of-care by portable high-field asymmetric waveform ion mobility spectrometry: a systematic review and meta-analysis, Journal of Breath Research, 15(2021) 046002

Q. Liu, E. Ahmed, K. M. M. Kabir, X. Huang, D. Xiao, J. Fletcher, W.A. Donald, Pulsed Nanoelectrospray Ionization Boosts Ion Signal in Whole Protein Mass Spectrometry, Applied Sciences, 11(2021) 10883.

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Professor Scott Henderson Kable

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Dr Martina Lessio

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Professor Jonathan Charles Morris

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Dr Martin D. Peeks (UNSW Scientia Fellow)

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Dr Nicole Rijs (DECRA Fellow)

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Professor Timothy Schmidt

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Professor Richard Tilley

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Professor Chuan Zhao

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Grants and Research Fellowships

AUSTRALIAN RESESARCH COUNCIL

Discovery Projects

Investigator(s)	$	Project
A/Prof J. Beves	120,000	Metal complexes for sustainable light-driven synthesis
A/Prof W.A. Donald	120,000	Ultrasensitive chemical analysis of single cells by mass spectrometry
A/Prof W.A. Donald	191,101	Cracking post-translational modification codes in high molecular definition
Dr A. Fahrenbach	130,000	Continuous Reaction Networks that Model Chemical Evolution of RNA
Scientia Prof J.J. Gooding,	130,000	Understanding how nanoconfinement can enhance electrochemical reactions
A/Prof J.B. Harper, Dr W.S. Price	140,000	Designer ionic liquids to control reaction outcome: Ionic liquids for solvent-controlled reactivity
Dr J. Ho	35,000	Understanding how nanoconfinement can enhance electrochemical reactions
Prof. S.H. Kable	170,000	The forgotten role of the ground state in atmospheric photochemistry
Prof. S.H. Kable, Prof. T.W. Schmidt	130,000	Resolving the interstellar carbon crisis with multilaser spectroscopy
A/Prof K. Kilian	428,914	Force mediated dynamic chemistry in hydrogels
Dr S. Neville, et al.	70,000	Emergent properties in spin crossover materials
Dr T.V. Nguyen	145,000	Organic Linchpin Reagents to Construct Structural Diversity and Complexity
A/Prof. N. Sharma	69,000	All-solid-state: new hybrid materials for next-generation lithium batteries
Scientia Prof. M.H. Stenzel, Dr Garvey	77,000	Bioactive Polymer Platelets
Scientia Prof. M.H. Stenzel, Dr Garvey	145,000	Virus-inspired nanoparticles based on polyion complex micelles
Prof. P. Thordarson, Prof. R. Astumian	110,000	Performing work through actively-driven self-assembled systems
Prof R. Tilley	150,000	Multi-Coloured' Tracers for Magnetic Particle Imaging
Prof. C. Zhao	155,000	Advanced electrocatalysts for ammonia synthesis with validated analysis

Laureate Fellowship

Investigator(s)	$	Project
Scientia Prof J.J. Gooding	1,300,932	The first generation of single entity measurement tools for analysis
Scientia Prof. M.H. Stenzel	330,000	Very small nanoparticles made to measure

Future Fellowship

Investigator(s)	$	Project
A/Prof J. Beves	93,000	Controlling chemistry with light powered molecular machines
A/Prof S. Neville	230,000	Molecular Switching Nanomaterials for Modern Technolgy
Dr V. Nguyen	190,000	Novel Organic Architectures and Functional Materials from Tropylium Ions
A/Prof. N. Sharma	240,000	Electrochemically activated solid state chemistry
Prof C. Zhao	320,000	Nanoconfined Ionic Liquids for Electrochemical Reduction of Carbon Dioxide

Centre of Excellence

Investigator(s)	$	Project
Scientia Prof J.J. Gooding, Prof P. Thordarson, et al	3,750,000	ARC Centre of Excellence in Convergent Bio-Nano Science and Technology
Prof T.W. Schmidt, A/Prof D. McCamey et. al.	631,000	ARC Centre of Excellence in Exciton Science

Industrial Training Centre

Investigator(s)	$	Project
Prof M.H. Stenzel, Prof P. Thordarson, Dr V. Nguyen, A/Prof J. Beves, et al	319,000	Training Centre for the Chemical Industries
Prof R. Tilley, A/Prof K. Swaminatha-Iyer et al	1,005,196	Next-Gen Technologies in Biomedical Analysis

Linkage Infrastructure Equipment and Facilities (LIEF)

Investigator(s)	$	Project
Prof C. Kepert, Prof P Thordarson, A/Prof S. Neville, A/Prof J.E. Beves, Dr T.V. Nguyen, Prof F. Stoddart, et al	136,111	High Performance Single Crystal X-ray Diffraction Facility

Linkage Program

Investigator(s)	$	Project
Scientia Prof JJ. Gooding,	295,000	Bioinks for the 3D printing of cells made from off-the-shelf components
Prof N. Kumar	178,552	Microbiologically Induced Stress Corrosion Cracking in Underground Mines
Dr M. Lessio, et al.	597,373	Advanced Molecular Frameworks for Sodium Battery Electrode Applications

Special Research Initiatives

Investigator(s)	$	Project
Prof N. Kumar	308,865	Development of electrochemically activated sorbents for PFAS defluorination

DECRA: Discovery Early Career Researcher Award

Investigator(s)	$	Project
Dr C. Hansen	139,912	The true impact of fluorinated compounds in the atmosphere
Dr S. Jamali	75,067	Exploiting biological noise for next generation electrochemical biosensors
Dr K.M. Mohibul Kabir	133,000	High-performance, portable ion-mobility surface-acoustic wave spectrometry
Dr D.J. Kim	139,000	Designing Supramolecular Compounds for Sustainable Energy Storage
Dr C. Medcraft	117,900	
Dr N. Rijs	100,000	Deconstructing molecular self-assembly by advanced mass spectrometry
Dr A. Wang	69,000	Conferring life-like properties to protocells

NATIONAL HEALTH & MEDICAL RESEARCH COUNCIL

Investigator(s)	$	Project
Scientia Prof J.J. Gooding	260,000	Building better ex vivo 3D cancer models with 3D printing
Scientia Prof J.J. Gooding	540,000	Investigator Grant: An in vitro pipeline for liquid biopsy biomarkers for cancer diagnosis and therapy
Prof N. Kumar	287,552	Tackling Hospital Acquired Infections with Peptide Mimics

UNIVERSITY OF NEW SOUTH WALES GRANTS

COVID – 19 Rapid Response Research Initiative

Investigator(s)	$	Project
Scientia Prof J.J. Gooding, et al	145,000	Point of Care, rapid testing for SARS CoV2 - Single molecule plasmonic sensor for amplification-free detection

Education Focused Careers

Investigator(s)	$	Project
Dr S. Wills	2,500	Professional Development

Faculty of Science / CK Cell Technologies – Industry Network Seed Fund

Investigator(s)	$	Project
A/Prof K. Kilian	10,000	Bioreactor design for developing cell-based therapies to treat Covid19 pneumonia

Faculty of Science Research Grant

Investigator(s)	$	Project
A/Prof. G.E. Ball	12,000	New solution NMR tools for locating hydrogen atoms in inorganic systems
Dr M. Lessio	7,844	Computational Design of Metal-Organic Frameworks for Heavy Metal Removal from Water
Dr M.D. Peeks	8,600	Organic materials for Faraday rotation
A/Prof. J.A. Stride	13,000	Rare earth metal organic frameworks, P^3 - porous, paramagnetic & photoluminescent

Office of the Pro-Vice Chancellor of Education and Student Experience

Investigator(s)	$	Project
Dr S. Wills	10,000	On the same page: Students' perceptions of assessment and feedback

Research Infrastructure Scheme

Investigator(s)	$	Project
Dr A. Fahrenbach	200,000	Cryogenic Ion Trap for Chemical Structure, Reactivity, and Spectroscopy
Dr L. McKemmish	10,000	Effective Modelling of Core Electrons with Mixed Ramp-Gaussian Basis Sets: Preliminary Investigations

Scientia Fellow Award

Investigator(s)	$	Project
Dr M.D. Peeks	30,000	
Dr N. Rijs	30,000	Deconstructing molecular self-assembly by advanced mass spectrometry

Strategic Education Fund

Investigator(s)	$	Project
Dr S.A. Sulway	40,000	Chemistry Syllabus Mapping

Torch Innovation Precinct

Investigator(s)	$	Project
Prof C. Zhao	900,000	Fuel Cell
Prof C. Zhao	625,000	3D oxygen electrode

AUSTRALIAN GRANTS

Investigator(s)	$	Project	Source
Dr A. Fahrenbach	16,000	Abiotic Ribonucleotide Synthesis from Energy-Driven Chemical Evolution, Access to Gamma Radiolysis Facility	ANSTO
Scientia Prof J.J. Gooding, Prof B. Eggleton (USyd)	1,000,000	New South Wales Smart Sensing Network (NSSN)	New South Wales State Government
Scientia Prof J.J. Gooding	420,000	Smart Sensor & Deep Learning Behavioural Engine for Personalised Health Monitoring	Cooperative Research Centre Project
Scientia Prof J.J. Gooding, et al	330,000	Innovative approaches to the application of nanotechnology for specific diagnosis and treatment of the dementias	Dementia Australia research Foundation – Yulgilbar
Dr J. Ho	112,000	Accelerating the design of novel catalysts and drugs through computational chemistry	National Computational Merit Allocation Scheme
A/Prof L. Hunter	1,000,000	Zero-Spin Silicon via Laser Isotope Separation for Quantum Computer Chips	Australian Government, Cooperative Research Centres Project (CRCP)
A/Prof K. Kilian	1,584,780	Microtumor arrays for the development of combination therapies for malignant melanoma	National Cancer Institute
Prof N. Kumar	45,386	Canola Oil based surfactants	Albright and Wilson Australia Ltd
Prof N. Kumar	50,000	Canola Oil based surfactants	Department of Industry, Innovation and Science
Prof N. Kumar	208,164	Design and synthesis of new isoflavone structures	Noxopharm Ltd
Prof N. Kumar	27,283	New disinfectant formulations	EcoAid
A/Prof S. Neville	200,000	Novel processing of pyrite ore to produce battery grade cobalt and supfur	Australian Government Cooperative Research Centres Projects.
Prof P. Thordarson, Prof W.J. Goscinski, et al	97,125 (UNSW portion)	The Australian Characterisation Commons at Scale	Australian Research Data Commons (ARDC) Platform grant
Prof P. Thordarson, Prof G. Sizer, Prof R. Nordon, et al	200,069 (UNSW portion)	Making cell & gene therapy affordable with a Microbioreactor	Australian Government Cooperative Research Centres Projects

Investigator(s)	$	Project	Source
Prof P. Thordarson, Prof J.A. McCarrol, et al	24,000	Application of gene-silencing nanodrugs to inhibit medulloblastoma growth	Cancer Australia - Priority-driven Collaborative Cancer Research Scheme
Prof P. Thordarson, Prof K. Rye, Prof S. Thomas	41,666	Preventing and Reversing Accelerated Atherosclerosis in Patients with Diabetes	NSW Health / Cardiovascular Research Capacity Program - Senior Researcher Grants
Prof J.A. Carroll, Prof P. Thordarson, Prof M. Kavallaris	66,667	Development of novel peptide-decorated nanodrug carriers for the treatment of childhood brain cancer	Hunter Medical Research Institute / Mark Hughes Foundation Brain Cancer
Prof P. Thordarson, Prof C. Marquis, Prof M. Kavallaris, Dr A. Farhenbach et al	979,790	NSW RNA Production and Research Network	NSW Health Program
Prof J.A. McCarrol, Prof P. Thordarson, et al	39,807	Application of gene-silencing nanodrugs to inhibit medulloblastoma growth	Cancer Australia - Priority-driven Collaborative Cancer Research Scheme

INTERNATIONAL GRANTS

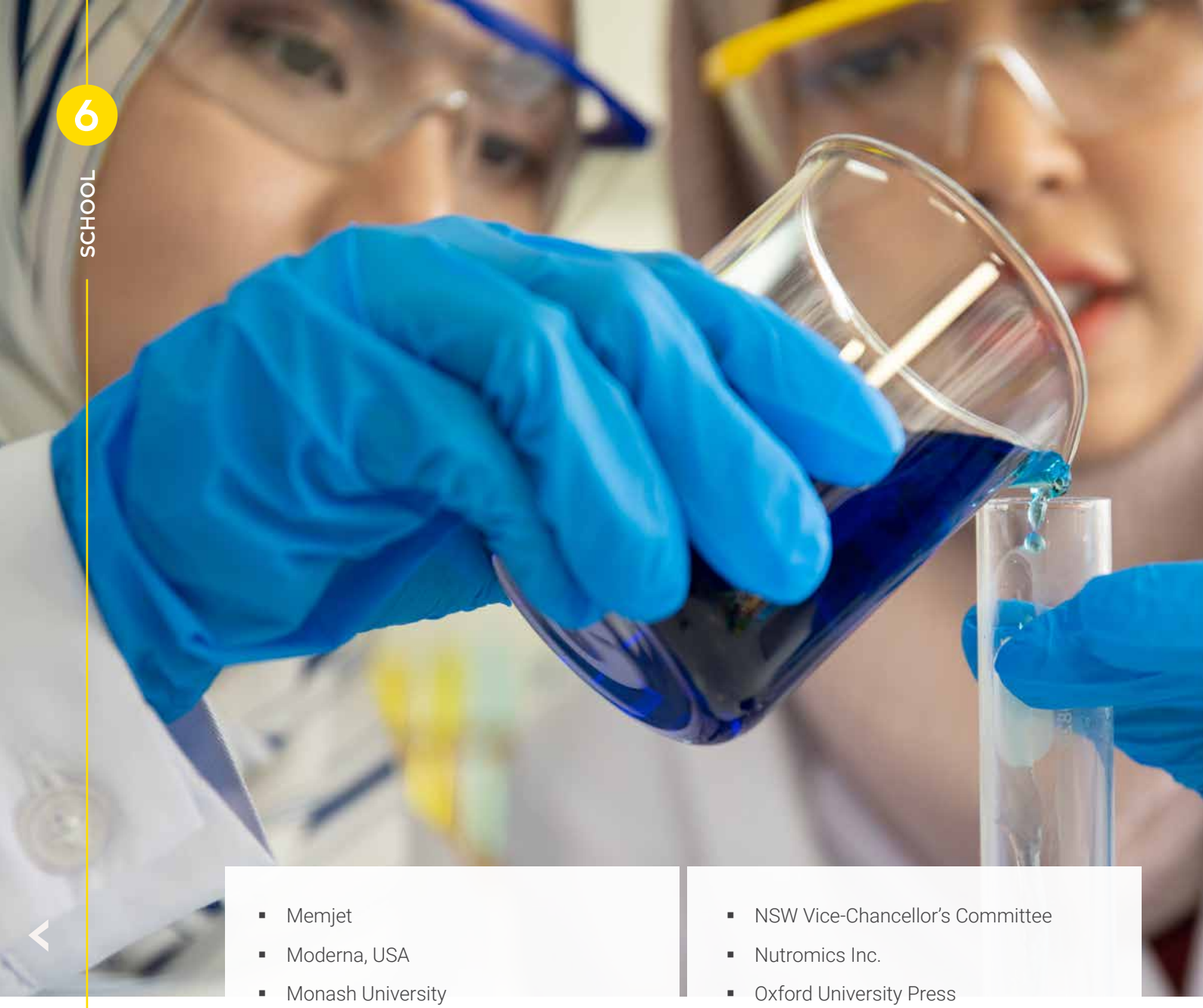
Investigator (s)	$	Project	Source
Prof. J.C. Morris	125,000	Development of CLK and SRPK1 inhibitors - stage 1	Emenda Therapeutics Ltd
Dr A. Wang	166,000	Stable propagation of a minimal synthetic cell	Human Frontier of Science Program
Dr C. Medcraft	13,000	Research Stays for University Academics and Scientists	Deutscher Akademischer Austauschdienst, (DAAD) German Academic Exchange Service

Industry and Community Interaction

Listed below are the companies, government authorities, societies and educational institutions that academic staff interacted with in 2021.

- Albright & Wilson (Australia) Pty Ltd
- Anglo American
- Anna University, Chennai, India
- Argonne National Laboratories
- Astra Zeneca, Sydney
- Australian Academy of Science
- Australian Centre for Astrobiology
- Australian Council of Science Deans
- Australian Institute of Nuclear Science and Engineering (AINSE)
- Australian Museum
- Australian National University
- Australian Nuclear Science & Technology Organisation (ANSTO)
- Australian Synchrotron
- Australian Wool Testing Authority (AWTA)
- Bentham Science Publishers
- Biocina (Adelaide)
- Brien Holden Vision Institute
- CAP-XX
- Charles Sturt University
- Chief Scientists Office of NSW
- Children's Cancer Institute, UNSW
- Children's Medical Research Institute, Westmead Hospital
- CK Cell Technologies
- Cobalt Blue
- Crosbe Cement
- CSIRO
- CSIRO Manufacturing
- Curtin University
- Dalian Institute of Chemical Physics
- DC Voltage Gradient Technology and Supply Ltd
- Deakin University
- Denison Gas Ltd
- Department of Industry, Science, Energy and Resources, Canberra
- Department of the Prime Minister and Cabinet Canberra
- Donghua University, Shanghai, China
- Dupont

- Earth Life Science Institute, Tokyo Institute of Technology
- Eco-Aid Pty Ltd
- Emenda
- Emory University
- Engineering Science and Technology University, Xi'an, China
- Ernst & Young
- Faculty of Medicine, UNSW
- Ferranova Pty Ltd.
- Flame Security International Pty Ltd
- Garvan Institute
- Greyhound Welfare and Integrity Commission
- Harvard University
- Heart Research Institute
- Heriot Watt University, Edinburgh, UK
- Hexion
- Honeywell Inc.
- Hong Kong Research Grants Commission
- Hong Kong Polytechnic University
- Hudson Institute of Medical Research
- Institut des Sciences Moléculaires d'Orsay, France
- Institute of Drug Technology, Melbourne
- International Union of Pure and Applied Chemistry (IUPAC)
- Inventia Life Sciences
- Journal of Inclusion Phenomena and Macrocyclic Chemistry
- Justus Liebig University Giessen
- Kirby Institute, UNSW
- Kyoto Institute of Technology
- Kyoto University, Dept of Polymer Chemistry
- Lowy Cancer Research Centre
- Macquarie University
- Mahidol University, Thailand
- Manchester University, UK
- Mark Wainwright Analytical Centre, UNSW
- Massachusetts Institute of Technology
- Massachusetts General Hospital
- Max Plank Institute, Germany
- McKenzie Consultancy on behalf of the Federal Government



- Memjet
- Moderna, USA
- Monash University
- Monash Institute of Pharmacy
- Mu'tah University, Jordan
- Nagasaki University, Japan
- National Aeronautics and Space Administration (NASA), Astrobiology Program
- National Measurement Institute
- National Wine and Grape Research Industry Centre
- Newcrest
- Noxopham Ltd
- NSW Chief Scientist and Engineer
- NSW Investment
- NSW Office for Health and Medical Research
- NSW Premier's Office
- NSW Vice-Chancellor's Committee
- Nutromics Inc.
- Oxford University Press
- Pharmorage Ltd
- Prince of Wales Clinical School
- Public Broadcasting Service (USA)
- PYC Therapeutics (Perth)
- Qingdao University, China
- Quanto Magazine
- Queensland Racing Integrity Board
- RNA Institute, UNSW
- Royal Australian Chemical Institute (RACI) NSW
- Royal Melbourne Institute of Technology (RMIT)
- Royal Institute of Technology, Stockholm, Sweden
- Royal Society of Chemistry

- Royal Society of New South Wales
- RR MedSciences Pty Ltd
- Rux Energy PTY LTD
- Sandia National Laboratories
- School of Biotechnolgy & Biomolecular Sciences (BABS), UNSW
- School of Chemical Engineering, UNSW
- School of Mechanical Engineering UNSW
- School of Medical Sciences, UNSW
- Schlumberger Industries, Alsace, France
- SDx Tethered Membranes
- Shaanxi Normal University
- Shoalhaven Starch
- Sicona Battery Technologies
- Strasbourg University
- St Vincent's Hospital
- Sustainable Energy Initiative (SEI)
- J. Sutton Associates
- Swinburn University of Technology
- Sydney Criminal & Traffic Lawyers
- Sydney Water
- Technical University, Monastir, Tunisia
- The Engineering & Design Institute (TEFI), London
- Textile Machinery Society of Japan
- THC Pharma Pty Ltd
- Tokyo Institute of Technology
- Tsinghua University
- Unilever
- University of Adelaide
- University of Alberta
- Universitá degli Studi di Bologna, Italy
- University of Bristol
- University of California
  - San Diego, USA
  - Davis, USA
- University of Cambridge
- University of Florence
- University of Florida
- University of Haute Alsace
- University of Leeds
- University of Maine, USA
- University of Melbourne
- University of New England
- University of Newcastle
  - Molecular Microbiology Group
- University of Northampton, UK
- University of Nottingham
- University of Oklahoma
- University of Oregon
- University of Queensland
  - BASE Facility
- University of Sydney
  - Bacterial Pathogens Group
- University of Technology, Sydney
- University of Texas, Austin, USA
- University of Trento, Italy
- University of Western Australia
- University of Wollongong
- Whitely Corporation
- Zhengzhou University

7 EXTERNAL ADVISORY COMMITTEE

The Committee comprises of representatives from our key stakeholder organisations – industry, government, schools and government research institutes. The terms of reference for the committee are as follows:

1. **To appraise the School programs in light of the needs of the School stakeholders.**
2. **To provide advice in regard to the direction that the School should take to best enhance future interactions with stakeholders.**
3. **To provide advice about the changing needs of industry, research and government organisations to best prepare the School's graduates for future opportunities.**
4. **To receive and discuss the School of Chemistry's Annual Report.**
5. **To aid the development of the School in any other way possible.**

Due to Covid the EAC meeting was not held in 2021.

As students were not permitted on campus for most of the year and staff had to adapt quickly to focusing on changing teaching and assessment methods, it was decided to defer the meeting to 2022.

The School and committee remain committed to improving and developing future opportunities for students and graduates.

External Representatives:

Ms Natalie Chapman (Chair)
Managing Director, genmaker

Dr Christopher Armstrong
Director, Office of the NSW Chief Scientist and Engineer

Emeritus Prof. Bruce Sutton
Honorary Professor (Agronomy), The University of Sydney

Professor Michelle Coote
Australian National University

Dr Sharon Chapman
Head of Science, Randwick Girls High School

Mr Luke Hanson
Head of Science, SCEGGS

Mr Dave Sammut
Principal, DCS Technical

Ex Officio Members

Professor Scott Henderson Kable
Head of School

A/Prof Jason Harper
Deputy Head of School

Scientia Professor Justin Gooding
Director of Strategy / NHMRC Leadership Fellow / Co-Director of the Australian Centre for NanoMedicine

Scientia Professor Martina Stenzel
ITTC Director

Professor Tim Schmidt
Director of Research

A/Prof John Stride
Director of Teaching

Dr Shannan Maisy
Director of Academic Programs, Faculty of Science

A/Prof Alison Beavis
Faculty of Science representative

Dr Toby Jackson
School Manager

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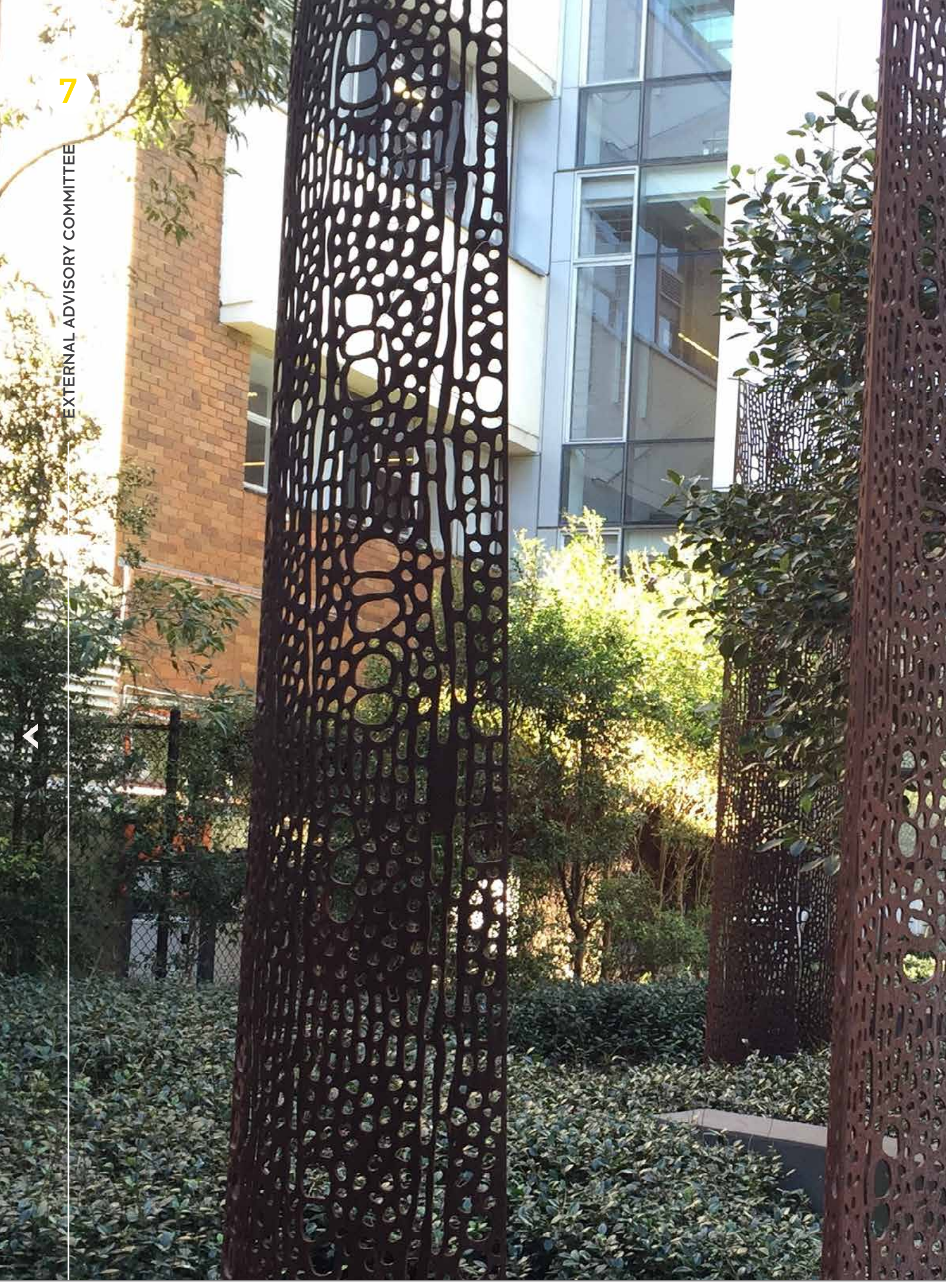
EXTERNAL ADVISORY COMMITTEE



NATALIE CHAPMAN

New Chair of the External Advisory Committee

In 2021 Natalie Chapman took over as Chair of the EAC from Dr Christopher Armstrong. Chris will remain on the committee in an advisory role.

Natalie, Managing Director of gemaker has degrees in both chemistry and marketing and is an award-winning commercialisation specialist and scientist, bringing the next generation of knowledge industries to the world. Over the past two decades, she has turned brilliant deep tech ideas into thriving businesses, building jobs and capabilities in Australia.

In 2011, she founded gemaker to help researchers to engage more effectively with industry. gemaker won a prestigious NSW Telstra Business Award in 2017, and Natalie was honoured with the University of Wollongong Alumni Award for Innovation and Entrepreneurship in 2018.

Since 2011, gemaker has worked with 80 innovative businesses, 45 research organisations and 10 government departments/ agencies. The company has also helped secure project funding for clients valued at $239M and generated local, national and international media coverage for clients worth $1.41M.

As a practical, pragmatic, profit-for-purpose organisation, Natalie and gemaker give back through mentoring women and marginalised individuals in STEM (Science, Technology, Engineering and Mathematics) and bringing free STEAM (Science, Technology, Engineering, the Arts and Mathematics) classes to primary schools.

The School of Chemistry warmly welcomes Natalie as the new EAC Chair.

8 APPENDIX A

A/Prof Graham Edwin Ball

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Emeritus Professor David St Clair Black

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Scientia Professor J. Justin Gooding

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