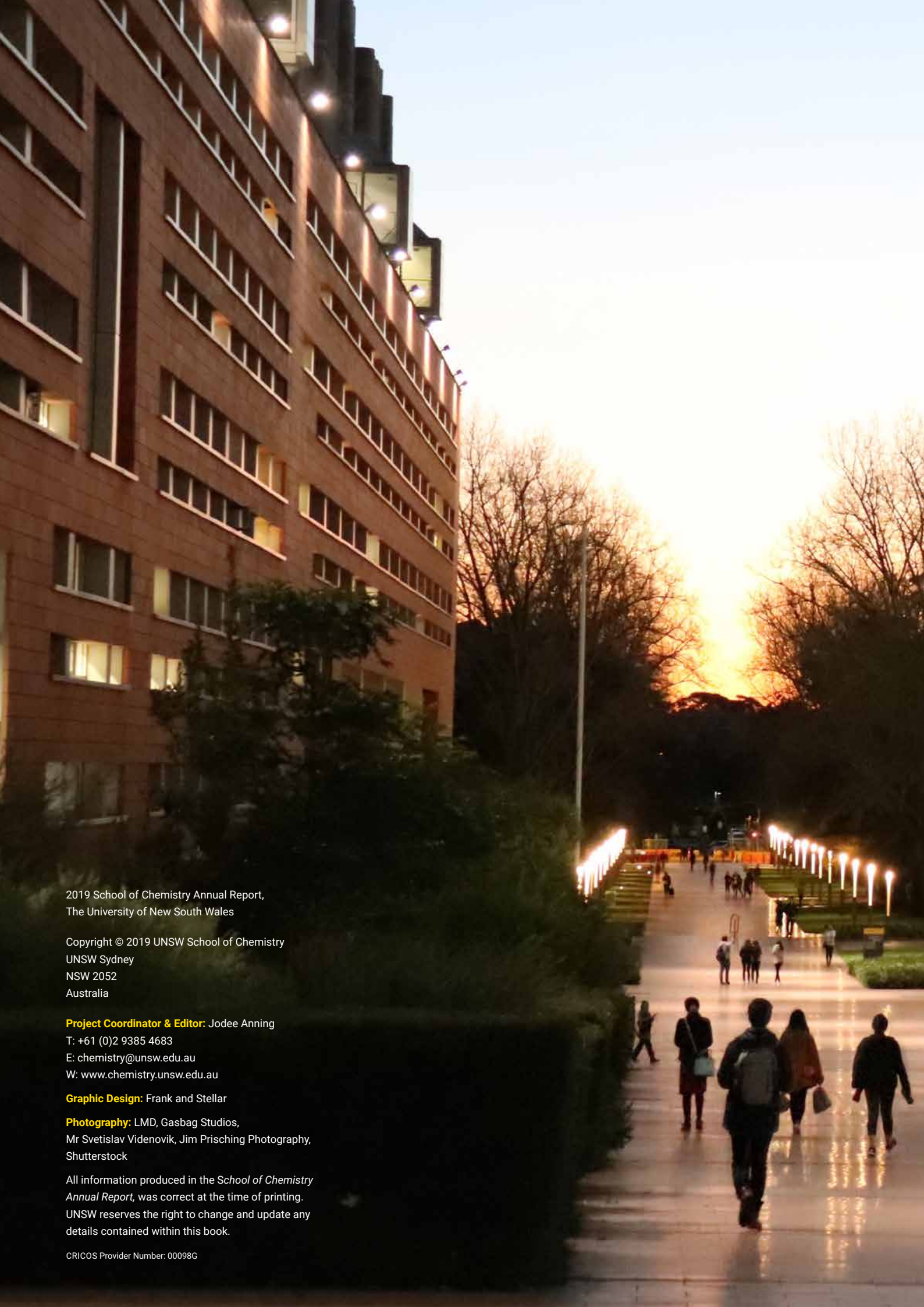


School of Chemistry Annual Report 2019



UNSW
SYDNEY



2019 School of Chemistry Annual Report,
The University of New South Wales

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UNSW Sydney
NSW 2052
Australia

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"I very much enjoy, and take great pride, when people in the School do well and get well-earned recognition for their research, teaching and service."

Head of School Report

As I sit here in the middle of 2020, during the second Australian COVID wave, it seems surreal to write about 2019.

At the present time, it is all about survival in universities, as we close ranks and buttress ourselves against loss of international students, budget cuts, online teaching, and a political climate towards the tertiary education sector that seems non-supportive, to say the least. But this will be the story for the 2020 report – at the end of 2019 it was all in the future.

The end of 2019 saw the end of my 5-year term as Head of School. I was asked by the Dean to accept a second term, and I thought deeply about whether it was in the School's best interest to do so. As you all know, I did end up saying yes. In part, I think I still have something to contribute to the School in this area. In part there are unfinished projects. But importantly, I mostly enjoy the role. In particular, I very much enjoy, and take great pride, when people in the School do well and get well-earned recognition for their research, teaching and service.

I want to use my report this year to reflect over the past 5 years. In the middle of 2015, I wrote my first business case, seeking more space for the School.

With 194 researchers in a building built for 150, we had run out of not only bench space and fume cupboards, but also run out of desks and office space. This business case was to fit out the 7th floor of Hilmer for chemistry, and the case was constructed around the success of Justin Gooding.

Obviously, that business case was successful, and I learned how to leverage the success of individual research and teaching in the School for many more business cases over the years, for extra space, people and resources. Martina Stenzel was pivotal for securing Level 7 of SEB; Tim Schmidt and his ARC Centre was important for half of Level 6 and Fraser Stoddart for the other half. The increase in undergraduate teaching load was responsible for securing new teaching labs in the Chemical Sciences building. This strategy of building around the success of individuals had benefit for the whole School. Many other groups enjoy the new research lab space in SEB and Hilmer. We have returned space temporarily used for research back to teaching, and the researchers remaining in Chemical Sciences have more room than they did before.

Overall, across many metrics, the School is about 50% bigger and more productive in 2019 than in 2015. Academic staff numbers have grown from 24 full-time equivalent to 38 (inc. ARC and NHMRC Fellows). Research staff (postdocs and RA's) from 29 to 48. Technical and administrative staff (19 to 28); HDR students (100 to 160) and completions (29 to 40); research space (2000 to 3300 sq. m); teaching space (1300 to 1600 sq. m); research income (\$5M to \$8.4M).

The School is fortunate to have an outstanding leadership group. These (mostly) professors are outstanding researchers across the board. They contribute strongly to teaching. But for me, they always provide sensible advice, which is always for the benefit of the School, rather than with self-interest. It has been a pleasure to work with this group over the past 5 years.

In the past year or so the School has seen the rise of an "emerging leadership" group. These are an outstanding group of mid-career academics who are enjoying sustained excellence in their research and teaching programs, and are starting to make their presence felt around the School in leadership roles. Watching their success evolve over the years has been most gratifying and a credit to their hard work.

About half of the academic staff are at Level B (lecturer), which is a stark reminder how "young" the School is. We have appointed no less than 16 new academic staff in the past 4 years. In 2019, we welcomed Martina Lessio, Martin Peeks and Siobhan Wills, and also new DECRA Fellows, Chris Hansen and Mohibul Kabir. With this number of excellent early career researchers just starting their independent careers, I can only see continuous improvement in quality papers published, research income garnered and HDR students recruited. With this number of ECR staff, there is a positive vibe of new ideas and enthusiasm. It is exactly this enthusiasm that I am confident will allow the School to not only ride out the COVID storm, but to ride to new success.

This report has been mostly about academic performance, but I cannot finish without commenting on the excellent group of admin and technical staff in the School. This team, led by Toby Jackson, Nancy Talavera and Josh Peterson (and Ruth Thomas when Nancy was on maternity leave) have been so effective that the School just seems to run on its own (although like the proverbial duck, I do get to see a lot of the underwater paddling!). Like the academic staff, it's easy to forget that this is also largely a new team. In 2019, we welcomed Vanessa Gotting to the team, and of the whole team, only seven were in the School when I started as Head. And of these, only four were in similar roles in 2015. I cannot express my thanks enough to the whole admin and technical team for the continued smooth running of the School.

In 2019, we saw the retirement of two long-serving members of the School – Steve Colbran and Jodee Anning. I wish them both a long and happy retirement and express my sincere thanks for more than 50 years of outstanding service to the School between them.

"The end of 2019 was a time of great optimism for the future of Chemistry at UNSW."

Several months into 2020, and the great COVID shadow hangs over our heads. Oh, to have a crystal ball and know what I will be writing at the end of my next term as Head of School. What I do know, however, is that quality always rises to the top, and I believe that we have quality people in the School across the board. Therefore I remain positive and optimistic about the next few years.

Professor Scott Henderson Kable



Staff

Committees

School Executive Committee

- Prof. Scott Kable (Chair)
- Scientia Prof. Justin Gooding
- Scientia Prof. Martina Stenzel
- Prof. Pall Thordarson
- A/Prof. Jason Harper
- Dr. Toby Jackson



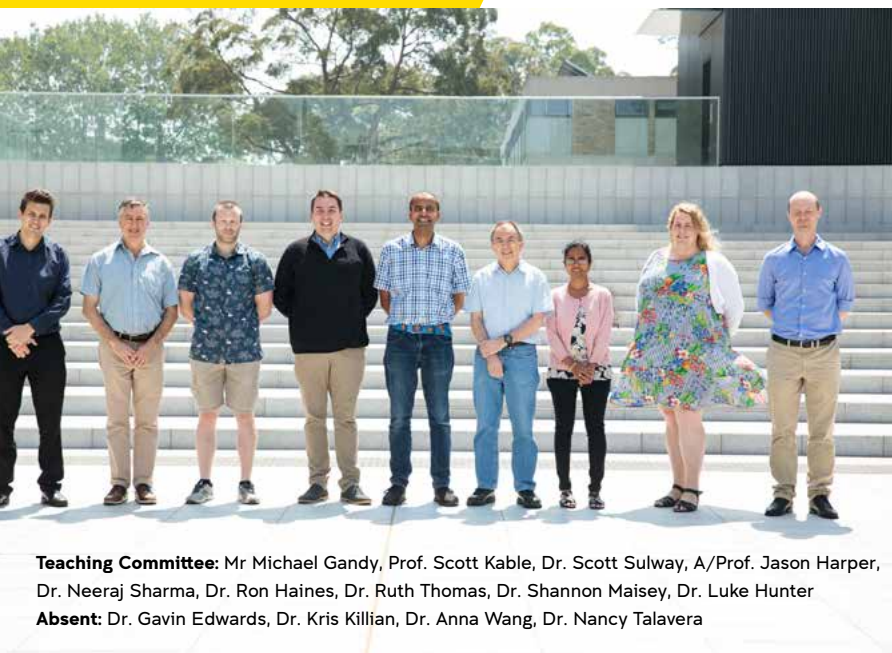
Dr. Toby Jackson, Prof. Scott Kable, Scientia Prof. Justin Gooding, Scientia Prof. Martina Stenzel, Prof. Pall Thordarson, Associate Prof. Jason Harper

Research Committee

- Scientia Prof. Martina Stenzel (Chair)
- Prof. Scott Kable
- Scientia Prof. Justin Gooding
- Prof. Les Field
- Prof. Chuan Zhao
- Prof. Fraser Stoddart
- Prof. Richard Tilley
- Dr. Suzanne Neville
- Dr. Nicole Rijs
- Dr. Josh Peterson



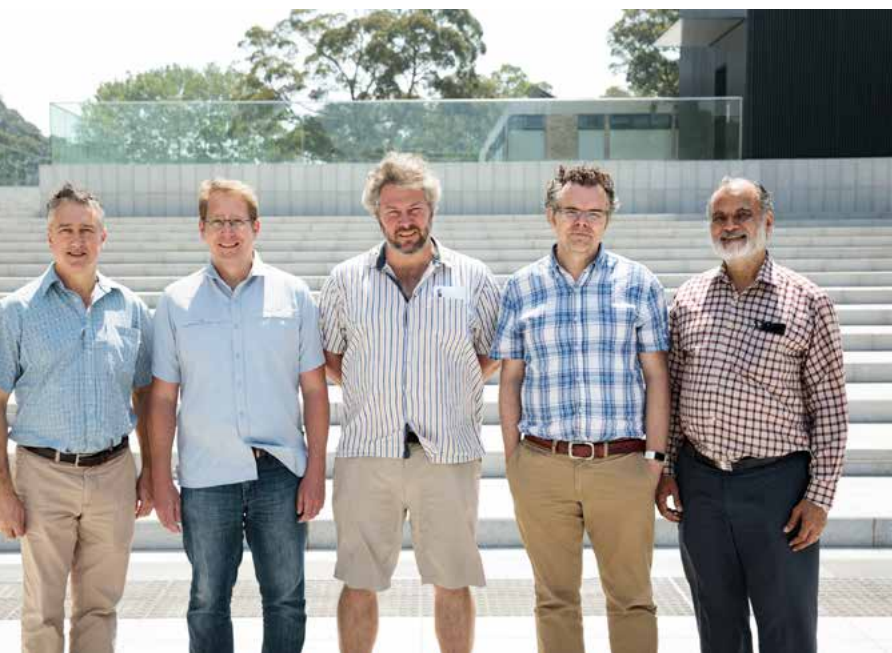
Prof. Scott Kable, Dr. Josh Peterson, Dr. Suzanne Neville, Prof. Chuan Zhao, Scientia Prof. Justin Gooding, Scientia Prof. Martina Stenzel, Prof. Les Field
(Absent: Prof. Fraser Stoddart, Prof. Richard Tilley, Dr. Nicole Rijs)



Teaching Committee: Mr Michael Gandy, Prof. Scott Kable, Dr. Scott Sulway, A/Prof. Jason Harper, Dr. Neeraj Sharma, Dr. Ron Haines, Dr. Ruth Thomas, Dr. Shannon Maisey, Dr. Luke Hunter
Absent: Dr. Gavin Edwards, Dr. Kris Killian, Dr. Anna Wang, Dr. Nancy Talavera

Teaching Committee

- A/Prof. Jason Harper (Chair)
- Dr. Gavin Edwards (Deputy Chair)
- Prof. Scott Kable
- Dr. Luke Hunter
- Dr. Kris Kilian
- Dr. Ron Haines
- Dr. Shannan Maisey
- Dr. Neeraj Sharma
- Dr. Anna Wang
- Dr. Nancy Talavera
- Mr Michael Gandy



Postgraduate Committee: Prof. Scott Kable, Dr. Jon Beves, Prof. Timothy Schmidt, A/Prof. John Stride, Prof. Naresh Kumar **Absent:** Prof. Pall Thordarson, A/Prof. Shelli McAlpine, Dr. Vinh Nguyen, Dr. Alex Donald, Dr. Junming Ho, Mr Ken McGuffin

Postgraduate Committee

- Prof. Naresh Kumar (Chair)
- Prof. Scott Kable
- Prof. Timothy Schmidt
- Prof. Pall Thordarson
- A/Prof. Shelli McAlpine
- A/Prof. John Stride
- Dr. Vinh Nguyen
- Dr. Jonathon Beves
- Dr. Alex Donald
- Dr. Junming Ho
- Mr Ken McGuffin



School HS Consultation Committee: Prof. Scott Kable, Dr. Robert Chapman, Mr Jeremy Dobrowolski, Mr Ian Aldred, Dr. Ruth Thomas, Mr Tim Fang, Dr. Toby Jackson, Dr. Neeraj Sharma



Chemistry Equity, Diversity and Inclusion Committee: Dr. Toby Jackson, Lori Jacobs, Dr. Neeraj Sharma, Dr. Ruth Thomas, A/Prof. John Stride, Anne Ayres, Prof. Scott Kable, Dr. Shannan Maisey

Outreach Committee

- Dr. Laura McKemmish (Chair)
- Prof. Scott Kable
- A/Prof. Graham Ball
- Dr. Scott Sulway
- Dr. DJ Kim
- Dr. Kim Lapere
- Mr Michael Gandy
- Mr Ken McGuffin

School HS Consultation Committee

- Dr. Josh Peterson (Chair)
- Dr. Vinicius Goncales (Deputy Chair)
- Prof. Scott Kable
- Dr. Neeraj Sharma
- Dr. Albert Fahrenbach
- Dr. Toby Jackson
- Dr. Robert Chapman
- Dr. Ruth Thomas
- Mr Ian Aldred
- Theresa Khawati (Faculty representative)
- Mr Jeremy Dobrowolski (Student representative)
- Mr Tim Fang (Student representative)

Chemistry Equity, Diversity and Inclusion Committee

- Dr. Neeraj Sharma (Chair)
- Prof. Scott Kable
- A/Prof. John Stride
- Dr. Shannan Maisey
- Dr. Toby Jackson
- Dr. Ruth Thomas
- Anne Ayres
- Lori Jacobs (student representative)

Academic Staff



Associate Professor Graham Edwin Ball

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

Professional Activities:

- RACI Member

Research:

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

Postdoctoral Fellows:

- Dr. Biswath Das

PhD Students:

- Mushi He (MSc)
- Jane Jung
- Christopher Pracey
- James Watson



Dr. Jonathon Beves

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
- Member, School of Chemistry Research Committee.

Research:

- Supramolecular chemistry
- Coordination chemistry

PhD Students:

- Lucy Fillbrook
- Aaron Kennedy
- Varsha Krishnan
- Fayaz Ali Larik
- Ena Luis
- Tom MacDonald
- Laura Wimberger



Dr. Robert Chapman (DECRA Fellow)

BEng (Ind. Chem Hons 1), UNSW, PhD, The University of Sydney

Professional Activities:

- Associate Editor PLOSOne
- Community editorial board (Materials Horizons)
- Member RACI
- Member RSC

Research:

- Oxygen tolerant controlled radical polymerisation systems for biomaterials design
- Protection of enzymes by nanoencapsulation

PhD Students:

- Zifei Han
- Zihao (Alvin) Li
- Daniele Melodia
- Ahmed Mustafa
- Yiping Wang

Honours Students:

- Austin Lai



Dr. Xianjue Chen (DECRA Fellow)

PhD, UWA

Professional Activities:

- Chartered Member, Royal Australian Chemical Institute (MRACI CChem)
- Member, Australian Carbon Society

Research:

- Nanomaterials
- Carbon nanostructures
- Membrane separation
- Energy applications.



Associate Professor Stephen Boyd Colbran

BSc (Hons), PhD, Otago

Professional Activities:

- Member of the American Chemical Society (ACS) and the Royal Australian Chemistry Institute (RACI)

Research

- Transition metal chemistry and electrochemistry
- Transition metal-based catalysis and electrocatalysis

PhD Students:

- Timothy Elton
- James McPherson
- Matthew Mudge



Dr. W. Alexander Donald

BSc Seattle University, PhD University of California, Berkeley

Professional Activities:

- Treasurer, Australian and New Zealand Society for Mass Spectrometry
- Chair, RACI NSW Analytical & Environmental Chemistry Division
- Associate Editor (Handling Editor), Journal of Enzyme Inhibition and Medicinal Chemistry
- Editorial Board, Expert Opinion on Therapeutic Patents
- Editorial Board, Journal of Enzyme Inhibition and Medicinal Chemistry
- Editorial Board, International Journal of Molecular Sciences (Biochemistry)

Research:

- Fundamental and applied mass spectrometry, including ionization and ion fragmentation
- Single cell chemical analysis by mass spectrometry
- Rapid, direct and portable ambient pressure methods for forming, focusing, separating and detecting ions

Postdoctoral Fellows:

- Dr. Morphy Dumlao

Honours Students:

- Sherrie Liu

PhD Students:

- Ezaz Ahmed
- Susannah Brown
- Hyun Eui (Peter) Lee
- Alireza Mashouf
- Giang Nguyen
- Mohammad Tajiki
- Huixin Wang
- Diana Zhang

MSc

- Liang Jiang
- Fon Kankaew

MPhil

- Qinwen Liu
- Jordan Mastellone



Dr. Gavin Leslie Edwards

BSc (Hons), PhD (Monash)

Professional Activities:

- Associate Dean – Academic Programs
- Deputy Director of Teaching, School of Chemistry



Dr. Albert Fahrenbach

BSc (Hons) Indiana University, PhD Northwestern University

Professional Activities:

- Secretary of the UNSW Chemical Society

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
- Nonenzymatic Template-Directed Peptide Synthesis



Professor Leslie David Field

B.Sc (Hons), Ph.D, D.Sc University of Sydney

Professional Activities:

- Fellow of the Australian Academy of Science
- Fellow of the Royal Australian Chemical Institute
- Fellow of the Royal Society for Chemistry
- Fellow of the Royal Society of NSW
- Member of the American Chemical Society
- Organometallic chemistry of carbon dioxide
- Applications of NMR spectroscopy in organic & organometallic chemistry
- Transition metal catalysis in organic synthesis
- Transition metal acetylides, organometallic polymers and new materials

Postdoctoral Fellows:

- Dr. Hsiu Lin Li
- Dr. Synøve Scottwell

Research:

- Organometallic chemistry of coordinated dinitrogen - nitrogen fixation.
- C-H Bond activation and functionalisation

Honours Students:

- Dylan Oakes
- PhD Students:
 - Silviu Dobrota
 - Surabhi Naik
 - James Watson



Dr. Vinicius Romero Goncales

BSc, PhD, University of Sao Paulo, Brazil

Research:

- Wearable Sensors



Scientia Professor J. Justin Gooding

B.Sc. Hons (Melb), D. Phil (Oxon)

Professional Activities:

- Founding Co-Director of the 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*
- 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 Dr. 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 three dimensional printing of cells (with 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. Lucy Gloag
- Dr. Fabio Lisi
- Dr. Raheleh Pardekhorrām
- Dr. Iman Tehrani
- Dr. Kristel Tjandra
- Dr. Wenqian Wang
- Dr. James Webb
- Dr. Yanfang Wu
- Dr. Ying Yang
- Dr. Long Zhang

PhD Students:

- Saifal Alam
- Fida'A Alshawawreh
- Yosef Armin
- Danielle Bennett
- Simone Bonaccorsi
- Lachlan Carter
- Ali Chamazketi
- Dongfei (Phoebe) Chen
- Hsiang-Sheng (Johnson) Chen
- Xueqian Chen
- Sanjun Fan
- Shreedhar Gautum

- Sharmin Hoque
- Nilou Jamshidi
- Mohaddeseh Kahram
- Cameron Kelly
- Jiaxin (Lily) Lian
- Ben McVey
- Milad Mehidpour
- Parisa Moazzem
- Munkhshur Myekhlai
- Duyen Nguyen
- Peter O'Mara
- Bijan Po
- Agus Poerwoprajitno
- Matthew Sims
- Panthipa Suwannakot
- Wenxian Tang
- Kristine Tolentino
- Cong Vu
- Johanna Wordsworth
- Manchen Zhao
- Kelly Zong

Honours Students:

- Kim Duong
- Azhry Mohd Ghazali
- Daniel Hagness
- Joseph Harding
- Kevin Mariandry



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:

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

PhD Students:

- Alyssa Gilbert
- Karin S. Schaffarczyk McHale



Associate Professor Jason Brian Harper

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

Professional Activities:

- Director of Teaching, School of Chemistry
- Reviewer for national funding bodies: Australia, Romania
- Ph.D. Examiner: Australia, Pakistan
- Technical Committee, Chemeca 19
- International Advisory Board, 31st International Symposium on the Chemistry of Natural Products & 11th International Congress on Biodiversity
- Treasurer, Southern Highlands Conference on Heterocyclic Chemistry
- Member, IUPAC Subcommittee on Structural and Mechanistic Organic Chemistry
- Associate Member, Division III (Organic), International Union of Pure and Applied Chemistry
- Fellow, Royal Australian Chemical Institute
- Member, American Chemical Society (ACS)
- 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

PhD Students:

- Benjamin Smit-Colbran
- Alyssa Gilbert
- Aidan Jowett
- Kenny Liu
- Karin Schaffarczyk McHale

Honours Students:

- Alicia Evans
- Daniel Morris
- Matthew Taylor



Associate Professor Junming Ho

BSc, UWA, BSc (Hons), PhD ANU

Professional Activities:

- Editorial Board Member (Chemical Data Collections and Elsevier Journal)

Research:

- Computational chemistry
- Physical organic chemistry
- Biomolecular simulations

PhD Students:

- Junbo Chen
- Gabriella Marcolin
- Isolde Sandler

Honours Students:

- Alicia Evans
- Jin Kato
- Ying Wu (Co-supervisor)



Dr. Luke Hunter

BSc (Advanced) (Hons), PhD, The University of Sydney

Professional Activities:

- Director of 1st Year, Chemistry UNSW
- Committee member, Chemistry Equity Diversity and Inclusion

Research:

- Exploiting stereoselective fluorination as a tool for controlling the conformations of diverse bioactive molecules.
- Developing next-generation cytotoxic chemotherapeutics that bind to DNA and crosslink it in unprecedented ways.
- Activating the hypoxia response as a neuroprotective strategy for enhancing recovery post-stroke.
- Optimising synthetic strategies for aryl-SF5 compounds

Honours Students:

- Ga Yi Ruan
- Patrick Ryan
- Ying Min Wu

PhD Students:

- Ahmed Ahmed
- Mohiminul Adib
- Grace Constable
- Yun Cheuk (Jimmy) Leung
- Yuvixza Lizarme
- Samantha Miles
- Nicole Richardson
- Glen Surjadinata
- Daniel Weissberger



Dr. K.M. Mohibul Kabir

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

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 on ion focusing method development, nanosecond plasma ion source and volatile organic compound detection
-



Professor Scott Henderson Kable

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

Professional Activities:

- Fellow, RACI

Research:

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

Postdoctoral Fellows:

- Dr. Christopher Hansen
- Dr. Klaas Nauta

Honours Students:

- Lorrie Jacob

PhD Students:

- Jyoti Campbell
 - Maria Perez-Pena
 - Keiran Rowell
 - Blair Welsh
-



Dr. Kris Kilian

BS, MS University of Washington, PhD UNSW

Professional Activities:

- Track chair and organiser, 10th International Nanomedicine Conference
- Proposal review, Australian Research Council, DP20, DE20
- Proposal review, National Health and Medical Research Council
- Proposal review, Human Frontiers Research Program
- Scientific Reports, Editorial activities
- Ad hoc peer review

Research:

My group is interested in how the chemistry of materials influence the behaviour of mammalian cells. Inspired by biological materials, we integrate nano- and micro- fabrication techniques with “hard” and “soft” materials to mimic the physical and chemical properties of the cell and tissue microenvironment. Current projects include:

- Mechanochemistry in hydrogels
- Dynamic macromolecular linkages for monitoring cell traction
- Magnetoactive composite materials
- Bioprinting in jammed yield-stress matrices
- Model tumour microenvironments (melanoma and pancreatic cancer)
- Somatic cell reprogramming and pluripotent stem cell differentiation

Postdoctoral

Fellows:

- Dr. Sara Romanazzo

Honours Students:

- Ashley Nguyen
- Lauren Niessen

PhD Students:

- Jake Ireland
- Md Shariful Islam
- Gagan Jalandhra
- Honda Jayathilaka
- Thomas Molley
- Stephanie Nemeč
- Pallavi Srivistava



Dr. Dong Jun Kim

BSc in Materials Science & Engineering, Yonsei University, Seoul, PhD Korea
Advanced Institute of Science and Technology, Daejeon, Republic of Korea

Professional Activities:

- Peer reviewer of scientific papers
- Outreach community members in the School of Chemistry

Research Activities:

- Energy storage applications
- Rechargeable batteries
- Supramolecular chemistry
- Molecular machine.

Postdoctoral Fellows:

- Dr. Ji Eun wang



Professor Naresh Kumar

BSc (Hons 1), MSc, Punjab Agricultural University, India

PhD University of Wollongong, Australia

Professional Activities:

- Postgraduate Coordinator: Student review and completion
- Member, Royal Australian Chemical Institute (RACI)
- 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 for ARC Discovery, Linkage and LIEF projects
- Assessor for ARC Laureate Fellowship applications
- Reviewer for NHMRC Project Grant applications
- Research project evaluation for Auckland Medical Research Fund, and Cancer Society of New Zealand
- Reviewer for Academic Research Fund applications, Nanyang Technological University, Singapore
- Reviewer for US-Israel Binational Science Foundation (BSF) research proposals
- PhD thesis examiner for national and international universities
- Referee for Tetrahedron Letters, Tetrahedron, Organic and Biomolecular Chemistry, Bioorganic and Medicinal Chemistry, Bioorganic and Medicinal Chemistry Letters, European Journal of Medicinal Chemistry, Journal of Organic Chemistry, Journal of Medicinal Chemistry, Biofouling, and Acta Biomaterialia

Research:

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

Postdoctoral Fellows:

- Dr. Renxun Chen
- Dr. Neil Mallo
- Dr. Daniel Wenzholz

Honours Students:

- Phuoc Linh Dan Nguyen
- Dittu Suresh

PhD Students:

- Katrina Brownie
- Sudip Chakraborty
- Xiaoming Fu
- Satyanaryana Gadde
- John Jones (MPhil)
- Sun Jun
- Shekh Sabir
- TszTin Yu



Dr. Kim Lapere

BSc (Honours), PhD, The University of Western Australia,
GCert (University Learning & Teaching) UNSW

Professional Activities:

- School of Chemistry Teaching Fellow Coordinator
- School of Chemistry Outreach Committee
- School of Chemistry Website Coordinator

Research:

- Chemical education - threshold / mastery project



Dr. Shannan Maisey

BSc (Hons), BCom, PhD, UWA

Professional Activities:

- Member of RACI national committee for chemical education.

Research:

- Chemical education threshold/mastery project
- Metacognition in novice science students
- Work integrated learning.



Associate Professor Shelli Renee McAlpine

BSc University of Illinois, PhD UCLA

Research:

- Investigating the mechanism of action of Heat shock protein 90 inhibitors as chemotherapeutics
- Designing small molecules that target Heat shock protein 70 and Heat shock protein 27

PhD Students:

- Zifei Han
- Jessica Kho
- Thien Nhan Lu

Research:

- Chi Pham Phuong
- Marwa Rahimi
- Quantao Sun
- Samantha Zaiter

Honours Students:

- Jordan Comey
- Haritha Krishna Sudhaker
- Alex Valois
- MSc Students:
- Yuanto Huo



Dr. Laura McKemmish

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

Professional Activities:

- Member of Early Career Researchers UNSW Women in Maths & Science Champions Program
- Secretary for the Royal Australian Chemical Institute (RACI) PhysChem division
- Member of RACI Equity, Diversity and Inclusion (EDI) committee
- Member of the Local Organising Committee for APATCC 2019 (Sydney)
- Chair of UNSW Outreach Committee

Research:

- Rovibronic spectroscopy, especially of TiO and for astrochemistry
- Mixed ramp-Gaussian basis sets

PhD Students:

- Anne-Maree Syme

Honours Students:

- Claudia Cox



Dr. Christopher Medcraft (DECRA Fellow)

BSc (Hons), PhD, Monash

Professional Activities:

- Member, Royal Australian Chemical Institute (MRACI)
- Member, Royal Society of Chemistry (AMRSC)
- Active reviewer for scientific journals from Royal Society of Chemistry (Physical Chemistry Chemical Physics), Elsevier (Spectrochimica Acta, Journal of Molecular Spectroscopy).

Research:

- Microwave spectroscopy for studying atmospheric chemical reactions.



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.
- Member, Scientific Advisory Board, Exonate Ltd.

Research:

- Total synthesis of biologically active natural products
- Design of inhibitors of kinases that regulate alternative splicing [with Exonate]
- 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. Irene De Silvestro
- Dr. Tom Hawtrey

Honours Students:

- Nathan Castellino

PhD Students:

- Stephen Butler
- Iliya Dragutinovic
- Jack Duncan
- Tess Mutton
- David Neale
- Matthew Peterson
- Quantao Sun
- Stephen Wearmouth



Dr. Suzanne Neville

BSc (Hons), PhD, The University of Sydney

Professional Activities:

- Council member RACI NSW Branch
- Council member Australian Synchrotron PAC

Research:

- Molecular sensing in porous materials
- Molecule-based switches.

Postdoctoral Fellows:

- Dr. Lida Ezzedinloo
- Dr. Synove Scotwell

Honours Students:

- Ashley Brennan
- Maxwell Pearce

PhD Students:

- Manan Ahmed
- Luonan Xu



Dr. Vinh Nguyen (Future Fellow)

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

Professional Activities:

- MRACI (RACI)

Research:

- Synthetic methodology
- Organic synthesis
- Organocatalysis

PhD Students:

- Reece Crockers
- Mohanad Hussein
- Demelza Lyons
- Giulia Oss
- Domenic Pace
- Uyen Tran



Dr. Martin Peeks (Scientia Fellow)

MChem, St Andrews, DPhil, Oxford

Professional Activities:

- RACI RSC member.

Research:

- Organic molecular electronics
- Supramolecular chemistry
- Aromaticity and antiaromaticity



Dr. Nicole Rijs (Scientia and DECRA Fellow)

BSc (Hons), PhD, University of Melbourne

Research:

- Gas Phase Ion Chemistry
- Mass Spectrometry
- Electrospray mechanisms

- Ion-Mobility
- DFT
- Supramolecular, Catalysis

Research Assistant:

- Dr. Weng Loo

MSc Student:

- Meng Yuan Zhang



Dr. Iman Roohani (NHMRC Fellow)

BSc, MSc (Materials Engineering) Isfahan University of Technology, PhD
(Biomedical Engineering) The University of Sydney

Research:

- Development of Bone-ink for bioprinting and in-situ printing of bone mimicked constructs.
- Effect of surface curvature on differentiation of bone marrow derived stem cells
- Identification of the role of microporosity on osteoinduction of synthetic bone grafts
- Fabrication and characterisation of biomimetic nanoparticles for treatment of bone metastasis
- Osteogenic and angiogenic behaviour of Lithium doped calcium phosphate nanoparticles
- A new technique for integration of bone forming growth factor with 3D printed synthetic grafts
- A modular design strategy to enable bone scaffolds to withstand complex in-vivo loadings and regulate mechanotransduction



Professor Timothy Schmidt

BSc (Hons 1M) The University of Sydney, PhD Cambridge

Professional Activities:

- Editorial Board, Journal of Photonics for Energy
- Review Editor, Frontiers in Astrochemistry
- President, UNSW Chemical Society
- Science Director, ARC Centre of Excellence in Exciton Science

Research:

- Molecular spectroscopy

Postdoctoral Fellows:

- Dr. Thilini Ishwara
- Dr. Shyamal K.K. Prasad

PhD Students:

- Cameron Bruno Dover
- Elham Morteza Gholizaadeh
- Parisa Hosseinabadi
- Zachary Levey
- Rosina Pelosi



Dr. Neeraj Sharma

B Advanced Science (Hons 1), PhD The University of Sydney

Professional Activities:

- Member of National Committee for Crystallography (NCCr), Australian Academy of Sciences
- Advanced Diffraction & Scattering (ADS) Beamline Advisory Panel (BAP), Australian Synchrotron
- Organising Committee and Symposium Chair, International Union of Materials Research Societies (IUMRS) International Conference in Asia, Perth, Australia
- Symposium co-chair, 2nd Global Forum on Advanced Materials and Technologies for Sustainable Development (GFMAT-2), Toronto, Canada

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

Postdoctoral Fellows:

- Dr. Henrik Andersen

Honours Students:

- Eleanor Parker

PhD Students:

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



Scientia Professor Martina Heide Stenzel

MSc, University of Bayreuth, Germany

PhD University of Stuttgart, Germany

Professional Activities:

- Co-Director Centre for Advanced Macromolecular Design (CAMD)
- Co-Director of the ARC Training Centre for Chemical Industries
- Fellow of the Australian Academy of Science
- Fellow of the Royal Australian Chemical Institute (RACI) and past chair of the RACI polymer division
- Scientific editor of the RSC journal Materials Horizon
- Associate editor: Beilstein Journal of Nanotechnology
- Member of the 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 of the 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
- Hollow nanoparticles for the delivery of proteins
- 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
- Polyion complex micelles for protein delivery
- Investigation into the interaction of nanoparticles with cancer cells in 2D and in 3D multicellular spheroids

Postdoctoral Fellows:

- Dr. Behnaz Aghaei
- Dr. Ben Kent

Honours Students:

- Lance Chan
- Lok Kan Orion Lam

PhD Students:

- Sylvia Gandy
- Nidhi Joshi
- Yee Khine
- Yimeng Li
- Jordan Lovegrove
- Russul Mamdooh
- Daniele Melodia
- Ahmed Mustafa
- Guannan Wang
- Yiping Wang
- Sandy Wong
- You Dan Xu
- Jeaniffer Yip
- Lin Zhang



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 of the Royal Society of New South Wales
- Member of the European Academy of Sciences and Arts
- Member of the National Academy of Sciences, USA
- Member of the American Academy of Arts and Sciences

- Honorary Fellow of the Royal Society of Edinburgh, UK
- Honorary Fellow of the Royal Society of Chemistry, UK

Research:

- Mechanically-interlocked molecular architecture
- Dynamic covalent chemistry
- Molecular switches
- Nanomechanical systems

PhD Students:

- Lucy Fillbrook



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. Sreenu Jennepalli
- Dr. Fatemeh Mirnajafizadeh

PhD Students:

- Jason Holland
- Md Habibur Rahaman
- Zhichen (Jeffrey) Yan



Dr. Scott Andrew Sulway

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

Professional Activities:

- Member of the School of Chemistry Teaching Committee

Research:

- Lanthanide coordination chemistry
- Magnetic interactions of lanthanide complexes



Professor Pall Thordarson

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

Professional Activities:

- 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, June 2022.
- Membership of the 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
- Australian Research Council (ARC) College of Expert member.

Research:

- Systems Chemistry
- Origins of life (pre-biotic chemistry)
- Self-assembled gels for biomedical applications and electroactive displays.
- Biophysical chemistry and the supramolecular chemistry of proteins.
- Non-linear interactions in supramolecular chemistry

Postdoctoral Fellows:

- Dr. Abbas Darestani Farahani
- Dr. Sandra Nurttala
- Dr. (Chin) Ken Wong

Honours Students:

- Pooja Laxman

PhD Students:

- Abdur Rehman Adil
- Fayaz Ali
- Karrar Al-Latef
- Eric Du
- Genevieve Duche
- Chelsea Forest
- Toby Funston (MRI)
- Han Han
- Luke Marshall (MPhil)



Professor Richard Tilley

MChem Oxford, PhD Cambridge

Professional Activities:

- Editorial board
ChemNanoMat

Research:

- Electron Microscopy,
Nanoparticle catalysts
and biomedical imaging
agents

Postdoctoral Fellows:

- Dr. Lucy Gloag

Honours Students:

- Muhammad Azrhy
Nichol Bin Mohd
Ghazali
- Kevin Mariandry

PhD Students:

- Ali Alinezhad
Chamazketi
- Hsiang-Sheng Chen
- Cameron Kelly
- Jiaxin Lian
- Munkhshur Myekhlai
- Agus Poerwoprajitno



Dr. Anna Wang (Scientia Fellow)

BSc (Adv, Hons 1 & Medal) The University of Sydney, MSc & PhD in Applied Physics, Harvard University

Research:

- Membrane biophysics
- Soft condensed matter
- Origins of life



Dr. Siobhan Wills

BSc (International), PhD, UWA

Research:

- Education-focused research on student engagement
and online student assessment.



Professor Chuan Zhao (Future Fellow)

MSc, PhD Northwest University

Professional Activities:

- Chair of Electrochemistry Division
Royal Australian Chemical Institute

Research:

- Electrochemical energy conversion and storage
- Gas sensors

Postdoctoral Fellows:

- Dr. Sheng Chen
- Dr. Xianjue Chen
- Dr. Richard Gondosiswanto
- Dr. Yibing Li
- Dr. Quentin Meyer
- Dr. Wenhao Ren
- Dr. Yuan Wang
- Dr. Yachao Zeng
- Dr. Yong Zhao

PhD Students:

- William Adamson
- Muhammad Ibrar Ahmed
- Xin Bo
- Karin Ching
- Kamran Dastafkan
- Tim Fang
- Mengchen Ge
- Haocheng Guo
- Chen Jia
- Shiyang Liu
- Chengli Rong
- Zhen Su
- Qian Sun
- Wanfeng Yang
- Tingwen Zhao

Honours Students:

- Xuancheng Peng
- Deeson Wu
- Sicheng Wu



Dr. Yiling Zhong (DECRA Fellow)

PhD, Soochow University, China

Research:

- Design and synthesis of multifunctional nanomaterials for bioapplications

Academic Staff Awards

Emeritus Professor Brynn Hibbert

Royal Society of New South Wales

- Royal Society Medal

Dr Laura McKemish

The University of New South Wales

- President's Award for Embracing Diversity (Women in Maths and Science Champions)

Dr Neeraj Sharma

New South Wales Premier's Prize for Science and Engineering

- Early Career Researcher (Physical Sciences).

Scientia Professor Martina Stenzel

Royal Society of New South Wales

- Liversidge Medal



School of Chemistry Academic Staff 2019

Staff

Administration

Head of School

Professor Scott Henderson Kable

Deputy Head of School

Professor Pall Thordarson

Director of Research

Scientia Professor Martina Heide Stenzel

Director of Teaching

Associate Professor Jason Brian Harper

Deputy Director of Teaching

Dr. Gavin Leslie Edwards

Strategy / SHARP

Scientia Professor John Justin Gooding

Post Graduate Coordinator – Student review and completion

Professor Naresh Kumar

Post Graduate Coordinator – Admissions and scholarships

Dr. William Alexander Donald

Outreach and Marketing Director

Dr. Laura McKemmish

Safety Committee Chair

Dr. Josh Peterson

Safety Committee Deputy Chair

Dr. Vinicius Goncales

Honours Coordinator

Dr. Neeraj Sharma

Third Year Director

Dr. Shannan Maisey

Second Year Director

Dr. Scott Sulway

First Year Director

Dr. Luke Hunter

First Year Laboratory and IT Coordinator

Dr. Ronald Stanley Haines

On-line Coordinator

Dr. Kim Lapere

Demonstrator Training

Dr. Scott Sulway

Tutorial Coordinator

Dr. Shannan Maisey

Medicinal Chemistry Program Coordinator

Associate Professor Shelli Renee McAlpine

Nanotechnology Program Coordinator

Professor Chuan Zhao

ITTC Director

Scientia Professor Martina Stenzel

ITTC Coordinator

Associate Professor John Stride

Website Coordinator

Dr. Kim Lapere

Scholarship & Prizes Coordinator

Dr. Jonathon Beves

Seminar Coordinators

Drs Albert Fahrenbach and Nicole Rijs

Teaching Fellows Coordinator

Dr. Kim Lapere

Talented Students Program Coordinator

Dr. Neeraj Sharma

Chemical Society President

Professor Timothy Schmidt

School Manager

Dr. Toby Jackson

Executive Assistant

Jodee Anning, BA (History) UNSW
(January – June)

Sandra Sarkissian
(July – September)

Vanessa Gotting, BA (History)
UNSW (October -)



Emeritus Professor David St. Clair Black, Dr. Joseph Brophy, Honorary Associate Professor Roger Read, Emeritus Professors D. Brynn Hibbert, Roger Bishop, Ian Dance, Ron Postle

Teaching Staff

Scientia Professors

- John Justin Gooding, BSc Melb, DPhil Oxon
- Martina Heide Stenzel, MSc Bayreuth, PhD Stuttgart

Nobel Laureate and Visiting Professor of Chemistry

- Sir Fraser Stoddart, BSc, PhD University of Edinburgh, FRS, FRSE, FRSC

Professors

- Leslie D. Field, PhD D.Dc USyd
- Scott Henderson Kable, BSc (Hons 1), PhD, Griffith
- Naresh Kumar, MSc Punj., PhD W'gong., CChem, MRACI
- Jonathan Charles Morris, BSc UWA, PhD ANU
- Timothy Schmidt, BSc USyd, PhD Cambridge
- Pall Thordarson, BSc Iceland, PhD Syd
- Richard Tilley, MChem Oxford, PhD Cambridge
- Chuan Zhao, BSc Shaanxi, MSc PhD Northwest UT

Associate Professors

- Graham Edwin Ball, BSc PhD Sheffield, MRACI
- Stephen Boyd Colbran, BSc PhD Otago
- Jason Brian Harper, BSc Adelaide, BSc ANU PhD ANU
- Shelli Renee McAlpine, BSc Ill, PhD UCLA
- John Arron Stride, BSc (Hons.) PhD E.Anglia

Senior Lecturers

- Jonathon Beves, BSc (Hons 1) MSc USyd, PhD Basel
- William Alexander Donald, BSc Seattle, PhD UCA Berkley
- Gavin Leslie Edwards, BSc PhD Monash, CChem, MRACI
- Junming Ho, BSc UWA, BSc (Hons) PhD ANU
- Luke Hunter, BSc (Adv)(Hons), PhD USYD
- Kris Kilian, BS, MS, University of Washington, PhD UNSW
- Suzanne Neville, PhD USYD
- Vinh Nguyen, B.Eng (Hons) UNSW, PhD, ANU
- Neeraj Sharma, BSc (Hons) PhD USYD

Lecturers

- Robert Chapman, BEng (Ind. Chem Hons 1) UNSW, PhD USYD
- Xianjue Chen, PhD UWA
- Albert Fahrenbach, PhD Northwestern
- Vinicus Goncales, PhD, USP, Brazil
- Ronald Stanley Haines, BSc PhD UNSW
- Dong Jun Kim, BSc, Yonsei University, Seoul, PhD KAIST
- Kim Lapere, PhD Berkley
- Shannan Maisey, BScComm, BSc PhD, UWA
- Laura McKemmish, BSc Adv, (Hons) USYD, PhD ANU
- Chris Medcraft, BSc (Hons), PhD Monash
- Martin Peeks, MChem, St AnDr.ews, DPhil, Oxford
- Nicole Rijs, BSc (Hons), PhD UMEL
- Dr. Iman Roohani, BSc, MSc Isfahan University of Technology, PhD USYD
- Scott Sulway, MChem (Hons), PhD Manchester
- Anna Wang, BSc USYD, MSc, PhD Harvard
- Siobhan Wills, BSc (International), PhD, UWA

Casual 1st Year Teaching Staff

- Dr. Kakali Chowdhury, PhD, Uni New Dehli, India

Visiting 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

Conjoint Professors

- Grainne Mary Moran, BSc PhD NUI, CChem, MRACI

Professorial Visiting Fellows

- Barbara Messerle, BSc PhD Syd
- Margaret Harding, B.Sc, PhD, DSc, USyd; CChem, FRACI

Visiting Fellows

- Dr. Joseph John Brophy, BSc, PhD DSc UNSW, DipEd Monash, CChem, FRACI

Honorary Associate Professors

- A/Prof. Roger Read, BSc PhD Syd., DIC Lond., CChem, FRACI

Adjunct Senior Lectuer

- Dr. Alex Falber, Algae Enterprises Ltd, Victoria, Australia

Professional Staff**Administrative Support**

- Anne Ayres – Undergraduate administration
- Kenneth Gerard McGuffin, BA USYD – Postgraduate administration
- Hannah Ritchie-Young

Computer Officer

- Ray Arnhold

Finance Officer

- Aftab Hossain, CA ANZ, MAcc UTS

Laboratory Managers

- Dr. Nancy Talavera – Teaching Laboratories, BSc (Hon), PhD Adel
- Dr. Joshua Peterson – Research Laboratories, BSc Chem Eng Washington, PhD USYD

School Store

- Ian Aldred
- Shan Balachandran
- Dr. Ahmed Ahmed, PhD UNSW

Student Services Manager

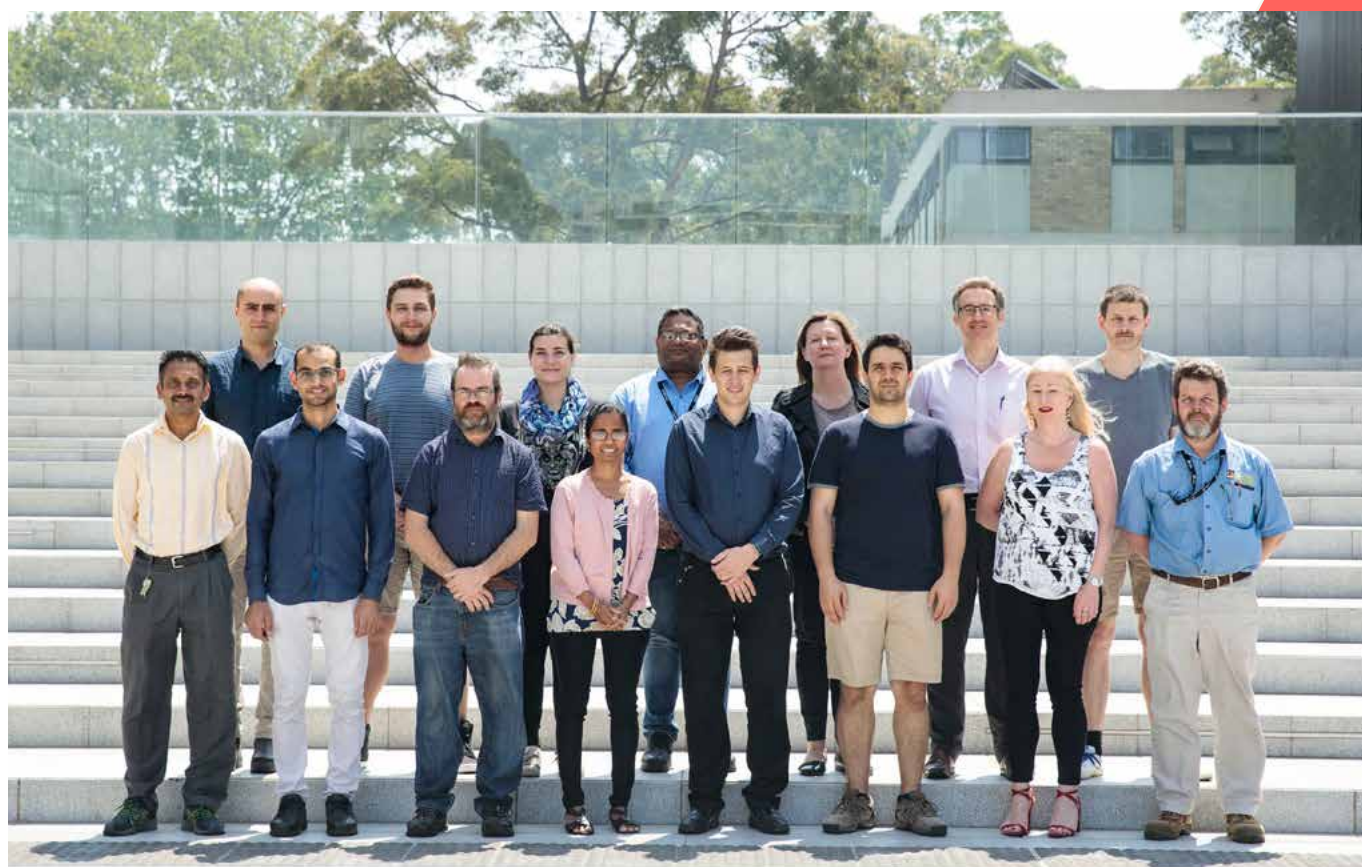
- Michael Gandy, BSc Chem, UWA

Teaching Administrative Support

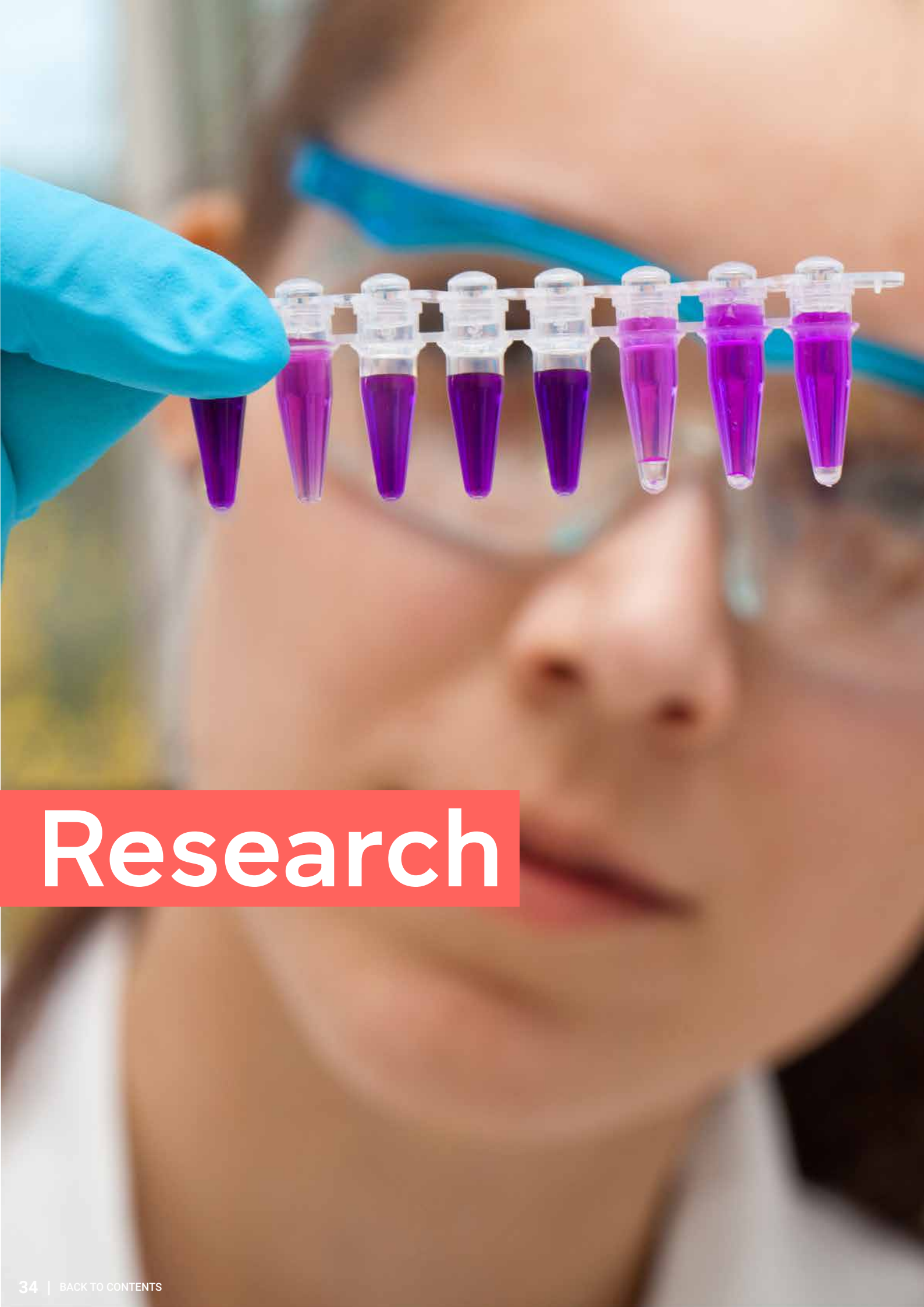
- Dr. Jeffrey Black, PhD UNSW

Technical Officers

- Dr. Majid Asnavandi, PhD UNSW
- Dr. Genevieve Duche, PhD UNSW
- Hitendra Gopal
- David Jacyna
- Dr. Mehran Bolourian Kashi, PhD UNSW
- Dr. Cameron Kelly, PhD UNSW
- Dr. Alireza Kharazmi, PhD UNSW
- Dr. Clare Sullivan
- Dr. Ruth Thomas, PhD UNSW
- Dr. Warren Truong, PhD UNSW
- Svetislav Videnovic, BChemEng, Sarajevo



TECHNICAL STAFF: Back Row: Dr. Mehran Bolourian Kashi, Dr. Cameron Kelly, Dr. Genevieve Duche, Shan Balachandran, Vanessa Gotting, Dr. Toby Jackson, Dr. Jeffrey Black Front Row: Hitendra Gopal, Dr. Ahmed Ahmed, David Jacyna, Dr. Ruth Thomas, Michael Gandy, Dr. Alireza Kharazmi, Anne Ayres, Ian Aldred



Research



Director of Research Report

Once again the School had a very productive year in 2019, with one of the major highlights being the opening of the research space in the new Science and Engineering building.

The state-of-the-art chemical research laboratories come with purpose built laser facilities and space for biological experiments catering for the multidisciplinary research topics in the School. This final footprint of the School of Chemistry is now able to accommodate our ever-growing research needs.

Grants:

We had another very strong year in terms of grant success and income. The School has secured four ARC Discovery Projects grants directly led by members of the School (Dr Jonathan Beves; Dr Thanh Vinh Nguyen; Professor Richard Tilley; Scientia Professor Martina Stenzel). Moreover, three staff members were involved in ARC DP applications led by other Universities (Dr Suzanne Neville, Dr Neeraj Sharma; Dr William Donald).

The School also continues to successfully mentor the applications of ARC DECRA fellowships. We welcomed Dr Christopher Hansen, who secured one of these highly competitive fellowships in 2019.

Two members of the school also led one of the largest ARC LIEF grants in the country. Professor Richard Tilley secured M\$1.1 for a new microscope while Scientia Professor Martina Stenzel led a bid for a new NMR instrument (M\$1.2).

Members of the School also supported applications led by other academics:

1. Associate Professor Patrick Spicer from UNSW, Chemical Engineering was supported by Scientia Professor Martina Stenzel and others for a Rheo-scattering facility.
2. Professor Peter Lay from The University of Sydney was supported by Scientia Professor Justin Gooding and others for IR/Raman microscopy.

Also notable is the success of two School academics who secured NHMRC funding under other UNSW leadership. Professor Naresh Kumar shared success with Professor Mark Willcox from the School of Optometry while Dr Kris Killian's work with Dr Kathryn Poole from the School of Medical Science was rewarded. Prof Kumar also received a NHMRC gold star in 2019.

We are particularly proud of the leadership shown by our younger staff members. Dr Martin Peeks and Dr Anna Wang, both Scientia Fellows, assembled strong research teams and were both successful in their application to the *Research Infrastructure Scheme*. This is complemented by a successful bid led by Dr Jonathan Beves.

Members of the staff increasingly engage with industry and work on research projects to tackle the challenges of our time.

Industry Engagement

The School continues to engage with a broad range of industry. The ARC funded Industrial Transformational Training Centre (ITTC) for the Chemical Industries has now officially commenced at the School of Chemistry with the first student in the Master for Industrial Research (MIR) degree already starting. As part of this program, a new health and safety course has been developed and will be rolled out in 2020.

Members of the staff increasingly engage with industry and work on research projects to tackle the challenges of our time. These research projects span from new energy solutions and better analysis of compounds to new drugs to fight cancer and antimicrobial resistance. Notable is the involvement of Dr Neeraj Sharma in the ARC Research Hub for Microrecycling of battery and consumer wastes, led by Scientia Professor Veena Sahajwalla (School of Materials Science and Engineering, UNSW). Moreover, Professor Naresh Kumar is a member of a strong team that received ARC Linkage support.

Accolades to our staff:

Dr Neeraj Sharma received the NSW Premier's Prizes in the category of Early Career Researcher of the Year (Physical Sciences) for his work on next generation batteries. This is an outstanding achievement reflecting on the very strong group of mid-career researchers in the School who continue to receive recognition for their work. This also includes the promotion of Drs Alex Donald, Suzanne Neville, Neeraj Sharma, Kris Kilian and Luke Hunter to Associate Professor, commencing in 2020, as recognition of their strong teaching and research

performance. Also, our senior staff members are recognized for their body of research including Scientia Professor Martina Stenzel who was awarded the Liversidge Medal from the Royal Society of New South Wales. But a huge congratulations must also go to our PhD students who are making waves as they receive numerous prizes for outstanding conference presentations.

Publications:

Assessment of the 2019 research output has now been completed. 396 (327 1st Quartile) research papers and book chapters have been identified for 2019, which is almost unchanged from 2018. However, the quality of publications has increased significantly as according to the Nature Index, UNSW is now the leading chemistry research institution in Australia in terms of output in top journals and now ranked at No. 54 in the Asia Pacific region

UNSW 2025 Strategy – Scientia

After welcoming two Scientia Fellows in 2018, Drs Nicole Rijs and Anna Wang, the School is proud to welcome two more Scientia Fellows, Dr Martin Peeks (Massachusetts Institute of Technology, MA) and Dr Martina Lessio (Columbia University/Uni Sydney) who joined us in 2019

Overall 2019 proved to be as challenging as it was rewarding and I look forward to reporting another year of stellar results in 2020.

Scientia Professor Martina Stenzel
Director of Research

The ARC Industrial Transformations Training Centre (ITTC)

ITTC brings together three leading Universities: The University of Melbourne, The University of New South Wales and Swinburne University of Technology

ITTC brings together three leading Universities: The University of Melbourne, The University of New South Wales and Swinburne University of Technology together with chemical industry companies and Chemistry Australia in a unique collaboration that will provide greater alignment between the chemical industry's need for highly-skilled STEM graduates equipped with excellent academic training, relevant industry skills and experience.

The Master of Industrial Research program places chemistry graduates into selected industry partner's company for 12 to 18 months, supported by academic co-supervision.

In 2019 Scientia Professor Martina Stenzel became the Director of ITTC at UNSW and is leading a team of researchers that include Associate Professor John Stride (Coordinator) Professor Pall Thordarson, Dr. Donovan Marney (Centre Manager), Dr. Luke Hunter, Associate Professor Shelli McAlpine, Dr. Jonathon Beves, Dr Thanh Vinh Nguyen, Professor Richard Tilley and Dr. Chin Ken Wong.

By partnering directly with industry as part of their post-graduate degree, students will be more work-ready upon graduation with industry relevant

research experience. Importantly, they will be equipped with the soft skills needed to fit in with and adjust to the workplace culture. Graduates will also be equipped with additional theoretical understanding of relevant chemistry disciplines from targeted coursework, which will be taught via traditional methods of imparting knowledge from academics to students, but enabled through alternative teaching media including online delivery, short intensive modular subjects and traditional lecture style delivery where this is the most appropriate method for knowledge transfer.

Our first student commenced in 2019 and our aim is to grow this cohort as we establish more industry connections. We are growing our industry connections via '1-1 conversations' word of mouth, and by developing deeper relationships and repeat business with our existing partners based on our demonstrated record of customer service and delivery of results. For example, the company who took our first candidate, has signed up for 3 more candidates, and one of our other clients are looking to establish deeper research-based connections with UNSW possibly via contract research or linkage proposals.



UNSW

Teaching



Director of Teaching Report

There were significant changes in 2019 in terms of teaching in the School of Chemistry, and the entire university, as it was the first year under the new UNSW3+ model: 2 × 13 week semesters were replaced by 3 × 10 week trimesters.

This change has had significant impact across the School, with more lectures per week, longer practical classes and shorter turnarounds for everyone involved.

Fortunately, due to a significant amount of planning and hard work by the entire School, the transition went relatively smoothly. Of particular note was the introduction of two new courses at third year: Chemistry of Materials and Chemistry of Catalysis, Systems and Biology, adding extra flexibility for our students both in terms of the content available and when courses were delivered, (two core courses were taught in each of the trimesters) as well as better representing the diversity in expertise of our staff. Overall, changes were well received by the student body, as demonstrated by feedback, both formal and informal, but also in terms of the enrolments; the third year numbers in the School were up 30% on 2018. This increase will likely have substantial impacts on our fourth year numbers into the future.

These improvements in enrolments were mirrored in our second year courses, with the trimester model supporting the defined pre-requisite structure that

the School had introduced. The decision to teach the second year Analytical Chemistry course twice during the year (trimesters 1 and 3) was found to add flexibility to programmes of many students, particularly those first year students who wished to accelerate their degree. At the same time, our first year numbers remained steady compared to the previous year, resulting in an overall (very pleasing) increase in student numbers across the School.

The changes to the teaching model have not occurred without associated challenges. The start of the teaching year is earlier and clashes with grant submissions, the end of the teaching year is later, and the decreased breaks between session are no longer common with other universities. The decrease in turnaround between the end of one trimester and the beginning of the next has led to significant time pressures in the marking of exams, and the evaluation and submission of results; this problem has been somewhat ameliorated by the university-level removal of academic supplementary exams. The changes to the first year model that have occurred over the past few years (moving to



An important initiative in 2019 was a trial involving soliciting feedback from students on courses through student representatives.

a threshold/mastery model), whilst ensuring continuous assessment for the students, has had noted workload impact in the abbreviated term structure. And for all the changes that were made that turned out well, with new experiments and new content, we didn't get everything right the first time. As such, 2019 marks the first step in a process of transition.

With the significant changes to the University's teaching model, there has been an emphasis on rationalising programmes. With this in mind, the School continues to prepare and develop our revision of the currently suspended Bachelor of Science (Nanotechnology) programme. This degree had previously resulted in a series of very successful cohorts through the School and negotiations continue with groups around the University as to how this might be redeveloped into the future.

An important initiative in 2019 was a trial involving soliciting feedback from students on courses through student representatives. In trimester 3, representatives from each third year course met with each other, and staff, to discuss the courses and how they were progressing, allowing for real-time changes to occur during term; such immediate feedback and action is not possible with the typical means of gathering student responses. With the success of the initial trial, it is planned that this scheme will be rolled out across all higher year courses in 2020. A big thank you to Dr Shannan Maisey for organising this project.

Next year is expected to be a continuation of the transition above and the challenge will be to retain the positive aspects of the change, whilst working on those aspects that could be improved. One advantage not touched on until this point of the new model is how early information on student numbers becomes available; enrolment for 2020 started in October 2019. It is hoped that into the future, this information will allow us to address concerns on student numbers (be they either too low or hopefully too high!) early on.

Associate Professor Jason B. Harper
Director of Teaching



First Year Chemistry

It was a very significant year for 1st year chemistry teaching at UNSW, for two reasons.

The first event was the transition to the new 3+ academic calendar. This transition entailed a good deal of work to redistribute the content of all 1st year courses from 12 weeks into 9. The most significant changes occurred in the laboratory, where the former arrangement of 12x 2h labs was remodelled into 9x 3h labs; the new arrangement benefits from more time allocated to theory-based discussions within the laboratory. Overall, I think that the 3+ calendar has given us a useful opportunity to re-think how, what, and why we teach.

The second major event related to 1st year chemistry teaching in 2019 was the rollout of the “threshold-mastery” style of teaching and assessment in three of our courses: CHEM1011 (Chemistry 1A), CHEM1031 (Higher Chemistry 1A) and CHEM1051 (Higher Chemistry 1A (Medicinal)). In the “threshold-mastery” model, students must demonstrate a complete understanding of all of the “threshold” concepts in order to pass the course. Students learn the “threshold” concepts in a self-paced fashion, and the assessment structure is designed to give them multiple opportunities to reach the required standard. By contrast, the “mastery” concepts are taught in traditional lectures and assessed in the final exam, for merit grades. The “threshold-mastery” style gives students clear and authentic feedback on their progress, and it offers the significant benefit that all passing students gain a complete, consistent minimum package of knowledge. There was much

work done behind the scenes to enable this rollout, including the development of a series of self-paced online lessons; a large question bank to assess the “threshold” concepts; an all-new set of “mastery” tutorials focusing on group-based discussions and problem solving; and a new style of “mastery” exam setting that probes students’ higher-level skills such as interpreting the scientific accuracy of newspaper articles. Work towards implementing the “threshold-mastery” model in Chemistry 1B courses is ongoing!

As always, 1st year chemistry is a huge team effort.

As always, 1st year chemistry is a huge team effort. I would like to sincerely thank all of my colleagues (academic, professional and postgraduate!) who have contributed by delivering lectures; leading tutorials; supervising lab classes; conceiving educational innovations; developing teaching resources; marking exams; analysing student feedback; handling myriad day-to-day student enquiries; and on and on.

Finally, I should mention that I have now handed the reins of 1st year Director to my exceptionally capable and inspiring colleague, Shannan Maisey. Shannan is an outstanding educator and I know that she will do amazing things in the 1st year space in the coming years.

Dr. Luke Hunter

1st Year Coordinator



2019 was a year of transition and change, adopting to the UNSW3+ model and my first year as Honours Coordinator.

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 within these 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.

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 researchers visiting UNSW via the Howard endowment. In 'Medicinal Chemistry' Honours students can choose a year-long research project in either the School of Chemistry or with academic staff in the Pharmacology section of the School of Medical Sciences, where they undertake a specialised course in Term 1. 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.

In 2019, 11 students completed Chemistry, 8 completed Medicinal Chemistry and 8 (7 of whom performed research projects in the School of Chemistry) completed Nanoscience Honours programs. A further 9 (8 Chemistry and 1 Medicinal Chemistry) completed Honours in July 2019 having started in July 2018. Lorrie Jacob (Chemistry) received a University Medal for outstanding performance across her degree program, including her final year research project with Professor Scott Kable. She was also awarded the Angyal Prize for the best performance in a Chemistry Honours, with Kevin Mariandry awarded the Nanoscience Prize



Furthermore, in 2019 the Chemistry Honours modules were further streamlined and simplified into Chem4502.

for best performance in Nanoscience Honours. Austin Lai and Ying Wu shared the Cavill Prize for the best performance in Medicinal Chemistry Honours. Congratulations to all our graduating students – well done!

2019 was a year of transition and change, adopting to the UNSW3+ model and my first year as Honours Coordinator. I thank Associate Professor John Stride for the excellent job he has done with the Honours program and his advice throughout the year. In adopting to the UNSW3+ model, 2019 was the first year where there were 3 Honours intakes, with students starting each term in the various Honours programs offered in the School of Chemistry. In term 2, 2019, 2 students started with a student each in the Chemistry and Nanoscience programs and in term 3, 2019 a further 2 students started in Chemistry. The UNSW3+ School of Chemistry Honours programs were designed such that students can start in any

term and follow a path in terms of assessment and expectations that is term independent. This allows for greater flexibility for students and academic supervisors. Furthermore, in 2019 the Chemistry Honours modules were further streamlined and simplified into Chem4502. The delivery of these modules is being developed towards a scheduled progression of 5-6 modules on offer over the Honours year for each cohort.

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

Dr Neeraj Sharma
Honours Coordinator



Postgraduate Research

The School has experienced a significant growth in postgraduate numbers over the last few years.

The number of enrolments has steadied to around 40 students enrolling in each year. In 2019, the School had 144 PhD and 8 MSc/MPhil students actively enrolled.

There were 38 completions recorded including 34 PhDs and 4 MSc/MPhil since the beginning of 2019. The School has a strong track record of on-time completions, leading the Faculty in this regard. Chemistry has also done quite well in terms of on-time reviews with very few cases outstanding due to special circumstances.

The students' progress was showcased in various research days. The first year students each gave a 12 minutes presentation as part of their confirmation while the second year students gave a one-minute talk in the same format as the Postgraduate Research Competition and prepared a poster suitable for a general science audience. The third year PhD students each gave a thirty minutes presentation. As usual, the best presentations were awarded:

Best First Year Oral Presentation winners:

- Junbo Chen
- Shreedhar Gautam
- Danielle Bennett

Best One-Minute Presentation winners:

- Peter O'Mara
- Jennifer Stanby
- Grace Constable

The School had a strong presence at the Faculty of Science Postgraduate Competition with our students doing their best in a one-minute pitch showcasing their research. Congratulations to Blair Welsh in winning the School of Chemistry best entrant prize. Our students also featured in the Inaugural Dean's Award for Outstanding PhD Theses announced in December 2019.

Professor Naresh Kumar

Postgraduate Research Coordinator:
Student Review and Completion



Outstanding PhD Theses in 2019

Student	Research Area	Primary Supervisor
Neil Mallo	Visible light-responsive photoswitches	Dr. Jonathan Beves
James McPherson	Transition metal and lanthanide chemistry of dipyridylpyrrolide ligands	A/Prof. Steve Colbran
Uyen Tran	Development of Novel Organic Syntheses Using Sustainable Methods	Dr. Vinh Nguyen
Yanfang Wu	Solid-State Nanopore Blockade Sensors: From Fabrication to Localised Surface Functionalization to Sensing Application	Scientia Professor Justin Gooding

Graduating Students

The following PhD students graduated in 2019

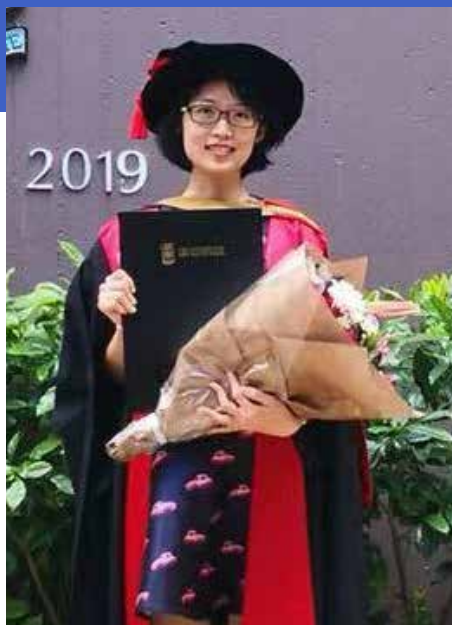
Student	Thesis Title	Supervisor(s)
Giang Nguyen	Nanoscale ion emitters in native mass spectrometry for measuring ligand-protein and ligand-DNA binding affinities	Dr Alex Donald
Huixin Wang	Fundamentals and applications of tandem mass spectrometry in top-down and bottom-up protein analysis	Dr Alex Donald
Dr Lachlan Carter	Superresolution light microscopy as a single molecule biosensing tool	Scientia Professor Justin Gooding
Dr Cameron Kelly	Electrocatalysts for methanol oxidation	Scientia Professor Justin Gooding
Dr Bijan Po	Single molecule sensors	Scientia Professor Justin Gooding
Dr Manchen Zhao	Single molecule pulldown assays	Scientia Professor Justin Gooding
Dr Karin S. Schaffarczyk McHale	Understanding how variation of the reagents affects ionic liquid solvent effects for substitution processes	A/Prof. Jason Harper, Dr Ron Haines (Co-supervisor)
Dr Aidan Jowett	Biphasic carbon dioxide/ionic liquid systems for performing reactions and extractions	A/Prof. Jason Harper
Dr Ahmed I. Ahmed	Flexible, iterative strategies for synthesising fluorinated bioactive molecules	Dr Luke Hunter, Honorary Associate Professor Roger Read (Co-supervisor)
Dr Yun Cheuk (Jimmy) Leung	Exploring functional groups that are rare in Nature for applications in medicinal chemistry	Dr Luke Hunter
Dr Yuvixza	Stereoselective fluorination as a conformational tool in a series of structurally related bioactive molecules	Dr Luke Hunter
Dr Jeremy Dobrowolski	Design, synthesis and biological evaluation of novel nitrogen containing heterocycles as therapeutic agents	Professor Naresh Kumar, Emeritus Professor David Black (Co-supervisor)
Dr Rajesh Kuppasamy	Design, synthesis and mode of action of short biphenyl and anthranilamide cationic peptidomimetics	Professor Naresh Kumar, Emeritus Professor David Black (Co-supervisor)



Student	Thesis Title	Supervisor(s)
Dr Jonathon Ryan	Convergent synthesis of the 5,3'- and 7,3'-linked naphthylisoquinoline alkaloids via an ortho-arylation strategy	Professor Jonathan Morris
Dr Reece Crocker	Organocatalysis with N-heterocycles and constructions of new functional materials with tropylium chromophores	Dr Vinh Nguyen
Dr Demelza Lyons	Applications of tropylium ions in organic chemistry	Dr Vinh Nguyen
Dr Uyen Tran	Development of novel organic synthesis using sustainable methods	Dr Vinh Nguyen
Dr Divya Sehrawat	Layered transition metal oxides as cathode materials for sodium-ion batteries	Dr Neeraj Sharma
Dr Damian Goonetilleke	Developing the next generation of energy storage devices: Resolving structure-electrochemistry relationships through operando X-ray and neutron scattering	Dr Neeraj Sharma
Dr Janina-Miriam Noy	The Delivery of Organoarsenical Anti-Cancer Agents for the Treatment of Sarcoma	Scientia Professor Martina Stenzel
Dr Alberto Piloni	Self-assembly of linear triblock glycopolymers into virus-like morphologies	Scientia Professor Martina Stenzel
Dr Mingxia Lu	Fructose- based Nanoparticles for Ruthenium Drug Delivery	Scientia Professor Martina Stenzel
Dr Cheng Cao	Investigation of self-assembled block copolymer nanoparticles for drug delivery by small angle scattering techniques	Scientia Professor Martina Stenzel
Dr Geneviève Duché	Encapsulating Self-Assembled Peptide Hydrogels in Liposomes for Drug Delivery and Aesthetic Therapy	Professor Pall Thordarson
Dr Cameron Kelly	Gold-Palladium Bimetallic Nanocrystals for Improved Methanol and Ethanol Oxidation Reaction Electrocatalysis	Professor Richard Tilley
Dr Mengchen Ge	Ionic Liquid-based Microchannels Amperometric Gas Sensors	Professor Chuan Zhao



Dr. Janina Miriam Noy



Dr. Huixin Wang

The following MSc students graduated in 2019

Student	Thesis Title	Supervisor
Jordan Mastellone	Separation of disaccharide isomers by differential ion mobility mass spectrometry (DMS-MS)	Dr Alex Donald
Panthipa Suwannakot	Rapid detection of perfluorooctanoic acid in water using metal-organic framework coated microneedles and mass spectrometry and understanding the adsorption process using computational modelling	Dr Alex Donald
Precilia Sonata Hermanto	Activating the body's hypoxia response as a strategy to treat stroke	Dr Luke Hunter
Jiaying Su	The effect of nanoparticle sizes and softness on cellular uptake	Scientia Professor Martina Stenzel



Outreach And Marketing

Chemistry in outreach 2019 made significant progress towards our long-term vision of delivering exceptional chemistry-focused engagement opportunities to NSW students in a sustainable manner with a focus to engaging traditionally under-represented groups.

The major development in chemistry outreach in 2019 was the establishment of the Year 12 “Biosignatures” depth study which combined a one-day on-campus excursion with nine hours of online lessons for in-school delivery. One hundred students from five schools participated in December 2019 over two days. This event replaces our previous bespoke school excursions and aligns with the new HSC curriculum.

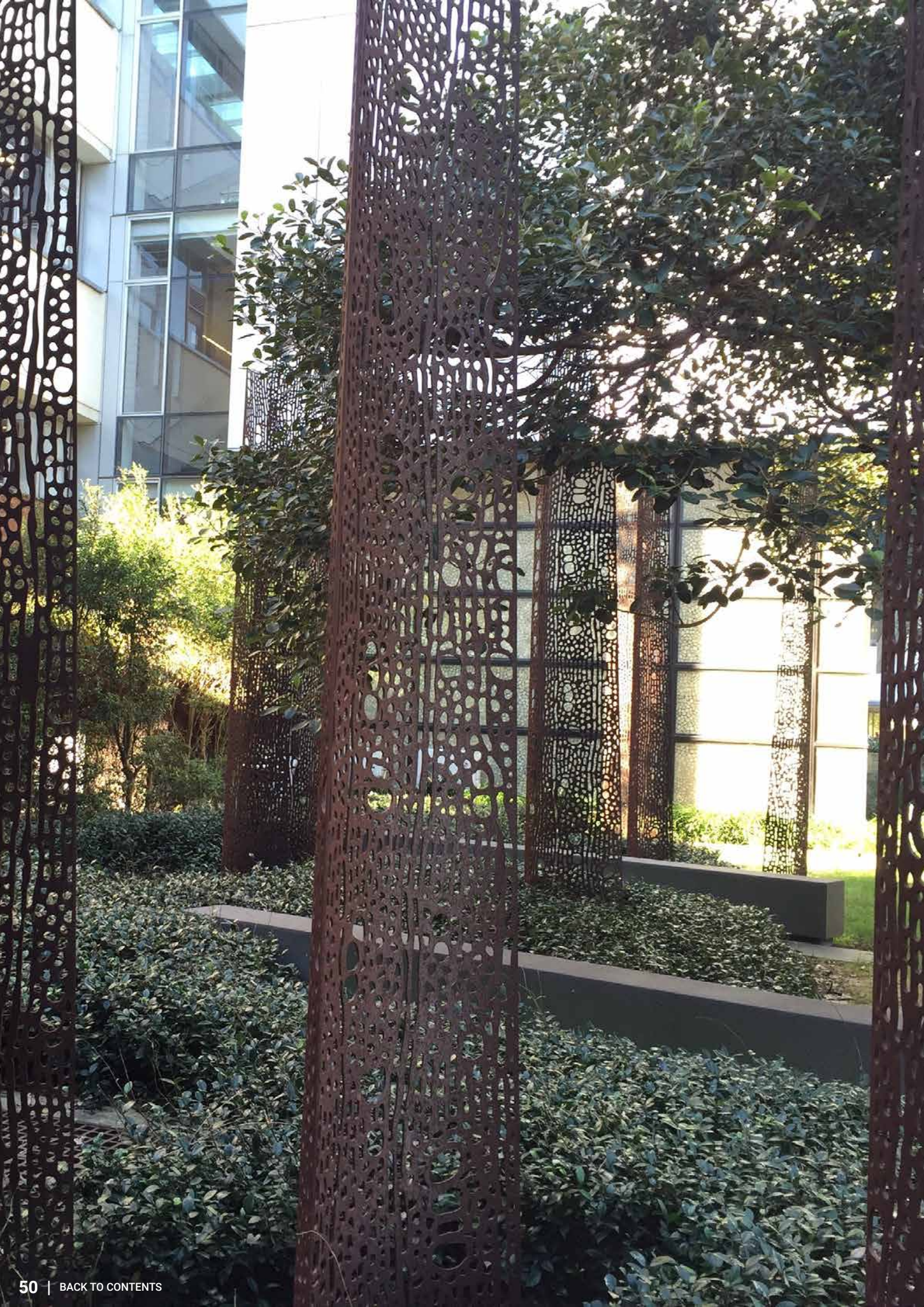
The School of Chemistry contributed extensively to outreach events organised by the Faculty of Science, Nura Gili and ASPIRE, focusing on promoting chemistry to under-represented groups and recruitment. The two central events were of course Open Day in September and Info Day in 2020. Other highlights include the regional visit where three chemistry demonstrators delivered workshops to more than 800 students and the Year 10 work experience full day program. Chemistry also ran workshops and/or expos at eight other events targeting diverse groups including Indigenous students.

UNSW also continued our long running and successful collaboration with RACI by hosting the RACI Titration Heats and Finals in June and September. .

The School of Chemistry contributed extensively to outreach events ... promoting chemistry to under-represented groups and recruitment.

Dr Laura McKemmish

Outreach & Marketing Coordinator



UNSW Chemical Society

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, and in 2019 it played host to the following Lecture series.

Cavill Lecture, 7th February
Professor William Jorgensen (Yale)
Efficient Discovery of Potent Enzyme Inhibitors

CHEMSOC Lecture, 10th April
Professor Les Field (UNSW)
Metal-Catalyzed Reduction of Nitrogen Gas to Ammonia

CHEMSOC Lecture, 18th April
RACI Margaret Sheil Leadership Award,
Amanda Ellis (Melbourne)
Nucleotides and the Art of DNA Nanostructuring

CHEMSOC Lecture, 24th May
Professor Uta Wille (Melbourne)
NO_x Air Pollutants and their Role in Oxidative Peptide Damage

CHEMSOC Lecture, 30th May
RACI Rita Cornforth Lectureship,
Dr. Yuning Hong (LaTrobe)
Molecular Reporters for Measuring Proteome Stress in Cells

Howard Fellow Lecture, 2nd July
Professor Amar Flood (Indiana),
Upgrading Anions: Their Receptors, Recognition and Assemblies

CHEMSOC Lecture, 2nd August
Simon Ives and Dr. Paula Dredge
(Sydney Art Gallery)
The Chemistry of Art

Kornis Lecture, 18th September
Professor Annelise Barron (Stanford)
Biomimetic Drugs: In Vitro, In Vivo & Mechanistic Studies of 5-12mer Antibacterial Peptoids to Treat Respiratory Infections

Howard Lecture, 1st October UNSW /
4th October USYD
Professor Clemens Richert (Stuttgart)
The Peptide RNA World

Howard Nobel Lecturer,
25th November – Symposium / 27th
Research Lecture / 28th Public Lecture
Professor Richard Schrock (MIT)
My Path to a Nobel Prize in 2005

Mellor Lecture, 13th December
Professor Becky Parker
(Institute for Research in Schools)
Challenges in STEM Education - A Vision for Students and Teachers



Students

SOCS 2019 Presidents Report

The Students of Chemistry Society has had a successful year, with a number of social events run alongside several School of Chemistry functions such as poster days, student talk sessions and guest lectures.

This year's exec team consisted of mostly new faces:

President	Iliya Dragutinovic
Treasurer	Stephen Butler
Secretary	David Neale
Social Coordinator	Surabhi Naik
Publicity Officer	Tess Mutton
Merchandise Officer	Grace Constable
Arc Delegate	Stephen Bortolussi
Higher Year Rep.	Arvind Kamath
Nano. Rep.	Lauren Niesen

The social calendar for the year was filled with many enjoyable events. The biggest event of the year for SOCS is always Chem Ball, now in its 17th iteration! Held once again at the L'Aqua Terrace room, the event was enjoyed by the whole school in a great night of celebration that brought together over 130 people. A massive thank you to Surabhi for her efforts in organising this fantastic event.

The annual SOCS trivia night was a great success, with a packed-out room featuring lots of pizza and laughter thanks to our excellent external host Matt.

We also obtained a brand new BBQ courtesy of the School of Chemistry and have put it to good use with some of the most well attended BBQs in recent years.

SOCS has also fostered a strong relationship with the newly revived UNSW Chemical Society, co-hosting events which feature named lectureships and packed-out food and drink sessions. We've also been involved in a number of smaller school events, organising drinks and food for the school research poster day, the school End of Year Party and PhD presentations, among other events.

SOCS was also involved in an O-week event, welcoming first year undergraduates to the school and the university! This involved a lot of fun making liquid nitrogen ice-cream and hopefully we'll be seeing more of those students in future.

I'd also like to extend a special thanks to Prof. Scott Kable and the School of Chemistry for their continued support and generosity.

And finally, a big thank you to the 2019 exec, who all worked hard to make these events run smoothly.

Iliya Dragutinovic
SOCS President 2019

Undergraduate Student Prizes

Honours Prize Winners

The Angyal Prize

Best performance in Honours Chemistry

LORRIE JACOB

The Cavill Prize

Best performance in Honours Medicinal Chemistry

AUSTIN LAI and YING WU

The Nanoscience Honours Prize

Best performance in Honours Nanoscience

KEVIN MARIANDRY

Third Year Prize Winners

The School of Chemistry Prize

and

School Medal for best performance in Level 3 Chemistry

JACK BENNETT and JASMIN BORSOVSZKY

Medicinal Chemistry Prize

Best performance in Level 3 Medicinal Chemistry

JACK BENNETT

The RACI Analytical Chemistry Group Prize

Best performance in Level 3 Analytical Chemistry

JACK BENNETT

The University of New South Wales Chemical Society Dwyer Prize

Best performance in Level 3 Inorganic Chemistry

ALAN SHENFIELD

The Inglis Hudson and Jeffery Bequests

Best performance in Level 3 Organic Chemistry

JACK BENNETT

The Bosworth Prize

and

Medal for best performance in Level 3 Physical Chemistry

JASMIN BORSOVSZKY



Teaching Fellows

Jennifer Stansby, Stephen Butler, Dr. Kim Lapere (Coordinator), Aaron Kennedy, Surabhi Naik, Kristine Tolentino, Domenic Pace, Jessica Kho Absent: Susannah Brown, Grace Constable, Blair Welsh and Michael Fenech

Second Year Prize Winners

The School of Chemistry Prize and

School Medal for best
performance in Level 2
Chemistry

JASNOOR MANN

Alan Norman Buckley Prize

for Analytical Chemistry

JASNOOR MANN

Howard Prize Level 2 Inorganic Chemistry

JASNOOR MANN

Howard Prize Level 2 Organic Chemistry

JASNOOR MANN

Howard Prize Level 2 Physical Chemistry

LUCIA CHEN

The University of New South Wales Chemical Society George Wright Prize

Meritorious performance in
Level 2 Chemistry Courses

LAYLA AL IBRAHIM

Year 10 Prize Winner

The School of Chemistry Prize

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

SHANNI YEHUDA

First Year Prize Winners

The June Griffith Memorial Prize

and

School Medal for best performance in Level 1 Chemistry

ZHIYUAN ZHANG

Howard Prize Chemistry 1A

IRIS HUANG

Howard Prize Chemistry 1B

JACK NETHERY

Howard Prize Higher Chemistry 1A

SOPHIE BOOTH

Howard Prize Higher Chemistry 1B

SOPHIE BOOTH

Howard Prize Medicinal Chemistry 1A

ZHIYUAN ZHANG

Howard Prize Medicinal Chemistry 1B

ZHIYUAN ZHANG

The University of New South Wales Chemical Society Prize

Meritorious performance in Level 1 Chemistry Courses

MEAGAN DAVIS

Postgraduate Prize Winner and Scholarships

Don Craig Memorial Prize

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

HSIANG-SHENG CHEN

Paddon- Row Scholarship

For the highest ranked commencing local PhD student

HENRY FOSTER

Black Scholarship

For the highest ranked commencing international PhD student

LAURA WIMBERGER



School



Publications & Patents

Associate Professor Graham Edwin Ball

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Emeritus Professor Roger Bishop

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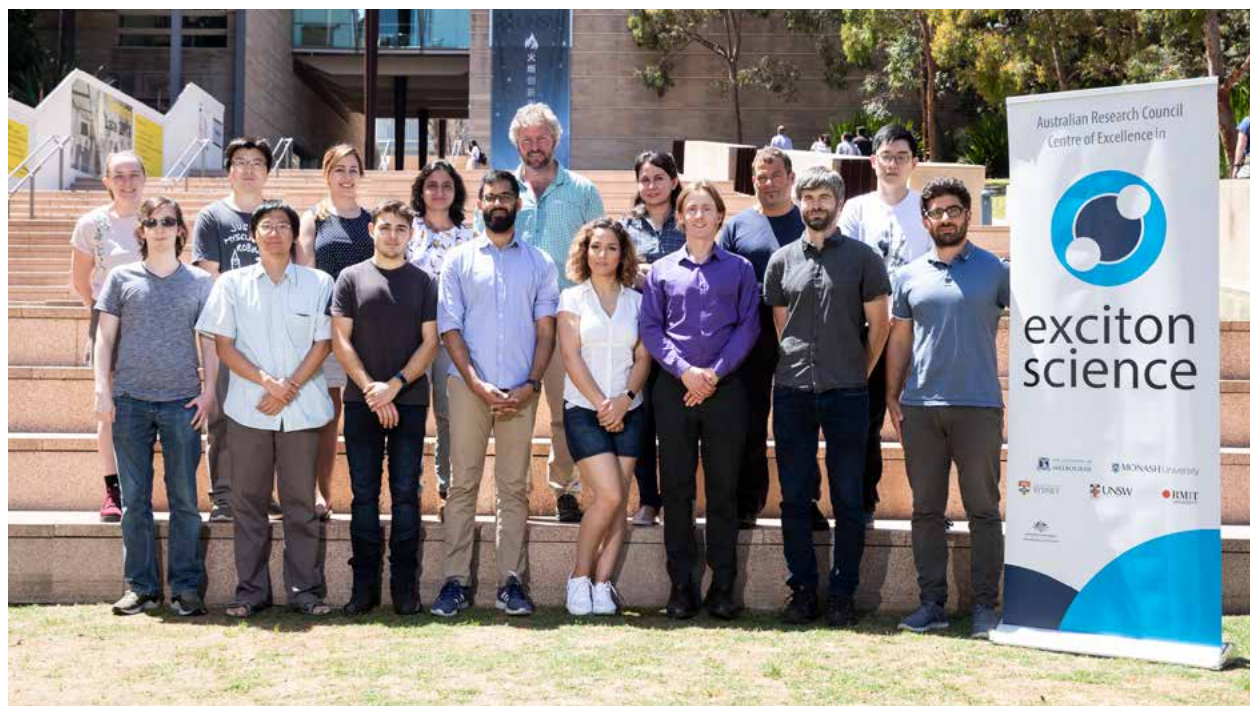
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AUSTRALIAN RESEARCH COUNCIL

Discovery Projects

Investigator(s)	\$	Project
A/Prof. SB Colbran, Prof. LD Field, Dr GE Ball, Prof. E. Norlander	94,000	Adding hydride punch to transition metal complexes for CO ₂ electroreduction
Dr. W. Alex Donald	150,000	Rapid ultra-sensitive protein structure information by mass spectrometry
Dr. N. Sharma	35,000	Scaffolding layered structures to improve insertion electrodes
Prof. MH Stenzel, Dr R Chapman	90,000	Polymeric nanoparticles for enzyme stabilisation
A/Prof. GE. Ball, Prof. L.D. Field	80,000	Charging transition metals with activating alkanes
A/Prof. JB. Harper, Dr. W.S. Price	140,000	Designer ionic liquids to control reaction outcome: Ionic liquids for solvent-controlled reactivity
Dr. L. Hunter	37,910	Mixing the Jigsaw Pieces of Natural Products: New Molecules - New Properties
Prof. N. Kumar, Prof. D. Black	98,100	New scaffolds for antimicrobial discovery
Dr. S. Neville, et al.	90,000	Emergent properties in spin crossover materials
Prof. R. Tilley	160,000	Nanoparticles with Structures that Mimic Enzymes for Electrocatalysis
Prof. JC. Morris	80,000	Diene Regenerative Diels-Alder Reactions to Access Chemical Scaffolds
Prof. MH Stenzel, Dr Garvey	130,000	Bioactive Polymer Platelets
Prof. P. Thordarson, Prof. R. Astumian	120,000	Performing work through actively-driven self-assembled systems
Prof. SH. Kable	150,000	The forgotten role of the ground state in atmospheric photochemistry
Prof. SH. Kable, Prof. TW. Schmidt	138,000	Resolving the interstellar carbon crisis with multilaser spectroscopy



Professor Tim Schmidt (back row, 5th from left) with the ARC Centre of Excellence Exciton Science research group

Laureate Fellowship

Investigator(s)	\$	Project
Prof. J.J. Gooding	1,300,932	The first generation of single entity measurement tools for analysis

Future Fellowship

Investigator(s)	\$	Project
Prof. C. Zhao	276,911	Nanoconfined Ionic Liquids for Electrochemical Reduction of Carbon Dioxide
Dr. J. Beves	187,376	Controlling chemistry with light powered molecular machines
Dr. S. Neville	230,000	Molecular Switching Nanomaterials for Modern Technology
Dr. K. Kilian	74,666	Synthetic extracellular matrices for control of cellular reprogramming
Dr. Vinh Nguyen	190,000	Novel Organic Architectures and Functional Materials from Tropylium Ions

Centre of Excellence

Investigator(s)	\$	Project
Prof. JJ. Gooding, Prof. P. Thordarson, et al	3,750,000	ARC Centre of Excellence in Convergent Bio-Nano Science and Technology
Prof. TW. Schmidt, A/Prof D. McCamey et. al.	633,000	ARC Centre of Excellence in Exciton Science

Industrial Training Centre

Investigator(s)	\$	Project
Prof. MH. Stenzel, Prof. P. Thordarson, Dr. V. Nguyen, Dr. J. Beves, et al	233,000	Training Centre for the Chemical Industries

Linkage Program

Investigator(s)	\$	Project
Prof. P. Thordarson, Prof. TW. Schmidt, Dr. JM. Hodgkiss, Dr A. Falber	110,000	Precision luminescent solar concentrators from robust quantum dot arrays
Prof. JJ. Gooding,	262,000	Bioinks for the 3D printing of cells made from off-the-shelf components
Prof. R. Nordon, Prof P. Thordarson, Prof. L. Bilston	76,000	Scaling manufacture of three-dimensional microstructures for the medical devices industry

LIEF Program

Investigator(s)	\$	Project
Prof. C. Zhao	376,358	Multi-angle in-operando mapping of nanoscale electro/photo-redox reactions
Prof. P. Thordarson, Prof. F. Stoddart, Dr. J. Beves, Dr. K. Kilian, Dr. V. Nguyen et al.	368,994	Next generation facility for investigating thermodynamics and kinetics
Prof. C. Raston, Prof. P. Thordarson, Dr. J. Beves, Dr. V. Nguyen et al.	380,000	Thin film microfluidic systems facility

Special Research Initiatives

Investigator(s)	\$	Project
Prof. N. Kumar	418,450	Development of electrochemically activated sorbents for PFAS defluorination

DECRA: Discovery Early Career Researcher Award

Investigator(s)	\$	Project
Dr. V. Nguyen	120,000	Organocatalysis: A new horizon for synthesis of organic structures
Dr. R. Chapman	142,000	Combinatorial design of multivalent polymers for cell receptor clustering
Dr. C. Medcraft	117,900	
Dr. Y. Zhong	122,751	High Performing Multifunctional Silicon Nanomaterials for Bioapplications
Dr. N. Rijs	100,000	Deconstructing molecular self-assembly by advanced mass spectrometry
Dr. K.M. Mohibul Kabir	135,000	High-performance, portable ion-mobility surface-acoustic wave spectrometry
Dr. J. Ho	99,000	Anion transporters as novel therapeutic agents



NATIONAL HEALTH & MEDICAL RESEARCH COUNCIL

Investigator(s)	\$	Project
Prof. JC. Morris	35,192	Understanding sphingolipid mediators of insulin resistance
Prof. JC. Morris	70,383	Targeting nicotinamide adenine dinucleotide biosynthesis to improve metabolism
Scientia Prof. JJ. Gooding, Prof. M. Kavallaris, Prof. B. Davis et al	1,417,704	Precision nanomedicine-based diagnostics and therapeutics for refractory malignancies
Prof. JC. Morris	95,738	Switching tristetraptrolin on to turn off inflammation in COPD (Project shared with University of Technology, Sydney)
Dr. K. Kilian	100,000	Mechanosensors in Cancer
Scientia Prof. JJ. Gooding	260,000	Building better ex vivo 3D cancer models with 3D printing

UNIVERSITY OF NEW SOUTH WALES GRANTS

Research Infrastructure Scheme

Investigator(s)	\$	Project
A/Prof. JB. Harper, Dr. R. Chapman, Dr. S. Neville, Dr. V. Nguyen, Dr. N. Sharma, Prof MH. Stenzel, A/ Prof. JA. Stride, Prof. P. Thordarson, et al	100,000	Thermal characterisation of advanced materials

Faculty Research Grant

Investigator(s)	\$	Project
Dr. J. Ho	24,000	Development of interpretable machine learning models

Goldstar

Investigator(s)	\$	Project
Prof. N. Kumar	20,000	Novel dual action antimicrobial coatings to combat biomaterial-related infection

Scientia Education Investment Fund (SEIF)

Investigator(s)	\$	Project
Dr. L. Hunter, Prof. SH. Kable, Dr. K. Lapere, Dr. S. Maisey, Dr. SA. Sulway, Mr. S. Yannoulatos	144,000	Threshold' vs. 'Expert' Knowledge: A New Way to Teach and Assess First-Year Chemistry

Near Miss + Industry Contribution

Investigator(s)	\$	Project
Dr. N. Sharma	18,000	Degradation mechanisms in 3 V supercapacitors, CAP-XX
Prof. C. Zhao	30,000	Hydrogen fuel cells with non-precious metal cathode catalysts

UNSW – Shanghai Jiaotong Seed Grant

Investigator(s)	\$	Project
Prof. C. Zhao	30,000	Lithium-air battery

Scientia Fellow Award

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

AUSTRALIAN GRANTS

Investigator(s)	\$	Project	Source
A/Prof. J.A. Stride	88,000	Coconut waste as a valuable resources for carbon fibre	Science and Industry Endowment Fund
Prof. JJ. Gooding, Prof B. Eggleton (USyd)	1,000,000	New South Wales Smart Sensing Network (NSSN)	New South Wales State Government
Dr. K. Kilian	100,000	Programming therapeutic activity of mesenchymal stem cells through engineered extracellular matrices	Industry Network Seed Fund, UNSW Faculty of Science/Cynata Therapeutics Ltd
Prof. N. Kumar	55,000	Development of new treatments for Myopia	Brien Holden Vision Institute
Prof. N. Kumar	117,988	Novel isoflavone analogues	Australian Pharmaceutical Industry
Prof. C. Zhao	1,558,253	Fuel Cell	Kohodo Hydrogen Energy Ltd.
Dr. N. Sharma	4,200	Full cell examination of spheroidized graphite	Archer
Dr. A. Fahrenbach	16,000	Abiotic Ribonucleotide Synthesis from Energy-Driven Chemical Evolution, Access to Gamma Radiolysis Facility	ANSTO
Scientia Prof. JJ. Gooding	330,000	Innovative approaches to the application of nanotechnology for specific diagnosis and treatment of the dementias	Dementia Australia Research Foundation – Yulgibar
Scientia Prof. JJ. Gooding	420,000	Smart Sensor & Deep Learning Behavioural Engine for Personalised Health Monitoring	Cooperative Research Centre Project
Dr. C. Medcraft	393,000	Travel and usage grant	Australian Synchrotron
Prof. C. Zhao	114,391	Highly efficient and low cost photovoltaic electrolysis (PVE) system to generate hydrogen by harvesting the full spectrum of sunlight	Australian Renewable Energy Agency
Prof. C. Zhao	250,000	Low-Cost Perovskite/Silicon Semiconductors Integrated with Earth Abundant Catalysts for Efficient Solar Hydrogen Generation	Australian Renewable Energy Agency
Prof. C. Zhao	293,755	3D Oxygen Electrode	Kohodo Hydrogen Energy Ltd.
Dr. J. Ho	176,000	National Computational Infrastructure	National Computational Merit Allocation Scheme
Dr. WA. Donald	120,000	Development of rapid chemical detection methods to improve grape and wine quality	National Wine and Grape Industry Centre
Prof. R. Tilley	100,000	Innovation grant	Dementia Australia Research Foundation – Yulgibar
Prof. TW. Schmidt	117,000	Device powering under low-light conditions	Innovations Connections



INTERNATIONAL GRANTS

Investigator (s)	\$	Project	Source
A/Prof. JC. Morris	93,594	Design of SRPK1 Inhibitors	EXONATE LTD (UK)
Scientia Prof. JJ. Gooding	6,000	Nanozymes: bi-metallic nanoparticles that mimic the architecture of enzymes for improved electrocatalysis	Australia-Germany Joint Cooperation Scheme
Scientia Prof. JJ. Gooding	5,500	Spatiotemporal Delivery of Chemically modified RNA with a Novel Sinterless 3D Printed Ceramic Scaffold to Treat Large Bone Defects - 2B BioBone	Australia-Germany Joint Cooperation Scheme
Dr. C. Medcraft	£5,000	Researcher Mobility grant	Royal Society of Chemistry (UK)
Dr. C. Medcraft	1,500	Travel grant	Royal Society of Chemistry (UK)

Industry and Community Interaction

Listed below are the companies, government authorities, societies and educational institutions that academic staff interacted with in 2019.

-
- Aachen University, Germany
 - AAV Legal
 - Australian Broadcasting Commission (ABC)
 - Albright & Wilson (Australia) Pty Ltd
 - Allnex
 - American Chemical Society
 - Stephen Andrianakis & Associates
 - Anna University, Chennai, Delhi, India
 - ANSTO (Australia's Nuclear Science and Technology Organisation)
 - Archer Limited
 - Arcturus Dynamics
 - Arizona State University
 - AusDiagnostics
 - Australian Academy of Science
 - Australian Centre for Astrobiology
 - Australian Museum
 - Australian National University
 - Australian & New Zealand Society for mass Spectrometry
 - Australian Synchrotron
 - Australian Wool Testing Authority
 - Bilbie Dan Solicitors
 - Biliias and Associates
 - Biomedical Engineering Society (BMES)
 - Brien Holden Vision Institute
 - CAP-XX
 - Centre for Advanced Material and Industrial Chemistry, RMIT
 - Chemistry Australia
 - Chess Legal
 - Chief Scientists Office
 - Children's Cancer Institute, POW
 - Children's Medical Research Institute, Westmead
 - CICenergigune, Spain
 - Cobalt Blue
 - Cochlear Ltd

- Cockburn Lawyers
- Colorado State University, USA
- Cornwall Stoddart
- CSIRO
- CSIRO Manufacturing
- Curtin University
- Cynata Therapeutics
- David Legal
- Deakin University
- Donghua University, Shanghai
- Durham University
- Earth-Life Science Institute, Tokyo Institute of Technology
- Elie Rahme Solicitor
- Emenda
- Emory University
- Exonate
- Faculty of Medicine, UNSW
- FB Rice
- Ferranova Pty Ltd.
- Flinders University
- George Washington University, USA
- Harvard University
- Hi-Vis Group
- Hong Kong Government
- Institute of Textiles and Clothing, Hong Kong Polytechnic University
- International Union of Pure and Applied Chemistry (IUPAC)
- Inventia Life Sciences
- King, Wood and Mallesons
- Kings College London
- Kohodo Sunshine Energy Pty Ltd.
- Kyoto University
- Lleaf Pty Ltd.
- Loop Hydrometallurgy
- Lowy Cancer Research Centre
- Ludwig Maximillians-Universität München
- Macquarie Lawyers Burwood
- Macquarie University
- Mark Wainwright Analytical Centre, UNSW
- Massachusetts General Hospital
- Mayo Clinic
- Memjet Pty Ltd.
- Monash Institute of Pharmacy
- Monash University
- Mu'tah University, Jordan
- Nagasaki University, Japan
- Newcastle University, UK
- NSW Education Department
- NSW Education Standards Authority (NESA)
- NSW Environmental Protection Authority
- NSW Wine & Grape Research Industry Centre
- Nutromics Inc.
- Office of the Chief Scientist and Engineer NSW
- Prince of Wales Clinical School
- Qingdao University, China
- Queensland Racing Integrity
- Rigaku
- RACI - Royal Australian Chemical Institute
- ReNature Pty Ltd.
- Royal Institute of Technology, Stockholm, Sweden
- Royal Melbourne Institute of Technology - RMIT
- Royal Society of Chemistry
- Royal Society of New South Wales
- RR MedSciences Pty Ltd.
- Rutgers University, New Jersey, USA
- RUX
- Science and Industry Endowment Fund (SIEF)
- School of Chemical Engineering, UNSW
- SDx Tethered Membranes
- Shaanxi Normal University
- Shanghai University, China
- Shanghai Jiaotong University, China
- Shanghai Zhizhen Medical Science and Technology Co. Ltd. China
- Shoalhaven Starches PTY Ltd.
- Solvay
- Strasbourg University



- Sustainable Energy Initiative
- Swiss Federal Institute of Technology
- Sydney Criminal and Traffic Lawyers
- Sydney Water
- Technical University, Liberec, Czech Republic
- THC Pharma Pty Ltd
- Tissue Engineering and Regenerative Medicine International Society (ISSCR)
- Tsinghai University
- University of Adelaide
- University of Arizona
- University of Basque Country, Spain
- University of British Columbia, Canada
- University of California, Davis, USA
- University of California, Los Angeles
- University of Cambridge
- University of Edinburgh
- University of Glasgow
- University of Iceland
- University of Illinois at Urbana-Champaign
- University of Leeds
- University of Maine, USA
- University of Melbourne
- University of Nancy, France
- University of New South Wales, Canberra
- University of Nevada, Las Vegas, USA
- University of Newcastle
- University of Nottingham
- University of Oklahoma
- University of Queensland
- University of Sydney
- University of Technology Sydney
- University of Texas, Austin, USA
- University of Victoria, Wellington NZ
- University of Western Australia
- Uppsala University, Sweden
- Victor Chang Cardiac Research Institute
- Western Sydney University
- Xinoa
- Yigitaku

External Advisory Committee

The Committee has 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 (industry, government, schools and research institutions).
- 2 To provide advice in regard to the direction that the School should take to best enhance future interactions with our 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.



External Representatives from Industry, Government and Education

Dr. Christopher Armstrong

Director, Office of the NSW Chief Scientist
and Engineer (Chair)

Emeritus Prof. Bruce Sutton,

Honorary Professor (Agronomy),
The University of Sydney

Ms. Natalie Chapman,

Managing Director, genmaker

Mr. Dave Sammut,

Principal, DCS Technical

Dr. Sharon Chapman,

Head of Science, Randwick Girls High School

Mr. Luke Hanson,

Head of Science, SCEGGS

Professor Michelle Coote,

Australian National University

Ex Officio Members

Professor Scott Henderson Kable,

Head of School

Professor Pall Thordarson,

Deputy Head of School

Scientia Professor Martina Stenzel,

Director of Research

Scientia Professor Justin Gooding,

Strategy

Associate Professor Jason Harper,

Director of Teaching

Dr. Shannan Maisey,

Director of 1st Year

Dr. Toby Jackson,

School Manager



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