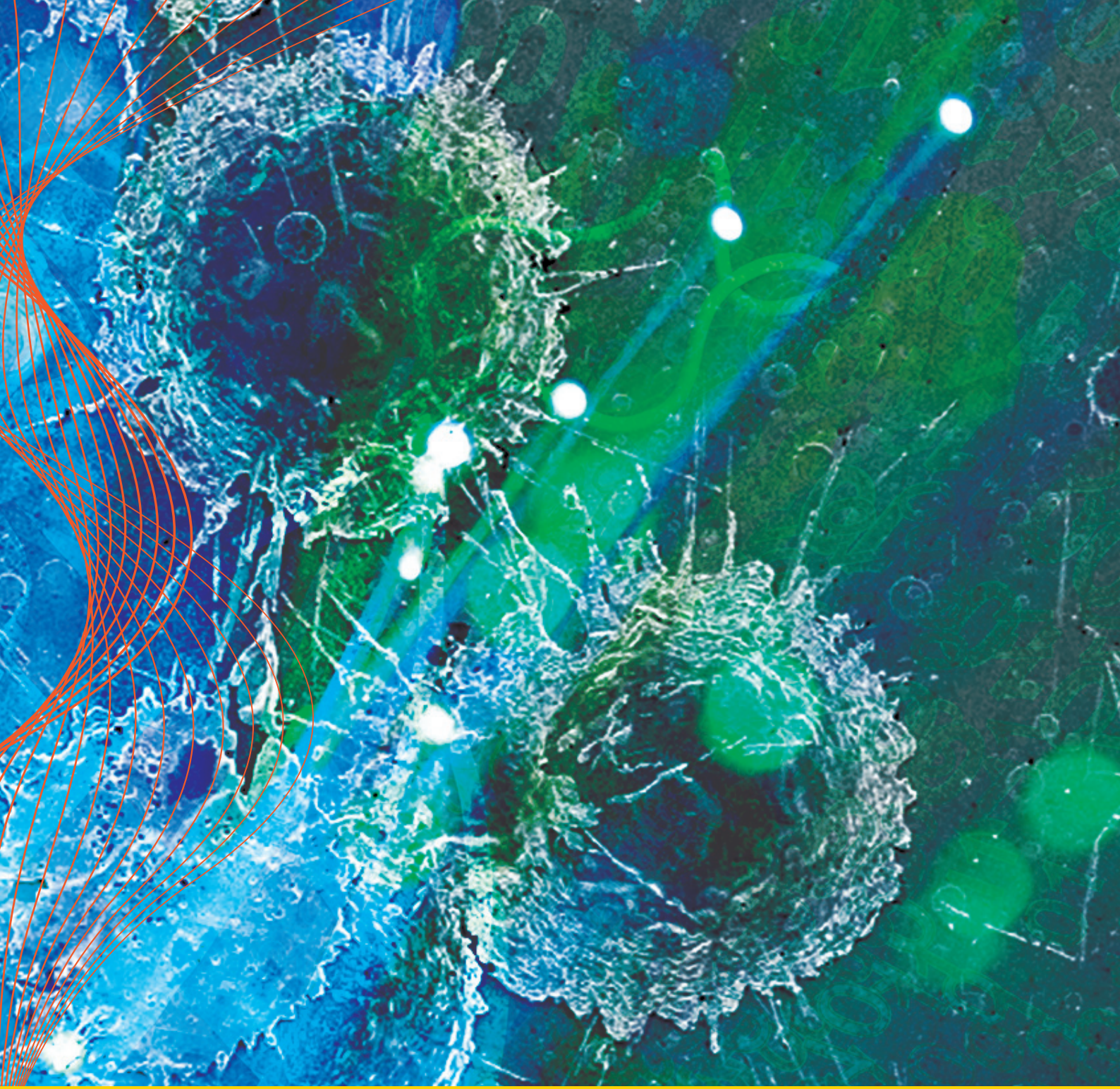


UNSW AUSTRALIA

School of Materials Science and Engineering

Annual Report 2015

Never Stand Still | Faculty of Science | School of Materials Science and Engineering

CONTENTS

OVERVIEW

WHO WE ARE

From its foundation over 60 years ago, the School of Materials Science and Engineering at UNSW Australia has developed an international reputation for research and teaching excellence, innovation and development.

Our goal is to provide first class teaching and research training in an intellectually stimulating and creative environment, equipping our graduates with technical and generic skills at a level that will lead them into attractive and productive employment. We continue to work in close partnership with local and international industry to develop innovative advancements in materials and solve real-world problems.

The School is consistently ranked number 1 in Australia (QS World Rankings 2015) and, out of approximately 640 materials schools currently in existence around the world, Materials Science and Engineering at UNSW continues to sit well within the top 50.

RANKED
QS WORLD UNIVERSITY RANKINGS 2015 by subject
Metallurgy and Materials
Top 50

Academic Staff	**24**
ARC Laureate Fellow	**1**
Research Staff	**31**
Professional Staff	**19**
Undergraduate and Masters by Coursework Students	**314**
Higher Degree Students	**156**
Refereed Research Publications	**279**
Grant Funding	**$5.84M**
Strategic UNSW Income	**$1.51M**

WELCOME FROM HEAD OF SCHOOL

I am pleased to introduce the School of Materials Science and Engineering 2015 Annual Report.

2015 saw the School relocate, finally, from its home for the past 50 years or more into the new 'Materials Science and Engineering' building. The new $143M building was completed and handed over to the university in March 2015. Staff and students were relocated quite painlessly over a single weekend in March. Laboratories and equipment took somewhat longer to relocate, install and commission. However, within a few months most of the laboratories were fully operational. Inevitably, with a building of this size and complexity, not everything went to plan, but eventually all the challenges presented by this new space were met. Special thanks must go to the laboratory staff of the School who worked tirelessly to ensure the relocated laboratories were installed properly and safely. As part of this relocation it was also a pleasure to host a visit by the former vice-chancellor and inaugural head of school, Professor Sir Rupert Myers. Sir Rupert was greatly impressed with the scale and scope of our new facility.

One significant aspect of this relocation was to revise completely all the WHS documentation sitting within the School. This has been an enormous task compounded by the School being asked to undergo an external WHS audit a few months after relocation. I am pleased to announce that the School passed the audit with flying colours. Much credit must go to Dr Owen Standard and Anthony Zhang for ensuring our compliance with current WHS standards.

The new building contrasts starkly with the School's old building, which was old, dilapidated and crowded. Students are able to work in spacious, contemporary and safe laboratories where there is room to expand. There is sufficient 'vacant' space that provides the opportunity for the School to make new strategic hires and take on large-scale new projects in the coming years.

The School continued to rejuvenate its academic staff portfolio in 2015 with a number of new staff members coming on board during the year. Since 2013 the School has hired seven new staff at the Lecturer/Senior Lecturer level. These staff members will constitute the next generation of leadership in the materials sciences and will have significant opportunities in the coming years to emerge as world leaders in their respective fields.

In the second session of 2015 the School launched its new postgraduate coursework masters program. This two-year program has replaced the School's former one-year coursework masters degree. The old degree had low enrolment levels and was a poorly designed degree that failed to engage students at a deep intellectual level. The new program is based on a mixture of core courses, electives across a range of subjects together with a ~6 month research program. The new program is proving to be highly popular with students overseas and in less than a year has attracted nearly 100 students into the degree. If such enrolments are sustained over the medium term the School has the opportunity to expand the degree of flexibility in the program.

As noted in the 2014 report, the University has moved to establish new exciting directions as part of the UNSW 2025 strategic plan. This plan was released towards the end of 2015 with implementation of the programs embedded in the plan being rolled out during 2016. The School is heavily involved in a range of initiatives outlined in the 2025 plan that will resonate through the School for many years to come.

Finally, it is very pleasing to note that the academic staff in the School are meeting the challenge of generating research publications in journals which form part of the Nature stable. Such publications immediately gain attention across the globe and put both the authors and the School in the international spotlight. Special plaudits to Professor Michael Ferry who authored two papers from the Nature publishing group in 2015. Our newest lecturer, Dr Kevin Laws, was co-author of one of those papers.

As well as providing an operational overview and a snapshot of the research currently taking place within the School, this report highlights many of the School's achievements over the past year. I hope you enjoy reading about our journey through 2015.

Professor Paul Munroe
Head of School

FINANCIAL REPORT 2015

2015 was a milestone year for the School. Not only did we relocate to our brand new state-of-the art building earlier in the year, but also our strong and robust financial position enabled us to recruit a couple of rising young female academics to join the No. 1 Materials Science School in Australia. This was primarily due to the growth in undergraduate and postgraduate research students and success in winning external research income.

INCOME

The School receives its income from three primary sources:

Operating income is allocations from the University, via the Faculty, to fund the day to day running of the School. Income, as it is earned by the University, is linked to a series of drivers around the level of undergraduate teaching load and research training, grants and outputs. It is then allocated based on undergraduate and postgraduate teaching load. *Research income* is from research grants obtained from bodies outside the university and *Strategic allocations* made by the University to the School for specific purposes. The graph below shows trends in the School's operating and research income.

Operating Income

Operating income is primarily used for salaries for teaching and research academics, technical and professional staff. Even though a number of the School's academic staff hold externally-funded research fellowships, there is invariably a shortfall in these fellowships which the School covers from its operating budget allocation, deriving a specific, though capped, allocation from the University for this purpose.

This income is also used to pay for casual teaching, administrative and laboratory staff. Other major expenditure items are support of teaching laboratories, administration, marketing and undergraduate recruitment scholarships, allocations to staff based upon research supervision and publications.

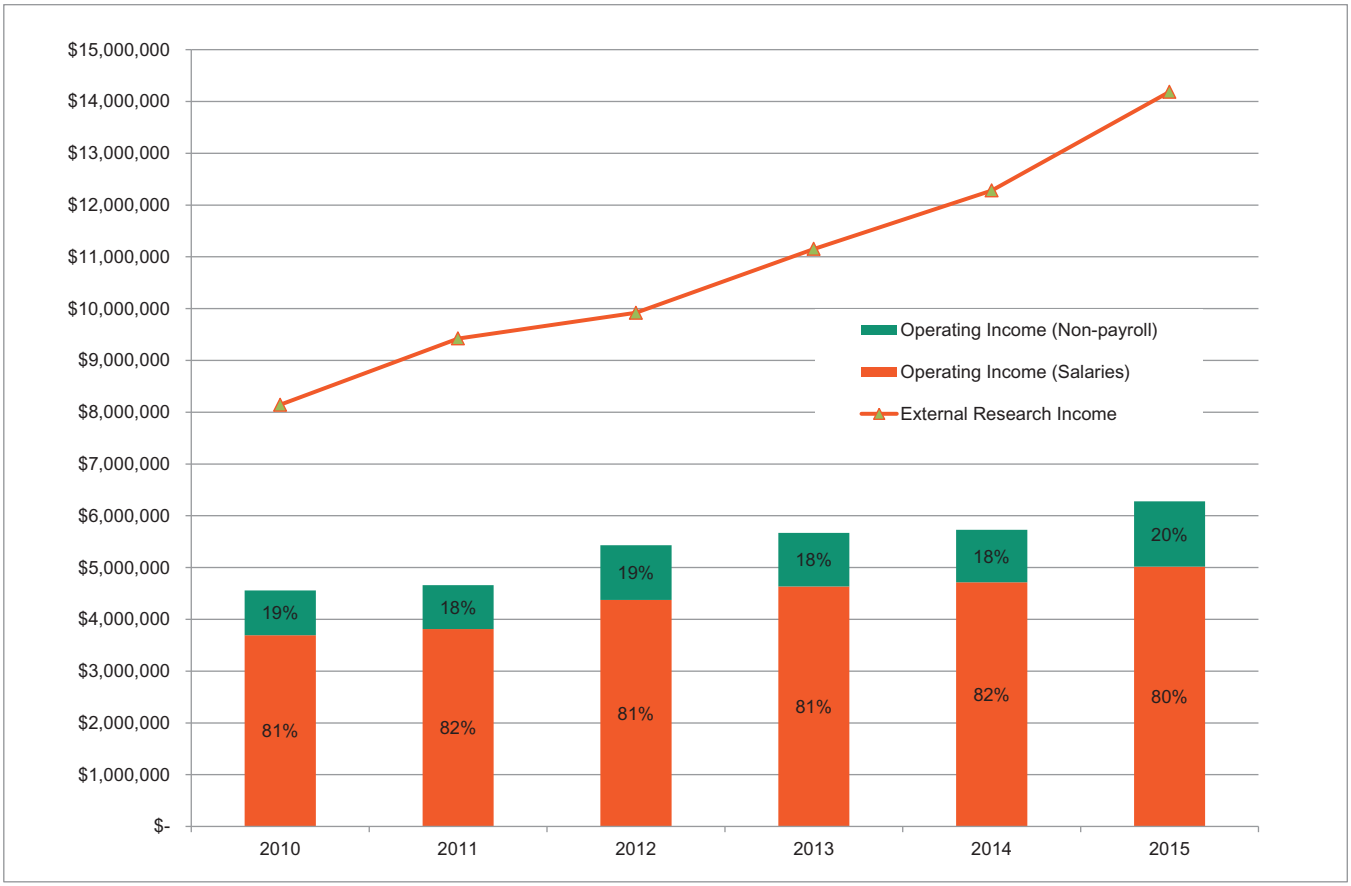


Figure 1

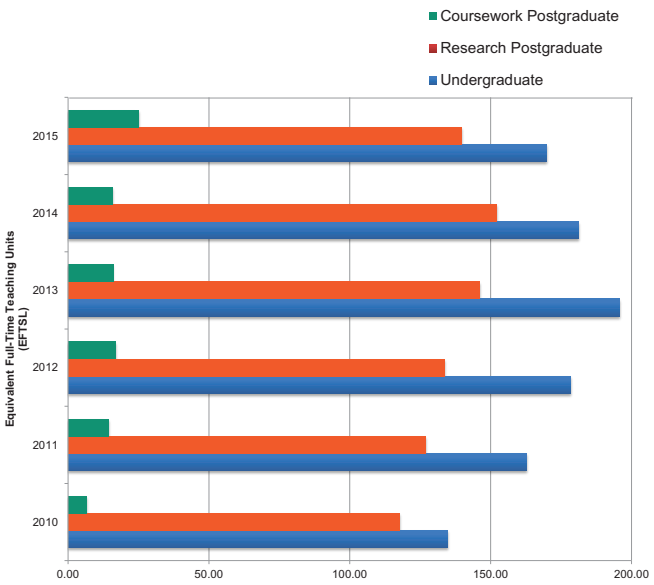
The following table shows the breakdown of School operating income in 2015. We had two Future Fellows and one DECRA fellow start this year. Seed funding enabled these Future Fellows to attract new higher degree research students. We also provided start up funds for new academic staff while still making a reasonable contribution to the University.

INCOME		
University:		
Teaching	$9,350,558	
Other	$41,448	**$9,392,006**
Allocation to School:		
Teaching and Research	$6,280,000	
Fellowship salary shortfalls	$146,484	
Capital equipment funding	$65,000	**$6,491,484**
EXPENDITURE		
Salaries	$4,746,677	
Non-salary	$1,060,711	
Capital expenses	$234,299	**$6,041,687**
Variance		$449,797

Apart from funding some essential laboratory equipment replacement, the School's Advisory Committee assessed applications for small equipment grants. The following bids were successful:

Equipment	Lead Applicant	Allocation ($)
Controllable stage for Nikon 600 optical microscope	George Yang	11,500
High energy ball mill for advanced ceramic processing	John Daniels	30,000
Langmuir films fabrication and characterisation	Dewei Chu	16,000
Rotovap	Damia Mawad	19,149
Spex Freezer Mill	George Yang	17,000
Basic ceramic processing instruments for undergrad teaching and research	Sean Li	30,000

The primary driver for operating income at the School level is undergraduate and postgraduate teaching load. The graph top right (next column), shows the strong growth which the School has enjoyed in these areas in recent years especially the number of Coursework Postgraduate students.



UNSW Strategic Funding

The University provides central funding for a range of strategic research purposes including infrastructure, support of national initiatives and projects for early career researchers. There are also strategic funds based on performance by higher degree research students completions, quality authorships, and grant income over the previous 3 years.

In 2015, these included:

Project Name	Project Manager	Amount ($)
4.11 AINSE fellowship	John Daniels	3,554
8.1 Areas of Research Strength & Internal Centres	Veena Sahajwalla	50,000
Research Support	Mark Hoffman	161,325
Novel Multiferroic Materials APF/ARF – 50:50	Claudio Cazorla	157,500
SPF03 Strategic Hire	Judy Hart	145,688
SPF03 Strategic Hire	Rakesh Joshi	135,846
Bridging Support	Kevin Laws	76,162
Powder Diffraction	John Daniels	26,790
2015 Silverstar-Study of the thermodynamic properties and structure of coke and char	Oleg Ostrovski	40,000
SPF02 Materials	Various	141,500
SPF04 Materials	Various	74,000
Total:		**1,012,365**

Major Research Equipment and Infrastructure Initiative (MREII) Grants

The University receives a Research Infrastructure Block Grant. With this funding, UNSW initiated the Major Research Equipment and Infrastructure scheme, designed to provide UNSW with a world-class research environment to attract and retain a critical mass of research excellence. In 2015, the School was awarded the following major items:

Lead Chief Investigator	Project Title	Grant ($)
Veena Sahajwalla	Dual chamber high temperature furnace for the ARC research hub on Green Manufacturing	69,993
Jan Seidel	Green Scanning probe microscope upgrade	63,583
Michael Ferry	Support for expert management of several state-of-the-art facilities in new MSEB. Tech Support Engineer to commission, maintain, manage and operate facilities	110,000

EXPENDITURE

The main component of School expenditure is staff salaries which comprised about 80% of total non-capital operating expenditure. This is in line with the majority of schools across the campus. Despite the strong rise in salary costs, our income has grown at a faster rate, providing greater flexibility in strategic directions like investing in better equipment. In 2015 we relocated to the new building and incurred higher than usual "repair and maintenance" costs to cover unexpected expenditure as part of this relocation. The table below shows the School's main expenditure items in 2015.

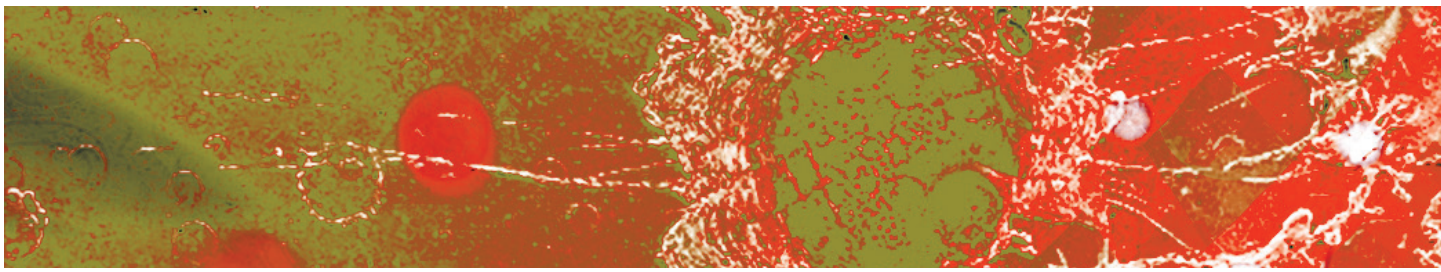
Item	Amount ($)
Faculty Research Grants	40,000
Student Research Allocations	150,000
Undergraduate scholarships	90,000
Publications allocation	100,000
Teaching laboratories	58,450
Safety	12,000
School Office	35,000
Staff Start Up	150,000
Marketing	35,000
Repair, Maintenance & building utilities	180,000
Relocation and upgrade IT equipment	108,452
International recruitment	10,000
Undergraduates' association support	2,500
Postgraduates' association support	5,000

Faculty Research Grants are funds for small research projects which are allocated from the School's operating budget. The School preferences junior staff who have not had the opportunity to build up significant external research funding when allocating these grants. In 2015, the recipients were:

Chief Investigator	Project Title	Grant ($)
Danyang Wang	Electrocaloric effect in lead-free relax or ferroelectrics	9,000
Judy Hart	New photocatalytic materials based on ZnS-GaP solid solutions and multilayered structures	15,500
Rakesh Joshi	Nano carbon materials from waste plastics	15,500

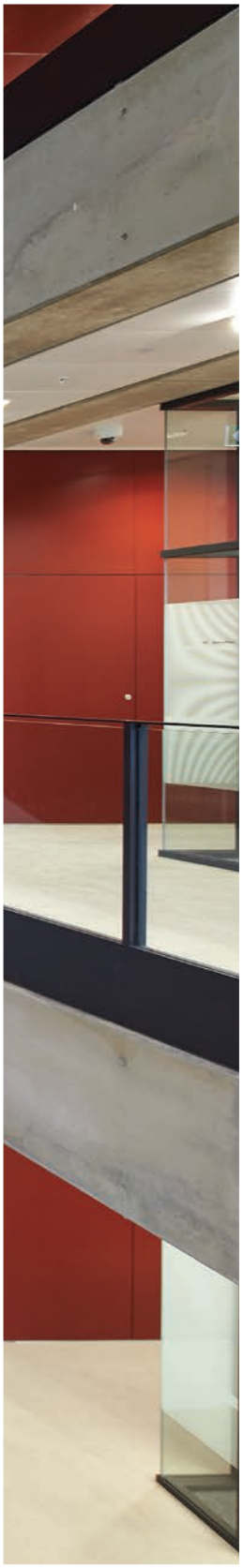
External Research Income

The School's external research income comprises the largest fraction of the overall income of the School. It is the funding provided by external bodies to the School's staff to undertake specific research projects. The School experienced a very high performing research year. Figure 1 on page 5 shows trends in external research income.



REPORTS

NEW MATERIALS SCIENCE & ENGINEERING BUILDING



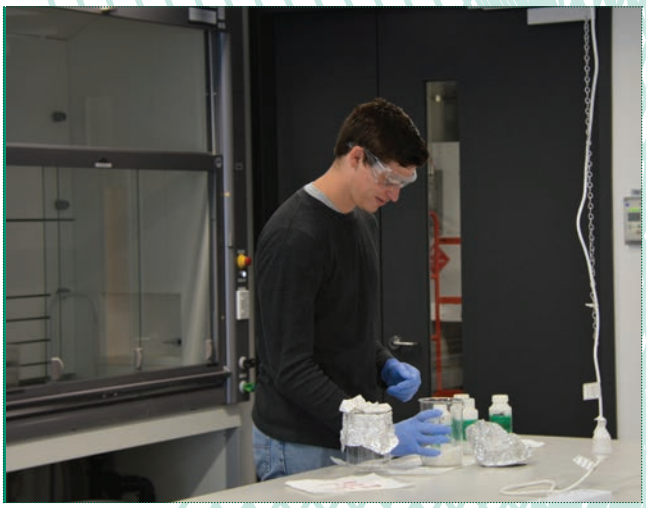
Life in our new home

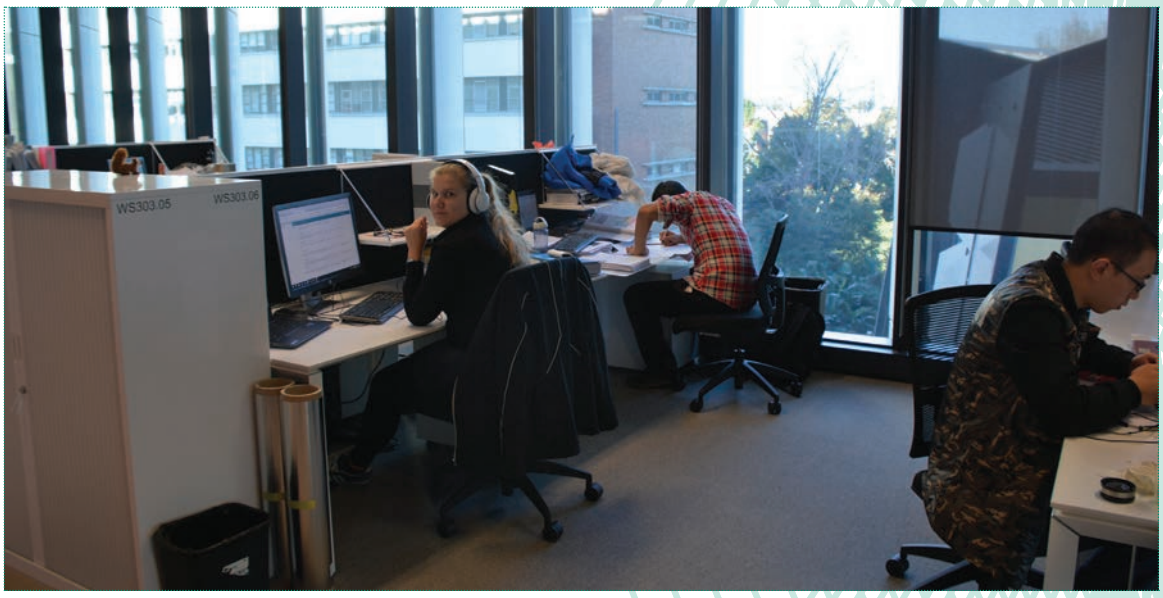
Staff and students of the School spent most of 2015 becoming accustomed to new surroundings, after the move to the new Materials Science and Engineering building in March. The relocation of laboratory equipment took a further three months, however, by mid-year most of the labs were commissioned and operational.

The School occupies the basement and floors 1-4, with expansion to Level 5 currently in the planning stages. Staff have wasted no time making use of the expansive collaborative spaces. Several School and industry functions have taken place, in addition to students also enjoying the areas available to them.

Our new home certainly dwarfs the old, and yet, when Sir Rupert Myers, the foundation Head of School and former UNSW Vice Chancellor, was given a tour of the new facilities, he noted that when the original School of Metallurgy was completed, there were many in the university who complained that it was far too big!

Former Vice Chancellor, Sir Rupert Myers, toured the facility with current Head of School Paul Munroe and former Head of School Mark Hoffman in July 2015





The end of an era

In the weeks prior to publication of this report, the end of an era was marked as the original School of Metallurgy was demolished to make way for a new Science and Engineering building, which, on completion in 2019, will connect with this building to create an enormous collaborative and learning space.

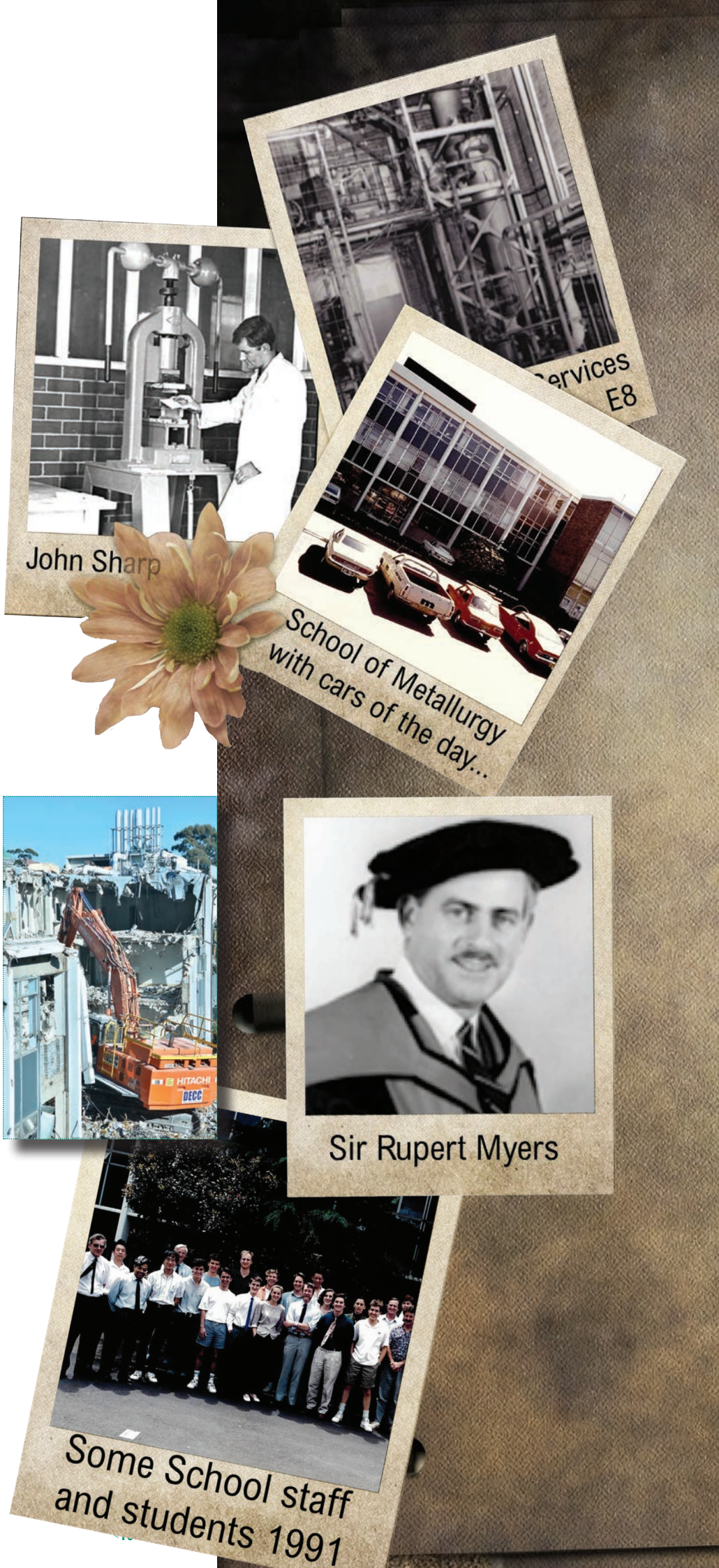
Building E8 was home to the School for over 50 years and was itself state-of-the-art in its day.

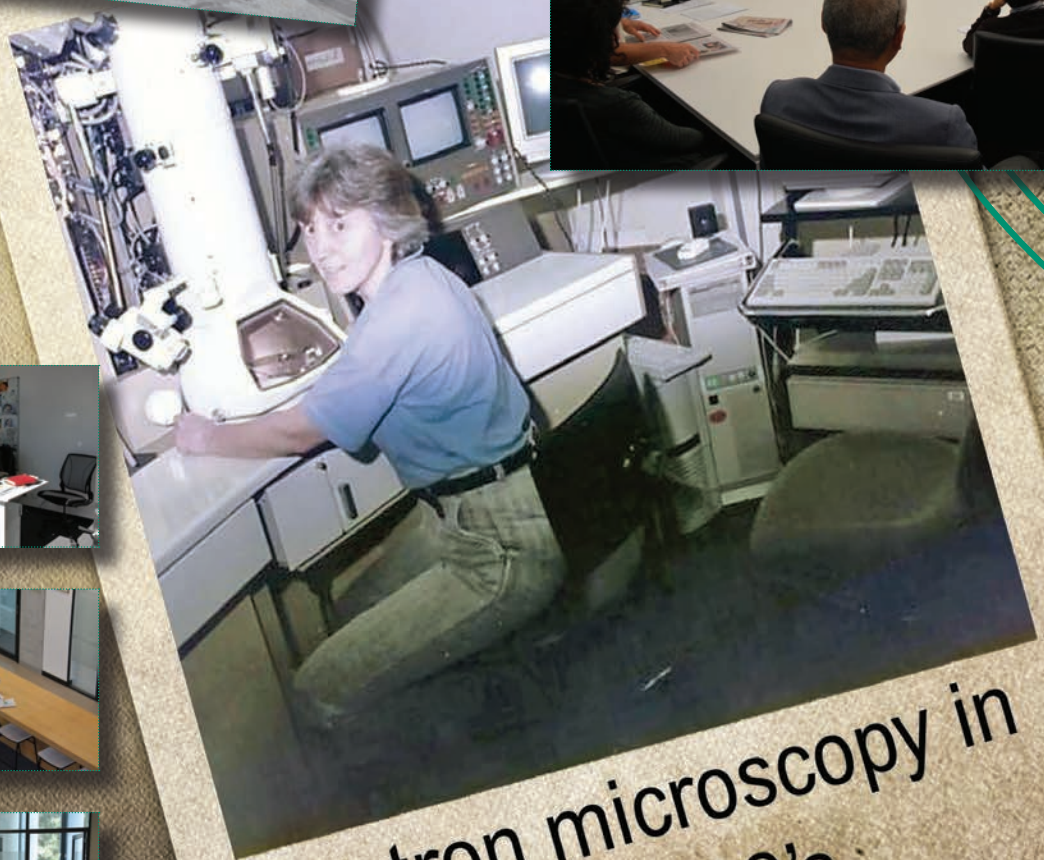
The School of Metallurgy was founded around 1950 with Sir Rupert Myers the foundation Head of School. Sir Rupert, of course, went on to become Vice Chancellor of the University of New South Wales from 1969 to 1981.

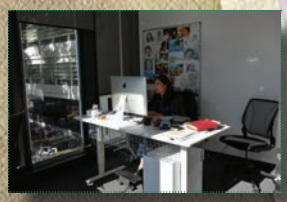
During the 1960's and 70's the School was very highly regarded, particularly for its advances in physical metallurgy. However, in the 1980's the School came close to being closed due to low enrolments and research inactivity. The 90's saw a revival, under the guidance of Emeritus Professor David Young, when it was redefined as the School of Materials Science and Engineering. Today, David continues to be an active and valued member of the School's academic staff.

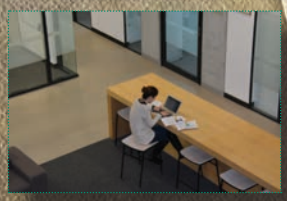
Now, in the early part of the 21st century, the School continues to expand, driven by growing enrolments and a highly regarded research profile. That growth has been rewarded and we are all enjoying our shiny new purpose-built space.

Somewhat nostalgically, and mindful that most of our readers studied at one time in Building E8, we have compiled a brief look back in time.









electron microscopy in the 1980's

ORANGE is the new BLACK party

On 30 April 2015, over a hundred Materials Science and Engineering undergraduates, postgraduates and School staff gathered at the student breakout area on level 1 of the new building. This was for an all-orange event to celebrate the move into our shiny new premises.

In colour psychology, orange is both optimistic and energetic and therefore warm and inviting. It is a colour that it is both physically and mentally stimulating, so it encourages people to think and talk. The School adopted this colour to symbolise a strong, friendly, stimulating and vibrant community.

This informal christening of the new facilities featured an all orange menu, including a range of healthy options in addition to plenty of sugary orange snacks and drinks. Students and staff wore their orange t-shirts, onesies and anything orange they could find, including a few carrot accessories.

ALUMNI BUILDING WARMING

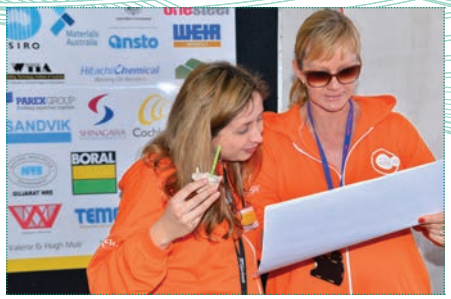
On Thursday 23 July, 2015, the School gathered Alumni, Industry partners and current and past staff to celebrate an historical milestone and to reconnect during an informal "Alumni and Friends Building Warming" evening at the new facilities.

The event began with an official welcome by the Head of School, Professor Paul Munroe. The Vice-Chancellor and President, Professor Ian Jacobs, then spoke, followed by the Dean of Science, Professor Merlin Crossley. Both strongly reiterated the University's ongoing commitment to the School of Materials Science and Engineering.

Following the official welcome, 125 guests enjoyed drinks and canapés served throughout the evening and had the opportunity to join an exclusive tour of the facilities, guided by our enthusiastic PhD students.

Alumni from the 1970s to the present day were able to catch up with old friends and academics and to network with industry contacts. All guests were given a commemorative School mug to remember the event and this unique milestone in the history of our School.

MARKETING & OUTREACH



The school's marketing strategy aims firstly to recruit the best undergraduate and postgraduate students into our degrees, as well as supporting and communicating all activities that happen within the school to internal and external stakeholders. This is facilitated through digital campaign management, outreach events and active promotion of student engagement activities to raise brand awareness.

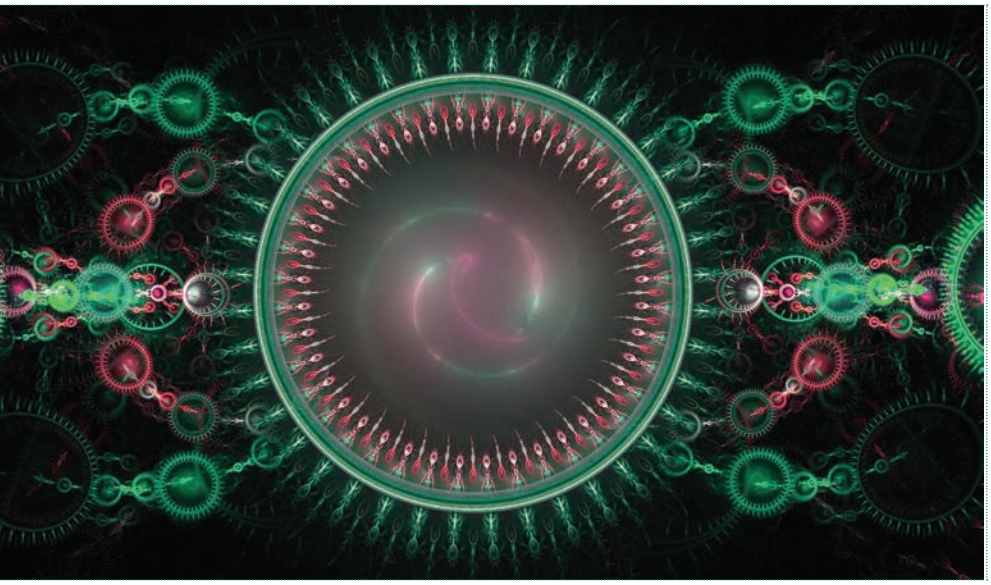
Open Day 2015 was a huge success with a record number of future student leads captured (540 students, 84 parents/visitors) and therefore actively engaging with our 80+ volunteers dressed in our signature bright orange t-shirts and onesies. We had the largest school presence on campus with several interactive materials science and engineering displays including the maglev train, charpy, microscopes and our newest stall, liquid nitrogen ice-cream! This was a great way to bring people into the tent - after they registered they received some delicious free ice cream made before their eyes by our students. These activities also form the basis for the school's outreach program, which sees various groups of high school students visiting the school throughout the year to tour the facilities and, most importantly, leave knowing what materials science is and how it fits in with their interests and favourite subjects in high school. Some of the outreach activities included participation in the Australian Museum Science Festival, hosting the Cochlear Science 50:50 STEMstart event at Cochlear HQ in Sydney, info day lectures, L'Oreal Girls in Science Forum, National Youth Science Forum, Nura Gili Indigenous Science and Engineering Program and The Science Experience.

In addition to our outreach activities, the school has increased its engagement with future students by continually

developing the digital marketing strategy to complement and enhance our outreach programs as well as reach more people who are unable to interact with us directly on campus. The school website now has fully integrated analytics built into the platform, which is forming the basis for gathering insights into the effectiveness of marketing campaigns and website design (95,280 global website visits in 2015). Aside from posting regular, engaging content for our social media followers to interact with, this year we also started targeted advertising using Facebook custom audiences, which acts as way to follow up with leads gained through outreach events as well as reach new international target audiences that fit our postgraduate recruitment needs.

In August the school hosted an 'Alumni and Friends Building Warming Cocktail Party' to celebrate the opening of our new facilities with our current staff and alumni. With over 125 people attending, it was a fantastic time for everyone to enjoy some dinner and cocktails while catching up and networking with new and old friends of the school. The University's President & Vice Chancellor, Professor Ian Jacobs, made a welcome speech on the night and was joined by former President & Vice-Chancellor Professor Mark Wainwright, Dean of Science Professor Merlin Crossley and Head of School Professor Paul Munroe to mark the occasion. Our alumni continue to be fantastic supporters of the school especially as we move into a period of growth and expansion in our new purpose-built facilities.

WORK HEALTH AND SAFETY (WHS)



The School of Materials Science and Engineering is committed to providing a safe work environment for all staff, students, and visitors in compliance with the Work Health and Safety Act 2011 and as implemented through the UNSW Work Health and Safety Policy.

In 2015, the School WHS Committee consisted of Owen Standard and Rakesh Joshi (academic staff representatives) and Scott Gleason, Anthony Zhang (School Safety Officer), Rahmat Kartono (administrative and technical staff representative), Ruiping Zou (research-only staff representative), and Paul Munroe (management representative). The Committee met quarterly to discuss, monitor, and implement WHS policy and procedures, to investigate hazards and incidents, and to consult with staff and students.

In September 2015, the election of School WHS committee members for 2016–2018 took place and the following people were elected: Rahmat Kartono (technical staff representative), Shane Smith (administrative staff representative), Owen Standard and Rakesh Joshi (academic staff representatives) and Scott Gleason (postgraduate student representative). Paul Munroe and Anthony Zhang remain as the management nominated positions of management representative and School Safety Officer, respectively. The School thanks the outgoing committee members for their contribution to the School WHS Committee and WHS in general.

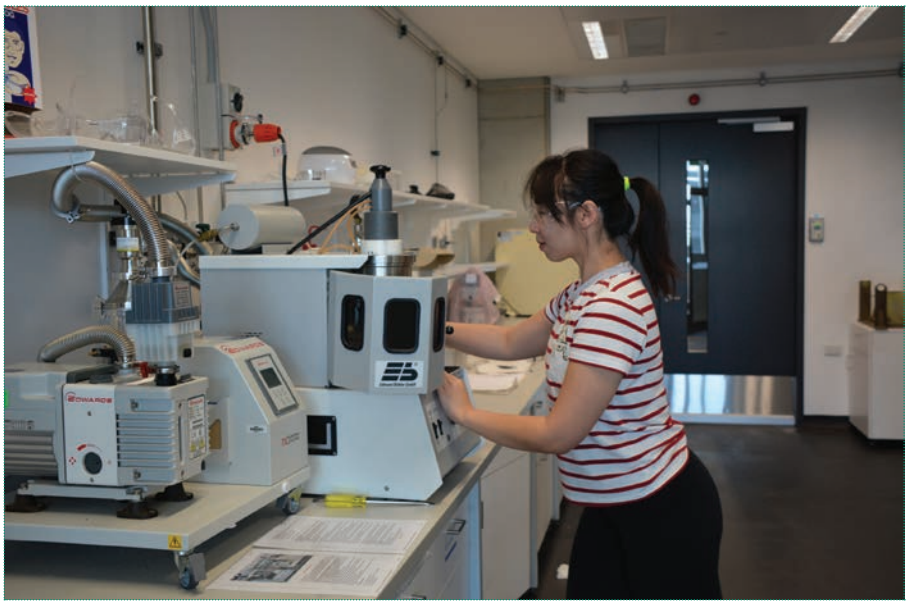
WHS activities in the School during 2015 included:

- completion of the University WHS self-audit tool by external auditor (for which the School received a compliance rating of 92%),
- commissioning of new laboratories and associated health and safety systems in the new MSE building by laboratory supervisors and laboratory managers in consultation with building designers and contractors,
- completion of new training for students and staff including overall inductions to the building, specific laboratory inductions and training, new risk management documentation via Safesys, new chemical register via SciQuest, and new equipment register in Safesys,
- implementation of a new working after-hours policy and procedure; completion of electrical tagging and testing of all equipment and appliances as part of the relocation to the new MSE building,
- mandatory School WHS information sessions (held in both semesters) for all new research staff, new postgraduate students, and Honours students;
- various laboratory training courses over the year,
- annual evacuation drill for the School,
- laboratory safety audits conducted bimonthly; and
- inspection and audit check of all offices and laboratories by the School WHS Committee.

All staff and students in the School are thanked for their ongoing cooperation and compliance with WHS requirements and procedures.

Dr Owen Standard
WHS Chairperson

WOMEN IN MATERIALS

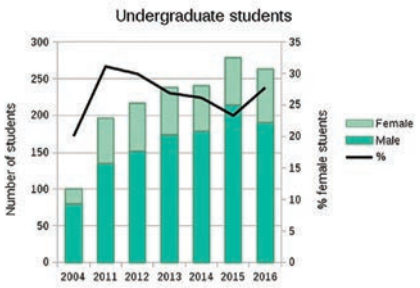


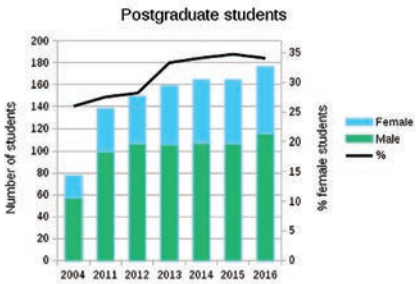
In 2015, the activities of the "Women in Materials" group (established in 2014), continued with two career seminars.

These seminars featured women working in different professions who then came to UNSW to talk to our female students. The talks included how these women overcame challenges within their own career paths. These events provided the students with insights into working in industry, as well as how to manage life as both an academic researcher and a mother of young children. These events were positively received by students and provided many interesting discussions.

Plans for 2016 include expanding the group's activities to events inclusive of both men and women; as well as continuing discussions on how each can play a role in increasing diversity in the science and engineering professions.

Currently in the School of Materials Science and Engineering, around 30% of our students are female, with slightly more at postgraduate than undergraduate level. The percentage of female undergraduate students increased in 2016, after a small dip in 2015.





Science 50:50

A program that aims to inspire young women to pursue degrees and careers in science and technology so they can succeed in an innovation-driven future. Science 50:50 makes the simple point – since half the population is female, why not half the scientists and technologists? By informing and engaging young women with the power of science and technology to solve complex problems and transform lives, and by introducing them to Australian scientists and innovators who are doing just that, Science 50:50 can help recalibrate the gender balance.

We need your support

Do you know an aspiring young scientist who you would like to nominate into the program? Are you an established scientist interested in mentoring a young scientist? Can you host a young researcher in the form of an internship or work experience, or provide other practical support?

What are we doing?

- Creating science and technology internship opportunities for young women
- Launching a New Innovators Competition offering university scholarships to the young women who submit the most innovative ideas for solving real world problems.
- Creating a video series featuring extraordinary women in research, industry, media and politics.
- Engaging girls with science and technology via school visits, videos, the media and online resources.
- Recruiting an expert Advisory Board across Australia's leading science and technology industries.
- Creating a web portal to showcase Australian innovators and link aspiring young women to dedicated mentors.

science.unsw.edu.au/50-50

Contact Us

Veena Sahajwalla **E:** veena@unsw.edu.au **P:** (02) 9385 4426
Ms Sarah Terkes **E:** s.terkes@unsw.edu.au **P:** (02) 9385 8808

PEOPLE

SCHOOL ADMINISTRATION AND STAFF

School Administration –

Head of School	Paul Munroe
Deputy Head of School	Owen Standard
School Manager	Lucy Zhang
Projects Coordinator / Executive Assistant to Head of School	Joanne Hallis
Undergraduate and Postgraduate Student Advisor	Laura McNally
Outreach and Student Liaison Officers	Juanita Vargas, Shane Smith
Administrative Officers	Anne Aylmer, Alan Chow, Qing Xia
Manager, Operations and Business Strategy, SMaRT	Uttra Benton
Research and Administrative Assistant, SMaRT	Celeste Thomson

Technical Staff –

Technical Officer	Soo Woon Chong
Research Assistant	Vaibhav Gaikwad
ITC Support Officer	Jane Gao
Research Support Engineer	William (Bill) Joe
Technical Officer	Rahmat Kartono
ITC Support Officer	Danny Kim
Research Assistant	Irshad Mansuri
Technical Officer	David Miskovic
Research Assistant	John Sharp
Technical Officer	George Yang
Safety Officer	Anthony Zhang

Research Staff –

Postdoctoral Fellow	Joseph Arsecularatne
Research Associate	Wen Fan Chen
Lecturer	Baoyu Guo
Senior Research Fellow	Sushil Gupta
Research Assistant	Reza Kabir
Associate Professor	Rita Khanna
Senior Research Associate	Pramod Koshy
Research Associate	Reza Mahjoub
Research Associate	Samane Maroufi
Postdoctoral Fellow	Thuan Dinh Nguyen
Senior Research Associate	Farshid Pahlevani
Research Associate	Anh Pham
Research Associate	Ravindra Rajarao
Postdoctoral Fellow	Daniel Sando
Professor	Yasushi Sasaki
Research Associate	Pankaj Sharma
Senior Research Scientist	Thiam Teck Tan
DECRA Fellow	Chunguang Tang
Postdoctoral Fellow	Xing Xing
Lecturer	Wanqiang (Martin) Xu
Postdoctoral Fellow	Adnan Younis
Senior Research Fellow	Rong Zeng
Postdoctoral Fellow/Technical Officer	Qi (Peggy) Zhang
Senior Lecturer	Ruiping Zou

OUR ACADEMIC STAFF

ARC Future Fellow
Dr Claudio Cazorla

Claudio's research expertise is built on the study of multifunctional materials using advanced quantum simulation methods. The topics that he investigates are relevant to a broad range of fundamentally and technologically important fields such as Materials Science, Earth and Planetary Sciences, and Condensed Matter Physics. Claudio is particularly interested in the fundamental study of and technological applications involving multi-ferroic and fast-ion conductor materials.

Associate Professor
Sammy Lap Ip Chan

Sammy's research interests are in the areas of energy materials, hydrogen storage and metal matrix composites (MMCs).

ARC Future Fellow
Dr Dewei Chu

Dewei's research interests include ionic conductive oxides based nanomaterials and their applications in nanodevices, including resistive random access memory, transparent thin film transistors, supercapacitors, electric double layer transistors, and artificial synapses, etc. He is also interested in functional ceramics for energy harvesting applications.

Professor
Alan Crosky

Alan's research focuses on the effect of structure (both micro and macro) on mechanical behavior. Specific areas of research include directed fibre placement in fibre reinforced plastic composites, failure of composites, natural fibre composites, wood plastic composites and engineering failure analysis.

Associate Professor
John Daniels

John's research focuses on the understanding of the structural origin of physical properties of materials. This research has, to date, been primarily directed in the field of electro-mechanical materials where a wide range of underlying structural processes at different length scales leads to the coupling of mechanical load and electrical charge.

Professor
Michael Ferry

Michael's research interests are concerned mainly with the mechanisms of microstructure and texture evolution during solidification, solid-state phase transformation and deformation & annealing with recent emphasis on the mechanical and physical properties of crystalline and amorphous light metals.

Lecturer
Dr Judy Hart

Judy's research interests are in developing new semiconducting materials, particularly solid solutions and doped materials, for use in renewable energy applications such as photocatalysis and solar cells. The focus of this work is understanding relationships between composition and properties and finding effective ways of using computational and experimental techniques in parallel.

Dean of Engineering
Professor Mark Hoffman

Mark's research expertise is in the area of structural integrity of materials, specifically the design of materials for high reliability in complex environments through a combination of computational modelling and investigation using extensive mechanical property. His research covers fracture mechanics, fatigue and wear and tribology from the macro- to nano-scale.

Lecturer
Dr Rakesh Joshi

Rakesh is currently focusing on developing methods to prepare high value carbon materials such as graphene and fullerene from waste materials. He has developed experimental methods to prepare graphene and carbon nanotubes for various applications. His areas of interest include sustainable materials, 2D materials, graphene and metal chalcogenides, nanomaterials and thin films. Dr Joshi is leading many industrial projects on the application of graphene and graphene supercomposites.

Senior Lecturer
Dr Kevin Laws

Kevin's research interests are concerned with the design, development and fundamentals of new or advanced metal alloys; specifically amorphous alloys (bulk metallic glasses) and single-phase high entropy alloys. This is closely tied with the design and development of new alloy production technologies and applications for these materials.

Professor
Sean Li

Sean's research is mainly focused on the interface engineering of heterostructural complex oxides and advanced multifunctional materials, including magnetic, thermoelectric and ferroelectric materials. In addition, his research examines the theoretical constructs underpinning the behaviour of these materials.

Lecturer
Dr Damia Mawad

Damia's research interests are in tissue engineering/regenerative medicine. Her contributions in the field focus on development of advanced functional biomaterials with tailored properties. These include flexible bioelectronics with enhanced electronic stability, conjugated nanoparticles for photo-thermal therapy and on-demand drug delivery, and 3D printing of bioactive scaffolds.

Head of School
Professor
Paul Munroe

Paul's research is focused on the characterization of materials using electron microscopy and related methods. This includes publication of a significant body of work focused on ion beam technology. He is also active in a range of areas in characterization of materials such as functional thin films, intermetallic alloys and biochars.

Emeritus Professor
Oleg Ostrovski

Oleg's major contributions are in the field of pyrometallurgical technologies for minerals processing, iron-, steel- and ferroalloy-making. Areas of research include thermodynamics, kinetics and mechanisms of metallurgical reactions, properties of molten metals and slags, reduction, smelting and refining processes, and environmental issues in pyrometallurgy.

Lecturer
Dr Sophie Primig

Sophie's research interests are in advanced property-structure relationships in structural metallic materials such as advanced steels, nickel-based alloys and refractory metals. She combines state-of-the-art experimental techniques such as electron microscopy, atom probe tomography and thermal analysis with mechanical testing and contemporary modeling approaches. Her research philosophy is to achieve a balance between fundamental discovery and industrial application.

ARC
Laureate Fellow,
Scientia Professor,
Veena Sahajwalla

Veena's research interests include sustainability of materials and processes with emphasis on environmental benefits. She has a deep knowledge of industrial processes. Veena invented an environmentally friendly process for recycling plastics and rubber into electric arc furnace steelmaking. As Director of SMaRT she provides leadership in research programs on sustainable materials.

More detailed information about our Academic Staff can be found on the School website:
materials.unsw.edu.au

Associate Professor Jan Seidel

Jan's research interests are in the area of advanced electronic, photonic and spintronic materials, including scanning probe microscopy, nanotechnology enhanced photovoltaics, electrochromism, nanoscale phase separation, nano-optics, spectroscopy, plasmonics, x-ray based synchrotron techniques and high-resolution transmission electron microscopy.

Professor Chris Sorrell

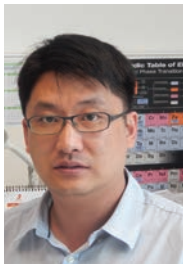
The main focus of Chris' research has been the processing of ceramics, including fabrication, forming and densification of bulk materials, thick films and thin films. Main research areas include phase equilibria, crystal growth, high-temperature superconductivity, bioceramics, microwave heating of ceramics, gas sensors and fuel cells and photocatalytic titania.

Deputy Head of School, Senior Lecturer, Dr Owen Standard

Owen's research is in the processing/ microstructure/ property relationship of advanced ceramics for functional applications including colloidal processing of electroceramics, compositional and microstructural modification of bioactive and bioinert ceramics, sol-gel deposition of functional ceramic coatings, development of sol-gel coatings on textile fibres and ceramic coatings on biomedical alloys.

Professor Nagarajan Valanoor

Nagy's most significant contribution is in the field of thin film epitaxy functional property relationships for ferroelectrics, dielectrics and multiferroic nano-materials. Research includes thin-film oxide epitaxy, scanned probe microscopy of functional materials and Landau-Ginzberg modelling of phase transitions.



Lecturer Dr Danyang Wang

Danyang's most significant contribution is in the field of growth and characterization of functional oxide thin films for ferroelectric, piezoelectric, electro-optic and dielectric applications. Areas of research include thin film technology and physics, functional materials and devices, micro/nanofabrication techniques, structural analysis and x-ray physics.

Associate Professor Runyu Yang

Runyu is focused in the field of particle/ powder science and technology. His primary research interests lie in particle technology, aiming to understand the behavior of particles through rigorous modelling and simulation at microscopic and macroscopic levels. This knowledge is then applied to solving problems in various industrial applications.

Emeritus Professor David Young

David's most significant contributions are in the field of high temperature alloy-gas interactions. Particular emphasis is placed on the diffusion and phase transformation processes which support these reactions. Current work includes fundamental studies of corrosion by CO_2, metal dusting reactions and water vapour effects on oxidation.

ARC QEII Fellow and Senior Lecturer Dr Jiabao Yi

Jiabao's most significant contributions are in the field of diluted magnetic semiconductors, based on oxide semiconductors, magnetic materials, nonstructural, oxide electronics and spintronics materials.

Associate Professor Jianqiang Zhang

Jianqiang's research is focused in the field of gas-solid reactions at high temperature, including high temperature corrosion and processing metallurgy. Research emphasis is on reaction thermodynamics and kinetics, phase transformation and characterisation, reaction mechanism understanding, sustainable materials processing and new materials development

SCHOOL COMMITTEES / INDUSTRY ADIVSORY BOARD

School Advisory Committee

Paul Munroe (Chair)
Owen Standard
Dewei Chu
Pramod Koshy
Laura McNally
Lucy Zhang

Research Committee

Nagy Valanoor (Chair)
Paul Munroe
Veena Sahajwalla
Sean Li

Teaching and Learning Committee

Sammy Lap Ip Chan (Chair)
Alan Crosky
Owen Standard
Danyang Wang
Judy Hart
Paul Munroe

Work Health & Safety Committee

Owen Standard (Chair)
Anthony Zhang
Paul Munroe
Rakesh Joshi
Rahmat Kartono
Shane Smith
Scott Gleason (PG rep)

Marketing and Recruitment Committee (Operational)

Paul Munroe (Chair)
Juanita Vargas / Shane Smith
Lucy Zhang
Joanne Hallis

Marketing and Recruitment Committee (Strategic)

Chris Sorrell (Chair)
John Daniels
Juanita Vargas / Shane Smith
Alan Crosky

Space Committee

Michael Ferry (Chair)
Lucy Zhang
Rahmat Kartono

School Scholarship Committee

Veena Sahajwalla (Chair)
Owen Standard

School Co-op Scholarship Representative

Owen Standard

Postgraduate Coordinators

John Daniels
Sophie Primig

Undergraduate Program Coordinator

Owen Standard

Honours Projects Coordinator

Jianqiang Zhang

Master by Coursework Coordinator

Runyu Yang

Misconduct and Grievance Officer

Owen Standard

PGSOC Staff Representative

Jan Seidel

MATSOC Staff Representative

Jiabao Yi

Faculty Undergraduate Assessment

Sammy Lap Ip Chan

Faculty Undergraduate Assessment

Alan Crosky

Nanotechnology Degree Coordinator

Danyang Wang

Overseas Degree Programs / Asia Engagement

Sammy Lap Ip Chan
Sean Li

Women in MS&E

Judy Hart

Equity & Diversity Committee

Paul Munroe
Owen Standard
Damia Mawad
Lucy Zhang
Joanne Hallis
Carina Ledermueller (UG rep)
Gita Naidu (PG rep)

Industry Advisory Board

Mr Roger Leigh (Chair)
COCHLEAR LIMITED

Mr Adam Berkovich
PACIFIC ALUMINIUM

Professor Lyndon Edwards
ANSTO

Dr Catherine Foley
CSIRO

Mr Michiel Freislich
HATCH

Dr Edward Humphries
WEIR MINERALS

Mrs Cathy Inglis
BRICKWORKS

Mr George Melhem
Perfect Engineering Pty Ltd

Mr Chris Mouatt
PGH Bricks & Pavers

Dr David Nolan
Bluescope Research

Professor Peter Lovibond
Faculty of Science
UNSW Australia

Professor Paul Munroe
School of Materials Science and Engineering
UNSW Australia

Dr Owen Standard
School of Materials Science and Engineering
UNSW Australia

Mrs Lucy Zhang
School of Materials Science and Engineering
UNSW Australia

NEW STAFF

DR KEVIN LAWS

Dr Kevin J Laws completed his Ph.D. in physical metallurgy at UNSW in 2008. He was appointed as a postdoctoral research fellow and project manager of the ARC Centre of Excellence in Light Metals Design (2008-2013) based at UNSW and was awarded an ARC DECRA fellowship (2012-2015) also taken on at UNSW. He has been an invited research fellow with the Laboratory of Metal Physics and Technology at the Swiss Federal Institute of Technology (ETH), Zurich (2010 & 2014) and with the Materials and Manufacturing Directorate of United States Air Force Research Laboratory (2011) for six to eight-month intervals working on specialist research projects with these groups. In January 2016, Kevin was appointed a Senior Lecturer in the School, teaching both fundamental and applied materials science and physical metallurgy.

Kevin's research interests include the design, development and fundamentals of new and advanced metal alloys; specifically amorphous alloys (bulk metallic glasses) and crystalline high entropy alloys. This is closely tied with the design and development of new alloy production technologies and applications for these materials. His current research projects include:

- Development of ductility in magnesium-based bulk metallic glasses and their composites
- High entropy brasses and bronzes for deep drawing and hard face bearing applications
- High entropy precious metal alloys for jewellery and catalyst applications
- Development of amorphous aluminium-based alloys (bulk metallic glasses)
- Beta and alpha + beta magnesium-rare earth alloys for aerospace applications

DR DAMIA MAWAD

In August 2015, Dr Damia Mawad took up a position as lecturer in polymer science. Damia completed a PhD in Biomedical Engineering at UNSW and from 2008 to 2012 held a post-doctoral position within the Intelligent Polymer Research Institute (IPRI) at the University of Wollongong.

Prior to joining the School, Damia completed her Marie Curie Fellowship in the Department of Materials at Imperial College in London, where she worked in Professor Molly Stevens' group. Her research interest is in functional polymers.

Damia's research interests are in polymeric bio-electrics applied in tissue engineering, with current projects including:

- Enhancing the electronic stability of conducting polymers in physiological conditions by tailoring the chemistry of conjugated polymers and developing fabrication techniques that allow the dopant to be retained in the matrix.
- 3D electroactive scaffolds for cell seeding, proliferation and differentiation.
- Sutureless conductive patches for cardiac regeneration with micro-patterned surfaces for cell alignment and photo-adhesion to tissue
- Investigations of the effect of electrically bio stable conjugated systems on the electro-physiology of electro-responsive tissues.
- Development of conjugated nanoparticles for photo-thermal therapy and on-demand drug delivery.
- 3D printing of biological scaffolds.

DR SOPHIE PRIMIG

Dr Sophie Primig joined the School in July 2015 as Lecturer in Physical Metallurgy. Her research interests are in structure-property relationships of advanced metallic materials.

Sophie was awarded both her Ph.D. (July 2012) and her Master's in Materials Science (November 2008) degrees at the Montanuniversität Leoben, Austria. Her Ph.D. research was an applied project in collaboration with Plansee SE, Austria. She designed and oversaw the metallurgical implementation of a new rolling and annealing schedule for the production of defect-free molybdenum plates such as are required for various electronics, coatings and high temperature structural applications.

Sophie was appointed to the position of a Post-Doctoral research fellow in the Christian Doppler Laboratory for Early Stages of Precipitation after her Ph.D., a prestigious Austrian funding scheme for applied research.

In July 2013, she took up the position of Senior Scientist at the Montanuniversität Leoben and headed the "High Performance Materials and Steels" research group. This group develops new microstructure-property relationships in structural materials such as steels, molybdenum alloys and nickel-based alloys and has close industry linkages.

STAFF AWARDS, PROMOTIONS AND CHANGES

STAFF AWARDS AND PROMOTIONS

Dr Pramod Koshy (pictured above) won the 2015 "Vice Chancellor's Award for Teaching Excellence" in the Early Career category. This is a highly prestigious award that is presented to the most outstanding teachers in the University. A total of 11 teaching staff across the University were honoured this year, with only 3 early career awards made.

Head of School, Professor Paul Munroe, said, "Koshy has done some outstanding teaching for the School over the past several years. His teaching is very highly regarded and he thoroughly deserves this award." Koshy's success follows a long tradition of staff in the School winning this award.

In September 2015 **John Daniels** and **Jianqiang Zhang** were both promoted to Associate Professor, effective in January 2016.

Both John and Jianqiang have generated impressive portfolios of achievement through sustained grant success, excellent publication records, active postgraduate student supervision, together with the provision of high quality teaching. Both also work very hard and very effectively in their respective student coordination roles – Jianqiang as undergraduate honours coordinator and John as postgraduate coordinator.

Dr Judy Hart was awarded this year's Faculty of Science "June Griffith Fellowship for Academic Women in Leadership". This is a faculty-wide award designed to promote teaching and learning amongst female academic staff. The award attracts a grant of $25,000 to support Judy's research and teaching activities.

Dr Sophie Primig and her Austrian refractory-metal team received the Grand Prize in APMI International's Excellence in Metallography Competition for 2015 for their submission, "Evolution of Strain-Induced Precipitates in the Molybdenum Base Mo-Hf-C Alloy". The intent of this competition is to recognise individuals responsible for the metallography used to support a conference technical paper. There is only one award made each year.

Laureate Professor Veena Sahajwalla was appointed as an Honorary Fellow of the Institute of Engineers Australia. This is the highest honour awarded by the Institute of Engineers and appropriately recognises Veena's enormous contribution to the profession over a sustained period.

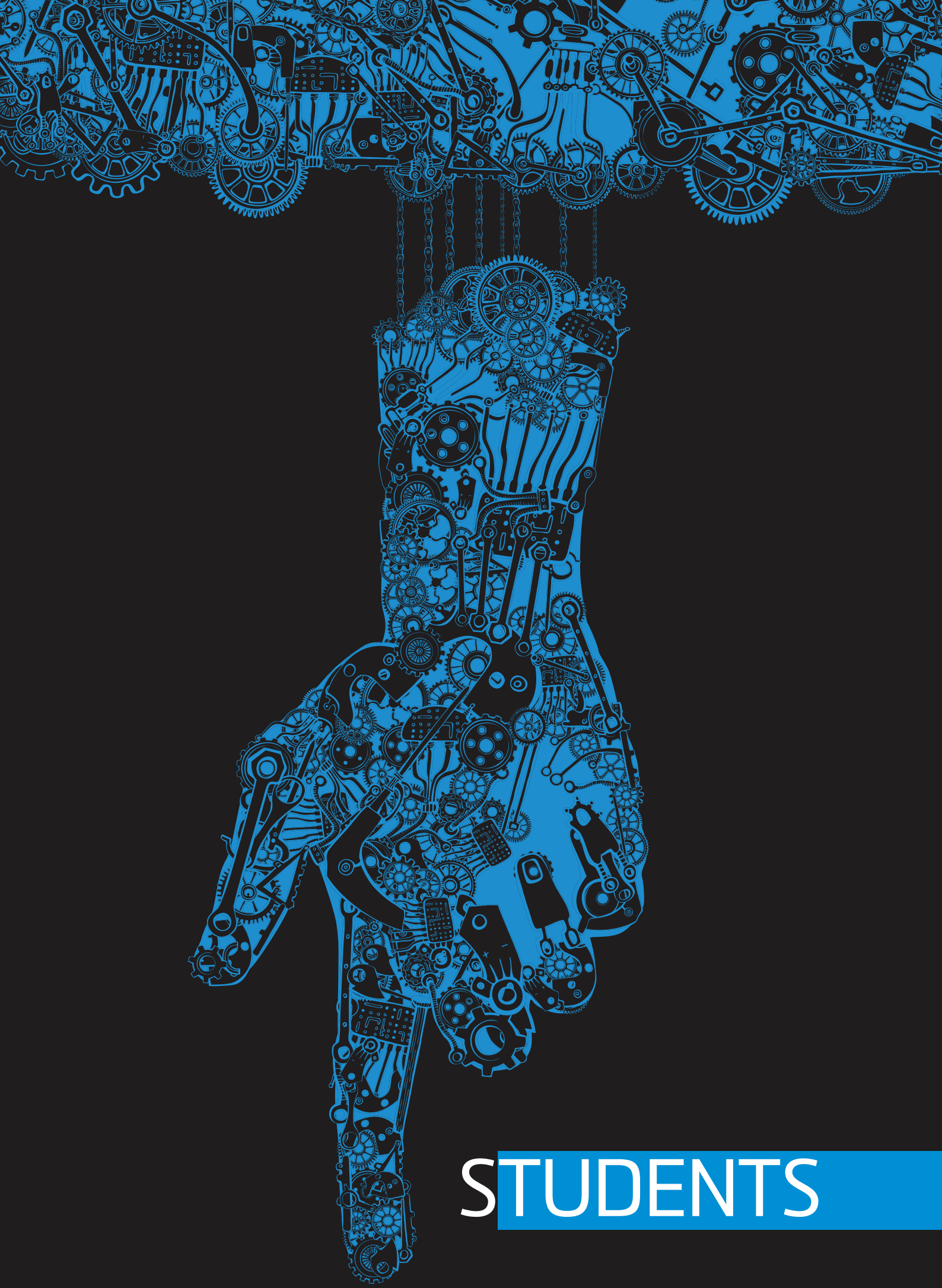
Veena was also one of six UNSW academics recognised in the "100 Women of Influence Awards for 2015", winning the Innovation category.

And finally, we are happy to announce that on 9th October 2015 our Outreach and Student Liaison Officer, Juanita Vargas and her husband Andrew Ward-Harvey, welcomed their second son, Oliver Hugo, a brother to six-year-old Leo.

STAFF CHANGES 2015

Retirement

In February 2015, Saha Chaudhury, one of the university's longest serving general staff members retired. Saha was employed at UNSW for over 40 years. He was originally employed by the former Faculty of Applied Science as a draughtsman. For the past 20 years he has worked with Professor Veena Sahajwalla as part of the SMaRT Centre. Saha took a number of roles in SMaRT most recently acting as the Centre's manager and much of the smooth operation of this Centre is attributable to Saha's calm and unflappable manner. We wish Saha the best for a long and happy retirement.



STUDENTS

UNDERGRADUATE STUDIES

UNDERGRADUATE PROGRAMS OFFERED

The primary aim of the School's undergraduate programs is to deliver graduates possessing the fundamental knowledge, skills, and capabilities needed to succeed in the discipline of Materials Science and Engineering, as well as having the graduate engineering competencies prescribed by Engineers Australia and, more generally, the generic graduate attributes expected in any graduate. The School's undergraduate programs are designed to have strong relevancy to today's material's industry and research whilst being adaptable to future trends and growth in the discipline.

The School offers a Bachelor of Engineering (BE) in Materials Science and Engineering which consists of four years of full-time study and requires students to complete at least 60 days of approved industrial training (in materials engineering or a related field). Students undertake a common engineering first year, a common second year of fundamental materials engineering courses and mathematics courses, followed by more discipline-specific materials courses in Years 3 and 4, as well as an Honours research project in Year 4. Students major in Materials Engineering, Ceramic Engineering, Physical Metallurgy, or Process Metallurgy by the selection of appropriate electives in Years 3 and 4 and an appropriate Honours research project topic in Year 4. The BE degree is fully accredited with Engineers Australia.

The BE degree is also offered in combination with the following degrees: Bachelor of Commerce (BE/BCom), Master of Biomedical Engineering (BE/MBiomedE), and a BE in Chemical Engineering (BE/BE). The School also offers a Bachelor of Science (BSc) majoring in Materials Science – this degree is three years of full time study (144 UOC) and Honours can be obtained by a further year of full-time study (48 UOC). The BSc can also be combined with degree programs in other Faculties, including Bachelor of Law, Bachelor of Engineering, Bachelor of Arts, etc.

NEW ENROLMENTS

Admission to the School's BE programs is through the Universities Admissions Centre (UAC) for local students. International students with appropriate qualifications apply through UAC International or directly through UNSW Apply Online. There are two intakes each year (one each for Semester 1 and Semester 2). Enrolments into the School's BE programs have been healthy over the past ~5 years and increased significantly for 2015 (see table below). The quality of the new local students has remained high as indicated by ATAR entry scores of 84.5 for the BE program, 91.0 for the BE/MBiomedE program, 96.3 for the BE/BCom program, and 91.0 for the BE/BE program. International students comprised just over one third of the 2015 student intake. In addition to the first year admissions, 12 students transferred into the School's BE programs from other degree programs in the University. The School continues to have the largest undergraduate program in the discipline nationwide by a considerable margin.

2015 FIRST YEAR INTAKE

Program	2011	2012	2013	2014	2015
3135 BE (Materials Sci. & Eng.)	52 (25)	39 (8)	46 (11)	44 (15)	63 (26)
3136 BE (Materials Sci. & Eng.)/BCom	4 (0)	4 (0)	3 (1)	7 (0)	9 (3)
3137 BE (Materials Sci. & Eng.)/ BE(ChemEng)	1 (0)	8 (1)	13 (4)	7 (0)	9 (2)
3138 BE (Materials Sci. & Eng.)/ MBiomedE	26 (5)	21 (2)	20 (2)	16 (0)	16 (5)
Total:	**83 (30)**	**72 (11)**	**82 (18)**	**74 (15)**	**97 (36)**

OVERALL PROGRAM ENROLMENT

The numbers of students enrolled in the School's programs in 2015 are given in the following table. The number in each stage of study is dependent on the number of students who entered that cohort initially (i.e., in Year 1) as well as the number of students who transferred into or out of the cohort in subsequent years. Furthermore, the number of students in a particular stage of study includes students who are deemed by the University's enrolment system to have not yet completed that stage of study (owing to failed courses and/or courses not yet undertaken). Overall, the number of students in each stage of study has increased compared with previous years in keeping with the increased intake of students into Year 1.

2015 PROGRAM ENROLMENT

Program	Year 1	Year 2	Year 3	Year 4	Year 5	Total
3135 BE (Materials Sci. & Eng.)	76	26	23	39	-	**164**
3136 BE (Materials Sci. & Eng.)/BCom	7	2	1	1	3	**14**
3137 BE (Materials Sci. & Eng.)/ BE(ChemEng)	8	8	11	5	-	**32**
3138 BE (Materials Sci. & Eng.)/ MBiomedE	16	13	16	11	13	**69**
Total:	**107**	**49**	**51**	**56**	**16**	**279**

The above enrolment in the School's programs represents approximately ~60% of the School's coursework teaching load. In addition to this, the School also teaches courses on its Masters program (~10%) and offers external undergraduate courses in other undergraduate programs in the University (~30%). A significant proportion of the latter is a first year introductory materials subject which is taken by ~500 students mainly from Engineering.

EXCHANGE STUDY

In addition to the significant proportion of international students enrolled in the School's programs, approximately 100 incoming exchange students completed undergraduate courses in the School in 2015. Six of the School's undergraduate students completed one semester of exchange study overseas, these being at the following institutions: University of Birmingham (UK), McGill University (Canada), University of Florida (USA), Swiss Federal Institute of Technology (Switzerland), University of Nottingham (UK), and Lulea University of Technology (Sweden). Seven undergraduate students completed research exchange practicum placements at Taiwan's Tunghai University and National Tsing Hua University (NTHU) as part of the UNSW AsiaBound Program. The School has a formal research exchange program for undergraduate students with the Department of Materials Science and Engineering at North Carolina State University (USA) and, in 2015, five students from the School went to NCSU, and six students came from NCSU to the School, to complete 10-week research projects.

GRADUATING CLASS

The BE degree is awarded at Honours (First Class, Second Class Division 1, Second Class Division 2) or Pass classifications as determined by a weighted average mark calculated based on the year of study and the relative weighting of each course in the curriculum for that year. A total of 32 students graduated in 2015 and the levels of Honours/Pass of the cohort are shown in the table below. Two students were awarded the University Medal with their First Class Honours in recognition of their outstanding academic achievement (average mark of >85%) throughout their study. A total of 32 students graduated from the School's programs in 2015 comprising of 21 students in Materials Engineering, 8 students in Process Metallurgy, 2 students in Ceramic Engineering, and 1 student in Physical Metallurgy. No students graduated from the BE/BE program as it is a 5 year program and it only commenced in 2012.

2015 PROGRAM ENROLMENT

Program	H1 + Medal	H1	H2/1	H2/2	Pass	Total
3135 BE (Materials Sci. & Eng.)	2	1	2	3	8	**16**
3136 BE (Materials Sci. & Eng.)/BCom	–	1	1	1	–	**3**
3137 BE(Materials Sci. & Eng.)/ BE(ChemEng)	–	–	–	–	–	**–**
3138 BE (Materials Sci. & Eng.)/ MBiomedE	–	5	4	3	1	**13**
Total:	**2**	**7**	**7**	**7**	**9**	**32**

UNDERGRADUATE PROGRAM REVISIONS

The School's undergraduate programs were revised in 2015 (for implementation in 2016) to ensure ongoing compliance with the University's policies and procedures in terms of student academic progression and the awarding of Honours, as well as to ensure compliance with the Australian Government's Australian Quality Framework (AQF) requirements for Bachelor Honours degrees. The revisions also ensured that the structure and rules of the BE component of each program are the same as the new Bachelor of Engineering Honours program introduced by the UNSW Faculty of Engineering in 2015. The curriculum of the BE component of the School's BE, BE/MBiomedE and BE/BCom programs remained largely unchanged from that established in 2011 (and accredited with Engineers Australia). However, the BE (Materials Science and Engineering)/BE (Chemical Engineering) program was not able to satisfy the new UNSW Honours Procedure and AQF requirements and so will be replaced from 2016 onward by a new BE Hons(Materials Science and Engineering)/ BEngSci (Chemical Engineering) program. This program is a combination of the core component of the Hons program and the core component of the Chemical Engineering stream of the B.Engineering Science program.

Dr Owen Standard
Undergraduate Program Coordinator

UNDERGRADUATE INDUSTRIAL TRAINING POSTER COMPETITION

On Tuesday 28 April 2015, the School held its annual Undergraduate Industrial Training Placement evening.

Each of our bachelor degree programs contains a requirement for students to complete a minimum of 60 hours industrial training, aimed at preparing them for future employment in their chosen engineering discipline. Industrial training enhances the academic material studied and allows students to practice what they have learned, while developing key professional attributes.

Around 35 students presented posters and a brief oral summary outlining their experiences during their industrial training. The quality of the presentations was very high and clearly many students found their IT placements to be a very valuable learning experience.

We were very pleased to welcome Zheshi Jin from OneSteel, who provided insightful and thoughtful judging.

The 2015 winners for the best presentations were:

1. **Nadia Funayama** - The manufacture of polyester
2. **James Edwards** - Investigating Material Failures
3. **Charles Hartson** - The potential of Additive Manufactured Tools for Injection Moulding

Nadia, James and Charles are to be congratulated for their outstanding and, importantly, highly reflective presentations.

1

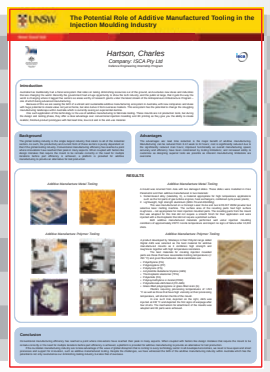
NADIA FUNAYAMA

2

JAMES EDWARD

3

CHARLES HARTSON



CO-OP SCHOLARSHIP PROGRAM

The Co-op Program is a scholarship program run in cooperation between the University of NSW and industry to provide scholarships and industrial training for undergraduate students in various degree programs. For the School of Materials Science and Engineering, co-op scholarships are a highly visible and very effective means to attract high-quality students into our discipline and to provide them with immensely beneficial industrial training in the engineering sector.

The first co-op scholarships in Materials Science and Engineering commenced in 1989 and the success of the co-op program in delivering the above benefits to scholars and sponsors in Materials Science and Engineering is demonstrated by the strong and consistent support of the program by industry: there have been a total of 127 scholarships from 30 different industrial sponsors since 1989. Co-op graduates are highly sought by industry and those students entering the materials industry usually rise to positions of leadership and management.

The co-op program attracts the academically strongest students (typically, ATARs are greater than 99.0) who, importantly, also have good leadership, teamwork, and communication skills. For students in Materials Science and Engineering, each scholarship provides ~$18,000 per annum for 5 years, 68 weeks of structured and highly relevant industrial training with up to 4 sponsor companies, the opportunity to experience typical graduate employment, and close access to potential employers. The program provides industrial sponsors with highly motivated, capable students to complete important and valuable industrial work. It also provides sponsors the opportunity to have direct involvement in the education and development of our School's students and from whom they can potentially recruit their future managers and leaders.

A total of 5 scholarships (Table 1) were provided by 4 industrial sponsors in 2015 (Table 2). This represents an investment by industry of ~$90,000 for the year. The attraction of new scholarships remains a challenge owing to the continued economic downturn in the Australian manufacturing industry.

Table 1: Materials Science and Engineering Co-op Program – Cohort Statistics (2011 to 2015)

Intake Year	2011	2012	2013	2014	2015	Total
Current Year of Degree	4	3 (IT)	3	2	1	
Number of Scholars						
Ceramic Eng.	–	–	–	–	–	0
Materials Eng.	2	–	–	–	1	3
Physical Met.	–	–	1	–	–	1
Process Met.	1	–	–	–	–	1
Total	**3**	**–**	**1**	**–**	**1**	**5**

Table 2: Materials Science and Engineering Co-op Program – Current Sponsors (2011-2015)

Alcoa Australia	Pacific Aluminium (Rio Tinto)
Bluescope Steel Research	TEMCO

Scholars completed the following industrial training (IT) placements during the year:

- IT1 (10 weeks) by students at the end of their first year;
- IT2 (10 weeks) by students at the end of their second year; and
- IT3 (24 weeks) and IT4 (24 weeks) by students midway through their third year of study.

Each IT placement was reviewed by the Academic Coordinator in the form of an interview with the scholar and sponsor representative(s). The scholar and sponsor also provided written appraisals of the placement. Each scholar also gave a short presentation to industry sponsors and fellow co-op students summarising their IT work and, importantly, the technical and professional benefit they obtained from the placement. Judging from the placement interviews, written appraisals and presentations, all placements were completed successfully and fulfilled the philosophy and objectives of the co-op program – for both scholars and sponsors. Industry sponsors indicated the significant quality and value of work completed by the scholars during their placements.

The commitment of scholars and sponsors to the IT placements is fundamental to the success of the co-op program. The School thanks all of its co-op sponsors for the efforts they put into organising the placements as well as their training, guidance, and support of scholars during the placements, and for their continued generous support of the co-op program.

Owen Standard
Academic Coordinator
Materials Science and Engineering Co-op Program

INTERNATIONAL EXCHANGE

The School has a vibrant program of international exchange and internship opportunities through collaboration with universities in Asia and the United States. Over the summer of 2015-16 four of our students visited Tunghai University in Taichung, Taiwan and six students visited North Carolina State University (NCSU). In July/August we hosted students from NCSU and Harvey Mudd College, California.

At Tunghai University, students are provided internships to either work in the materials industry or in the University's own materials labs. At NCSU the students are assigned an academic supervisor and spend their time working through a research project.

This is an invaluable experience for our students, introducing them to amazing new research opportunities and kick-starting their network of connections across the world.

ALEXANDRA TILSON

To have the opportunity to travel, receive industrial experience as well as gain insight into the professional world of materials science was what immediately attracted me to apply for this scholarship. At the end of our experience I hope to have gained deeper insight into the world of materials research, as well as form and develop connections with other students and professors from NC State.

JU LIEN ONG

The prospect of networking and collaborating with fellow materials engineers from America that involves sharing ideas and learning from one another truly excites me. I also love giving back to the community, both in and out of UNSW and I strongly believe that I can incorporate the invaluable exchange experience in the U.S. into the many associations I am involved with that can result in further improvement.

Shortly after our 2015-16 groups landed at their respective destinations, we asked the students to give us their first impressions as they immersed themselves in new cultures and eye-opening experiences.

NOORI CHUNG

My first impression of Tunghai was amazement at the size of the campus. I had complained about UNSW's lower to upper campus, but walking roughly half the perimeter of the campus took at least one hour. It was interesting experiencing an university that has their own deer and cow farms, lake and affiliated high school. The first day here I managed to travel to a different part of the city and sign up with a Taekwondo sports club and am continuously training with them every week.

Initially due to the language barrier I was eating at convenience stores but I slowly started experimenting at different restaurants trying new things and learning by trial and error. As for work, I am currently placed at a cosmetic manufacturing plant called Jing Young Biotech, where I am slowly starting to learn how the plant runs and though it may seem daunting at first the staff are extremely friendly and so far it has been an enjoyable experience. For anyone thinking about joining the program I strongly recommend to do so, as they will get to experience lots of new things and the language barrier isn't that big of a deal once you get used to it.

VICTOR TAN

It has been a bit over two weeks since arriving in Taiwan for the Materials Science and Engineering research exchange program. The focus of my work at Tunghai University will be to develop a biosensor for cell and

environmental testing, using conductive polymer materials.

The smooth transition into life in Taiwan has been in no small part thanks to the friendly and helpful students and staff of the university. Their guidance and warm reception has made the time both fun and eye opening. While not boasting state of the art facilities, the work ethic is no less conscientious and high quality.

The first thing that stood out to me in Taiwan was the hordes of scooters, which greatly outnumber cars on the road. Food is both cheap and readily available from the abundant convenience stores and local shops. Supplies and the university campus are but a short walk away, with the frequent (and free!) public bus services making for easy trips into the main city, making little shortage of things to do or places to explore.

With over two months left in this program, I hope to be able to see more of what Taiwan has to offer, and of course perform quality research at Tunghai University.

CATHERINE ISAAC

After eventually arriving in Raleigh, NC (approximately 48 hours of travel after a cancelled flight and a free stay in a Toronto hotel) I finally set eyes on the town that I would be calling home for the next 3 months. The first thing that I noticed was how spread out the campus is, it is so large that NCSU has its own free bus line around the campuses and almost all the students have their own car. The second thing that I noticed was the famed southern hospitality. Everyone is extremely friendly, from offering free lifts when they found out we don't have a car to cooking advice in the supermarket from strangers after overhearing our confusion on how to cook various vegetables.

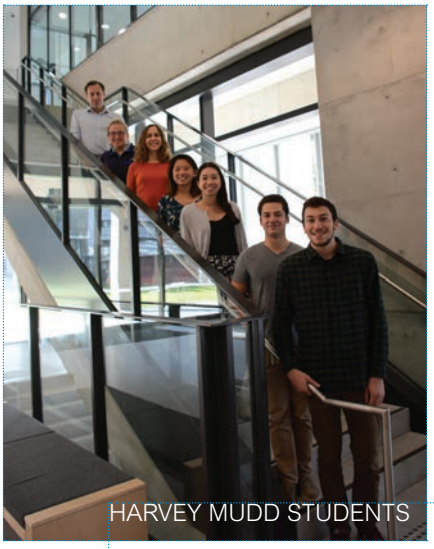
During the week I have been researching the temperature dependence of domain wall switching in ferroelectrics under the supervision of Jacob Jones. This involves x-ray diffraction of materials in an electric field and at elevated temperatures. However, on the weekends we have had free time to go hiking in Umsted State Park, explore downtown Raleigh, Duke University and the nearby town or Durham. Over the Christmas/New Year break we have planned a trip to visit New York City, Philadelphia and Washington DC. Next year I plan to further explore Raleigh, hopefully spot a raccoon and experience the American college lifestyle.

ALEXANDER HO

The US is a very different place, everything here is so large especially the food! In North Carolina, the place is very spacious, the apartments organised for us are massive and the campus is also massive compared to UNSW. I wouldn't walk across the whole campus on a regular basis! My supervisor, Joseph Tracy, is very accommodating, giving me a taste of academic freedom and even inviting his whole research team into his home to have desserts, tea and coffee. It was particularly exciting to enter a traditional American home during the festive season with a real living Christmas tree!

I'm working on magnetic particles and gold nanoparticles /rods incorporated into polymers but depending on experiments things may change! This is the joys of research work.

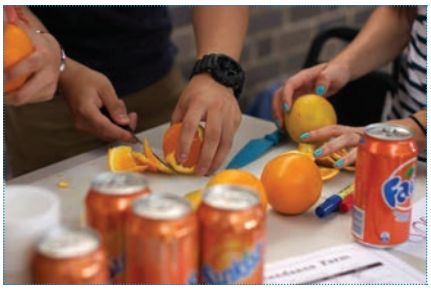
There is a Christmas/New Year's break coming up soon and most of us are heading to New York, Philadelphia and Washington D.C.! The supervisors are very relaxed about us taking trips to explore the States but of course we are still expected to do the assigned work!



HARVEY MUDD STUDENTS

TAWAIN GROUP

2015 MATSOC PRESIDENT'S REPORT



President: **Amanda Lai**
Vice-Presidents: **Scarlet Kong** & **Jacqueline Mach**
Secretary: **Andrew Trimmer**
Treasurer: **Maya Dougherty**
ARC Delegate: **Ju Lien Ong**
Social Director: **Jackson Wong**
Industrial Liason: **Gustad Irani**
Fourth Year Representatives: **Richard Chu** & **Jamie Elters**
Third Year Representatives: **Maya Dougherty** & **Nathan Miller**
Second Year Representatives: **Richard Chen** & **Quynh Pham**
First Year Representatives: **Michael Thein** & **Chantelle Liew**

Another year done and dusted for MATSOC, and what a year it was. We began with a directive to have more students' input and involvement in everything that we do, because after all, we are here to represent all of the 200-odd undergraduate students in the school. I would evaluate the year a great success, but there is always more that can be done and I look forward to hearing about next year's triumphs. For now, let's take a look back at my short time holding the reins.

I feel it would be rude not to mention the most significant change of 2015: the new building!

We may have only moved our desks and offices 100m geographically but the building represents a huge step forward for the growth of the school and the focus on research at the university. The new labs are brighter, cleaner and more comfortable places to work and the same can be said of the study spaces. I have never seen the breakout area on Level 1 empty as yet, even in the middle of semester break.

Of course, we wouldn't be an undergraduate society without options for affordable food and drinks.

In the true spirit of the School of Materials and our collective love of the colour orange, we started the year with an orange juice stand. Our team slaved away all afternoon in front of UNSW Main Library cutting and juicing fresh oranges in plastic cups to sell. 80c on a hot summer day, all we were missing was the green front lawn and white picket fence.

We hosted a joint BBQ with Chemical Engineering, Food Science and Industrial Chemistry undergraduate societies as a precursor to the annual orientation camp we all co-supervised at Wiseman's Ferry. That weekend is always a highlight and it's nice to meet the new students and watch them bond over the distinct shortage of power points and phone reception up there. This long-standing alliance between our societies was also responsible for the harbour cruise, masquerade ball and numerous pub crawls throughout the year.

For the first time, we crowd-sourced the design of our MATSOC hoodie and they turned out to be a huge hit! The winning combination of a Rutherford atom and stress-strain curve represent two concepts we will all remember fondly forever.

Amanda Lai
President 2015

STUDENT AWARDS & PRIZES




GRADUATING CLASS OF 2015

Jennifer Lao and **Richard Winkler** were awarded the University Medal in Materials Engineering. The University Medal is the most distinguished award to be bestowed on an undergraduate.

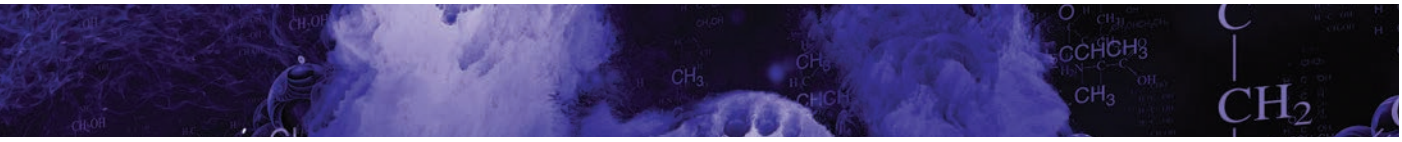
We congratulate both Jennifer and Richard for this outstanding achievement.

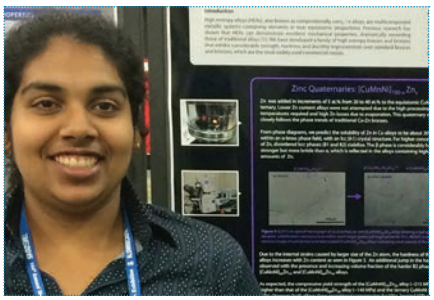
At the graduation of our 2015 class (held in June 2016) several industry-sponsored prizes were awarded to undergraduate students who achieved outstanding results in the course of their studies:

- **Catherine Isaac** received the *Wallarah Minerals Prize* for best performance in an honours thesis in the BE Ceramic Engineering program
- **Thomas McFee** received the *Max Hatherly Prize* for the best performance in MATS4001 Secondary Processing of Metals
- **Xia Ping Lee** received the *Cochlear Prize* for the highest overall WAM at the end of Year 3
- **Jeff Huang** received the *Pacific Aluminium* prize for the best performance in MATS3007 Materials Industry Management
- **Brian Ng** received the *Sir Rupert Myers Prize* for the best performance in MATS3001 Micromechanisms of Mechanical Behaviour of Metals
- **Scarlet Kong** received the *Australasian Corrosion Association Prize* for the best performance in MATS4007 Engineered Surfaces to Resist Corrosion and Wear
- **Declan Walsh** received the *John Morris Scientific Prize* for the best performance in MATS2003 Materials Characterisation
- **Alex Ho** received the *ANSTO Prize* for the best performance in MATS3006 Design and Application of Materials Science and Engineering 3: Computational Modelling

Finally, **Amanda Lai** was awarded the prestigious *Hugh Muir Prize* for the student who, in the opinion of the Head of School, has contributed most to the corporate life of the School of Materials Science and Engineering.

Congratulations to these students and to our entire graduating class of 2015. We wish them all success for the future.

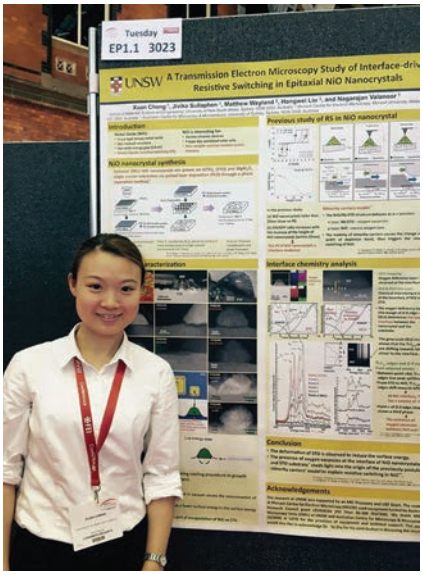




OTHER AWARDS AND PRIZES

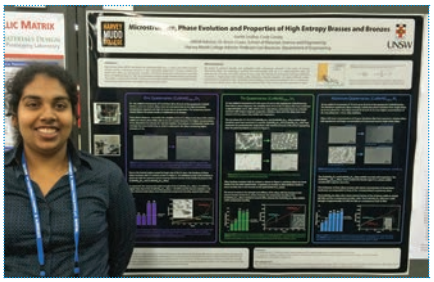
Postgraduate student **Michael Saleh** was the recipient of the inaugural *ANSTO Early Career Researcher Award*. Michael is a part-time PhD student working principally in ANSTO's Materials Division. His PhD project is on material plasticity and is supervised by Professor Paul Munroe. Beyond the rigours of his PhD project, Michael has generated a large number of excellent papers on ballistics and stress distributions in cold sprayed metals.

Xuan (Heidi) Cheng, a postgrad student supervised by Professor Nagarajan Valanoor, recently attended the 2015 Microscience Microscopy Congress held in Manchester, United Kingdom. Her poster, entitled "A Transmission Electron Microscopy Study of Interface-driven Resistive Switching in Epitaxial NiO Nanocrystals", was awarded first prize in the Poster Competition.



Aarthi Sridhar has been awarded the "Undergraduate Poster Prize for the Structural Materials Division" and overall undergraduate "Best in Show" poster prize at this year's TMS conference in Orlando. His poster was entitled "Microstructure, Phase Evolution and Properties of High Entropy Brasses and Bronzes" by Aarthi Sridhar, Cody Crosby, Kevin Laws and Lori Bassman.

Aarthi was one of a small group of students from Harvey Mudd College, California to visit UNSW for a 3-month practicum exchange program. During that time, he studied under the supervision of Dr Kevin Laws (MSE) and Dr Lori Bassman (HMC). Much of the work for his poster was performed in our School as part of this collaboration.



POSTGRADUATE DEGREE PROGRAMS

The School of Materials Science and Engineering has one of the largest and most active programs in postgraduate research in Australia. The School's staff normally lead UNSW in research grant success, journal publication rates, and postgraduate supervision/graduation rates.

Master of Materials Technology (Coursework)

The Master of Materials Technology program consists of 2 years of full-time or equivalent study comprising coursework in materials processing, materials design, materials technology and materials industry management. It is designed for graduates wishing to acquire expertise in the design, selection, use and performance of modern materials. It also includes a component of experimental and/or design project work, and an original research project is also undertaken in a chosen area.

Materials Science and Engineering – Master of Science (Research)

A Master by Research degree requires completion of an original piece of research, more limited in scope and nature than that required for a PhD. Candidates develop mastery of appropriate methodology and they present their findings in the wider context of their discipline.

There is the opportunity for graduates of the Master of Engineering program to progress to PhD study.

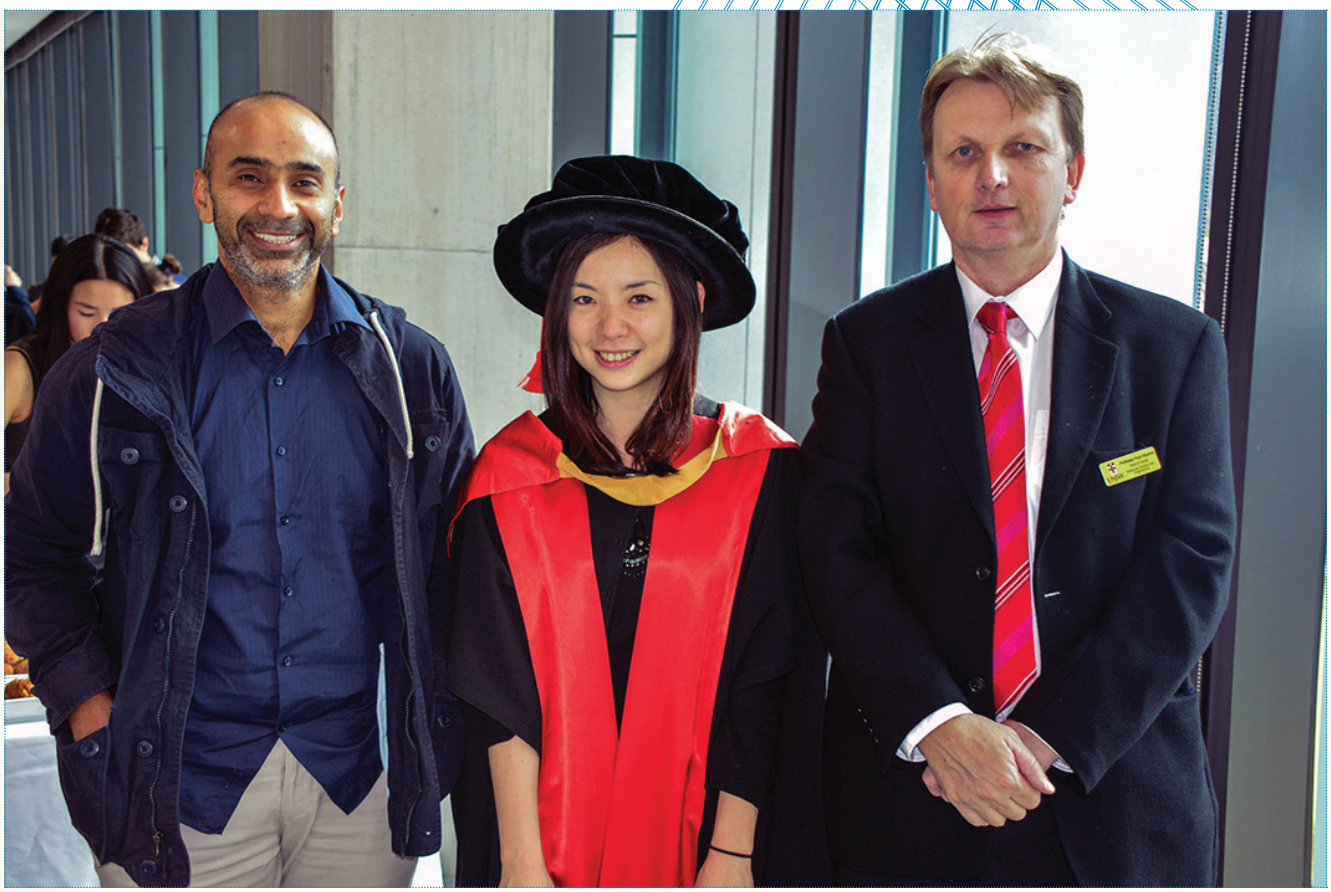
Materials Science and Engineering – PhD

A PhD degree requires completion of a piece of research that demands a significant and original contribution to knowledge in the field of study. Candidates acquire advanced specialist research training and produce a thesis that summarises the research and provides evidence of independent thought and critical analysis, effective communication and expert knowledge of the discipline in the international context.

Materials Science and Engineering – Master of Philosophy (Research)

The M.Phil degree involves a minimum of 1.5 years full time study during which students undertake supervised research leading to the production of a thesis. The program is designed to provide an alternative to the honours program for students who have previously completed a BSc and wish to proceed to a research degree.

There is the opportunity for graduates of the Master of Engineering program to progress to PhD study.



PROGRAM	MODE	UNSW PROGRAM CODE	LENGTH OF STUDY	MINIMUM UNITS OF CREDIT
Materials Technology - Masters Degree (Coursework)	Campus, Online, Directed Research, Independent Research	8717	2 years full-time	96
Materials Science Engineering - Masters Degree (Research)	Directed Research, Independent Research	2055	2 years full-time	96
Master of Philosophy (Research)	Directed Research, Independent Research	2475	1.5 Years full-time	72
Materials Science and Engineering - PhD	Directed Research, Independent Research	1045	3-4 years full-time	144

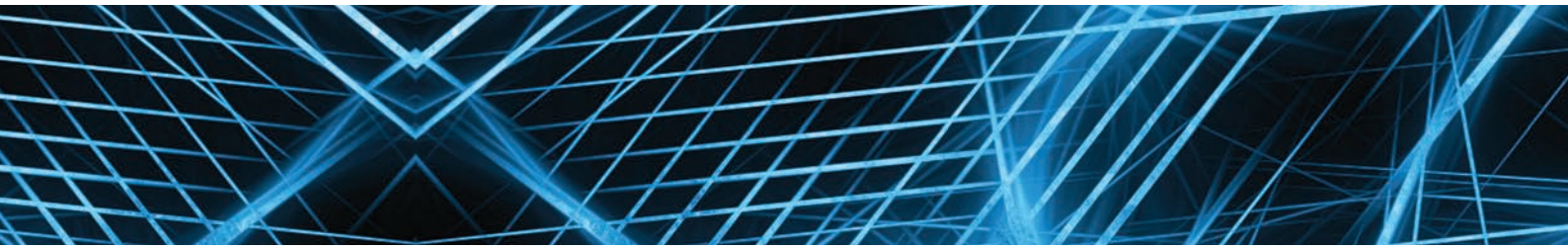
2015 POSTGRADUATE STUDENTS PROJECTS

LAST NAME	FIRST NAME	RESEARCH TOPIC	SUPERVISOR 1	SUPERVISOR 2
Adabifiroozjaei	Esmaeil	High-temperature reactions during wetting of Hexacelsian	C. Sorrell	"P. Koshy (joint) & O. Standard (co)"
Al-Elyani	Mansour Mohammad	Environmental induced cracking in dissimilar metals welding.	S. Chan	A. Crosky
Alanazi	Faisal Hamoud	Cathodic Protection	S. Chan	A. Crosky
Albarakati	Sultan Yasseen	Photocatalytic titania	C. Sorrell	P. Koshy
Alsubaie	Abdullah Saad	Complex oxide materials research	J. Seidel	N. Valanoor
Baca Triveno	Geraldine	Fabrication of $SrTiO_3$ nanostructures for thermoelectric applications	S. Li	D. Chu
Bandyopadhyay	Rakhi	Effect of coal properties on scaffold formation in rotary kilns.	V. Sahajwalla	S. Gupta
Bao	Boyang	Novel effects on the fracture strength of poly-crystalline silicon wafers	T. Vodenitcharova	M. Hoffman
Biletska	Olga	Bulk metallic glasses for ballistic/armour applications.	M. Ferry	K. Laws
Buchy	Manuel Pierre Claude	Natural fibre composites	A. Crosky	
Cao	Fuyang	Microstructure of hard nitride coatings	P. Munroe	N. Valanoor
Cao	Qinghua	Thermoelectrics: Fundamental understanding of electric-field-induced strain mechanisms in Barium Titanate	J. Daniels	N. Valanoor
Cao	Yi	Processing and properties of Al-based metallic glasses	M. Ferry	K. Laws
Cayumil Montecino	Romina Roxan	Plastic and metal recovery from E-waste	V. Sahajwalla	R. Khanna
Chen	Biao	Materials science	S. Li	R. Tian
Chen	Chuyang	Particulate Processing	A. Yu	X. Jiang
Chen	Hsin	Photocatalytic Titania	C. Sorrell	A. Nakaruk
Chen	Jie	Energy materials	S. Li	D. Wang
Chen	Lu	Bismuth based lead-free ferroelectric ceramics for photovoltaic applications	D. Wang	S. Li
Chen	Wen-Fan	Photocatalytic titania	C. Sorrell	P. Koshy
Chen	Yen-Hao	Intergranular corrosion of AA5083 Al-Mg alloy	S. Chan	J. Zhang
Chen	Yu	Work-hardening with nanocrystal in metallic glasses	M. Ferry	C. Tang
Cheng	Xuan	Defect phenomena in epitaxial oxide heterostructures	N. Valanoor	P. Munroe
Cheung	Jeffrey	Metal oxide nanostructures: Interface effects of oxide nanocrystals	N. Valanoor	K. Ostrikov
Cheung	Keng Ho (Kenny)	X-ray activated photocatalytic coating implant	C. Sorrell	P. Koshy
Cholake	Sagar Thakraj	Composites in infrastructure engineering	S. Bandyopadhyay	Yun Bai
Citrawati	Fatayalkadri (Taya)	Selective growth mechanism of goss grains in a grain oriented silicon steel	P. Munroe	M. Ferry
Conway	Patrick Lars Joseph	Bulk metallic glasses	M. Ferry	K. Laws
Cui	Yongli	Carbonylation of Nickel, Cobalt and Iron.	O. Ostrovski	Guangqing Zhang
Deng	Junjiao	Synthesis, characterisation and application of graphene-metal composites and graphene oxide membranes	"V. Sahajwalla R. Joshi"	
Ding	Rui	Interface Engineering	D. Wang	S. Li
Du	Haiwei	Functional materials	D. Chu	S. Li
Duan	Jiaqi	Microstructure and thermal stability of metals processed by accumulative roll bonding	M. Ferry	"K. Laws (joint) & P. Munroe (co)"
Elias	Elias Nasser	Stress corrosion cracking of rock bolts.	A. Crosky	S. Chan
Emami Khansari	Sayedeh	Phase Change Memory (PCM) alloys	M. Hoffman	M. Ferry
Esfandiary	Amir Hossein	Multiphase flow modelling	A. Yu	K. Dong & Andrew Vince
Fan	Xukun	Particle flow simulations	R. Yang	R. Zou
Faraji Ouch Hesar	Nastaran	The electronic properties of Au-ZnO core-shell nanoparticles	J. Seidel	J. Daniels
Farzana	Rifat	Recycling waste plastics in EAF steelmaking	V. Sahajwalla	Ravindra Rajarao
Ganly	Brianna	The effect of grain size on the x-ray fluorescence response of light elements and transition metals	V. Sahajwalla	J. Daniels
Ghasemi Ardi	Ebrahim	Modelling of the wetting of powders	R. Yang	A. Yu
Ghasemian	Mohammadbagher	Energy harvesting based on lead - free piezoelectric nanofibres	D. Wang	S. Li

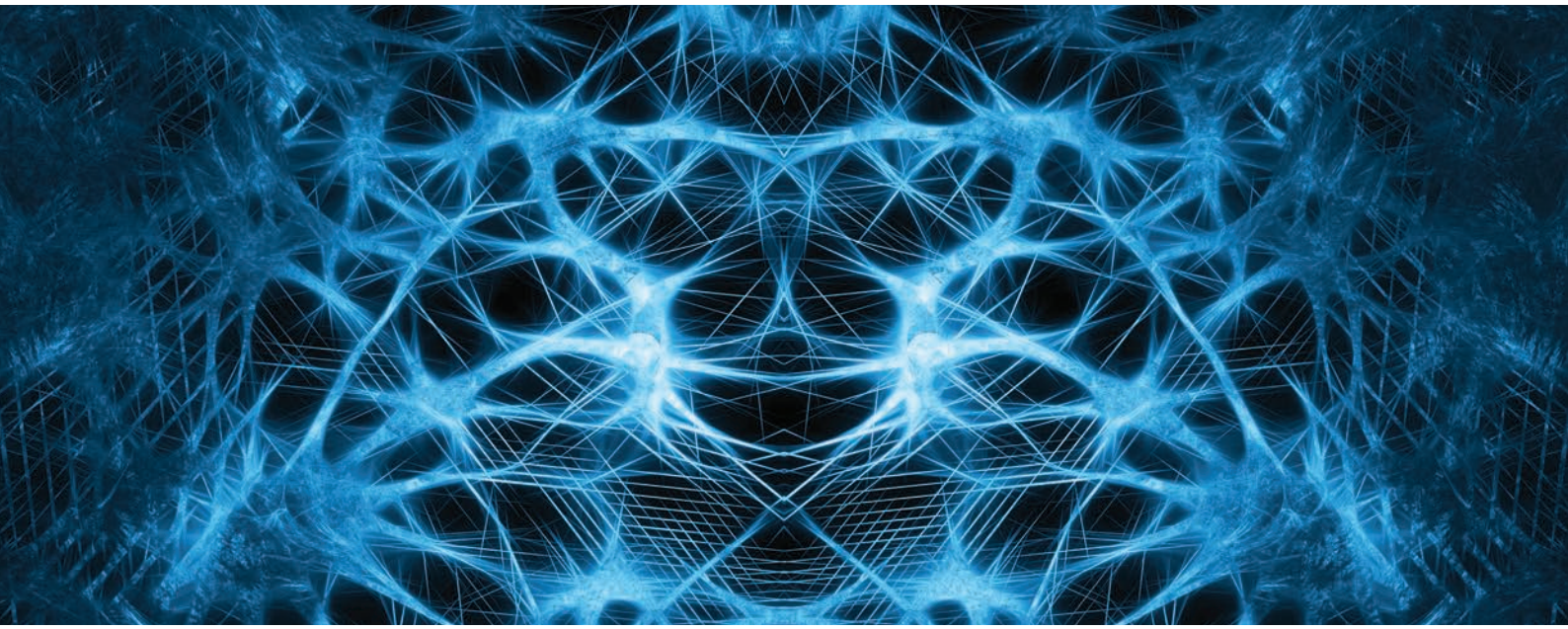
LAST NAME	FIRST NAME	RESEARCH TOPIC	SUPERVISOR 1	SUPERVISOR 2
Ghodrat	Maryam	Mulitphase flow modelling in coal preparation	A. Yu	Andrew Vince
Gleason	Scott Alan	Metallic Glasses for Biomedical Applications	M. Ferry	K. Laws
Goda	Rahul Kumar	Synthesis and properties of hybrid composites for sustainable use	V. Sahajwalla	R. Rajarao
Guan	Peizhe	Computational investigation of dry powder dispersion	R. Yang	A. Yu
Guo	Rui	Thermoelectric materials	S. Li	Dr Daniel Gregg
Gurnasinghani	Jagrati	Electrocaloric effect in ferroelectric materials	D. Wang	S. Li
Hamilton	Nicholas Edward	MD simulations of bulk metallic glasses.	M. Ferry	J. Daniels
Hang	Tian (Annalise)	Partial discharge in piezoelectric ceramics	J. Glaum	M. Hoffman
He	Yi	Compaction of Iron Ore fine particles	R. Yang	A. Yu
Healy	Caitlin Marie	Processing and properties of high entropy alloys.	M. Ferry	K. Laws
Heo	Yooun	Optoelectric oxides	J. Seidel	N. Valanoor
Ho	Chun Hung Samuel	Photocatalytic Titania	"C. Sorrell & J. Hart"	Pramod Koshy
Hossain	Mohammad Jahangir	Mechanism of electro-mechanical coupling in polycrystalline lead-free piezoelectric ceramic materials	J. Daniels	O. Standard
Hosseini Kouh Kamari	Mahsa	Numerical investigation of particle flow in rotating drum and its applications in grinding	R. Yang	A. Yu
Htoo	Thwin	Spintronics	S. Li	J. Yi
Hu	Hailong	Investigation of interfacial properties in the $LaA_1O_3/SrTiO_3$ heterostructures	S. Li	D. Wang
Hu	Songbai	Strain-tuned phase transitions in strontum cobaltates thin films	J. Seidel	"O. Standard (co) & N. Valanoor (co)"
Huang	Hsin-Hui (Sonia)	Microstructural analysis of thin films	P. Munroe	N. Valanoor
Huang	Shihao	Superhydrophobic coatings of surfaces for composites	S. Bandyopadhyay	J. Hart
Ibraheem	Shahad	Fibre composites using epoxy & fly ash & CNT	S. Bandyopadhyay	D. Wang
Jahangir	Solmaz	Metallic thin films	N. Valanoor	M. Ferry
Jiang	Peng	Cable bolt failure in underground mines	A. Crosky	Serkan Saydam
Jiang	Yifeng	Thermal Storage Materials	S. Li	D. Chu & Dr. Yanping Sun
Johnstone	Mehrnoosh	Flotation flow	R. Zou	A. Yu
Jullian Fabres	Domingo	High temperature corrosion	J. Zhang	D. Young
Kabir	Imrana Iftekhar	Dopant effects on photocatalytic titania	C. Sorrell	S. Bandyopadhyay
Kabir	Md. Rezaul	Thermoelectric Materials.	S. Li	D. Chu
Kabir	Mohammad Sharear	Microstructural property relationships in advanced nitride coating	P. Munroe	Sammy Chan
Kaneti	Yusuf Valentino	Recycling polymers in auto shredder residue.	X. Jiang	A. Yu
Kapelyushin	Yury	Use of magnetite ore in FINEX process	O. Ostrovski	J. Zhang
Khansur	Neamul Hayet	Actuation mechanisms in novel lead-free electro-mechanical materials	J. Daniels	M. Hoffman
Ko	Kwang Hyun	Recycling agricultural wastes and plastics for aluminium process	V. Sahajwalla	Aditya Rawal (co) & Gangadhara Prutsy (co)
Kurnia	Fran	Multilayer semiconductor thin films as highly efficient water splitting photocatalysts	J. Hart	N. Valanoor
La Robina	Michael	Development of novel high temperature materials	M. Ferry	C. Sorrell
Lashgari	Hamid Reza	Thermoelectrics	S. Li	D. Chu
Lazo	Neil Israel	Design of low-density metal structures	M. Hoffman	M. Ferry
Leong	Mandy	Thermoelectric Materials.	S. Li	D. Chu
Li	Ann	Diamond-like coatings	P. Munroe	M. Hoffman
Li	Chenliang	Compaction of particles.	R. Yang	A. Yu
Li	Mengyao	Diluted magnetic semiconductors with high anisotropy	J. Yi	S. Li
Li	Mingyu	Highly dense (K, Na)NbO_3 ceramics sintered by SPS	D. Wang	D. Chu
Li	Xianchao	Microstructural development of new twinning induced plasticity steels	M. Ferry	Sammy Chan

LAST NAME	FIRST NAME	RESEARCH TOPIC	SUPERVISOR 1	SUPERVISOR 2
Li	Xiang	Graphene materials	S. Li	Zhimin Ao
Li	Xiang	Packing of particles	R. Yang	A. Yu
Li	Yi	Functional nanomaterials	X. Jiang	A. Yu
Lin	Christine Yi Wen	Titania coatings	C. Sorrell	O. Standard
Lin	Qianru	Lead free piezoelectric thin films	D. Wang	S. Li
Lin	Xi	Nanocapacitor	D. Chu	S. Li
Liu	Chunyang	Magnetisation of antiferromagnetic nanostructures	J. Yi	S. Li
Liu	Guangqing	Multilayer ferroelectrics	N. Valanoor	J. Seidel
Liu	Lisha	Scintillation materials.	J. Daniels	D. Wang
Liu	Peiyao	Investigation of innovative sustainable low - carbon products for built environment	V. Sahajwalla	R. Rajarao
Liu	Vivian	Electrochemical characterisation of facted Manganese Oxide nanostructure	N. Valanoor	C. Sorrell
Liu	Zhao	Photocatalytic titania	C. Sorrell	Owen Standard
Luo	Xi	Thermoelectric Materials	J. Yi	"Rodica Ramer & T Zhang"
Mada	Mykanth	Nanocomposite materials for clean energy	S. Bandyopadhyay	C. Sorrell
Mansuri	Irshad Ahmed	Transforming Industrial Waste into Carbons for Fe-C Alloys	V. Sahajwalla & R. Khanna	
Mantri	Sukriti	Engineering collective domain dynamics in bulk piezoelectrics	J. Daniels	N. Valanoor
Maran	Ronald	Lead-free piezoelectric thin films	N. Valanoor	P. Munroe
Marlton	Fred	Composite electro-ceramics	J. Daniels	O. Standard
Maroufi	Samane	Kinetic modelling.	O. Ostrovski	J. Zhang
Mayyas	Mohannad Aref Jadallah	Investigation of innovate sustainable low - carbon products for built environment	V. Sahajwalla	Rita Khanna
McGuiness	Blane Patrick	Study on the cathodic protection of steel in concrete	S. Chan	Jianqiang Zhang
Meng	Fanyu	Effect of coal blending on carbonization phenomona and coke strength/ reactivity.	V. Sahajwalla	S. Gupta
Miao	Zhen	Particle-fluid flow	Z. Zhou	A. Yu
Miskovic	David Mathias	Bulk metallic glasses	M. Ferry	K. Laws
Moorthy	Alagu Anbanantha	TBC	S. Bandyopadhyay	"D. Wang (co) & J. Daniels (co)"
Mu	Guangjun	Powder metallurgy of metal matrix composites	S. Chan	A. Crosky
Mukkavilli	Akhila	Composite materials	A. Crosky	Garth Pearce (joint) & S. Bandyo (co)
Musavi Gharavi	Paria Sadat	Investigating defects in oxides using TEM	N. Valanoor	P. Munroe
Najafzadeh	Niloofar	Microstructural analysis of roll bonded aluminium	P. Munroe	Md Quadir
Nguyen	Duong Dinh	Effects of cellulose ether and polyvinyl alcohol on hydration and rheology of cementitious tile adhesives	C. Sorrell	P. Koshy
O'Hara	Toby	Metal recovery from e - waste	V. Sahajwalla	Rita Khanna
Pace	Benjamin Joseph	Advanced biochar composites for agricultural applications	P. Munroe	Torsten Thomas
Park	Kwanwuk (Ryan)	Top gas recycling in blast furnace	V. Sahajwalla	S. Gupta
Parrington	Anthony James	Building materials cycle.	C. Sorrell	O. Standard
Pengiran Haji	Norazimah	Remote area power supply system.	S. Chan	
Piao	Jingyuan Jingyuan	Magnetic and electrical properties of magnetic element doped ZnO nanowires	J. Yi	S. Li
Prillieux	Aurelien Francois Ge	High-temperature alloy-gas reactions	D. Young	J. Zhang
Qi	Shaohua	Photocatalysis	C. Sorrell	O. Standard

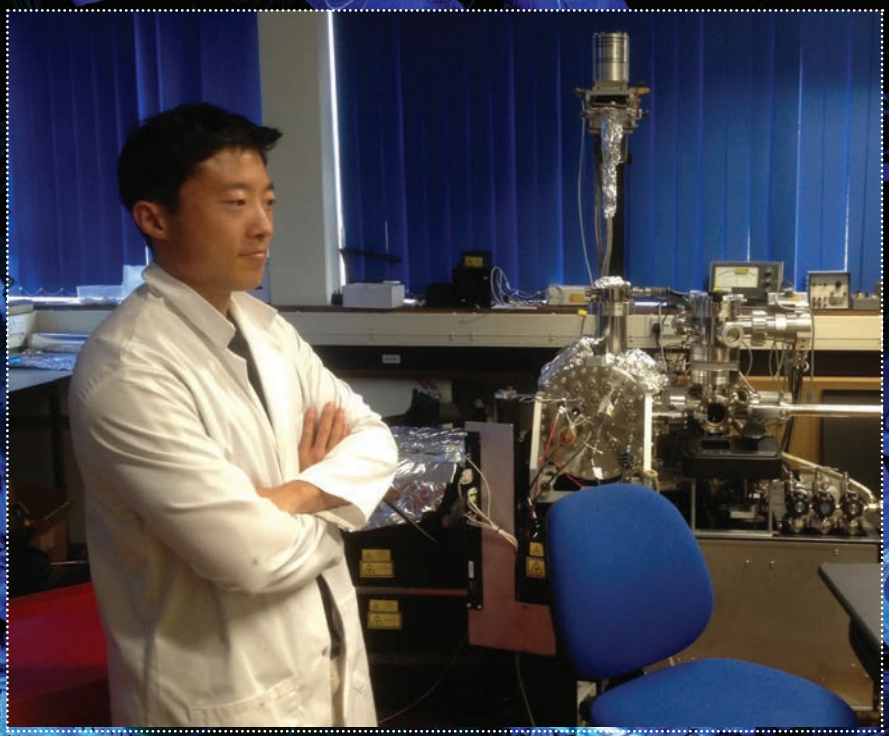
LAST NAME	FIRST NAME	RESEARCH TOPIC	SUPERVISOR 1	SUPERVISOR 2
Qi	Zhenjun	Nanomaterials	S. Li	D. Chu
Qian	Ze	Soft magnetic materials	S. Li	D. Chu
Qu	Bo	Development of WO_3 based ionic conductors for artificial synapse	D. Chu	D. Wang
Rajagopal	Raghu Raman	Recycling polymer wastes in materials processing.	V. Sahajwalla	R. Rajarao
Ramesh	Vidya	Ferroelectric thin film	N. Valanoor	P. Munroe
Reddy	Cyndhia	Composite materials.	A. Crosky	S. Bandyopadhyay
Ren	Hangjuan	Photocatalytic properties of semiconductors	P. Koshy	C. Zhao
Saleh	Michael	Multi-scale analysis of radiation damage in structural materials for GEN IV nuclear reactors	P. Munroe	J. Daniels & Lyndon Edwards
Shahbazi	Sorour	Bioapplication of iron oxide nanoparticles	S. Li	Jia-Lin Yang
Shahmiri	Reza	Optical properties zirconia ceramics for aesthetic dental restoration	O. Standard	"Judy Hart & Chris Sorrell"
Shen	Fenglei	Influence of processing conditions and coal properties on coke.	Sushil Gupta	V. Sahajwalla
Shokri	Ali	Recycling of Electronic Waste towards Material Recovery	V. Sahajwalla	R. Khanna
Soatthiyanon	Niphaphun	Natural fibre composites.	A. Crosky	S. Bandyopadhyay
Suhandi	Andi	Thermoelectrics	S. Li	D. Wang
Taherymoosavi	Sarasadat	Analysis of Biochar based organo-mineral fertilizer	P. Munroe	Torsten Thomas
Tang	Hui Xiang (Lance)	Ductile magnesium-lithium alloys	M. Ferry	J. Daniels
Tian	Xiangyang	Energy materials	S. Li	D. Wang
Toppler	Karl Jeno	Failure analysis.	A. Crosky	
Torii	Michael	FEM of bone	M. Hoffman	T. Vodenitcharova
Tseng	Allen	Thermoelectric materials	S. Li	D. Wang
Tseng	Li-Ting (Lily)	Electric field effect of magnetic semiconductor films	J. Yi & S. Li	
Tseng	Yu-Sheng	Hydrogen storage alloys for remote area power supply	S. Chan	R. Yang
Tung	Patrick	Active disorder	J. Daniels	N. Valanoor
Ukritnukun	Supphatuch	Geopolymers	C. Sorrell	"P. Koshy (joint) & Arnaud Castel (co)"
Vo	Nguyen Nam Viet	Composites	A. Crosky	S. Bandyopadhyay
Wang	Amanda Yuong Xiang	Microstructural analysis of thermal spray coatings.	P. Munroe	S. Chan
Wang	Jishou	Nanoelectronic materials	S. Li	Adnan Younis
Wang	Lijun	Bio Electro Mechanics	J. Daniels	O. Standard
Wang	Lin	Fluorine-free mould flux for steel continuous casting	J. Zhang	"D. Young (co) & O. Ostrovski (co)"
Wang	Szu Ying (Cindy)	Processing and Properties of Mortars.	C. Sorrell	"P. Koshy (joint) & O. Standard (co)"
Wang	Wenxuan	Thermoelectric materials.	S. Li	Dewei Chu
Wang	Yiren	Spincaloritronics based on oxide magnetic semiconductors	J. Yi	S. Li
Wang	Zi	Compaction of iron ore fines	R. Yang	A. Yu
Wei	Tung-Ying (Alex)	Hydrogen storage of Buckypaper	S. Chan	R. Yang
Wu	Weichang	Graphene.	S. Li	D. Wang
Wu	Yun-Qi (Beryl)	Ceramic Wear Mechanism of Dental Enamel	M. Hoffman	O. Standard
Xie	Yun	High temperature corrosion	J. Zhang	D. Young
Xie	Zhengmao	Fracture strength of polycrystalline silicon wafers under thermal loading conditions	T. Vodenitcharova	M. Hoffman
Xiong	Shixian	Functional Nanoparticles	R. Zou	A. Yu
Xiong	Xinrun	Thermoelectric materials	S. Li	D. Chu
Xu	Song	Nitride hard thin films	P. Munroe	S. Chan
Xu	Zhemi	Transparent Thin Film Devices Printed with p-type Quantum Dots	S. Li	D. Chu



LAST NAME	FIRST NAME	RESEARCH TOPIC	SUPERVISOR 1	SUPERVISOR 2
Yan	Mengzhen	Effect of Implants on Bone.	M. Hoffman	William Walsh (joint) & Nicky Bertollo (co)
Yan	Qiyu	Packing of non-spherical particles	R. Yang	A. Yu
Yang	Jian	Fluoride-free mould flux for steel continuous casting	J. Zhang	O. Ostrovski
Yang	Jian	Growth of cobalt oxide thin films by oxide molecular beam epitaxy	S. Li	J. Yi
Yao	Yin	Stress corrosion cracking of aluminium-based composites.	S. Chan	O. Standard
Yap	Emily Wern Jien	Development of a novel compact x-ray source	J. Daniels	J. Seidel, R. Preston, J. Tickner
Yin	Songyan	Pre - Nitriding Carburizing the steel - effect of time, temperature and atmosphere	V. Sahajwalla	Gangadhara Prusty & Farshid Pahlevani
You	Yi	Study of surface interaction and transport through graphene-based structure and developing graphene supercomposites	"V. Sahajwalla R. Joshi"	
Young	Thomas	Ferroelectric Thin Film Epitaxy	N. Valanoor	J. Seidel
Yu	Chun	Oxidation and carburisation of steel in CO_2 gas atmosphere	J. Zhang	D. Young
Yu	Le	Carbothermal reduction of quartz in the N_2-H_2 gas atmosphere	O. Ostrovski	
Zaidi	Syed Zain Ali	Biodegradable composites	A. Crosky	John Foster
Zhang	Huiming	Modelling of ironmaking process	R. Zou	A. Yu (co) & R. Yang (co)
Zhang	Ji	Inert Matrix Fuel	S. Li	Dr Daniel Gregg
Zhang	Lepeng	Thin film technology	S. Li	TT Tan
Zhang	Li	Thermoelectrics	S. Li	TT Tan
Zhang	Yichi	Lead-free piezoelectrics	J. Glaum	M. Hoffman
Zhang	Yu	Modelling of liquid - solid flow.	R. Yang	S. Chan
Zhou	Dongyi	Magnetoelectric properties of epitaxial spinel oxide thin films	N. Valanoor	J. Daniels
Zhou	Yanyu (Maggie)	Microstructural analysis of multiferroic thin films	P. Munroe	N. Valanoor
Zhou	Yingze	Electrocaloric materials	D. Wang	S. Li
Zhu	Beibei	Synthesis, structures and properties of Indium(In)-based Oxide Thermoelectric Materials	S. Li	D. Chu



PROFILE: ALAN XU

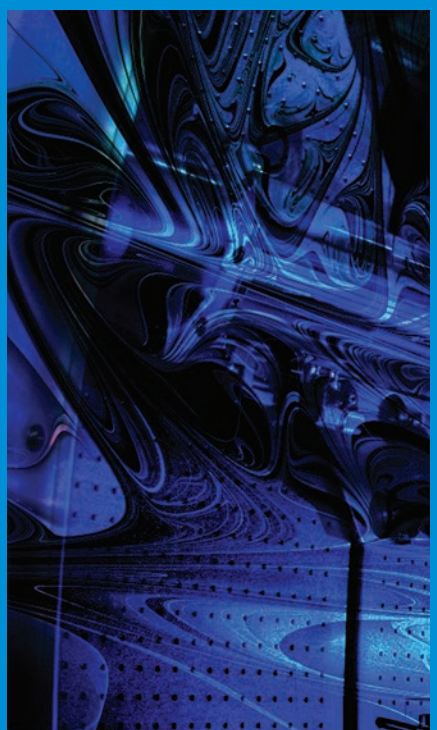


3135 Bachelor of Materials Science and Engineering (Physical Metallurgy)
Graduated with First Class Honours 2010
Awarded the University Medal
WAM 87.85

When I graduated from UNSW I started at ANSTO as a materials graduate. Six months into my graduate program I received a UK government funded scholarship to research tungsten and tungsten alloys for diverter components within future fusion reactors such as ITER. I completed my PhD at Oxford University in 2015.

I returned to ANSTO upon graduation from Oxford and am currently still in the field of researching effect of radiation damage on materials. The type of materials I work on now is much broader and they include materials currently used and being field tested for Fusion as well as Generation IV reactors: Nickel, Zirconium and Tungsten etc.

In my current role, I am collaborating with people both nationally and internationally and I hope to develop a strong connection with UNSW in the future as well.



MSE PGSOC IN 2015

The Materials Postgraduate Society (MSE PGSOC) is a community for postgraduate students of the school. The society endeavoured to ensure 2015 was a fun and productive year through various social and development activities. Below were some of our highlights:

BIGGEST MORNING TEA AND BAKING COMPETITION

In May 2015, PGSOC held the Cancer Council's Biggest Morning Tea and Baking Competition to raise money for cancer research. Students and staff participated in the baking competition proving that members of the school aren't just talented in science laboratories!

POSTER COMPETITION 2015

In August 2015, PGSOC held a Postgraduate Poster Competition, where students were able to show off their research and practice their presentation skills. Judges were from various streams of Materials Engineering in industry and also academic staff in the School.

PEER MENTORING INITIATIVE

In 2015, PGSOC implemented a peer mentoring program for new students in the school. Students were issued with personalised USBs which contained a specially made Welcome Package. The package details aspects of the school on both the academic and social fronts, including notes about the culture of the school and various activities in and around UNSW and Sydney. Students who received these found them very useful for settling in to their postgraduate life.

PGSOC 2015 CHRISTMAS PARTY

The 2015 Comic-Book themed Christmas Party was a great way to cap off a busy year. There was plenty of food, drinks, a best dressed competition and giant games. It was an enjoyable way for students and staff to get together, relax and celebrate the achievements of the year.

Throughout the year, PGSOC also held smaller social gatherings such as Friday drinks, barbeques, art gallery visits and bowling nights, to ensure students have ample time to relax and socialise with their peers.


MERRY XMAS


ART GALLERY OF NEW SOUTH WALES

PGSOC POSTER COMPETITION

The Materials Postgraduate Student Society (PGSOC) held their annual poster competition in September 2015. This annual event is an opportunity for current postgraduate students to practise and enhance their communication and presentation skills.

The overall quality of this year's posters was excellent. The four judges, representing the School and our Industry Partners, were impressed by the high calibre of the competition entries, eventually choosing the following worthy winners:

1st Prize - **Sultan Albarakati** (supervisors: Chris Sorrell and Pramod Koshy)

2nd Prize - **Zhao (Kevin) Liu** (supervisors: Chris Sorrell and Pramod Koshy)

3rd Prize - **Amanda Wang** (supervisor: Paul Munroe)

Our thanks go to this year's judges for their time and commitment to the School:

Taka Numata from Brickworks

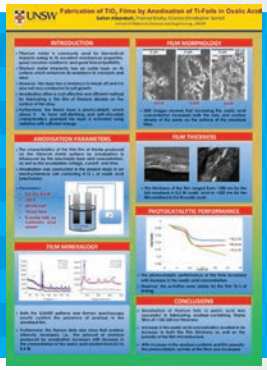
Michael Drew from ANSTO

George Melhem from Perfect Engineering

Sophie Primig, Lecturer at UNSW Materials Science and Engineering

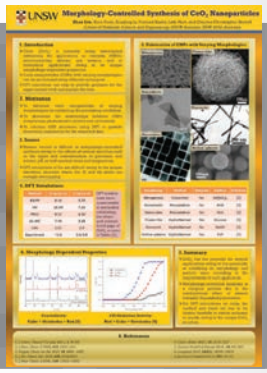
1

SULTAN ALBARAKATI



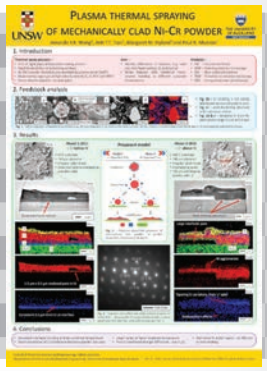
2

ZHAO (KEVIN) LIU

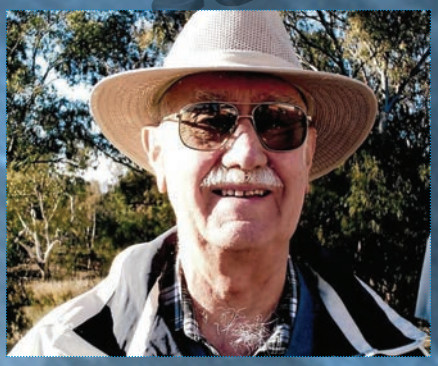


3

AMANDA WANG



PROFILE: DR JOHN MCLENNAN



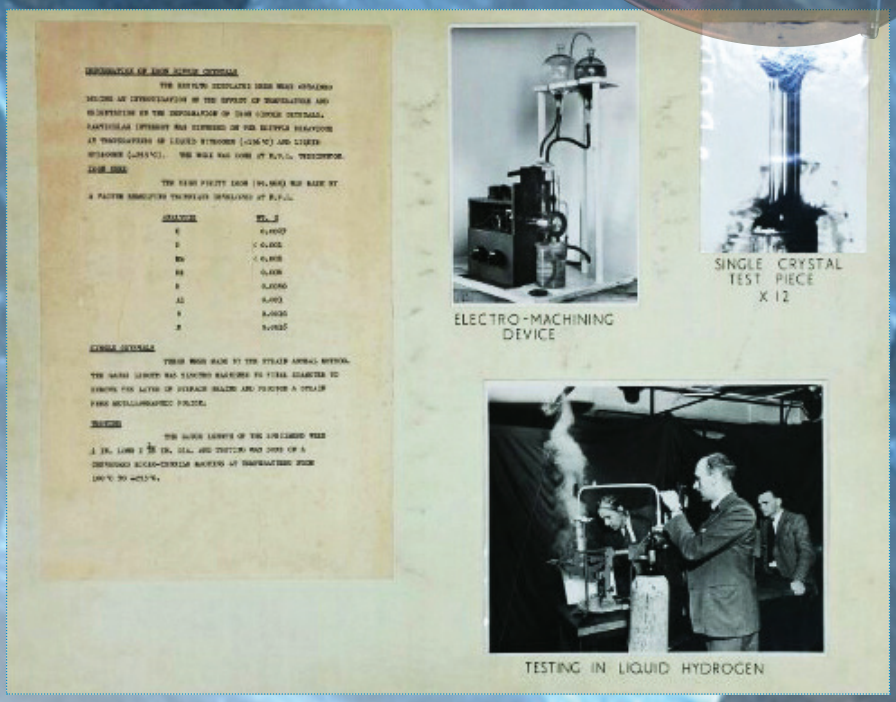
Earlier this year Dr John McLennan contacted the School offering to donate some of his research work for the School's archives. John completed his Master of Science in the School of Metallurgy (now Materials Science and Engineering) at UNSW in 1964.

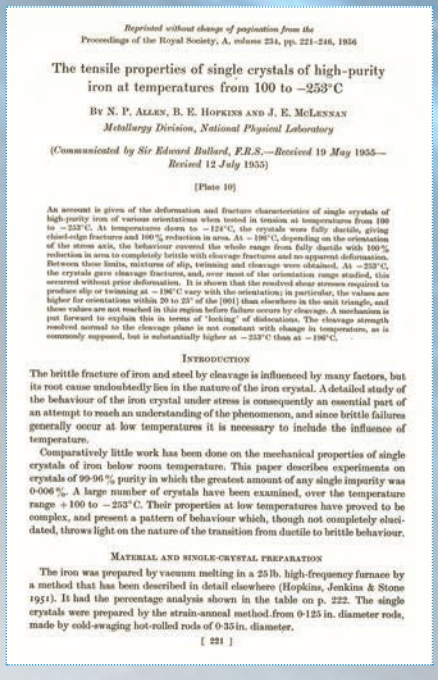
John was a member of the team from the Metallurgy Division of the National Physical Laboratories in London, charged with determining what caused the catastrophic failure of the American warships crossing the North Atlantic in the winters of World War II. He has provided the school with the posters developed for the team's presentation on their findings, along with several original copies of the paper:

"The tensile properties of single crystals of high-purity iron at temperatures from 100 to -253°C", by N.P. Allen, B.E. Hopkins and J.E. McLennan, Proceedings of the Royal Society, A, volume 234, pp. 221-246, 1956.

It is rare that such a significant piece of history just drops in your lap and we are extremely grateful to Dr McLennan for donating these documents to the School. The poster triptych has now been framed and is proudly displayed in the School.

Following is Dr John McLennan's story.





Reprinted without change of pagination from the
Proceedings of the Royal Society, A, *volume* 234, pp. 221–246, 1956

The tensile properties of single crystals of high-purity iron at temperatures from 100 to −253°C

By N. P. Allen, B. E. Hopkins and J. E. McLennan
Metallurgy Division, National Physical Laboratory

(*Communicated by Sir Edward Bullard, F.R.S.—Received* 19 *May* 1955—
Revised 12 *July* 1955)

[Plate 10]

An account is given of the deformation and fracture characteristics of single crystals of high-purity iron of various orientations when tested in tension at temperatures from 100 to −253°C. At temperatures down to −124°C, the crystals were fully ductile, giving chisel-edge fractures and 100 % reduction in area. At −196°C, depending on the orientation of the stress axis, the behaviour covered the whole range from fully ductile with 100 % reduction in area to completely brittle with cleavage fractures and no apparent deformation. Between these limits, mixtures of slip, twinning and cleavage were obtained. At −253°C, the crystals gave cleavage fractures, and, over most of the orientation range studied, this occurred without prior deformation. It is shown that the resolved shear stresses required to produce slip or twinning at −196°C vary with the orientation; in particular, the values are higher for orientations within 20 to 25° of the [001] than elsewhere in the unit triangle, and these values are not reached in this region before failure occurs by cleavage. A mechanism is put forward to explain this in terms of "locking" of dislocations. The cleavage strength resolved normal to the cleavage plane is not constant with change in temperature, as is commonly supposed, but is substantially higher at −253°C than at −196°C.

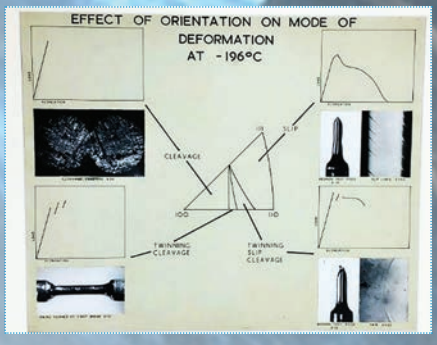
Introduction

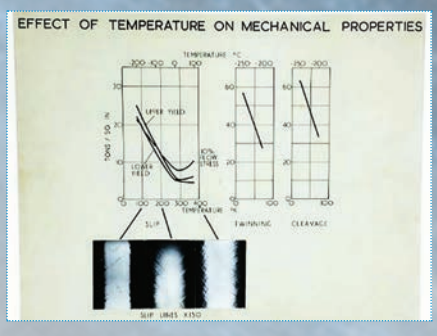
The brittle fracture of iron and steel by cleavage is influenced by many factors, but its root cause undoubtedly lies in the nature of the iron crystal. A detailed study of the behaviour of the iron crystal under stress is consequently an essential part of an attempt to reach an understanding of the phenomenon, and since brittle failures generally occur at low temperatures it is necessary to include the influence of temperature.

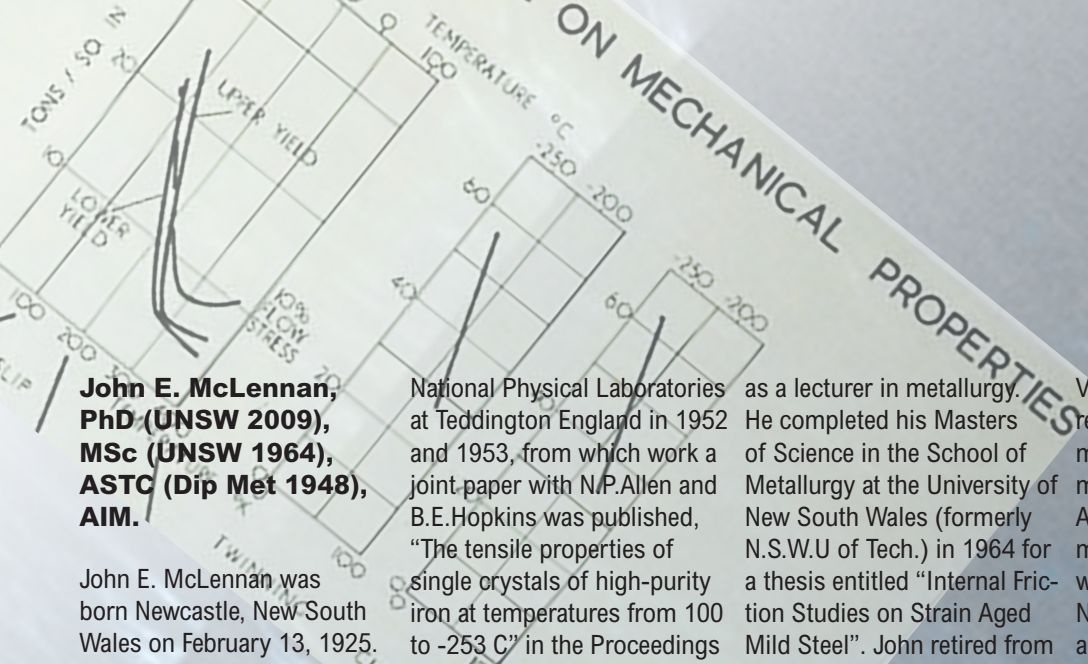
Comparatively little work has been done on the mechanical properties of single crystals of iron below room temperature. This paper describes experiments on crystals of 99·96 % purity in which the greatest amount of any single impurity was 0·006 %. A large number of crystals have been examined, over the temperature range +100 to −253°C. Their properties at low temperatures have proved to be complex, and present a pattern of behaviour which, though not completely elucidated, throws light on the nature of the transition from ductile to brittle behaviour.

Material and single-crystal preparation

The iron was prepared by vacuum melting in a 25 lb. high-frequency furnace by a method that has been described in detail elsewhere (Hopkins, Jenkins & Stone 1951). It had the percentage analysis shown in the table on p. 222. The single crystals were prepared by the strain-anneal method from 0·125 in. diameter rods, made by cold-swaging hot-rolled rods of 0·35 in. diameter.







John E. McLennan, PhD (UNSW 2009), MSc (UNSW 1964), ASTC (Dip Met 1948), AIM.

John E. McLennan was born Newcastle, New South Wales on February 13, 1925. Educated at Cardiff Primary School 1933 to1936 and Newcastle Boys High School 1937 to 1941, he then attended Newcastle Technical College from 1942 to 1947 gaining an Associate Diploma in Metallurgy (with Credit) in 1948. John was a postgraduate student at UNSW from 2001 to 2009 and awarded PhD 2009.

John was employed at John Lysaght (Newcastle) 1942 to 1951 as a trainee ,during which time he was engaged in general scientific work including armour plate production and transformer sheet research. He joined the Australian Department of Supply in 1952 and worked on the brittle fracture of mild steel at the National Physical Laboratories at Teddington England in 1952 and 1953, from which work a joint paper with N.P.Allen and B.E.Hopkins was published, "The tensile properties of single crystals of high-purity iron at temperatures from 100 to -253 C" in the Proceedings of the Royal Society, A, 234, pp. 231-246, 1956. He joined the Aeronautical Research Laboratories, Fisherman's Bend, Victoria in 1954.

John served in the Volunteer Defence Corp in 1945 as a Gunner on Park Battery (Newcastle) under Commanding Officer Lieutenant Arthur Coles.

He met Judith Ingham while attending the Newcastle Cathedral Fellowship. They were married on June 5, 1947 and had two sons, Iain born February 15, 1954 and Malcolm born June 2,1956.

In 1955 John joined the Newcastle College of the NSW University of Technology as a lecturer in metallurgy. He completed his Masters of Science in the School of Metallurgy at the University of New South Wales (formerly N.S.W.U of Tech.) in 1964 for a thesis entitled "Internal Friction Studies on Strain Aged Mild Steel". John retired from the University of Newcastle in 1985.

John was an Associate member of the Institution of Metallurgists from 1953 and a member of the Iron and Steel Institute and the Institute of Metals (London) from 1953. He was also a member of Australian Institute of Metals from 1947 and received the Meritorious Service Award in 1980.

He served on the H.S.C. Examination committee for Industrial Arts for the N.S.W. Education Department from 1975 to 1985.

John became a member of the Catgut Acoustical Society Inc. in 1975 and was appointed Vice President for 1984-89, representing the Australian membership. He became a member of the Australian Association of Musical Instrument Makers Inc. in 1982, where he held the positions of National Chairman 1988-89, and Journal Editor 1986- 90. He became a member of the Australian String Teacher's Association Inc. 1978. John attended and presented a paper at Tiverton 1987 and joined the British Violin Making Association in 1995.

John has been actively engaged in acoustical research and violin making since 1980, with his main areas of interest being the function of the soundpost, air modes, the function of the sealer and varnish, etc.

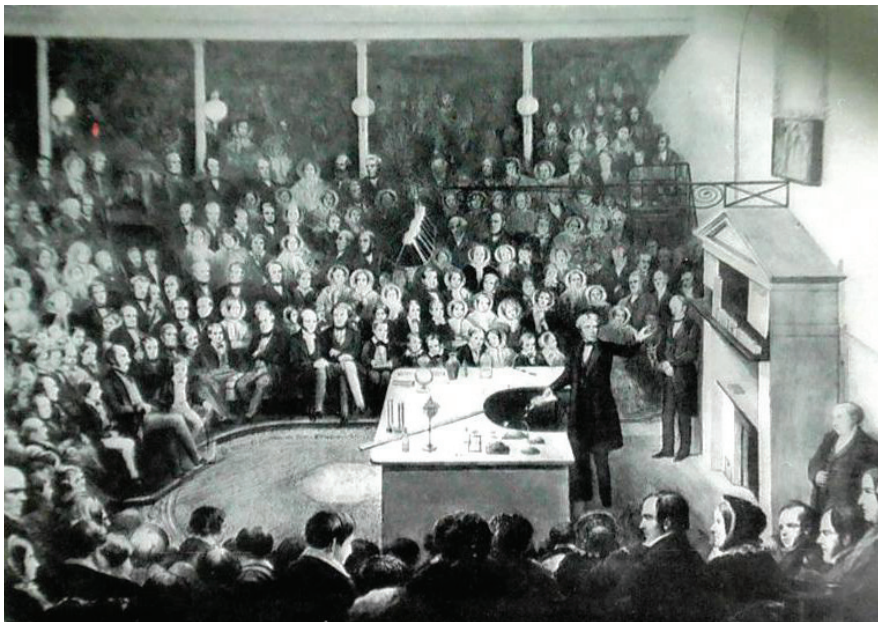
Webpage address for latest activity: www.phys.unsw.edu.au/music/people/mclennan.html

"John McLennan, Violin Maker"

John developed an interest in violins as early as 1948 when he commenced lessons, firstly with his uncle, then with Errol Collins, a violinist and musician well known in the Newcastle area.

John's interests in metallurgical materials engineering, as well as all things musical, led to a lifetime interest in violin making and acoustics. It was sparked in the 1970's when his ventures into violin repairs, restoration and bow making led to some work in acoustics, and culminated in 2009 with the completion of his Ph.D in Physics at UNSW, in which he researched the acoustical properties of the violin.

THE FRIDAY NIGHT DISCOURSE



By John E. McLennan, PhD (UNSW 2009), MSc (UNSW 1964), ASTC (Dip Met 1948), AIM.

April 2015

Dr N.P. Allen was the Director of the Metallurgy Division at National Physical Laboratories to which I was seconded for 2 years (1952-1953) by the, then, Department of Supply of the Commonwealth of Australia. I was given the task of determining the tensile properties of pure iron single crystals over a range of temperatures from 100°C to -196°C (we went to -253°C). I had to make the crystals, determine their orientation and test them in a small tensile machine.

My employment was not connected to any existing program of the Division of Metallurgy to which I was attached, but m y stay at NPL was most productive. The brittle fracture of mild steel at low temperatures was being studied due to the catastrophic failure of the early American Liberty ships, which fractured during the winter crossing of the North Atlantic in WWII. I worked completely alone but was given the run of the Division and all the assistance I required. The work that I did, unaided except for the assistance of a technician with the equipment that I was using, became the subject of a paper in the Proceedings of the Royal Society in 1956.

The 'Friday Night Discourse' (FND) was introduced by Michael Faraday in 1825 at the Royal Institution of Great Britain to enlighten the interested public about advances in scientific discovery. Many illustrious scientists have appeared like Sir Humphrey Davy. They have continued on to modern times.

The FND was a black tie affair with attendance by ticket to the small lecture theatre at the Royal Institution in Albermarle Street in London. This was the same lecture theatre that was originally used by Faraday, with tiered seating and a demonstration desk and clock on the wall above. The lecture was given under a strict protocol; the speaker walked through a door near the desk at precisely 8 pm gave the lecture and withdrew through the same door at precisely 9 pm. There were no questions or discussion. A technician was at hand to help with any practical demonstration.

Towards the end of 1953, Dr Allen gave a lecture at the FND on the Brittleness of Mild Steel and included mention of the work that I had done. I was asked to prepare a poster showing the results of my work for the occasion.

Being an all welded construction, at low temperatures a small crack in the microstructure at a location of high stress would be able to circumnavigate the hull allowing the ship to break in two. I was given the related project of determining the tensile properties of pure iron over a wide range of temperatures to well below room temperature. I was given the freedom of the Division to make small iron single crystals that could be tested on a French Chevenard machine that gave a photographic record of the test result. It was fitted out to allow tests to be done at dry ice and liquid nitrogen temperatures using a modified Dewar flask. The test pieces were made on a Swiss Lorch watchmakers lathe and threaded at each end. Single crystals were grown by the strain-anneal technique developed by L.G. Pheil in Sheffield. It was found that a layer of small grains formed on the surface of the small test piece. This was removed by electrochemical machining leaving a perfect metallographic finish. Orientation of the tensile axis was found using the Laue X-ray method. It was possible to determine the tensile behaviour down to temperatures of liquid hydrogen. The poster and the subsequent paper in the Proceedings of the Royal Society set out the results of this study.

Many thanks are due to the Director of the Division, Dr. N.P. Allen, who suggested the topic, my supervisor, B.E. Hopkins and the Australian Department of Supply at the time for the secondment. The paper was written after 1953 by B.E. Hopkins and the Laboratory notes are held in the Division at NPL.

STUDENT EXCHANGE TO ETH ZURICH

KARA POON

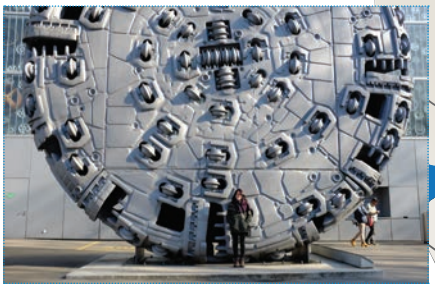
3138 MATS/BioMed
Exchange to ETH Zurich
January – July 2015

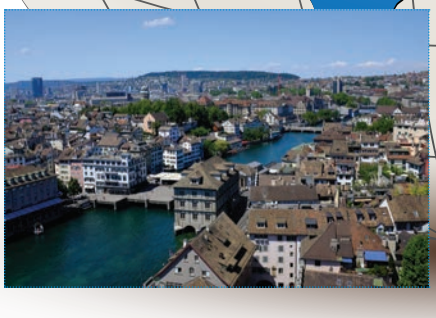
In January this year, I set off on my longest solo trip. For the next seven months, I'd be living away from home in lands where I couldn't speak the language and where my skills in charades would be put to the test. After travelling almost 24 hours, I arrived in Europe, ecstatic to start my exchange life. For the first few weeks, I travelled around different European cities such as Paris, London, Brussels and Venice. Then it was time to start my academic life in Zürich, Switzerland. When I arrived it was bitterly cold but absolutely beautiful. I've never seen so much snow in my life and the city was charming with its blanket of pure white snow.

Before my semester started, I took an intensive German class for exchange and Masters students. In this class I learned everything from "Ich heisse Kara und ich komme aus Australien" to "Ich liebe Schweizer Schokolade". I can't say that my German really improved all that much, but it was enough to help me to get around the country fairly easily.

I studied Materials Science and Biomedical Engineering courses at ETH Zurich for the semester. It is considered to be one of the top universities in Europe and alumni include people such as Albert Einstein and Wolfgang Pauli. To say I was daunted was an understatement, especially since I was arrived at the university during the exam period when all the students seemed hushed and focused in the hallways. ETH Zurich has two campuses that are vastly different. The main campus is in the heart of the city and its main sandstone building was erected in 1855 and looks impressive and grand. Its other campus is 20 minutes away and is modern with mostly concrete, steel and glass structures but equally impressive in its own way. I was initially overwhelmed by the fact that I was taking 6 subjects plus an additional German language class. Thankfully, the classes were all interesting and there was only one lecture per week for each class. In my MRI Imaging class, the university didn't seem satisfied to only teach us the theory behind the equipment. They allowed us to climb into the machine to get our brains scanned! In another class, I had the even more surreal experience of being allowed into a surgical theatre wearing scrubs and all, to observe spinal and elbow surgeries. During my semester, I also had the opportunity to visit EMPA – the Swiss Federal Laboratories for Materials Science and Technology as part of my corrosion science studies.

I also made friends with an incredible bunch of people from various countries such as the Netherlands, Germany, Sweden, Bulgaria, Austria, Finland, America, Singapore and of course, Switzerland. In our free time, we would travel to different areas in Switzerland to experience more of the culture and the country. Some of my more memorable trips include skiing and snowboarding in the Swiss Alps. How many people can say that they learnt to ski in the Swiss Alps?! It was such a surreal experience to be able to





say things like “I’m just going to hike around the Matterhorn on the weekend” or “I’m going to take a short train ride to the next country tomorrow”. But this is considered so normal in Switzerland, that the locals usually didn’t bat an eye.

Zürich is considered Switzerland’s largest city, yet the population is far smaller than in Sydney. I often felt as if I was living in a quiet city rather than the main city of the country. But that was something I quickly became accustomed to, as I grew to love just how close everything was. During the week, I would attend my classes and within 30 minutes of finishing them, I could be on the other side of the city, climbing a mountain or swimming in the river, or be in the main financial district bustling around with the city’s financial elite.

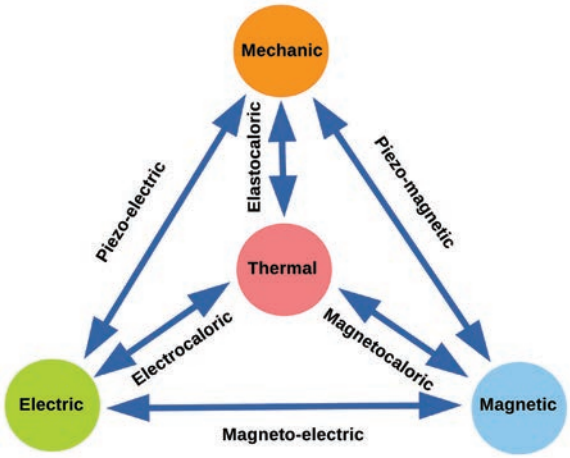
During the time I was there, I was lucky enough to experience some of their festivals. In April, Zürich celebrates Sächsilüüte, which is a traditional holiday to welcome the Spring season. The most bizarre event during Sächsilüüte is the burning of the Böög- a figure of a snowman filled with fireworks in its head. It is set alight on top of a bonfire and it is said that the time it takes for the fireworks to explode will be an indication of how good the following summer will be. Thankfully, the lengthy wait of 21 minutes this year was not at all correct, as the summer turned out to be beautifully warm!

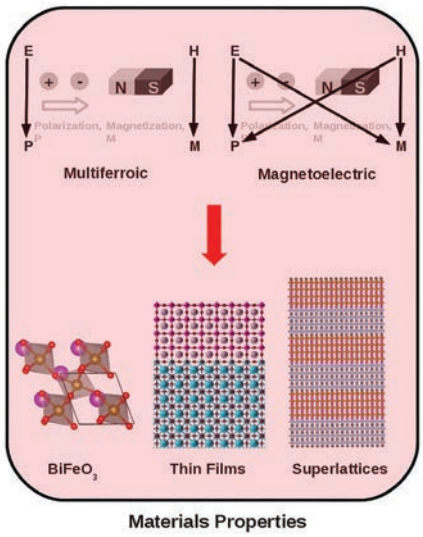
My stay in Switzerland was exciting, eye-opening and at times very surreal – from studying at a world renowned university, to eating copious amounts of cheese and chocolate, to exploring beautiful landscapes with fun company. It was such a great opportunity to learn more about Materials Science and Biomedical Engineering and the broad opportunities in each field. Furthermore, it was amazing to learn so much about different cultures and to gain some valuable life skills from living on my own in a foreign country. My exchange semester in Switzerland is definitely an experience I will treasure for the rest of my life.

RESEARCH

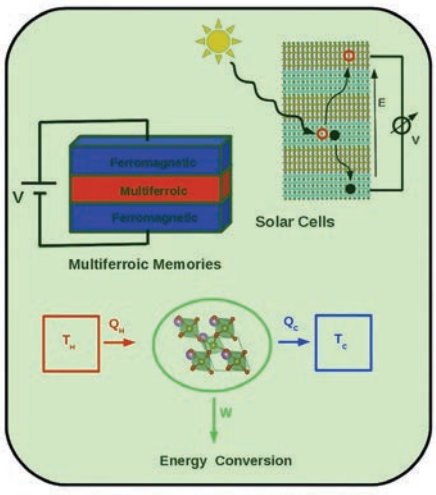
RATIONAL DESIGN OF MULTIFERROIC MATERIALS FOR ENERGY APPLICATIONS

Dr Claudio Cazorla





Materials Properties



Efficient and Green Energy Applications

Overview: Multiferroics, i.e. materials in which unique combinations of electric and magnetic properties coexist simultaneously (see Figure 1), are the cornerstones of potentially revolutionary developments in green energy engineering and sustainability fields (see Figure 2). The unusual electronic and magneto-electric properties of these compounds together with their suitability for being synthesised in layered thin-film heterostructures, raise high hopes to surpass the efficiency of current state-of-the-art solar cells and ubiquitous memory devices based on semiconductor technologies.

Also, the abrupt first order phase transitions taking place in these materials, and which involve disparate ferroelectric and magnetic states, open promising routes for the engineering of green energy conversion processes, such as of heat directly into electricity, and solid-state cooling. Unfortunately, finding single-phase multi-ferroics in nature has proved to be extremely difficult.

Currently this research aims to establish the rational basis for systematic design of novel artificial multi-ferroic materials composed of species that are potentially, but not necessarily, ferroelectric under natural conditions. For this, general and accurate computational schemes are developed to simulate these materials at finite temperatures and assess their potential as photovoltaic, caloric, and green energy materials. In particular, state-of-the-art simulation methods are employed, which allow the value of the macroscopic electrical variables of interest (e.g., polarization and electric displacement) to be constrained in them and to estimate their corresponding free energy.

RESEARCH ARTICLE

INNOVATIVE METHODS OF DEVELOPING GRAPHENE PRODUCTS FOR APPLICATIONS

Rakesh Joshi and Veena Sahajwalla (SMaRT@UNSW)

This research group is developing innovative ways to make graphene and develop graphene products for various applications[1]. This group's research focus is on transforming low value waste to realise graphene based 'supercomposite' that integrates the revolutionary performance qualities of graphene into an economically viable, multifunctional new material suitable for large-scale applications. By characterising, understanding and controlling the experimental methods, we aim to deliver new knowledge necessary to enable the transformation of waste into a matrix of high performance graphene composites and, so, introduce the extraordinary properties and multi-functionality of graphene into the new material. Graphene based products developed at SMaRT center have direct applications for industries.

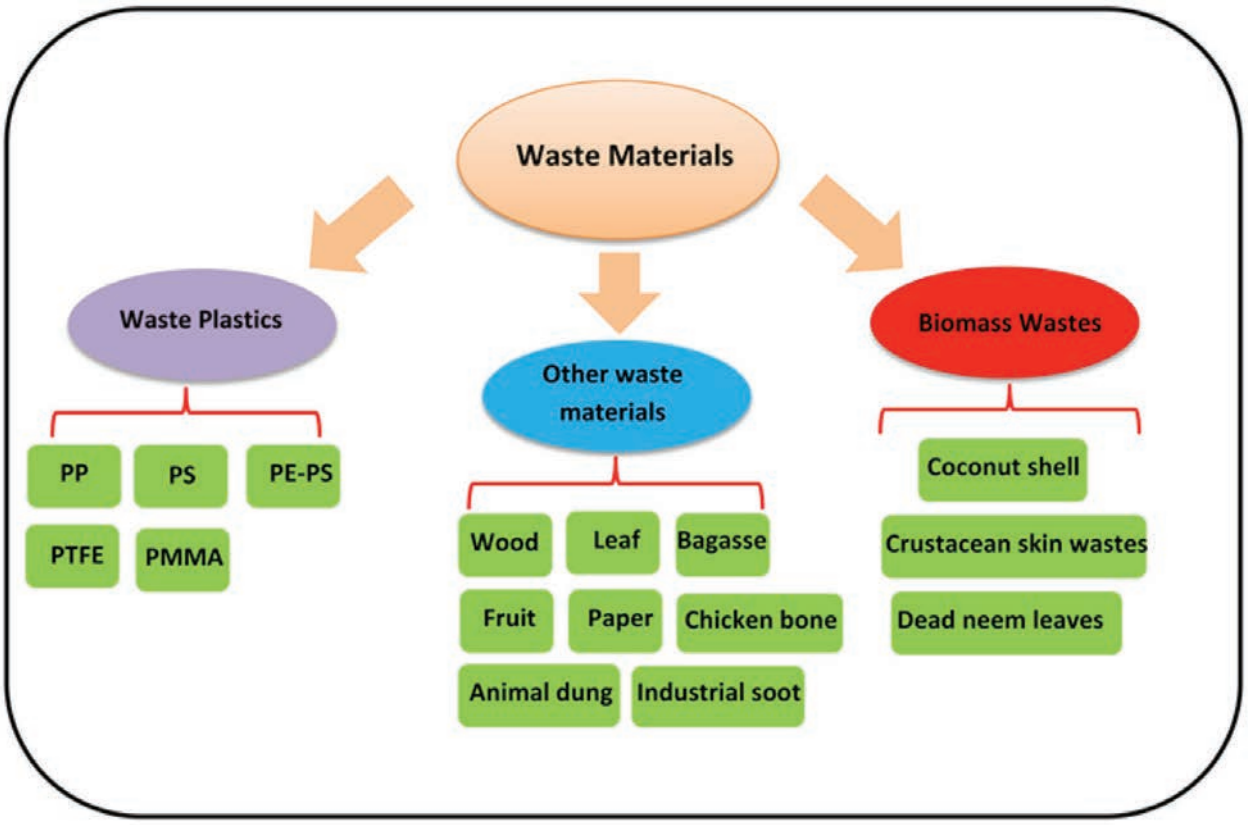


Figure 1. (below and top right) Transformation of waste into graphene

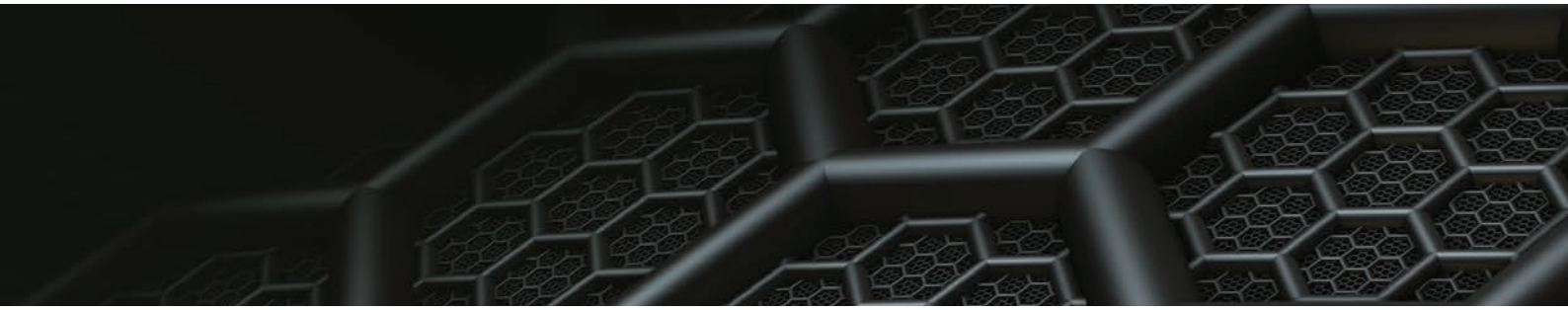
In another major project, this research team developing highly precise graphene oxide for water filtration[2]. This is a collaborative research projects with Sydney Water. The aim of this research is to obtain high flux of pure water with durability and to understand the mechanism of ultra-fast water transport through graphene oxide membranes using Molecular Dynamics.

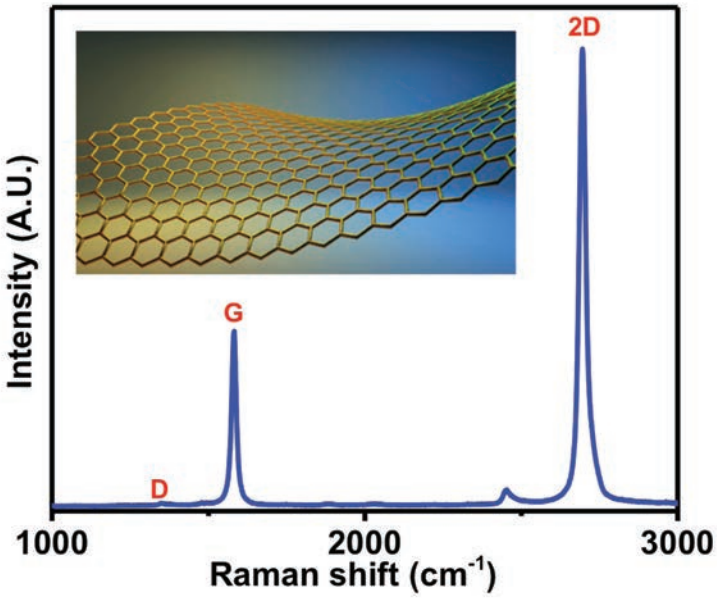
1 J. Deng, Y. You, V. Sahajwalla and R. K. Joshi, *Carbon N. Y.*, 2016, 96, 105–115.

2 Y. You, V. Sahajwalla, M. Yoshimura and R. K. Joshi, *Nanoscale*, 2015, **8**, 117–9.

3 H. Huang, Y. Ying and X. Peng, *J. Mater. Chem. A*, 2014, **2**, 13772–13782.

4 R. K. Joshi, P. Carbone, F. C. Wang, V. G. Kravets, Y. Su, I. V Grigorieva, H. a Wu, a K. Geim and R. R. Nair, *Science*, 2014, **343**, 752–4.





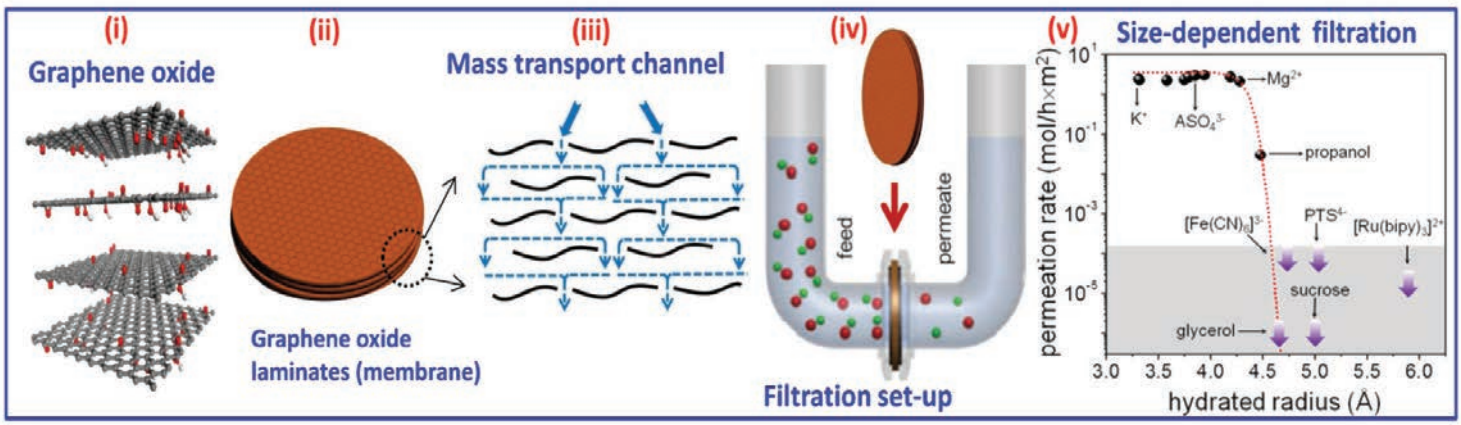
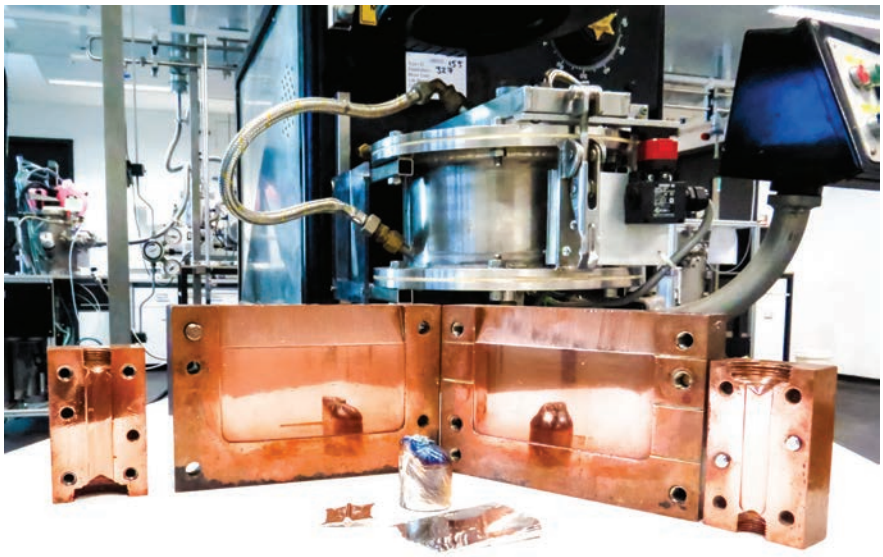


Figure 2. Membrane application of graphene oxide: graphene oxide layers (i), laminates as membrane (ii), mass transport in graphene oxide membranes (iii, and U-tube set-up typically used for filtration (iv). Size dependent filtration using graphene oxide. Images (i)-(iii) are reproduced from Huang et al,[3] and images (iv) and (v) taken from Joshi's previous work[4].

RESEARCH ARTICLE

A PREDICTIVE STRUCTURAL MODEL FOR BULK METALLIC GLASSES

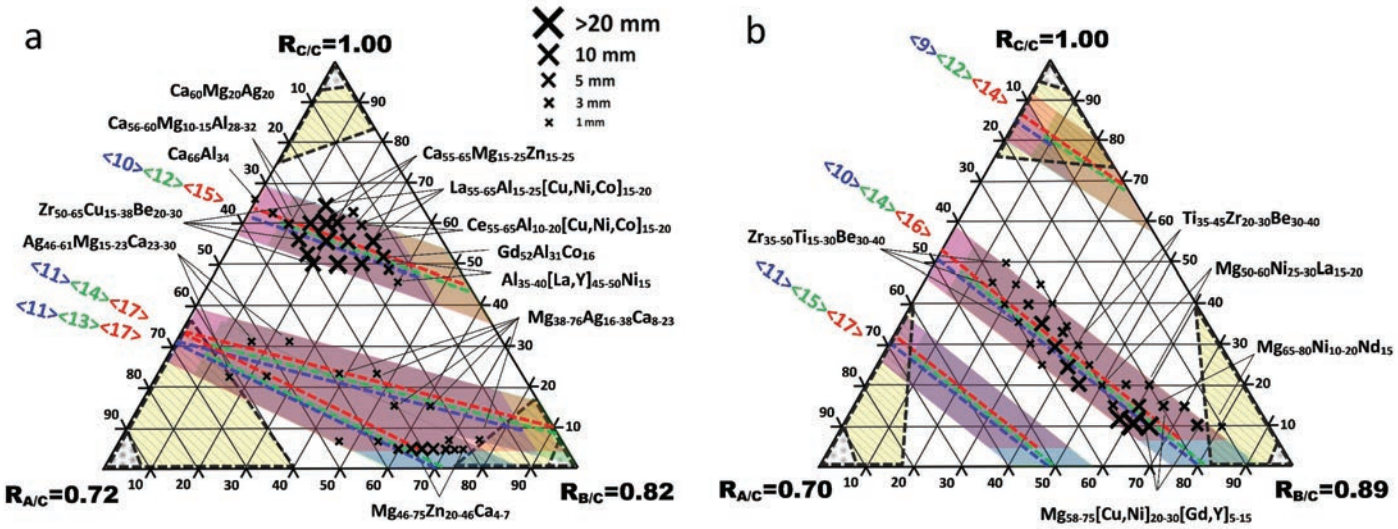
Dr Kevin J Laws



Bulk metallic glasses (BMGs) have been deemed *"**the most significant development in material science since the discovery of plastics over 50 years ago**"* (Mike Ashby, 2011). BMGs are a new class of advanced metal alloys with a metastable amorphous structure (similar to ceramic glasses or plastics) that exhibit extraordinary properties including exceptionally high strengths (three times that of regular metal alloys), the ***highest elastic limits*** of all metallic materials (twice that of regular alloys) and are among the ***toughest of all materials known***. Whilst entirely metallic, BMGs behave like ceramic glasses or plastics, when heated above their glass transition temperature, they transform into a ***low viscosity*** supercooled liquid where, ***unlike any other metal***, they can be formed with ease.

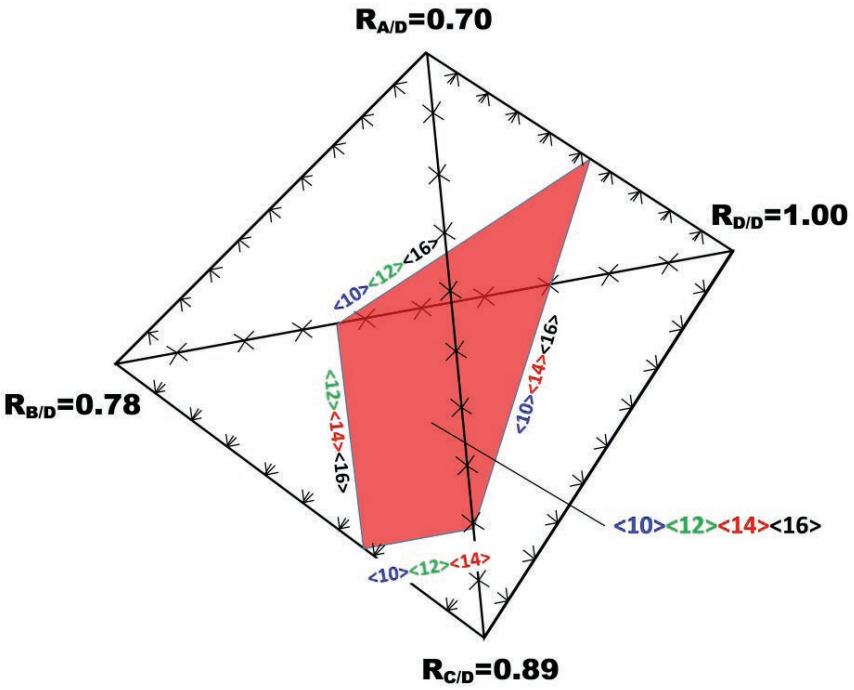
The largest problem in producing BMGs is the high cooling rate required to avoid crystallisation when casting from the molten state (not many alloy compositions can produce BMGs). Historically the discovery of BMG-forming compositions has been a trial and error process, with little attention to understanding the underlying fundamentals of glass-formation.

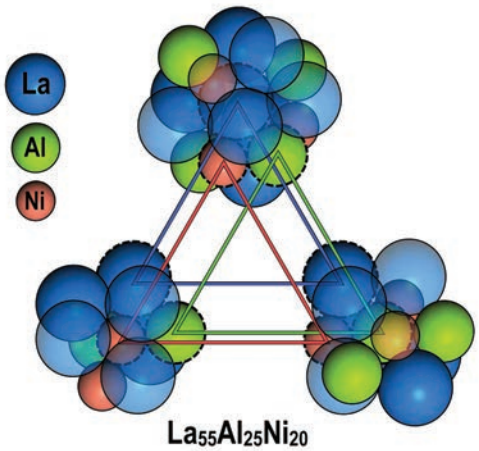
Liquid alloys are not simply a random jumble of atoms. They exhibit topological and chemical short-range ordering that minimises their structural



energy and can improve liquid stability. After several years of development and the discovery of over 200 new BMGs at UNSW, this research has identified and exploited the stable structural elements of the liquid state that control the ***thermodynamic and kinetic*** aspects of the liquid to solid transformation.

In collaboration with Dr Daniel Miracle of the US Air Force Research Laboratories and Professor Michael Ferry (UNSW), Dr Laws has published *"A predictive structural model for bulk metallic glasses" (**Nature Communications** 6 (2015) Article No. 8123)* which is essentially an instruction manual for the prediction of new BMG compositions for next-generation materials.





RESEARCH ARTICLE

STRUCTURE-PROPERTY RELATIONSHIPS OF ADVANCED METALLIC MATERIALS

Dr. Sophie Primig

Our research interests are in structure-property relationships of advanced metallic materials such as steels, nickel-based alloys and refractory metals. These materials can be designed in order to meet current challenges in structural applications such as engineering and construction, automotive applications, aviation and aerospace but also medical technology, or electronics. The outstanding properties such as high (hot-)hardness and strength, high toughness, low specific density, or high corrosion resistance are determined by the microstructure after processing (thermal or thermo-mechanical treatments).

Advanced metallic materials often exhibit complex multi-phase microstructures with nm-grain sizes, homogenously distributed atomic clusters and fine precipitates, and even desired segregation of certain elements to defects or interfaces. To design the structure-property relationship during processing of the next generation of advanced metallic materials, we apply state-of-the-art methods of materials characterisation, testing and modelling over various length scales.

We recently developed novel correlative microscopy approaches to study grain boundary segregation in molybdenum materials for certain structural and electronic applications by atom probe tomography. These materials suffer from intergranular brittle fracture dependent on their grain size and contents of impurities at grain boundaries. We successfully tackled the challenging site-specific

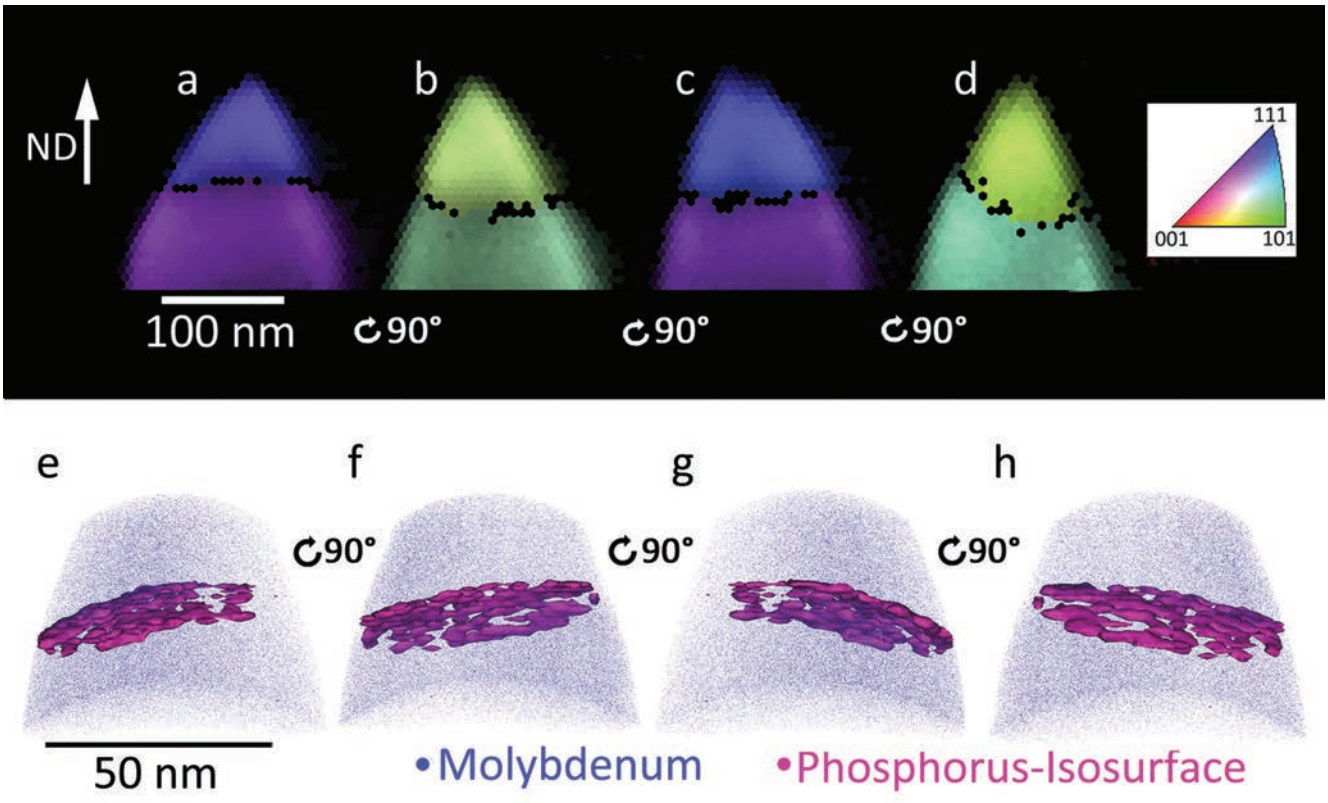


Figure 1: Transmission Kikuchi diffraction images (a-d) and atom maps (e-h) of an atom probe sample containing a high angle grain boundary after site-specific preparation by focused ion beam milling [K. Babinsky et al., Ultramicroscopy 2014 & 2015].

atom probe sample preparation by a combination of focused ion beam milling and transmission Kikuchi diffraction (Fig. 1). In collaboration with the Australian Centre for Microscopy and Microanalysis at Sydney University, we currently use this approach to come closer towards a full crystallographic and chemical description of grain boundaries.

We also studied structure property relationships during induction heat treatments of heat treatable steels. Such continuous heat treatments are often favorable compared to conventional isothermal ones due to significant time and cost savings. Less decarburization, lower amounts of retained austenite and less distortion are further advantages. The main challenge is to control the evolution of the key microstructural features that determine the resulting mechanical properties (Fig. 2). We investigated industrially optimized induction heat treatments of a 42CrMo4 steel and found a slight decrease in strength but a ~30 J/cm2 higher impact energy compared to conventional approaches. This is due to delayed recovery and the precipitation of finer carbides during continuous tempering.

Currently, we are also focusing on hierarchical microstructural design of modern high strength low alloy and advanced high strength steels as well as on direct ageing of nickel-based alloys for turbine discs of modern aircraft engines.

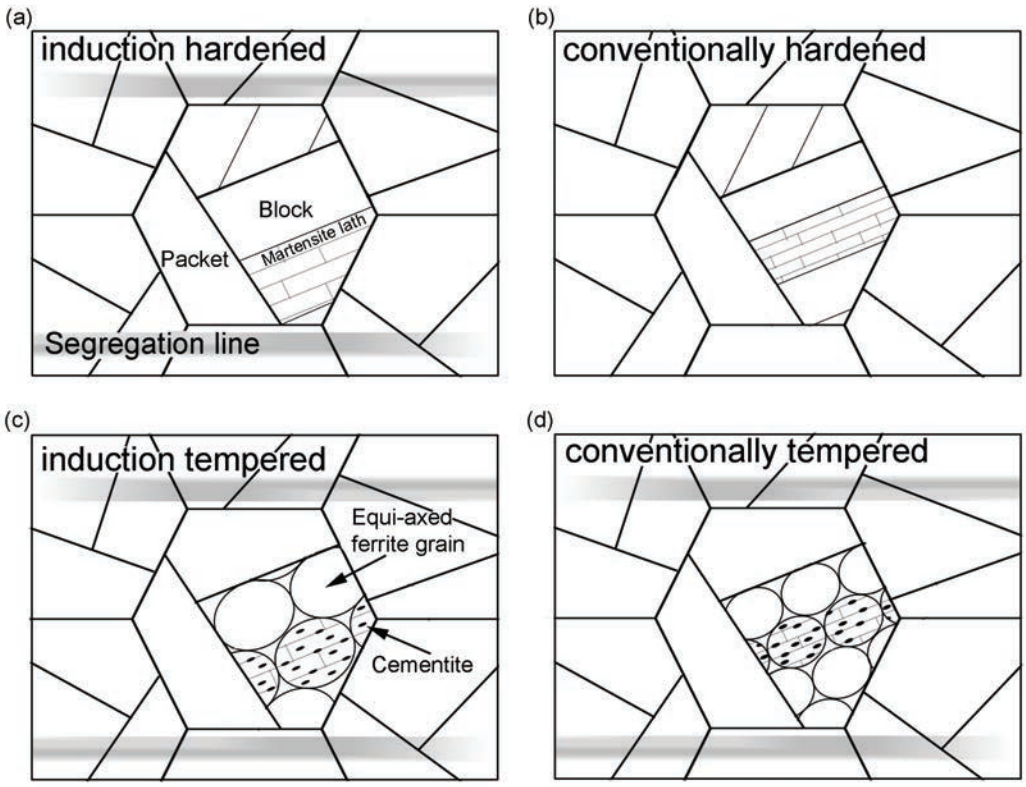


Figure 2: Schematic microstructural evolution during induction (a: hardened, c: tempered) versus conventional (b: hardened, d: tempered) heat treatments of 42CrMo4 steels [S. Sackl et al., Mettrans A, 2014 & 2016].

RESEARCH ARTICLE

FLEXIBLE BIOELECTRONICS

Dr Damia Mawad

Dr Damia Mawad's research group is interested in developing advanced functional materials that could be applied in regenerative medicine, drug delivery, and at the interface with biological tissues. In particular, we focus on electrically conducting polymers. These are synthetic macromolecules that have demonstrated a broad variety of controlled properties including chemical, optical and electronic characteristics. Our interest in these polymers lies in their application as polymeric scaffolds applied in tissue engineering and as biocompatible materials at the biotic/abiotic interface.

This research provides an excellent multidisciplinary environment that is built on a cohesive research framework whereby chemistry, physics, material science, biology and biomedical engineering partner together for the development of advanced functional biomaterials.

RESEARCH HIGHLIGHTS:

Conducting polymers at the biotic/abiotic interface:

This research area focuses on developing conducting polymer based constructs with enhanced electronic stability and testing their functionality at the biotic/abiotic interface (Figure 1).

By careful design of the chemical interactions between the conducting polymer, the dopant and other components in the device, we have recently developed a free-standing sutureless conductive patch with demonstrated electronic stability, appropriate physical properties of a biomaterial, and immediate effect on cardiac conduction signal.

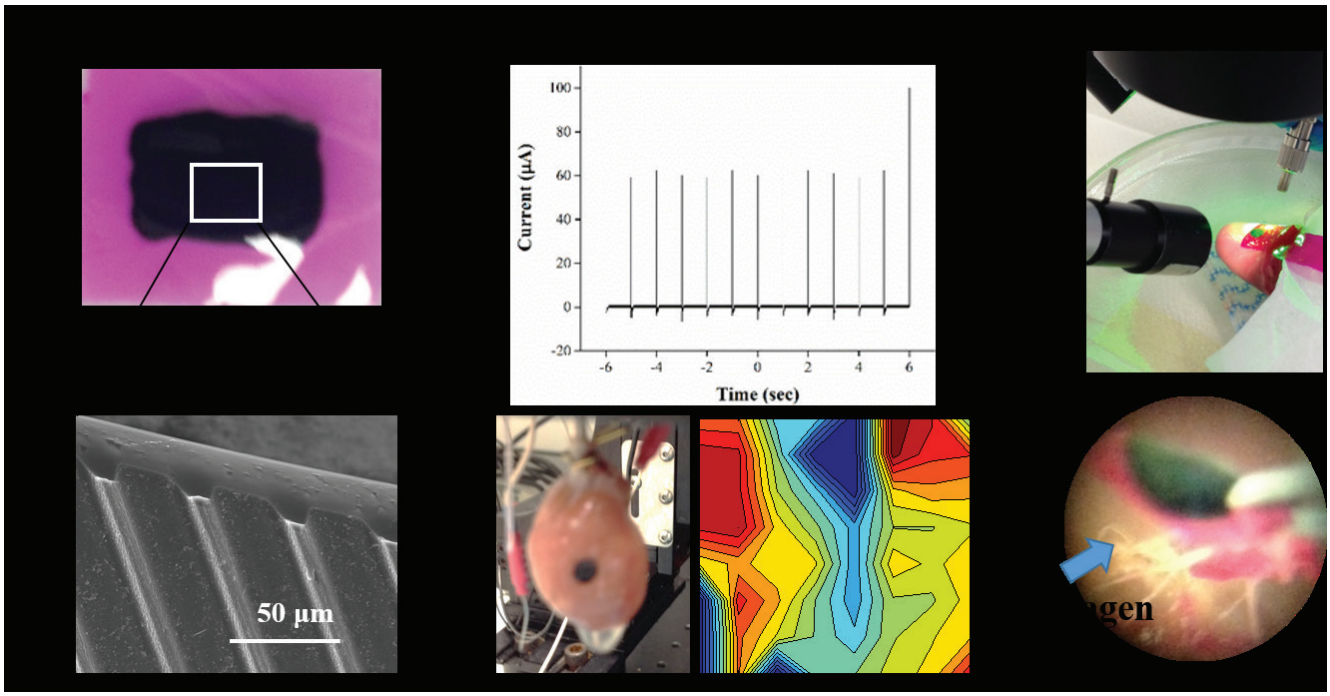


Figure 1: A conductive patch with enhanced electronic stability that is (A) flexible and micropatterned; (B) electronically stable and enhances conduction velocity of the heart; (C) could be applied to tissue by photoadhesion.

Conducting polymers in tissue engineering:

These research investigations focus on developing processable conducting polymers with end or side functionalities by chemical polymerization (Figure 2).

The field of tissue engineering aims at restoring a biological function through the design of smart materials that mimic the properties of the native extracellular matrix. One of the last decade's challenges has been the fabrication of tissue-engineered scaffolds for electro-responsive organs such as the heart and neural system.

The scaffold should not only match the mechanical properties of the native tissue, but it should be electronically conductive to aid the tissue regain its functionality. Conducting polymers are being considered as the structural components for the fabrication of electroconductive hydrated scaffolds. However, most current designs focus on growing non-functional conducting polymers in a hydrophilic polymeric matrix, limiting control over the scaffold properties.

Our material design strategy transitions from monomeric building blocks modified with appropriate functional groups, to processable conjugated polymers with functional pendant chains. The side functionalities allow post-functionalization of the polymer to be tailored for desired scaffold requirements. The chemical design is complimented by scaffold fabrication, characterisation techniques and in vitro cell studies.

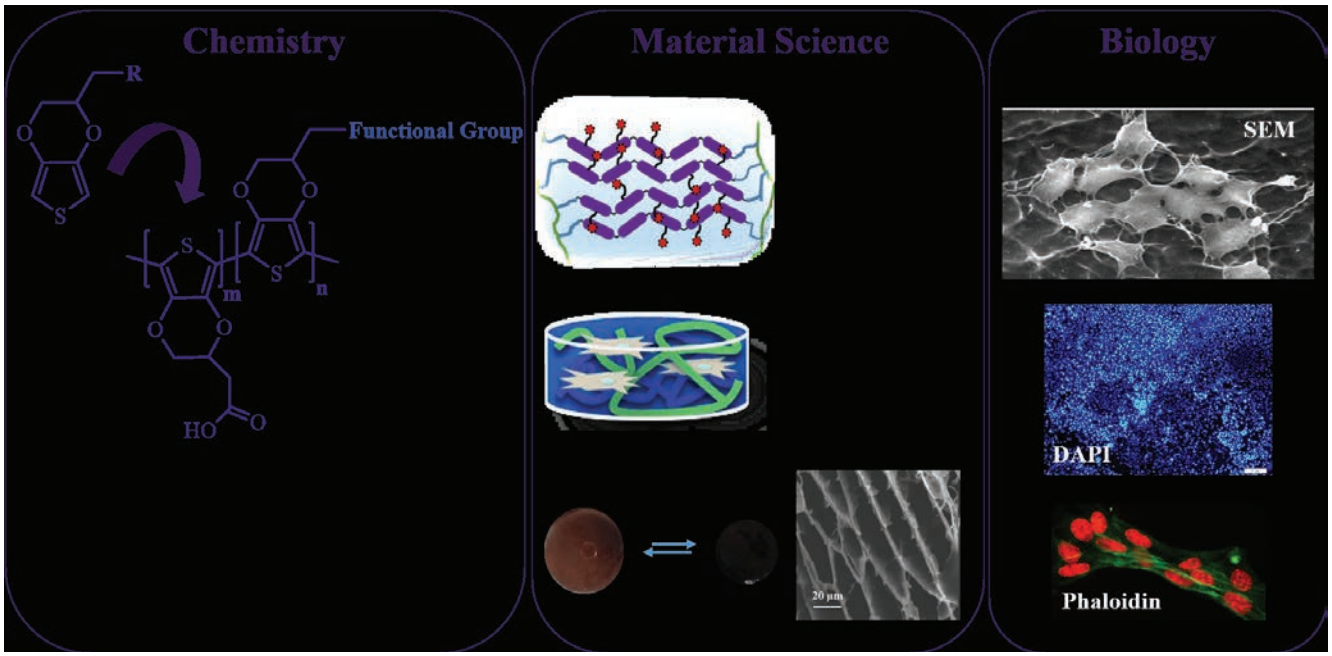


Figure 2: A multidisciplinary approach to develop advanced functional materials applied in tissue engineering.

RESEARCH CENTRE

SMaRT@UNSW
Sustainable Materials Research & Technology

ARC NEW GREEN MANUFACTURING HUB LAUNCH

Representatives of industry, government and science helped officially launch the $8.8 million Australian Research Council Green Manufacturing Hub on 19 November, 2015.

The collaboration between industry partners and researchers at UNSW, the University of Sydney, the University of Wollongong and Monash University is focused on developing new processes to direct waste into industrial production and create value-added green material. The Hub's industry partners include Commonwealth Steel/ MolyCop Mining Consumables, Brickworks Building Products, Jaylon Industries and TES-AMM Australia.

The Hub will undertake world-leading research into transforming materials and associated technologies that can transform complex automotive waste into metal alloys and green ceramics.

ARC Chief Program Officer Dr Laura Dan officiated at the launch.

.THE 4TH R (REFORM)

Laureate Professor Veena Sahajwalla and her team at the SMaRT Centre are continuing on with their discovery of innovative re-form (the 4th R advocated by SmaRT Centre: Reduce, Reuse, Recycle and Reform) of waste tyres and transforming them into a resource. Utilising the Polymer Injection Technology (PIT) has enabled them to transform resources from waste tyres to create steel. OneSteel has been using PIT as a standard practice since 2008 in Sydney and have now consumed over 2.4 million recycled tyres in the process. PIT has been granted patent protection in most major industrial countries and has now been implemented in Thailand in 2011, Korea in 2014, UK 2014 and Norway in 2015.

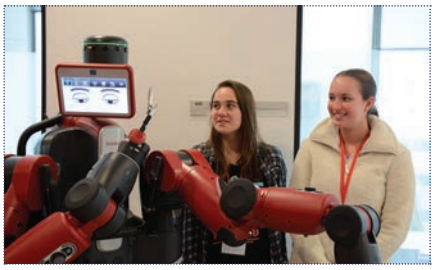
The SMaRT Centre is looking at other opportunities to reform complex waste materials into raw material resources and products and therefore creating green materials. Traditional recycling focuses on reusing materials in their original form – glass into glass, steel into steel. This model doesn't work for more complex materials. For instance, they are examining ways to utilise car parts (which include ferrous materials, plastics, rubber and laminated glass) to generate useful silicon carbide and ferrosilicon alloys

EWASTE

Australia is one of the biggest producers of e-waste on a per capita basis. The Australian Bureau of Statistics (ABS) says that in 2007–08, 15.7 million computers reached their end of life and less than 10 per cent of those were recycled. Electronic waste is responsible for 70 per cent of the toxic chemicals such as lead, cadmium and mercury found in landfill.

The SMaRT Centre is researching non-toxic ways to extract valuable metals from e-waste. For example, the large amount of copper that can be recycled from e-waste makes environmental and economic sense.

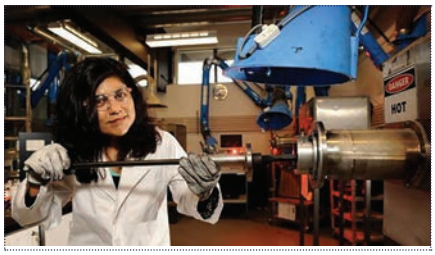
MICRO-RECYCLER ROBOT



Look in to the future of recycling and the role of technology cannot be ignored. The SMaRT Centre is researching the possible benefits that robots can play in this process. With the dedication of the micro-recycler team, they are examining ways to train robot 'Smarty' to sort and detect the different properties within fragmented

waste. This involves creating image processing algorithms that can use 2D features with 3D data. The other challenge is manipulating the waste materials and the team have researched cutting edgemanipulation for small, irregular objects which are difficult to grip.

GREEN STEEL UPDATE AND SCIENCE 50:50 INITIATIVE



In March 2015 UNSW's Science 50:50 initiative was launched at the Women in Science Symposium co-hosted by the Australian National Maritime Museum. Led by Professor Veena Sahajwalla, the event was attend by more than 200 female high school students where they heard inspiring stores from leading female scientists and industry representatives.

The Science 50:50 initiative provides scholarships, mentoring and industry networking opportunities to help encourage girls to pursue careers in science and technology. This initiative is supported by Professor Sahajwalla's Australian Research Council Georgina Sweet Laureate Fellowship.

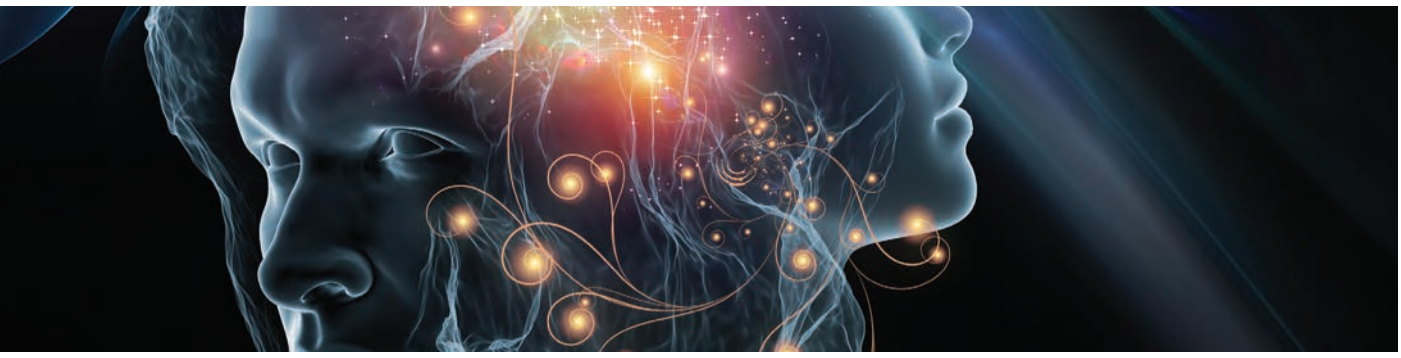
UNSW-SJTU INNOVATION HUB

(Pictured are (L to R): Professor Michael Ferry, UNSW Hub Leader, the Honourable Mike Baird, Premier of NSW, Professor Zhang Jie, President of SJTU and Professor Jinfu Li, SJTU Hub Leader.)

On 7th November 2015, Professor Michael Ferry joined NSW Premier Mike Baird, UNSW Pro-Vice Chancellor (International), Ms Fiona Docherty, and President of Shanghai Jiao Tong University, Professor Zhang Jie, for the official launch of the UNSW-SJTU Innovation Hub, held at SJTU.

Professor Ferry gave a presentation on the research collaboration between UNSW and SJTU and the importance of the research to both Australia and China.

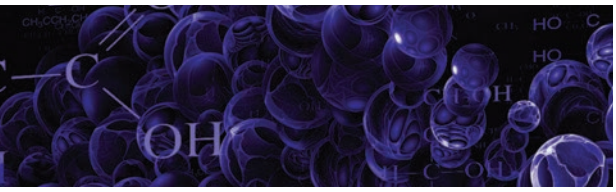
The Innovation Hub involves researchers at both UNSW and SJTU working on the design and testing of a new class of hypervelocity impact resistant material for protecting future space infrastructure, such as satellites, spacecraft and space stations, from catastrophic damage from micrometeorites and impossible-to-track space junk. Professor Ferry leads the UNSW node of the Hub with support from Chief Investigators, Drs Kevin Laws and Martin Xu (UNSW Sydney) and Dr Juan Escobedo-Diaz (UNSW Canberra).



CURRENT RESEARCH GRANTS

ARC DECRA	**Hinterstein, J.M.,** *On the origin of high strain in lead-free piezoelectric materials*, $315,000
ARC DECRA	**Tang, C.,** *Materials Design for Self-toughening Bulk Metallic Glasse*s, $368,000
ARC Discovery Project	Burbilis, N., **Laws, K.J., Ferry, M.,** *Ultra-lightweight alloys with unique multi-dimensional property profiles*, $355,100
ARC Discovery Project	Morozovska, A., **Munroe, P.R.,** Weyland, M., **Valanoor, N.,** *'Designer defects' - a new approach to functional oxide interface*s, $473,900
ARC Discovery Project	**Young, D.J., Zhang, J.-Q.,** *Controlling nickel-base alloy high temperature corrosion in CO_2-rich gases*, $399,500
ARC Discovery Project	**Sorrell, C.C., Koshy, P.,** *X-Ray Activation of Photocatalytic Titania-Coated Biomedical Implants in Situ*, $365,000
ARC Discovery Project	**Seidel, J.,** *Electronic charge separation at polar topological defects - photovoltaics beyond the conventional p-n junction*, $380,000
ARC Discovery Project	Koumoto, K., **Li, S.,** *Beyond Phononic Crystals - Building New Concepts to Enhance Thermoelectricity*, $384,700
ARC Discovery Project	Xie, Z., Xu, J., **Munroe, P.R.,** *Design of Tough, Durable and Corrosion-resistant Coatings*, $325,500
ARC Discovery Project	**Glaum, J., Daniels, J.E.,** *Electro-mechanics of natural load-bearing materials: Understanding mechanisms of toughenign, remodelling and self-healing*, $360,000
ARC Discovery Project	Morosovska, A., **Seidel, J., Valanoor, N.,** *Domain wall nanoelectronics: The wall is the device*, $330,000
ARC Discovery Project	Ding, J., Lee, W.-T., Morenzoni, E., Suzuki, K., **Yi, J.,** *Spin manipulation in oxide magnetic semiconductors towards spintronics applications*, $240,000
ARC Discovery Project	**Zou, R., Yu, A.B.**, *Micromechanic modelling and analysis of the dynamics of non-spherical particles coupled with fluid flow*, $460,000
ARC Discovery Project	Ding, J., **Wang, D., Li, S.,** *Development of Novel Spin Caloritronic Materials and Devices for Heat Management in Nanoelectronic Systems*, $400,000
ARC Discovery Project	Hibbert, B., **Zhang, J., Young, D.J**., *Heat-resisting iron-nickel base alloys in challenging new applications - oxygen permeabilities and resistance to internal oxidation*, $460,000
ARC Discovery Project	Chaudhury, S., Narendra, M., **Sahajwalla, V.H.**, Seetharaman, S., **Khanna, R.,** *Direct reduction of mixed oxides at lower temperatures: A novel approach to produce lightweight ferrous alloys*, $345,000
ARC Future Fellowship	**Cazorla Silva, C.,** *Rational Design of Novel Multiferroic Materials for Energy Harvesting and Energy Efficiency*, $778,874
ARC Future Fellowship	**Chu, D.**, *Building Novel Solid State Electric Double Layer Transistors with Interface Engineering of Ionic Conductive Oxide Superlattices*, $735,144
ARC Future Fellowship	**Seidel, J.,** *Nanoscale Characterization And Manipulation of Complex Oxide Interfaces And Topological Boundaries*, $913,028
ARC Industrial Transformation Research Hub	Dippenaar, R.J., Littlejohn, R., Lloyd, S., **Ostrovski, O.**, Prusty, G., Rasmussen, K.J., Simpson, S., Singh, R., Tooze, I., **Sahajwalla, V.H.,** *Transforming Waste Directly in Cost-effective Green Manufacturing*, $4,021,756
ARC Laureate Fellowship / Georgina Sweet Award	**Sahajwalla, V.,** *Fundamental high temperature e-waste investigations for high-value products*, $3,465,119
ARC LIEF Grant	Arnold, M., Ball, G., Bossomaier, T.R., Cheung, K.W., De Marco, O., Dlugogorski, B.Z., **Ferry, M.**, Ford, M., Georges, A., Gondro, C., Greer, P., Henskens, F., Johnson, M., King, G., Lewis, G., Muller, D., Poulton, C., Radom, L., Rahmani, A., Reimers, J.R., Sajeev, A., Stampfl, C.M., Susilo, W., Wilkins, M., **Yang, R., Yu, A.B.,** Yu, H., Zhao, M., Hawkes, E., *Renewing intersect's share of the National Computational Infrastructure's peak facility*, $1,970,000
ARC LIEF Grant	Hamilton, A., McKenzie, D.R., Micolich, A.P., Ulrich, C., **Valanoor, N., Seidel, J.,** *Next-Generation Electronic and Magnetic Materials Characterisation Facility*, $1,292,547
ARC LIEF Grant	D'Alessandro, D., Gooding, J., **Hart, J.,** Lakhwani, G., Schmidt, T., McCamey, D.R., *Fabrication Facility for Oxygen-Sensitive Electronic Materials*, $440,000
ARC LIEF Grant	Chen, Y., Dou, S.X., Lewis, R.A., Li, L., Mai, Y.W., Peleckis, G., Spinks, G.M., Wang, X., **Yi, J.,** *New generation cryogen free 14T PPMS system: advancing functional materials' characterization to new frontiers*, $52,500 partner contribution

ARC LIEF Grant	Barnet, M., Dorin, T., Hodgson, P.D., Hutchinson, C., Stanford, N., **Ferry, M.,** *Quench and deformation dilatometer for studying materials science*, $15,000 partner contribution
ARC LIEF Grant	**Ferry, M.**, Barnett, M., Bettles, C., Cairney, J., Davies, C., **Hoffman, M.J., Laws, K.J**., Ma, Q., **Munroe, P.R**., Quadir, Md. Z., Ringer, S.P., Stanford, N., Zhang, M-X., *Thermal and Mechanical Simulation Laboratory for Light Metals*, 2013 $390,000
ARC Linkage Project	**Koshy, P.,** Pandolfelli, V., da Luz, A.P., **Sorrell, C.C.,** *New Paradigm for Materials Technology for AZS Glassmaking Refractories*, $580,000
ARC Linkage Project	**Laws, K.J.,** Patel, Y., **Ferry, M.,** *Reducing the environmental impact of passenger vehicles by the design of lightweight alloy components*, $727,000
ARC Linkage Project	Aminorroaya-Yamini, S., Dou, S.X., Li, W., Zhang, C., **Li, S.,** *New generation high efficiency thermoelectric materials and modules for waste heat recovery in steelworks*, $226,896
ARC Linkage Project	Bhushan, B., Freislich, M.C., **Khanna, R., Sahajwalla, V.H.,** *Lower temperature ironmaking:macro and atomic-level understanding of accelerated carburisation of reduced iron*, $450,000
ARC Linkage Project	Hockings, K., Zhang, G., Zulli, P., **Ostrovski, O.,** *Coke integrity in blast furnace ironmaking: Understanding and technology development*, $665,000
ARC Linkage Project	Lenagh, M., Williams, R., **Zou, R. Yu, A.B.,** *Fundamental studies of multiphase flow and separation performance of natural medium cyclones for recovering waste coal*, $905,000
ARC Linkage Project	**Sahajwalla, V.H.,** *Novel Recycling Approach for Automotive Waste Glass and Plastics*, $546,013
ARC Linkage Project	**Sahajwalla, V.H**., *Recycling lignocellulosic agricultural waste as an iron oxide reductant in ferrous processing*, $360,000
ARC Linkage Project	**Ostrovski, O.,** *The use of Australian magnetite ore in advanced ironmaking*, $420,000
ARC Linkage Project	Maric, M., Zhang, C., **Zhang, J., Ostrovski, O.,** *Decrease of environmental impact of steelmaking: development of fluorine-free mould flux for steel continuous casting*, $365,000
ARC Linkage Project	**Ostrovski, O.,** *The use of non-traditional materials in production of manganese alloys with economic and environmental benefits*, $304,516
ARC Linkage Project	Joseph, S.D., **Munroe, P.R.**, Thomas, T., *Development of the next generation of organo-mineral fertilisers utilising domestic and commercial waste products*, $445,000
ARC Linkage Project	Fang, Y., Hodgson, P.D., **Laws, K.J.,** Quadir, M.Z., Stanford, N., **Ferry, M.,** *Reducing the environmental impact of steel making through direct strip casting*, $460,000
ARC Linkage Project	**Crosky, A., Hoffman, M.J.,** *A novel solution to reducing cavitation wear in hydraulic systems*, $390,000
ARC Linkage Project	Shen, Y., **Zou, R., Yu, A.B.,** *Model studies of new ironmaking processes*, $1,315,000
ARC QEII Fellowship	**Yi, J.**, *The Development of advanced diluted magnetic semiconductors through nonmagnetic element doping and defect engineering for spin transistors*, $750,000
Australia - European Union Collaboration Program Shared Grant	Ben-Nissan, B., Giordano, G., Grossin, D., Stamboulis, A., Taraschi, V., **Standard, O.**, *Next generation of 3D multifunctional coatings for biomedical applications*, $12,963
Australia-India Strategic Research Fund (AISRF)	Agarwala, V., Choudhary, V., Graham, P.M., **Khanna, R.,** Mishra, B.K., Mukherkjee, P.S., Park, M.B., **Sahajwalla, V.H.,** *Novel Approach for Processing Hazardous Electronic Waste*, $365,000
Australia-India Strategic Research Fund (AISRF)	Htoo, T., J., P.A., Klose, F., **Munroe, P.R**., Ogale, S., Ramasse, Q., **Valanoor, N.,** *Topological Defects In Non-Collinear Multiferroics: A Nanodomain Approach To Multifunctionality*, $300,000
BaoSteel-Australia Joint Research and Development Grant	Fang, Y., Wang, X., Xu, W., Yu, Y., **Ferry, M**., *An integrated metallurgical and process control strategy for generating new high-strength strip-cast steel grades free of detrimental casting defects*, $200,000
BaoSteel-Australia Joint Research and Development Grant	**Ferry, M., Laws, K.J., Li, S., Chu, D.,** *Advanced Fe-based nanocrystalline alloys with low coercive force and high saturation magnetic flux density for high performance electric motors*, $300,000
CRC for Low Carbon Living	Else, D., Hatrz-Karp, J., Hill, R., Maher, K., Newton, P., Pearson, C., **Sahajwalla, V.H.,** Sproul, A.B., Taylor, M., Thompson, S.M., White, S., Prasad, D.K., *The CRC for Low Carbon Living,* $4,596,000
CRC for Low Carbon Living	Amin, S., Bartesaghi Koc, C.A.A., Bruce, A., Craft, W.J., Diaz Sandoval, C.A., Fiorito, F., Heriyanto, Hodge, T., Irger, M., Karim, S.M., Macgill, I., Marzban, S., Osmond, P.W., Peters, A., Prasad, D.K., Roberts, M.B., **Sahajwalla, V.H.,** Sanchez Gomez, A., Sproul, A.B., Thompson, S.M., Timchenko, V., Williams, P., Yang, S., Ding, L., *Node of Excellence in High Performance Architecture*, $26,500



DAFF Carbon Farming Futures - Filling the Research Gap Shared Grant	Donne, S., Van Zwieten, L., Young, R., **Munroe, P.R.,** *Low-emission nitrogen fertilizers based on clay-modified activated charcoal*, $78,340
Defence Science and Technology Organisation Grant	Tseng, Y.S., **Chan, S.L.I.,** *Design, characterisation and performance evaluation of hydrogen storage alloy material for laboratory and full-scale metal hydride canisters*, $85,000
Industry	**Young, D.J.**, *Corrosion in CO_2*, $50,646
Industry	**Pahlevani, F.,** *Transforming waste into value-added materials*, $50,000
Industry	**Koshy, P., Sorrell, C.C.,** *Incubator Air Purification System*, $19,530
Industry	**Laws, K.J.**, *A Fundamental Approach to Developing Aluminium-based Bulk Amorphous Alloys based on Stable Liquid-Metal Structures and Electronic Equilibrium*, $44,292
Industry	**Cholake, S.T., Pahlevani, F.,** *Feasibility study on replacing polypropylene with natural-fibre and polypropylene composite in extruded parts*, $100,000
Industry	**Sahajwalla, V.H.,** *Low coke blast furnace reaction forecasting*, $214,890
Industry	**Seidel, J.,** *Exploration of exotic electronic conduction of carrier-doped multiferroics*, $88,106
Industry	Jones, J., **Valanoor, N.,** *Electrode stability in high temperature sensors for petroleum applications*, $8,714
Industry	**Li, S., Chu, D.,** *Development of RRAM*, $260,845
Industry	**Pahlevani, F., Sahajwalla, V.H**., *CRC LCL Investigation of innovative sustainable low carbon products from waste materials for built environments*, $150,000
Industry	**Chu, D., Li, S., Younis, A., Wang, D.**, *Fabrication of electrodes*, $23,000
Industry	**Nguyen, T.D.,** Yu, C., **Zhang, J., Young, D.J.,** *Metal dusting exposure tests*, $22,950
Industry	**Nguyen, T.D.,** Yu, C., **Zhang, J., Young, D.J**., *Ammonia and Syngas testing*, $27,900
Industry	**Chan, S.L.I.**, *Study on backfill mortar acidification of impressed current cathodic protection (ICCP) systems*, $20,000
Industry	**Nguyen, D.T., Young, D.J.,** *Solar-driven Supercritical CO_2 Brayton Cycle*, $17,333
Industry	**Sorrell, C.C.,** *Development of Refractories from Fly Ash*, $426,361
Industry	**Koshy, P., Gupta, S., Sorrell, C.C.,** *Low temperature pyrolysis of coals and alternative carbonaceous materials*, $65,000
MREII	**Munroe, P.R.,** Marjo, C., *A Stylus Profilometer for accurate elemental depth-profiling on the nanoscale*, $79,140
MREII	**Sahajwalla, V.H.,** *Dual chamber high temperature furnace for the ARC research hub on Green Manufacturing*, $69,993
MREII	**Seidel, J.**, *Scanning probe microscope upgrade*, $63,583
SJTU-UNSW Collaboration	**Chan, S.L.I.**, Kong, H., Liang, J., Ma, M., Quadir, M.Z., Zhang, D., **Munroe, P.R.**, *Synthesis, microstructure and mechanical properties of ultrafine structured Al, Cu and Ti matrix nanocomposite*, $22,000
SJTU-UNSW Collaboration	**Hamilton, N.E**., Kong, L., **Laws, K.J.**, Li, J., **Mahjoub, R**., **Shen, Y.**, **Xu, W.,** Zhou, Y., **Ferry, M**., *Atomic architecture and its influence on the mechanical performance of Zr-based bulk amorphous alloys*, $27,000
SJTU-UNSW Collaboration	Abdool, A.A., Gonzalez, P., Huang, D., **Munroe, P.R.**, Nielsen, S., Yang, H., Ye, J., Zhang, L., Zhang, R., Thomas, T., *Improving food production: Evaluation of biochar for stimulating the microbial nitrogen cycle in agricultural soil*, $22,000

PUBLICATIONS

JOURNAL ARTICLES

1. Adabifiroozjaei, E., P. Koshy, R. Pardehkhorram, E. Rastkerdar and C. C. Sorrell (2015). "Interfacial reactions between $BaAl_2Si_2O_8$ and molten Al alloy at 850°C." Journal of the American Ceramic Society **98**(10): 3299-3307.
2. Adabifiroozjaei, E., P. Koshy and C. C. Sorrell (2015). "Assessment of non-wetting materials for use in refractories for aluminium melting furnaces." Journal of the Australian Ceramic Society **51**(1): 139-145.
3. Afrin, N., M. Z. Quadir and M. Ferry (2015). "Formation of highly misoriented fragments at hot band grain boundaries during cold rolling of interstitial-free steel." Metallurgical and Materials Transactions A: Physical Metallurgy and Materials Science **46**(7): 2956-2964.
4. Ao, L., H. Y. Xiao, X. Xiang, S. Li, K. Z. Liu, H. Huang and X. T. Zu (2015). "Functionalization of a GaSe monolayer by vacancy and chemical element doping." Physical Chemistry Chemical Physics **17**(16): 10737-10748.
5. Ao, Z., Q. Jiang, S. Li, H. Liu, F. M. Peeters, S. Li and G. Wang (2015). "Enhancement of the stability of fluorine atoms on defective graphene and at graphene/fluorographene interface." ACS Applied Materials and Interfaces **7**(35): 19659-19665.
6. Arsecularatne, J. A., J. P. Dingeldein and M. Hoffman (2015). "An in vitro study of the wear mechanism of a leucite glass dental ceramic." Biosurface and Biotribology **1**(1): 50-61.
7. Auckett, J. E., G. J. McIntyre, M. Avdeev, H. De Bruyn, T. T. Tan, S. Li and C. D. Ling (2015). "Neutron Laue diffraction study of the complex low-temperature magnetic behaviour of brownmillerite-type $Ca_2Fe_2O_5$." Journal of Applied Crystallography **48**(1): 273-279.
8. Bandyopadhyay, S., S. T. Cholake, M. R. Mada, R. Kumar and P. Boughton (2015). "Comparative nano-indentation creep study of ductile metal, ductile polymer and polymer-fly ash composite." Annals of Materials Science and Engineering **2**(2): 1022.
9. Bandyopadhyay, S., S. T. Cholake, G. Morgan, B. Joe, Y. Bai, R. K. Singh, X. L. Zhao and S. Rizkalla (2015). "Improved fracture toughened epoxy matrix system reinforced with recycled milled carbon fibre." Annals of Materials Science & Engineering **2**(2): 1023.
10. Bandyopadhyay, S., S. Devasahayam, O. Standard and S. Ibraheem (2015). "Use of secondary ion mass spectrometry (SIMS) to identify fly ash mineral special and particulate distribution in epoxy polymer." International Journal of Mineral Processing **142**: 139-146.
11. Bersani, M., A. Paduano, M. Favaro, P. Koshy, C. C. Sorrell, A. Martucci and G. Granozzi (2015). "Preparation of high-porosity TiO_xC_y powders from a single templating carbon source." Ceramics International, **42**(6): 7690-9696
12. Bhat, P. B., R. Rajarao, V. Sahajwalla and B. R. Bhat (2015). "Immobilized magnetic nano catalyst for oxidation of alcohol." Journal of Molecular Catalysis A: Chemical **409**: 42-49.
13. Blackwell, P., S. Joseph, P. Munroe, H. M. Anawar, P. Storer, R. J. Gilkes and Z. M. Solaiman (2015). "Influences of biochar and biochar-mineral complex on mycorrhizal colonisation and nutrition of wheat and sorghum." Pedosphere **25**(5): 686-695.
14. Borrero-Lõpez, O., T. Vodenitcharova, M. Z. Quadir and M. Hoffman (2015). "Scratch fracture of polycrystalline silicon wafers." Journal of the American Ceramic Society **98**(8): 2587-2594.
15. Callori, S. J., S. Hu, J. Bertinshaw, Z. J. Yue, S. Danilkin, X. L. Wang, V. Nagarajan, F. Klose, J. Seidel and C. Ulrich (2015). "Strain-induced magnetic phase transition in $SrCoO_3$-delta thin films." Physical Review B - Condensed Matter and Materials Physics **91** 140405(R).
16. Cayumil, R., R. Khanna, R. Rajarao, PS. Mukherjee and V. Sahajwalla (2015). "Concentration of precious metals during their recovery from electronic waste." Waste Management (doi:10.1016/j.wasman.2015.12.004).
17. Cazorla, C. (2015). "In the search of new electrocaloric materials: Fast ion conductors." Results in Physics **5**: 262-263.
18. Cazorla, C. (2015). "The role of density functional theory methods in the prediction of nanostructured gas-adsorbent materials." Coordination Chemistry Reviews **300**: 142-163.
19. Cazorla, C. and J. Boronat (2015). "First-principles modeling of quantum nuclear effects and atomic interactions in solid ^{4}He at high pressure." Physical Review B **91**(2): 024103-1 – 024101-9.
20. Cazorla, C. and J. Boronat (2015). "First-principles modeling of three-body interactions in highly compressed solid helium." Physical Review B - Condensed Matter and Materials Physics **92**: 224113.
21. Cazorla, C. and M. Stengel (2015). "Electrostatic engineering of strained ferroelectric perovskites from first principles." Physical Review B - Condensed Matter and Materials Physics **92**: 214108.
22. Chen, C., B. H. Suryanto, C. Zhao, X. Jiang and A. Yu (2015). "Nanostructures: Direct hydrothermal synthesis of carbonaceous silver nanocables for electrocatalytic applications, Small **11**(29): 3556.
23. Chen, C., B. H. R. Suryanto, C. Zhao, X. Jiang and A. Yu (2015). "Direct hydrothermal synthesis of carbonaceous silver nanocables for electrocatalytic applications." Small **11**(29): 3557-3567.
24. Chen, C., T. Zhang, R. Donelson, T. T. Tan and S. Li (2015). "Effects of yttrium substitution and oxygen deficiency on the crystal phase, microstructure, and thermoelectric properties of $Sr_{1-1.5x}Y_xTiO_{3-\delta}$ ($0 \le x \le 0.15$) " Journal of Alloys and Compounds **629**: 49-54.
25. Chen, L., Y. Yang, Z. Gui, D. Sando, M. Bibes, X. K. Meng and L. Bellaiche (2015). "Large elasto-optic effect in epitaxial $PbTiO_3$ films." Physical Review Letters **115**: 267602.
26. Chen, W. F., H. Chen, P. Koshy and C. C. Sorrell (2015). "Photocatalytic performance of vanadium-doped and cobalt-doped TiO_2 thin film." Journal of the Australian Ceramic Society **51**(2): 1-8.
27. Chen, W. F., P. Koshy and C. C. Sorrell (2015). "Effect of intervalence charge transfer on photocatalytic performance of cobalt- and vanadium-codoped TiO_2 thin films." International Journal of Hydrogen Energy **40**(46): 16215-16229.
28. Chen, W. F., P. Koshy and C. C. Sorrell (2015). "Effects of film topology and contamination as a function of thickness on the photo-induced hydrophilicity of transparent TiO_2 thin films deposited on glass substrates by spin coating." Journal of Materials Science, **51**: 2465-2480
29. Chen, Y., C. M. Wong, H. Deng, H. M. Yau, D. Wang, Z. Yan, H. Luo, H. L. W. Chan and J. Dai (2015). "Ferroelectric domain structures in <001>-oriented $K_{0.15}Na_{0.85}NbO_3$ lead-free single crystal." AIP Advances **5**: 037117.
30. Cheung, K. H., P. Koshy, C. Inglis, T. Numata and C. C. Sorrell (2015). "Preliminary analysis of gas emissions during firing of clay bricks containing end-of-life rubber tyres." Journal of the Australian Ceramic Society **51**(2): 9-17.
31. Choe, H., S. Gorfman, M. Hinterstein, M. Ziolkowski, M. Knapp, S. Heidbrink, M. Vogt, J. Bednarcik, A. Berghäuser, H. Ehrenberg and U. Pietsch (2015). "Combining high time and angular resolutions: Time-resolved X-ray powder diffraction using a multi-channel analyser detector." Journal of Applied Crystallography **48**: 970-974.
32. Cholake, S. T., G. Moran, Y. Bai, R. K. S. Raman, X. L. Zhao, S. Rizkalla and S. Bandyopadhyay (2015). "Physico-chemical characterization of novel epoxy matrix system reinforced with recycled short milled carbon fibre." Journal of Minerals and Materials Characterization and Engineering **03**(05): 373-389.
33. Chu, K., J. Chen and A. Yu (2015). "Applicability of a coarse-grained CFD-DEM model on dense medium cyclone." Minerals Engineering, **90**: 43-54
34. Cittadini, M., M. Sturaro, M. Guglielmi, A. Resmini, I. G. Tredici, U. Anselmi-Tamburini, P. Koshy, C. C. Sorrell and A. Martucci (2015). "ZnO nanorods grown on ZnO sol–gel seed films: Characteristics and optical gas-sensing properties." Sensors and Actuators B: Chemical **213**(C): 493-500.
35. Cui, Y., Y. Chen, C. Cheng, C. C. Sorrell and Y. Zhao (2015). "Effects of La- and Pr-substitution on the structure and superconductivity of $Ba_{0.6}K_{0.4}BiO_3$." Rare Metal Materials and Engineering **44**(9): 2081-2085.
36. Cui, Y., L. Wang, J. Yang, J. Zhang, Y. Sasaki and O. Ostrovski (2015). "Phase equilibria of fluoride-free boracic mould flux for steel continuous casting." Steel Research International **86**(6): 662-669.
37. Devasahayam, S., M. A. Ameen, T. V. Verheyen and S. Bandyopadhyay (2015). "Brown coal dewatering using poly (Acrylamide-co-potassium acrylic) based super absorbent polymers." Minerals **5**(4): 623-636.
38. Dhunna, R., P. Koshy and C. C. Sorrell (2015). "Effect of iron doping on the mineralogical, microstructural, optical, and chemical properties of WO_3: thin films." Journal of the Australian Ceramic Society **51**(2): 18-22.
39. Dou, J., J. Yu, A. Tahmasebi, F. Yin, S. Gupta, X. Li, J. Lucas, C. Na and T. Wall (2015). "Ultrasonic-assisted preparation of highly reactive Fe-Zn sorbents supported on activated-char for desulfurization of COG." Fuel Processing Technology **135**: 187-194.
40. Du, H., X. Lin, Z. Xu and D. Chu (2015). "Electric double-layer transistors: a review of recent progress." Journal of Materials Science **50**(17): 5641-5673.

41. Du, H., X. Lin, Z. Xu and D. Chu (2015). "Recent developments in black phosphorus transistors." Journal of Materials Chemistry C **3**(34): 8760-8775.
42. Duan, J. Q., M. Z. Quadir and M. Ferry (2015). "An analytical framework for predicting the limit in structural refinement in accumulative roll bonded nickel." Metallurgical and Materials Transactions A: Physical Metallurgy and Materials Science, **47**(1): 471-478
43. Farzana, R. and V. Sahajwalla (2015). "Novel recycling to transform automotive waste glass and plastics into SiC-bearing resource by silica reduction." Journal of Sustainable Metallurgy **1**(1): 65-74.
44. Feng, Y., J. N. Hart, R. J. Patterson and A. Lowe (2015). "Electrospinning of TiO_2 nanofibers: The influence of Li and Ca doping and vacuum calcination." Materials Letters **139**: 31-34.
45. Flynn, S. J., Z. B. Tong, R. Y. Yang, H. Kamiya, A. B. Yu and H. K. Chan (2015). "Computational fluid dynamics (CFD) investigation of the gas-solid flow and performance of Andersen cascade impactor." Powder Technology **285**: 128-137.
46. Genenko, Y. A., J. Glaum, M. J. Hoffmann and K. Albe (2015). "Mechanisms of aging and fatigue in ferroelectrics." Materials Science and Engineering: B **192**(C): 52-82.
47. Glaum, J., H. Simons, J. Hudspeth, M. Acosta and J. E. Daniels (2015). "Temperature dependent polarization reversal mechanism in $0.94(Bi_{½}Na_{½})TiO_{3-0.06}Ba(Zr_{0.02}Ti)_{.98})O_3$ relaxor ceramics." Applied Physics Letters **107** 232906
48. Guo, P., J. Zhang, D.J. Young and C.H. Konrad (2015). "Oxygen permeability measurements in Ni using H_2/H_2O, CO/CO_2 and Ni/NiO Rhines pack atmospheres." Oxid. Met. **83** 223-235.
49. Hinterstein, M., M. Hoelzel, J. Rouquette, J. Haines, J. Glaum, H. Kungl and M. Hoffman (2015). "Interplay of strain mechanisms in morphotropic piezoceramics." Acta Materialia **94**: 319-327.
50. Hinterstein, M., L. A. Schmitt, M. Hoelzel, W. Jo, J. Rödel, H. J. Kleebe and M. Hoffman (2015). "Cyclic electric field response of morphotropic $Bi_{½}Na_{½}TiO_3$-$BaTiO_3$ piezoceramics." Applied Physics Letters **106** 222904.
51. Hou, Q., J. Li and A. Yu (2015). "CFD-DEM study of heat transfer in the reduction shaft of Corex." Steel Research International **86**(6): 626-635.
52. Hou, Q. F., Z. Y. Zhou and A. B. Yu (2016). "Gas-solid flow and heat transfer in fluidized beds with tubes: Effects of material properties and tube array settings." Powder Technology **296**: 59-71.
53. Hou, Z., Z. Tian, R. Liu, K. Dong and A. Yu (2015). "Formation mechanism of bulk nanocrystalline aluminium with multiply twinned grains by liquid quenching: A molecular dynamics simulation study." Computational Materials Science **99**: 256-261.
54. Hu, H. L., Y. P. Zeng, K. H. Zuo, Y. F. Xia, D. X. Yao, J. Günster, J. G. Heinrich and S. Li (2015). "Synthesis of porous Si_3N_4/SiC ceramics with rapid nitridation of silicon." Journal of the European Ceramic Society **35**(14): 3781-3787.
55. Hu, Q., H. Du, W. Feng, C. Chen and Y. Huang (2015). "Studying the roles of Cu and Sb in $K_{0.48}Na_{0.52}NbO_3$ lead-free piezoelectric ceramics." Journal of Alloys and Compounds **640**: 327-334.
56. Hu, S., Z. Yue, J. S. Lim, S. J. Callori, J. Bertinshaw, A. Ikeda-Ohno, T. Ohkochi, C. H. Yang, X. Wang, C. Ulrich and J. Seidel (2015). "Growth and properties of fully strained $SrCoO_{x\ (x \approx 2.8)}$ thin films on $DyScO_3$." Advanced Materials Interfaces **2**(8): 1500012.
57. Huang, H. H., Q. Zhang, E. Huang, R. Maran, O. Sakata, Y. Ehara, T. Shiraishi, H. Funakubo, P. Munroe and N. Valanoor (2015). "Epitaxial $PbZ_xrTi_{1-x}O_3$ Ferroelectric Bilayers with Giant Electromechanical Properties." Advanced Materials Interfaces **2**(8): 1500075.
58. Huang, W. M., W. F. Sun, G. H. Chen and L. Tan (2015). "Nanocavities double the toughness of graphene-polycarbonate composite." Advanced Engineering Materials **17**(3): 299-304.
59. Iamsasri, T., G. Tutuncu, C. Uthaisar, S. Wongsaenmai, S. Pojprapai and J. L. Jones (2015). "Electric field-induced phase transitions in Li-modified $Na_{0.5}K_{0.5}NbO_3$ at the polymorphic phase boundary." Journal of Applied Physics **117**: 024101.
60. Ikram-ul-Haq, M., R. Khanna, V. Sahajwalla (2015). "Interfacial reactions between alumina-carbon refractories and molten iron at 1823 K." High Temp. Mater. Processes ISSN (Online) 2191-0324 ISSN (Print) 0334-6455 (DOI: 10.1515/htmp-2015-0127)
61. Jalowicka, A., W. Nowak, D. J. Young, V. Nischwitz, D. Naumenko and W. J. Quadakkers (2015). "Boron Depletion in a Nickel Base Superalloy Induced by High Temperature Oxidation." Oxidation of Metals **83**(3-4): 393-413.
62. Jing, S., A. Younis, D. Chu and S. Li (2015). "Resistive Switching Characteristics in Electrochemically Synthesized ZnO Films." AIMS Materials Science **2**(2): 28-36.
63. Joseph, S., H. M. Anawar, P. Storer, P. Blackwell, C. Chia, Y. Lin, P. Munroe, S. Donne, J. Horvat, J. Wang and Z. M. Solaiman (2015). "Effects of Enriched Biochars Containing Magnetic Iron Nanoparticles on Mycorrhizal Colonisation, Plant Growth, Nutrient Uptake and Soil Quality Improvement." Pedosphere **25**(5): 749-760.
64. Joseph, S., O. Husson, E. Graber, L. van Zwieten, S. Taherymoosavi, T. Thomas, S. Nielsen, J. Ye, G. Pan, C. Chia, P. Munroe, J. Allen, Y. Lin, X. Fan and S. Donne (2015). "The Electrochemical Properties of Biochars and How They Affect Soil Redox Properties and Processes." Agronomy **5**(3): 322-340.
65. Joseph, S., D. Pow, K. Dawson, D. R. G. Mitchell, A. Rawal, J. Hook, S. Taherymoosavi, L. V. Zwieten, J. Rust, S. Donne, P. Munroe, B. Pace, E. Graber, T. Thomas, S. Nielsen, Y. E. Jun, Y. Lin, G. Pan, L. I. Lianqing and Z. M. Solaiman (2015). "Feeding Biochar to Cows: An Innovative Solution for Improving Soil Fertility and Farm Productivity." Pedosphere **25**(5): 666-679.
66. Joshi, R. K., S. Alwarappan, M. Yoshimura, V. Sahajwalla and Y. Nishina (2015). "Graphene oxide: the new membrane material." Applied Materials Today **1**(1): 1-12.
67. Jung, M., J. N. Hart, D. Boensch, J. Scott, Y. H. Ng and R. Amal (2016). "Hydrogen evolution via glycerol photoreforming over Cu-Pt nanoalloys on TiO_2." Applied Catalysis A: General **518**: 221-230.
68. Jung, M., J. N. Hart, J. Scott, Y. H. Ng, Y. Jiang and R. Amal (2016). "Exploring Cu oxidation state on TiO_2 and its transformation during photocatalytic hydrogen evolution." Applied Catalysis A: General **521**: 190-201.
69. Kabir, R., R. Tian, T. Zhang, R. Donelson, T. T. Tan and S. Li (2015). "Role of Bi doping in thermoelectric properties of $CaMnO_3$." Journal of Alloys and Compounds **628**: 347-351.
70. Kahram, M., M. Asnavandi, P. Koshy and C. C. Sorrell (2015). "Corrosion investigation of duplex stainless steels in chlorinated solutions." Steel Research International, **86**: 1022-1027.
71. Kaneti, Y. V., C. Chen, M. Liu, X. Wang, J. L. Yang, R. A. Taylor, X. Jiang and A. Yu (2015). "Carbon-coated gold nanorods: A facile route to biocompatible materials for photothermal applications." ACS Applied Materials and Interfaces **7**(46): 25658-25668.
72. Kaneti, Y. V., J. Moriceau, M. Liu, Y. Yuan, Q. Zakaria, X. Jiang and A. Yu (2015). "Hydrothermal synthesis of ternary δ-Fe_2O_3-ZnO-Au nanocomposites with high gas-sensing performance." Sensors and Actuators, B: Chemical **209**: 88-897.
73. Kaneti, Y. V., J. Yue, J. Moriceau, C. Chen, M. Liu, Y. Yuan, X. Jiang and A. Yu (2015). "Experimental and theoretical studies on noble metal decorated tin oxide flower-like nanorods with high ethanol sensing performance." Sensors and Actuators, B: Chemical **219**: 83-93.
74. Kapelyushin, Y., Y. Sasaki, J. Zhang, S. Jeong and O. Ostrovski (2015). "In-situ study of gaseous feduction of magnetite doped with alumina using high-temperature XRD analysis." Metallurgical and Materials Transactions B: Process Metallurgy and Materials Processing Science **46**(6): 2564-2572.
75. Kapelyushin, Y., X. Xing, J. Zhang, S. Jeong, Y. Sasaki and O. Ostrovski (2015). "Effect of alumina on the gaseous reduction of magnetite in CO/CO_2 gas mixtures." Metallurgical and Materials Transactions B: Process Metallurgy and Materials Processing Science **46**(3): 1175-1185.
76. Kaya, S., E. Yilmaz, A. Aktag and J. Seidel (2015). "Characterization of interface defects in $BiFeO_3$ metal–oxide–semiconductor capacitors deposited by radio frequency magnetron sputtering." Journal of Materials Science: Materials in Electronics **26**(8): 5987-5993.
77. Khanitchaidecha, W., A. Nakaruk, P. Koshy and K. Futaba (2015). "Comparison of simultaneous nitrification and denitrification for three different reactors." BioMed Research International, **2015**: 901508.
78. Khansur, N. H., M. Hinterstein, Z. Wang, C. Groh, W. Jo and J. E. Daniels (2015). "Electric-field-induced strain contributions in morphotropic phase boundary composition of $(Bi_{½}Na_{½})TiO_3$-$BaTiO_3$ during poling." Applied Physics Letters **107**: 242902.
79. Khansur, N. H., H. Kawashima, S. Wada, J. M. Hudspeth and J. Daniels (2015). "Enhanced extrinsic domain switching strain in core-shell structured $BaTiO_3$-$KNbO_3$ ceramics." Acta Materialia **98**: 182-189.

PUBLICATIONS

80. Khansur, N. H., T. Rojac, D. Damjanovic, C. Reinhard, K. G. Webber, J. A. Kimpton and J. E. Daniels (2015). "Electric-field-induced domain switching and domain texture relaxations in bulk bismuth ferrite." Journal of the American Ceramic Society, **98**: 3884-3890

81. Komiyama, K. M., B. Y. Guo, H. Zughbi, P. Zulli and A. B. Yu (2015). "Numerical analysis of titanium compounds in blast furnace hearth during titania addition." Steel Research International **86**(6): 592-603.

82. Krishnan, P. S. S. R., J. A. Aguiar, Q. M. Ramasse, D. M. Kepaptsoglou, W. I. Liang, Y. H. Chu, N. D. Browning, P. Munroe and V. Nagarajan (2015). "Mapping strain modulated electronic structure perturbations in mixed phase bismuth ferrite thin films." Journal of Materials Chemistry C **3**(8): 1835-1845.

83. Kumar, A., R. Khanna, M. Ikram-ul-Haq, J. Spink and V. Sahajwalla (2015). "Corrosion behavior of Al_2O_3-C refractories with casting mould meniscus slags at 1 550 °C." Steel Research International, **87**: 46-56.

84. Kumar, A., R. Khanna, M. Ikram-Ul-Haq, J. Spink and V. Sahajwalla (2015). "Effect of glaze on the corrosion behavior of ZrO_2-graphite insert of the submerged entry nozzle in the continuous casting of steel." Steel Research International **86**(9): 1004-1013.

85. Kurnia, F. and J. N. Hart (2015). "Band-gap control of zinc sulfide: Towards an efficient visible-light-sensitive photocatalyst." ChemPhysChem **16**(11): 2397-2402.

86. La Fontaine, A., B. Gault, A. Breen, L. Stephenson, A. V. Ceguerra, L. Yang, T. Dinh Nguyen, J. Zhang, D. J. Young and J. M. Cairney (2015). "Interpreting atom probe data from chromium oxide scales." Ultramicroscopy **159**: 354-359.

87. Lang, D., J. Schatte, W. Knabl, R. Dallinger, H. Clemens and S. Primig (2015). "Evolution of strain-induced precipitates in a molybdenum-base Mo-Hf-C alloy." International Journal of Powder Metallurgy **51**(4): 21-25.

88. Lashgari, H. R., Z. Chen, X. Z. Liao, D. Chu, M. Ferry and S. Li (2015). "Thermal stability, dynamic mechanical analysis and nanoindentation behavior of FeSiB(Cu) amorphous alloys." Materials Science and Engineering: A **626**: 480-499.

89. Laws, K. J., C. Crosby, A. Sridhar, P. Conway, L. S. Koloadin, M. Zhao, S. Aron-Dine and L. C. Bassman (2015). "High entropy brasses and bronzes - microstructure, phase evolution and properties." Journal of Alloys and Compounds **650**: 949-961.

90. Laws, K. J., D. B. Miracle and M. Ferry (2015). "A predictive structural model for bulk metallic glasses." Nature Communications **6** Article 8123.

91. Lazo, N., T. Vodenitcharova and M. Hoffman (2015). "Optimised bio-inspired stiffening design for an engine nacelle." Bioinspiration & Biomimetics **10**: 066008.

92. Lee, T. C., P. Koshy, H. Z. Abdullah and M. I. Idris (2015). "Precipitation of bone-like apatite on anodised titanium in simulated body fluid under UV irradiation." Surface and Coatings Technology, **301**: 20-28.

93. Lei, M., W. T. Wang, M. H. Pu, H. Zhang, X. Zhang, Y. Zhang and Y. Zhao (2015). "Preparation of coated conductors with fluorine-free CSD method." IEEE Transactions on Applied Superconductivity **25**(3): 6601704.

94. Leung, S. S. Y., P. Tang, Q. Zhou, Z. Tong, C. Leung, J. Decharaksa, R. Yang and H. K. Chan (2015). "De-agglomeration effect of the US Pharmacopeia and Alberta Throats on carrier-based powders in commercial inhalation products." AAPS Journal **17**(6): 1407-1416.

95. Li, K., R. Khanna, J. Zhang, M. Barati, Z. Liu, T. Xu, T. Yang and V. Sahajwalla (2015). "Comprehensive investigation of various structural features of bituminous coals using advanced analytical techniques." Energy and Fuels **29**(11): 7178-7189.

96. Li, K., J. Zhang, M. Barati, R. Khanna, Z. Liu, J. Zhong, X. Ning, S. Ren, T. Yang and V. Sahajwalla (2015). "Influence of alkaline (Na, K) vapors on carbon and mineral behavior in blast furnace cokes." Fuel **145**: 202-213.

97. Li, M., Q. Li, S. Kuang and Z. Zou (2016). "Transferring characteristics of momentum/energy during oxygen jetting into the molten bath in BOFs: A computational exploration." Steel Research International **87**(3): 288-300.

98. Li, M., M. Liu, S. Joseph, C. Y. Jiang, M. Wu and Z. P. Li (2015). "Change in water extractable organic carbon and microbial PLFAs of biochar during incubation with an acidic paddy soil." Soil Research **53**(7): 763-771.

99. Li, Q., X. Jin, X. Yang, C. Chen, Z. Chen, Y. Qin, T. H. Wei and W. Sun (2015). "Reducing the excess energy offset in organic/inorganic hybrid solar cells: Toward faster electron transfer." Applied Catalysis B: Environmental **162**: 524-531.

100. Li, Q., M. Li, S. Kuang and Z. Zou (2015). "Numerical simulation of the interaction between supersonic oxygen jets and molten slag–metal bath in steelmaking BOF process." Metallurgical and Materials Transactions B: Process Metallurgy and Materials Processing Science **46**(3): 1494-1509.

101. Li, X., G. Zhang, O. Ostrovski and R. Tronstad (2015). "Effect of gas atmosphere on the formation of silicon by reaction of SiC and SiO_2." Journal of Materials Science, **51**(2): 876-884

102. Li, X., G. Zhang, K. Tang, O. Ostrovski and R. Tronstad (2015). "Carbothermal reduction of quartz in different gas atmospheres." Metallurgical and Materials Transactions B: Process Metallurgy and Materials Processing Science **46**(3): 1343-1352.

103. Li, X., G. Zhang, K. Tang, O. Ostrovski and R. Tronstad (2015). "Carbothermal reduction of quartz in methane–hydrogen–argon gas mixture." Metallurgical and Materials Transactions B: Process Metallurgy and Materials Processing Science **46**(5): 2384-2393.

104. Li, X., G. Zhang, R. Tronstad and O. Ostrovski (2016). "Synthesis of SiC whiskers by VLS and VS process." Ceramics International **42**(5): 5668-5676.

105. Li, X., Z. M. Zong, W. W. Ma, J. P. Cao, M. Mayyas, Z. H. Wei, Y. Li, H. L. Yan, D. Wang, R. Yang and X. Y. Wei (2015). "Multifunctional and highly active Ni/microfiber attapulgite for catalytic hydroconversion of model compounds and coal tars." Fuel Processing Technology **134**(C): 39-45.

106. Liao, S. C., Y. L. Chen, W. C. Kuo, J. Cheung, W. C. Wang, X. Cheng, Y. Y. Chin, Y. Z. Chen, H. J. Liu, H. J. Lin, C. T. Chen, J. Y. Juang, Y. L. Chueh, V. Nagarajan, Y. H. Chu and C. H. Lai (2015). "Self-assembled epitaxial core-shell nanocrystals with tunable magnetic anisotropy." Small **11**(33): 4117-4122.

107. Lin, Q., D. Wang, Z. Chen, W. Liu, S. Lim and S. Li (2015). "Periodicity dependence of the built-in electric field in $(Ba_{0.7}Ca_{0.3}TiO_3/Ba(Zr_{0.2}Ti_{0.8})O_3$ ferroelectric superlattices." ACS Applied Materials and Interfaces **7**(47): 26301-26306.

108. Lin, Q., D. Wang and S. Li (2015). "Strong Effect of Oxygen Partial Pressure on Electrical Properties of $0.5Ba(Zr_{0.2}Ti_{0.8})\ O_{3-0.5}(Ba_{0.7}Ca_{0.3})\ TiO_3$ Thin Films." Journal of the American Ceramic Society **98**(7): 2094-2098.

109. Lin, Q. R., S. Li and D. Y. Wang (2015). "Built-in electric field in compositionally graded (1 - *x*) $Ba(Zr_{0.2}Ti_{0.8})\ O_{3-x}(Ba_{0.7}Ca_{0.3})TiO_3$ thin films." RSC Advances **5**(68): 55453-55457.

110. Lin, Q. R., D. Y. Wang, B. C. Luo, R. Ding, D. L. Lorenzen and S. Li (2015). "Composition dependence of ferroelectric and piezoelectric properties of epitaxial (1 - *x*)$Ba(Zr_{0.2}Ti_{0.8})\ O_3$-x$(Ba_{0.7}Ca_{0.3}TiO_3$ thin films prepared by pulsed laser deposition." Applied Surface Science **331**: 477-481.

111. Liu, J. Y., X. Cheng, V. Nagarajan and H. L. Xin (2015). "Understanding growth mechanisms of epitaxial manganese oxide (Mn_3O_4) nanostructures on strontium titanate (STO) oxide substrates." MRS Communications: **5**(2): 277-284.

112. Liu, S., Z. Zhou, K. Dong, A. Yu, D. Pinson and J. Tsalapatis (2015). "Numerical investigation of burden distribution in a blast furnace." Steel Research International **86**(6): 651-661.

113. Liu, S. Y., Q. P. Cao, X. Qian, C. Wang, X. D. Wang, D. X. Zhang, X. L. Hu, W. Xu, M. Ferry and J. Z. Jiang (2015). "Effects of substrate temperature on structure, thermal stability and mechanical property of a Zr-based metallic glass thin film." Thin Solid Films **595**: 17-24.

114. Liu, X., Y. Huang, J. Yun, X. Wen, Z. Lu, T. Zhang, H. Cui, W. Li, C. Y. Lee, S. Xu, X. Hao and G. Conibeer (2015). "Characterization of a Cu_2ZnSnS_4 solar cell fabricated by sulfurization of metallic precursor Mo/Zn/Cu/Sn." Physica Status Solidi (A) Applications and Materials Science **212**(9): 2074-2079.

115. Luo, X., L. T. Tseng, W. T. Lee, G. Z. Xing, T. Liu, S. Li and J. B. Yi (2015). "Monodispersed ZnO quantum dots with Nd doping." Nanoscience and Nanotechnology Letters **7**(5): 417-421.

116. Luo, X., L. T. Tseng, S. Li and J. Yi (2015). "The magnetism of $BiFeO_3$ powders." Functional Materials Letters **8**(2): 1550027.

117. Luo, X., L. T. Tseng, S. Li and J. B. Yi (2015). "Room temperature ferromagnetic ordering of NiO films through exchange coupling." Materials Science in Semiconductor Processing **30**: 228-232.

118. Ma, H. J., K. C. Shen, S. P. Pan, J. Zhao, J. Y. Qin, K. B. Kim and W. M. Wang (2015). "Role of tri-capped triangular prism (TTP) polyhedra in formation and destabilization of Fe-Y-B glassy alloys." Journal of Non-Crystalline Solids **425**: 67-73.

119. Ma, J., D. Zhou, L. Zhao, G. Liang, Y. Zhang and Y. Zhao (2015). "Electromagnetic braking of high temperature superconducting maglev train traveling in evacuated tube transport." Journal of Vacuum Science and Technology **35**(2): 130-136.

120. Mahat, M. M., D. Mawad, G. W. Nelson, S. Fearn, R. G. Palgrave, D. J. Payne and M. M. Stevens (2015). "Elucidating the deprotonation of polyaniline films by X-ray photoelectron spectroscopy." Journal of Materials Chemistry C **3**(27): 7180-7186.

121. Mahjoub, R., K. J. Laws, J. P. Scicluna, J. E. Daniels and M. Ferry (2015). "A first principles molecular dynamics study of the relationship between atomic structure and elastic properties of Mg-Zn-Ca amorphous alloys." Computational Materials Science **96**(Part A): 246-255.

122. Mahjoub, R., W. Xu, B. Gun, K. J. Laws, L. T. Kong, J. F. Li and M. Ferry (2015). "Heterogeneous nucleation at inoculant particles in a glass forming alloy: an ab initio molecular dynamics investigation of interfacial properties and local chemical bonding." Computational Materials Science, **108**(Part A): 94-102

123. Mallick, S., M. S. Kabir and A. Sharif (2015). "Study on the properties of Zn–xNi high temperature solder alloys." Journal of Materials Science: Materials in Electronics, **27**: 3608-3618.

124. Najafzadeh, N., M. Z. Quadir and P. Munroe (2015). "Through Thickness Microstructural and Texture Inhomogeneity Within Al Layers in ARB-Produced Al-Al(Sc) Layered Composite Sheets." Metallurgical and Materials Transactions A: Physical Metallurgy and Materials Science **46**(10): 4772-4782.

125. Nguyen, D. D., L. Devlin, P. Koshy and C. C. Sorrell (2015). "Quantitative x-ray diffraction analysis of anhydrous and hydrated Portland cement – Part 1: Manual methods." Advanced Materials Research **1087**: 493-497.

126. Nguyen, D. D., L. Devlin, P. Koshy and C. C. Sorrell (2015). "Quantitative x-ray diffraction analysis of anhydrous and hydrated Portland cement - Part 2: Computer-based methods." Advanced Materials Research **1087**: 498-503.

127. Nguyen, D. D., L. P. Devlin, P. Koshy and C. C. Sorrell (2015). "Effect of polyvinyl alcohol on rheology of Portland cement pastes." Journal of the Australian Ceramic Society **51**(2): 23-28.

128. Nguyen, D. D., L. P. Devlin, P. Koshy and C. C. Sorrell (2016). "Effects of acetic acid on early hydration of Portland cement." Journal of Thermal Analysis and Calorimetry **123**(1): 489-499.

129. Nguyen, T., J. Zhang and D. Young (2015). "Effect of Si on corrosion of Fe-Cr and Fe-Ni-Cr alloys in wet CO_2 gas." Corrosion Science and Technology **32**(3): 16-21.

130. Nguyen, T. D., J. Zhang and D. J. Young (2015). "Effects of cerium and manganese on corrosion of Fe-Cr and Fe-Cr-Ni alloys in Ar-20CO_2 and Ar-20CO_2-20H_2O gases at 650°C." Corrosion Science **100**: 448-465.

131. Nguyen, T.D., J.Q.Zhang and D.J. Young (2015). "Microstructures of chromia scales grown in CO_2." Mater. High Temp. **32** 16-21.

132. Nguyen, T. D., J. Zhang and D. J. Young (2015). "Water vapor effects on corrosion of Fe–Cr and Fe–Cr–Ni alloys containing silicon in CO_2 gas at 818°C." Oxidation of Metals **83**(5-6): 575-594.

133. Nguyen, T. D., J. Q. Zhang and D. J. Young (2015). "Microstructures of chromia scales grown in CO_2." Materials at High Temperatures **32**(1–2): 16-21.

134. Oddershede, J., M. Majkut, Q. Cao, S. Schmidt, J. P. Wright, P. Kenesei and J. E. Daniels (2015). "Quantitative grain-scale ferroic domain volume fractions and domain switching strains from three-dimensional X-ray diffraction data." Journal of Applied Crystallography **48**: 882-889.

135. Olivares, R. I., D. J. Young, P. Marvig and W. Stein (2015). "Alloys SS316 and Hastelloy-C276 in supercritical CO_2 at high temperature." Oxidation of Metals, **84**: 585-606

136. Pandika, K., P. Koshy, K. K. Kit Ho, N. Kumar and C. C. Sorrell (2015). "Photocatalytic TiO_2 thin films on fluorinated ethylene propylene copolymer (FEP) substrates." Journal of the Australian Ceramic Society **51**(2): 160-170.

137. Pardehkhorram, R., A. Tajarodi, M. Imani, S. Ebrahimi, P. Koshy and C. C. Sorrell (2015). "Simplified synthesis of $Fe_2(MoO_4)_3$ nanoparticles by microwave-assisted combustion." Journal of the Australian Ceramic Society **51**(2): 94-98.

138. Pham, A., C. J. Gil, S. C. Smith and S. Li (2015). "Orbital engineering of two-dimensional materials with hydrogenation: A realization of giant gap and strongly correlated topological insulators." Physical Review B - Condensed Matter and Materials Physics **92**: 035427.

139. Pisitpipathsin, N., P. Kantha, K. Pengpat, M. Promsawut and S. Pojprapai (2015). "Effect of $KNbO_3$ on physical and electrical properties of lead-free $BaTiO_3$ ceramic." Ceramics International **41**(3): 3639-3646.

140. Prasad, R., N. Gorjizadeh, R. Rajarao, V. Sahajwalla and B. R. Bhat (2015). "Plant root nodule like nickel-oxide-multi-walled carbon nanotube composites for non-enzymatic glucose sensors." RSC Advances **5**(56): 44792-44799.

141. Qi, Z., S. B. Kuang and A. B. Yu (2015). "Numerical investigation of the separation behaviours of fine particles in large dense medium cyclones." International Journal of Mineral Processing **142**: 35-45.

142. Qi, Z., A. Younis, D. Chu and S. Li (2015). "A facile and template-free one-pot synthesis of Mn3O4 nanostructures as electrochemical supercapacitors." Nano-Micro Letters: **8**(2): 165-173.

143. Qiao, L., J. H. Jang, D. J. Singh, Z. Gai, H. Xiao, A. Mehta, R. K. Vasudevan, A. Tselev, Z. Feng, H. Zhou, S. Li, W. Prellier, X. Zu, Z. Liu, A. Borisevich, A. P. Baddorf and M. D. Biegalski (2015). "Dimensionality controlled octahedral symmetry-mismatch and functionalities in epitaxial $LaCoO_3$/$SrTiO_3$ heterostructures." Nano Letters **15**(7): 4677-4684.

144. Quin, P., S. Joseph, O. Husson, S. Donne, D. Mitchell, P. Munroe, D. Phelan, A. Cowie and L. Van Zwieten (2015). "Lowering N_2O emissions from soils using eucalypt biochar: the importance of redox reactions." Sci Rep **5**: 16773.

145. Rajagopal, RR., R. Rajarao, V. Sahajwalla (2015). "High temperature transformations of waste printed circuit boards from computer monitor and CPU: Characterisation of residues and kinetic studies". Waste Management (doi:10.1016/j.wasman.2015.11.016)

146. Rajarao, R., R. Farzana, R. Khanna and V. Sahajwalla (2015). "Synthesis of SiC/Si_3N_4 nanocomposite by using automotive waste tyres as resource." Journal of Industrial and Engineering Chemistry **29**: 35-38.

147. Sahajwalla, V., R. Cayumil, R. Khanna, M. Ikram-Ul-Haq, R. Rajarao, P. S. Mukherjee and A. Hill (2015). "Recycling polymer-rich waste printed circuit boards at high temperatures: Recovery of value-added carbon resources." Journal of Sustainable Metallurgy **1**(1): 75-84.

148. Schmitt, L. A., H. Kungl, M. Hinterstein, L. Riekehr, H. J. Kleebe, M. J. Hoffmann, R. A. Eichel and H. Fuess (2015). "The impact of heat treatment on the domain configuration and strain behavior in Pb[Zr,Ti]O_3 ferroelectrics." Journal of the American Ceramic Society **98**(1): 269-277.

149. Seidel, J. (2015). "Ferroelectric nanostructures: Domain walls in motion." Nature Nanotechnology **10**(2): 109-110.

150. Shahbazi, S., X. Wang, J. L. Yang, X. C. Jiang, R. Ryan and A. B. Yu (2015). "Synthesis and surface modification of magnetic nanoparticles for potential applications in sarcomas." Journal of Nanoparticle Research **17**: 257.

151. Shamlaye, K. F., K. J. Laws and M. Ferry (2016). "Supercooled liquid fusion of carbon fibre-bulk metallic glass composites with superplastic forming properties." Scripta Materialia **111**: 127-130.

152. Sharma, N., E. Gonzalo, J. C. Pramudita, M. H. Han, H. E. A. Brand, J. N. Hart, W. K. Pang, Z. Guo and T. Rojo (2015). "The unique structural evolution of the O_3-phase $Na_{2/3}Fe_{2/3}Mn_{1/3}O_2$ during high rate charge/discharge: A sodium-centred perspective." Advanced Functional Materials **25**(31): 4994-5005.

153. Shen, Y. and A. Yu (2015). "Characterization of coal burnout in the raceway of an ironmaking blast furnace." Steel Research International **86**(6): 604-611.

154. Sul, J. H., B. G. Prusty and A. Crosky (2015). "Effect of the addition of multi-walled carbon nanotubes on the thermomechanical properties of epoxy resin." Polymer Composites, doi:10.1002/pc.23757

155. Tang, C., H. F. Wilson, M. J. S. Spencer and A. S. Barnard (2015). "Catalytic potential of highly defective (211) surfaces of zinc blende ZnO." Physical Chemistry Chemical Physics **17**(41): 27683-27689.

156. Thurnheer, P., R. Maaß, K. J. Laws, S. Pogatscher and J. F. Löffler (2015). "Dynamic properties of major shear bands in Zr-Cu-Al bulk metallic glasses." Acta Materialia **96**: 428-436.

157. Tian, Z. A., K. J. Dong and A. B. Yu (2015). "Structural evolution in the crystallization of rapid cooling silver melt." Annals of Physics **354**: 499-510.

158. Tian, Z. A., L. L. Zhou, Y. F. Mo, Y. C. Liang and R. S. Liu (2015). "Cooling rate dependence of polymorph selection during rapid solidification of liquid metal zinc." Transactions of Non-Ferrous Metals Society of China (English Edition) **25**(12): 4072-4079.

PUBLICATIONS

159. Tong, Z., A. Yu, H. K. Chand and R. Yang (2015). "Discrete modelling of powder dispersion in dry powder inhalers - A brief review." Current Pharmaceutical Design **21**(27): 3966-3973.

160. Usher, T. M., I. Levin, J. E. Daniels and J. L. Jones (2015). "Electric-field-induced local and mesoscale structural changes in polycrystalline dielectrics and ferroelectrics." Scientific Reports **5**: 14678.

161. Vodenitcharova, T. M., Y. Kong, L. Shen, P. Dayal and M. Hoffman (2015). "Nano/micro mechanics study of nanoindentation on Al/Pd nanofilms." Journal of Materials Research **30**(5): 699-708.

162. Walker, J., P. Bryant, V. Kurusingal, C. Sorrell, D. Kuscer, G. Drazic, A. Bencan, V. Nagarajan and T. Rojac (2015). "Synthesis-phase-composition relationship and high electric-field-induced electromechanical behavior of samarium-modified $BiFeO_3$ ceramics." Acta Materialia **83**: 149-159.

163. Walker, J., B. Budic, P. Bryant, V. Kurusingal, C. Sorrell, A. Bencan, T. Rojac and N. Valanoor (2015). "Robust polarization and strain behavior of sm-modified $BiFeO_3$ piezoelectric ceramics." IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control **62**(1): 83-87.

164. Wang, F., Y. W. Mai, D. Wang, R. Ding and W. Shi (2015). "High quality barium titanate nanofibers for flexible piezoelectric device applications." Sensors and Actuators, A: Physical **233**: 195-201.

165. Wang, J., R. Zeng, G. Du, W. Li, Z. Chen, S. Li, Z. Guo and S. Dou (2015). "Rapid microwave-assisted synthesis of various MnO_2 nanostructures and their magnetic properties." Materials Chemistry and Physics **166**: 42-48.

166. Wang, L., Y. Cui, J. Yang, C. Zhang, D. Cai, J. Zhang, Y. Sasaki and O. Ostrovski (2015). "Melting properties and viscosity of SiO_2-CaO-Al_2O_3-B_2O_3 system." Steel Research International **86**(6): 670-677.

167. Wang, N., T. Hang, D. Chu and M. Li (2015). "Three-dimensional hierarchical nanostructured Cu/Ni–Co coating electrode for hydrogen evolution reaction in alkaline media." Nano-Micro Letters **7**(4): 347-352.

168. Wang, S. Y., E. Eroles, P. Koshy and C. C. Sorrell (2015). "Investigation of failure of tile adhesive mortars subjected to prolonged water immersion." Journal of the Australian Ceramic Society **51**(2): 123-129.

169. Wang, Y., X. Luo, L. T. Tseng, Z. Ao, T. Li, G. Xing, N. Bao, K. Suzukiis, J. Ding, S. Li and J. Yi (2015). "Ferromagnetism and crossover of positive magnetoresistance to negative magnetoresistance in Na-doped ZnO." Chemistry of Materials **27**(4): 1285-1291.

170. Wang, Y., J. Piao, G. Xing, Y. Lu, Z. Ao, N. Bao, J. Ding, S. Li and J. Yi (2015). "Zn vacancy induced ferromagnetism in K doped ZnO." Journal of Materials Chemistry C **3**(45): 11953-11958.

171. Wang, Z., W. T. Wang, X. Zhang, M. Lei, M. J. Wang and Y. Zhao (2015). "Influence of metal cation concentration on structure and performance of $SmBa_2Cu_3O7_{-z}$; superconducting films by non-fluorine CSD method." Materials Letters **153**: 73-76.

172. Waske, A., L. Giebeler, B. Weise, A. Funk, M. Hinterstein, M. Herklotz, K. Skokov, S. Fähler, O. Gutfleisch and J. Eckert (2015). "Asymmetric first-order transition and interlocked particle state in magnetocaloric $La(Fe,Si)_{13}$." Physica Status Solidi - Rapid Research Letters **9**(2): 136-140.

173. Wei, X. X., X. Lin, W. Xu, Q. S. Huang, M. Ferry, J. F. Li and Y. H. Zhou (2015). "Remelting-induced anomalous eutectic formation during solidification of deeply undercooled eutectic alloy melts." Acta Materialia **95**: 44-56.

174. Wu, W. C., Z. M. Ao, C. H. Yang, S. Li, G. X. Wang, C. M. Li and S. Li (2015). "Hydrogenation of silicene with tensile strains." Journal of Materials Chemistry C **3**(11): 2593-2602.

175. Wu, Y. Q., J. A. Arsecularatne and M. Hoffman (2015). "Effect of acidity upon attrition-corrosion of human dental enamel." Journal of the Mechanical Behavior of Biomedical Materials **44**: 23-34.

176. Xiao, H. Y., W. J. Weber, Y. Zhang, X. T. Zu and S. Li (2015). "Electronic excitation induced amorphization in titanate pyrochlores: An ab initio molecular dynamics study." Scientific Reports **5**: 8265.

177. Xiong, X., R. Tian, X. Lin, D. Chu and S. Li (2015). "Formation and photocatalytic activity of $BaTiO_3$ nanocubes via hydrothermal process." Journal of Nanomaterials **2015**: 692182.

178. Xiong, X., R. Tian, X. Lin, D. Chu and S. Li (2015). "Thermoelectric properties of sol-gel derived lanthanum titanate ceramics." RSC Advances, **5**: 14735-14739.

179. Xu, J., Z. Li, S. Xu, P. Munroe and Z. H. Xie (2015). "A nanocrystalline zirconium carbide coating as a functional corrosion-resistant barrier for polymer electrolyte membrane fuel cell application." Journal of Power Sources **297**: 359-369.

180. Xu, J., L. Liu, P. Munroe and Z. H. Xie (2015). "Promoting bone-like apatite formation on titanium alloys through nanocrystalline tantalum nitride coatings." Journal of Materials Chemistry B **3**(19): 4082-4094.

181. Xu, J., Ma, A., Xu, Z., Liu, X., Chu, D. and Xu, H. (2015). "Synthesis of Au and Pt hollow capsules with single holes via Pickering emulsion strategy." The Journal of Physical Chemistry Part C: Nanomaterials and Interfaces, **119**(50): 28055-28060.

182. Xu, J., S. Xu, P. Munroe and Z. H. Xie (2015). "A ZrN nanocrystalline coating for polymer electrolyte membrane fuel cell metallic bipolar plates prepared by reactive sputter deposition." RSC Advances **5**(82): 67348-67356.

183. Xu, W., N. Birbilis, G. Sha, Y. Wang, J. E. Daniels, Y. Xiao and M. Ferry (2015). "A high-specific-strength and corrosion-resistant magnesium alloy." Nature Materials **14**(12): 1229-1235.

184. Xu, W., Q. Zeng and A. Yu (2015). "Prediction of the overall Young's moduli of clay-based polymer nanocomposites." Journal of Composite Materials **49**(28): 3459-3469.

185. Xu, W., L. Zhou, W. Sun, J. Zhang and W. Tu (2015). "Effect of difunctional acids on the physicochemical, thermal, and mechanical properties of polyester polyol-based polyurethane coatings." Journal of Applied Polymer Science **132**(2): 41246.

186. Yamini, S. A., Mitchell, D. R. G., Gibbs, Z. M., Santos, R., Patterson, V., Li, S., Pei, Y. Z., Dou, S. X. and J. Snyder, G. (2015). "Heterogeneous distribution of sodium for high thermoelectric performance of p-type multiphase lead-chalcogenides." Advanced Energy Materials **5**(21): 1501047.

187. Yan, Y., S. Li, Z. Yu, L. Liu, C. Yan, Y. Zhang and Y. Zhao (2014). "Influence of indium concentration on the structural and optoelectronic properties of indium selenide thin films." Optical Materials **38**: 217-222.

188. Yang, J., Y. Cui, L. Wang, Y. Sasaki, J. Zhang, O. Ostrovski and Y. Kashiwaya (2015). "In-situ study of crystallization behaviour of a mold flux using single and double hot thermocouple technique." Steel Research International **86**(6): 636-643.

189. Yang, W. J., Z. Y. Zhou and A. B. Yu (2015). "Discrete particle simulation of solid flow in a three-dimensional blast furnace sector model." Chemical Engineering Journal, **278**: 339-352.

190. Yang, W. J., Z. Y. Zhou and A. B. Yu (2015). "Particle scale studies of heat transfer in a moving bed." Powder Technology **281**: 99-111.

191. Yang, W. J., Z. Y. Zhou, A. B. Yu and D. Pinson (2015). "Particle scale simulation of softening-melting behaviour of multiple layers of particles in a blast furnace cohesive zone." Powder Technology **279**: 134-145.

192. Yang, X., V. Salles, Y. V. Kaneti, M. Liu, M. Maillard, C. Journet, X. Jiang and A. Brioude (2015). "Fabrication of highly sensitive gas sensor based on Au functionalized WO_3 composite nanofibers by electrospinning." Sensors and Actuators, B: Chemical **220**: 1112-1119.

193. Yang, Z., Q. Meng, W. Yan, J. Lv, Z. Guo, X. Yu, Z. Chen, T. Guo and R. Zeng (2015). "Novel three-dimensional tin/carbon hybrid core/shell architecture with large amount of solid cross-linked micro/nanochannels for lithium ion battery application." Energy **82**: 960-967.

194. Yao, C., S. Joseph, L. I. Lianqing, G. Pan, Y. Lin, P. Munroe, B. Pace, S. Taherymoosavi, L. V. Zwieten, T. Thomas, S. Nielsen, Y. E. Jun and S. Donne (2015). "Developing more effective enhanced biochar fertilisers for improvement of pepper yield and quality." Pedosphere **25**(5): 703-712.

195. Yavuz, M., M. Knapp, S. Indris, M. Hinterstein, W. Donner and H. Ehrenberg (2015). "X-ray total scattering investigation of $Al_{0.57}Sn_{0.43}O_{1.71}$ nanoparticles." Journal of Applied Crystallography **48**: 1699-1705.

196. Yi, J., W. Xu, X. Xiong, L. Kong, M. Ferry and J. Li (2015). "Abnormal crystallization behaviour of an $(Al_{86}Ni_9La_5)_{98}Si_2$ amorphous alloy." Materials Letters **159**: 403-405.

197. Yi, J. J., W. Xu, X. Z. Xiong, L. T. Kong, M. Ferry and J. F. Li (2015). "Influence of mutual substitution between la and Gd on the glass-forming ability of Al-Ni-La-Gd alloys." Journal of Alloys and Compounds **628**: 245-250.

198. Yi, L. Y., K. J. Dong, R. P. Zou and A. B. Yu (2015). "Radical tessellation of the packing of spheres with a log-normal size distribution." Physical Review E - Statistical, Nonlinear, and Soft Matter Physics **92**(3): 032201.

199. Younis, A., D. Chu, Y. V. Kaneti and S. Li (2015). "Tuning the surface oxygen concentration of {111} surrounded ceria nanocrystals for enhanced photocatalytic activities." Nanoscale **17**(8): 378-387.

200. Younis, A., D. Chu and S. Li (2015). "Ethanol-directed morphological evolution of hierarchical CeOx architectures as advanced electrochemical capacitors." Journal of Materials Chemistry A **3**(26): 13970-13977.

201. Younis, A., D. Chu and S. Li (2015). "Evidence of filamentary switching in oxide-based memory devices via weak programming and retention failure analysis." Scientific Reports **5**: 13599.

202. Yu, A. and K. Chu (2015). "Editorial on the special issue - Mineral processing in Australia and China." International Journal of Mineral Processing **142**: 1.

203. Yu, C., T. D. Nguyen, J. Zhang and D. Young (2015). "Effect of sulphur on Fe-20Cr-(Mn, Si) alloy corrosion in CO_2-H_2O gases at 650°C." ECS Transactions **66**: 23-39.

204. Yu, C., T. D. Nguyen, J. Zhang and D. J. Young (2015). "Corrosion of Fe-9Cr-(Mn, Si) alloys in CO_2-H_2O-SO_2 gases." Corrosion Science **98**: 516-529.

205. Yu, S., W. Zheng, Z. Ao and S. Li (2015). "Confinement of massless Dirac fermions in the graphene matrix induced by the B/N heteroatoms." Physical Chemistry Chemical Physics **17**(8): 5586-5593.

206. Yuan, Y., Y. V. Kaneti, M. Liu, F. Jin, D. F. Kennedy, X. Jiang, J. Huang and A. Yu (2015). "Seed-mediated synthesis of dendritic platinum nanostructures with high catalytic activity for aqueous-phase hydrogenation of acetophenone." Journal of Energy Chemistry **24**(5): 660-668.

207. Yun, J. S., A. Ho-Baillie, S. Huang, S. H. Woo, Y. Heo, J. Seidel, F. Huang, Y. Cheng and M. A. Green (2015). "Benefit of grain boundaries in organic–inorganic Halide Planar perovskite solar cells." The Journal of Physical Chemistry Letters **6**(5): 875-880.

208. Yun, S., C. S. Woo, G. Y. Kim, P. Sharma, J. H. Lee, K. Chu, J. H. Song, S. Y. Chung, J. Seidel, S. Y. Choi and C. H. Yang (2015). "Ferroelastic twin structures in epitaxial WO_3 thin films." Applied Physics Letters **107**: 252904.

209. Zhang, D., G. Pan, G. Wu, G. W. Kibue, L. Li, X. Zhang, J. Zheng, J. Zheng, K. Cheng, S. Joseph and X. Liu (2014). "Biochar helps enhance maize productivity and reduce greenhouse gas emissions under balanced fertilization in a rainfed low fertility inceptisol." Chemosphere, **142**: 106-113

210. Zhang, L., T. T. Tan and S. Li (2015). "The effect of annealing oxygen concentration in the transformation of $CaxCoO_2$ to thermoelectric $Ca_3Co_4O_9$." RSC Advances **5**(36): 28158-28162.

211. Zhang, Q., N. Valanoor and O. Standard (2015). "Epitaxial (001) $BiFeO_3$ thin-films with excellent ferroelectric properties by chemical solution deposition-the role of gelation." Journal of Materials Chemistry C **3**(3): 582-595.

212. Zhang, X., Y. Zhao, Y. Xia, C. Guo, C. H. Cheng, Y. Zhang and H. Zhang (2015). "Growth of thick $La_2Zr_2O_7$ buffer layers for coated conductors by polymer-assisted chemical solution deposition." Physica C: Superconductivity and its Applications **513**: 18-23.

213. Zhang, Y., J. A. Arsecularatne and M. Hoffman (2015). "The effects of three different food acids on the attrition-corrosion wear of human dental enamel." Journal of Physics D - Applied Physics **48**: 285401.

214. Zhao, Y., H. Xu, X. Zhang, G. Zhu, Y. Yao, S. Lu and A. Yu (2015). "Facile synthesis and optical performance of $Y_{2.9}Ce_{0.1}Al_5O_{12}$ phosphor thick films from sol-gel method." Journal of the American Ceramic Society **98**(4): 1043-1046.

215. Zheng, Q. J. and A. B. Yu (2015). "Finite element investigation of the flow and stress patterns in conical hopper during discharge." Chemical Engineering Science **129**: 49-57.

216. Zheng, Q. J. and A. B. Yu (2015). "Modelling the granular flow in a rotating drum by the Eulerian finite element method." Powder Technology **286**: 361-370.

217. Zhou, D., J. Ma, L. Zhao, Y. Zhang, J. Guo and Y. Zhao (2015). "Design of ring-shaped accelerator for high-temperature superconducting maglev trains moving in evacuated tube." Zhenkong Kexue yu Jishu Xuebao/Journal of Vacuum Science and Technology **35**(4): 391-398.

218. Zhou, D., D. Zhang, C. Kong, P. Munroe and R. Torrens (2015). "Grain and nanoparticle coarsening of an ultrafine structured Cu-5 vol.% Al_2O_3 nanocomposite during isochronal annealing." Journal of Alloys and Compounds **642**: 83-91.

219. Zhou, T., Y. Zheng, H. Gao, S. Min, S. Li, H. K. Liu and Z. Guo (2015). "Surface Engineering and Design Strategy for Surface-Amorphized TiO_2@Graphene Hybrids for High Power Li-Ion Battery Electrodes." Advanced Science **2**: 1500027.

220. Zhou, Y., K. Liu, H. Xiao, X. Xiang, J. Nie, S. Li, H. Huang and X. Zu (2015). "Dehydrogenation: A simple route to modulate magnetism and spatial charge distribution of germanane." Journal of Materials Chemistry C **3**(13): 3128-3134.

221. Zhou, Y., Q. Liu, H. Xiao, X. Xiang, X. Zu and S. Li (2015). "Mechanism for hydrogen-promoted information of helium polymer in silicon carbide material: A diffusion study." Journal of Alloys and Compounds **647**: 167-171.

222. Zhu, B., T. Zhang, R. Tian, T. T. Tan, R. Donelson and S. Li (2015). "Enhancement of thermoelectric properties in Sn doped $(In_{0.95}Lu_{0.05})_2O_3$." Journal of Alloys and Compounds **644**: 119-123.

BOOKS

223. Kong, L. B., Y. Z. Huang, W. X. Que, T. S. Zhang, S. Li, J. Zhang, Z. L. Dong and D. Y. Tang (2015). Transparent Ceramics, Springer.

BOOK CHAPTERS

224. Crosky, A., C. Grant, D. Kelly, X. Legrand and G. Pearce (2015). Fibre placement processes for composites manufacture. Advances in Composites Manufacturing and Process Design, Elsevier**:** 79-92.

225. Idapalapati, S., X. Song, V. Reddy, N. Srikanth, F. Pahlevani, K. R. Narayanan and M. Zarinejad (2015). Materials in metal forming. Handbook of Manufacturing Engineering and Technology, Springer**:** 231-284.

226. Joseph, S. D., M. L. Anh, A. Clare and S. Shackley (2015). Socio economic feasibility, implementation and evaluation of small-scale biochar projects. Biochar for Environmental Management: Science and Technology. S. Joseph and J. Lehmann, Routledge. **Second Edition:** 853-880.

227. Joseph, S. D. and J. Lehmann (2015). Biochar for environmental management: an introduction. Biochar for Environmental Management: Science and Technology. S. Joseph and J. Lehmann, Routledge. **Second Edition:** 1-14.

228. Joseph, S. D., S. Shackley, A. Clare, B. A. McCarl and H. P. Schmidt (2015). Economic evaluation of biochar systems: current evidence and challenges. Biochar for Environmental Management: Science and Technology. S. Joseph and J. Lehmann, Routledge. **Second Edition:** 813-852.

229. Khanna, R., M. Ikram-ul-Haq and V. Sahajwalla V (2015). Influence of wettability and reactivity on refractory degradation: Interactions of molten iron and slags with steelmaking refractories at 1550 °C. Surface Energy and Wetting, Dr Mahmood Aliofkhazraei (Ed.), Intech, pp. 271-294.

230. Khanna, R., I. Mansuri and V. Sahajwalla (2015). Wettability of Carbonaceous Materials with Molten Iron at 1550°C. Surface Energy and Wetting, Dr Mahmood Aliofkhazraei (Ed.), Intech, pp. 357-374

231. Li, S., L. B. Kong, Y. Huang, T. Zhang, W. Que, Z. Dong and D. Y. Tang (2015). Processing and applications of transparent ceramics. Encyclopedia of Inorganic and Bioinorganic Chemistry. R. A. Scott, John Wiley & Sons, Ltd. **1:** 1-27.

232. Munroe, P. R., C. H. Chia and A. Downie (2015). Characteristics of biochar: Physical and structural properties. Biochar for Environmental Management: Science and Technology. S. Joseph and J. Lehmann, Routledge. **Second Edition:** 89-110.

233. Van Zwieten, L., C. Kammann, M. L. Cayeula, B. P. Singh, S. Joseph, S. Kimber, S. Donne, T. Clough and K. Spokas (2015). Biochar effects on nitrous oxide and methane emissions from soil. Biochar for Environmental Management Science, Technology and Implementation. S. Joseph and J. Lehmann, Routledge. **Second Edition:** 489-520.

CONFERENCE PROCEEDINGS

234. Chen, C., T. Zhang, R. Donelson, D. Chu, T. T. Tan and S. Li, "Theremoelectric Properties of $Na_{0.8}Co_1$-xfexo$_2$ ceramic prepared by spark plasma sintering," 38th International Conference on Advanced Ceramics and Composites (ICACC), Daytona Beach, FL, American Ceramic Society.

235. Dankwah, J. R., E. Baarwuah, J. Dankwah, F. Awotwe-Appiah and P. Koshy, "Generation of Carbonaceous Material from "Pure Water Sachets" and their Subsequent Utilisation as Reductants for the Opon Mansi Iron Ore," Conference of Metallurgists (COM 2015), Toronto Canada.

236. Dankwah, J. R., J. Dankwah, F. Awotwe-Appiah, A. Y. Fosu and P. Koshy, "Carbothermal Upgrading of the Awaso Bauxite Ore using Waste Polypropylene as Reducing Agent," Conference of Metallurgists (COM 2015), Toronto Canada.

237. Ferry, M., M. Z. Quadir, N. Afrin, W. Xu, A. Loeb, B. Soe, C. McMahon, C. George and L. Bassman, "Uncovering the true nature of deformation microstructures using 3D analysis methods," IOP Conference Series: Materials Science and Engineering

238. Guo, B., A. Yu and J. Guo, "Numerical modelling of ESP for design optimization," New Paradigm of Particle Science and Technology Proceedings of the 7th World Congress on Particle Technology.

PUBLICATIONS

239. Gupta, S., P. Koshy and C. C. Sorrell, "High Temperature Characteristics of Coke in Blast Furnaces," 10th CSM Steel Congress & the 6th Baosteel Biennial Academic Conference, Shanghai.

240. Hang, T., J. Glaum, T. T. Phung and M. Hoffman, "Partial discharge characteristics of piezoelectric ceramics under bipolar and unipolar applied voltages," 2015 IEEE 11th International Conference on the Properties and Applications of Dielectric Materials (ICPADM), Sydney, Australia, IEEE.

241. Ibraheem, S., S. Devasahayam, O. Standard and S. Bandyopadhyay, "Use of Secondary Ion Mass Spectrometry (SIMS) to identify fly ash mineral spatial and particulate distribution in epoxy polymer," Elsevier, Second Australia-China Joint Symposium on Minerals and Metallurgy.

242. Islam, M. A., J. Escobedo-Diaz, P. J. Hazell, G. J. Appleby-Thomas and Z. Quadir, "Characterisation of closed-cell aluminium foams subjected to compressive loading," TMS 2015 144th Annual Meeting and Exhibition, Orlando, Florida, USA, Wiley.

243. Johnstone, M., B. Guo and A. Yu, "The effect of material property on flow in oscillatory baffled columns," IMECS 2015, Hong Kong.

244. Jullian, D., A. Prillieux, J. Zhang, D. Hibbert and D. Young, "Oxygen solubility in Fe-Ni alloys at high temperature in Rhines packs and in gas mixtures," Corrosion and Prevention 2015, Adelaide, Australasian Corrosion Association.

245. Kumar, A., V. Choudhary, R. Khanna, R. Cayumil, M. Ikram-ul-Haq, V. Sahajwalla, "Transforming polymeric waste from electronic and automotive sectors into value-added commercial products," 15th International Waste Management and Landfill Symposium, Sardinia, Italy

246. Li, X., G. Zhang, K. Tang, O. Ostrovski and R. Tronstad, "Synthesis of silicon carbide by carbothermal reduction of quartz in H2-Ar gas mixtures," The Fourteenth International Ferroalloys Congress INFACON XIV, Kiev, Ukraine, Interservice Kiev.

247. Maroufi, S., G. Ciezki, S. Jahanshahi, S. Sun and O. Ostrovski, "Dissolution of silica in slag in silicomanganese production," The Fourteenth International Ferroalloys Congress INFACON XIV, Kiev, Ukraine, Interservice, Kiev.

248. Nguyen, T., J. Zhang and D. Young, "Effect of Mn on corrosion of Fe-Cr and Fe-Cr-Ni alloys in dry CO_2 at 650°C," Corrosion and Prevention 2015, Adelaide.

249. Nguyen, T. D., J. Zhang and D. J. Young, "Effect of Mn on corrosion of Fe-Cr and Fe-Cr-Ni alloys in dry and wet CO_2 gas," Corrosion & Prevention 2014, Darwin, Australia.

250. Saini, R., R. Khanna, RK. Dutta, R. Cayumil, M. Ikram-ul-Haq, R. Rajarao, V. Sahajwalla and V. Agarwala, "A novel approach for reducing toxic emissions during processing of hazardous e-waste," 15th International Waste Management and Landfill Symposium, Sardinia, Italy

251. Soatthiyanon, N. and A. Crosky, "Comparison of experimental and calculated tensile properties of flax fibres," Second International Conference on Performance-based and Lifecycle Structural Engineering (PLSE 2015), Brisbane, Australia.

252. Soatthiyanon, N. and A. Crosky, "Elementary kenaf fibre extraction," Second International Conference on Performance-based and Lifecycle Structural Engineering (PLSE 2015), Brisbane, Australia.

253. Sorrell, C., P. Koshy and S. Gupta, "Multimodule System for Wastewater Treatment by Photocatalysis," 10th CSM Steel Congress & the 6th Baosteel Biennial Academic Conference, Shanghai.

254. Vandermaat, D., E. Elias, S. Saydam, A. Crosky, P. C. Hagan and P. Craig, "Bent beam coupon testing for the investigation of stress corrosion cracking in rockbolts," 13th International Congress of Rock Mechanics, Montreal, Canada, ISRM.

255. Xing, X., H. Rogers, G. Zhang, P. Zulli and O. Ostrovski, "Macrostrength and pore structure of coke subjected to gasification and annealing under blast furnace conditions," AISTech 2015

256. Yang, J., G. Zhang, S. Jahanshahi and O. Ostrovski, "Reduction of a garnieritic laterite ore by CO-CO_2 gas mixtures," The Fourteenth International Ferroalloys Congress INFACON XIV, Kiev, Ukraine, Interservice Kiev.

257. Young, D. J., V. P. Deodeshmukh, H. Li and P. Crook, "A study of the behaviour of several high-chromium nickel alloys under conditions conducive to metal dusting," Corrosion 2015, NACE, Houston TX 2015.

258. Yu, C., J. Zhang and D. Young, "Corrosion behaviour of ferritic Fe-Cr alloys in CO_2-H_2O-SO_2 gases at 800C," Corrosion and Prevention 2015, Adelaide, Australasian Corrosion Association.

259. Zhou, Y., D. Zhou, D. R. G. Mitchell, N. Valanoor and P. Munroe, "Analysis of interfacial structure and chemistry in FeV_2O_4-based heterostructures on (001)-oriented $SrTiO_3$," Journal of Physics: Conference Series, **644**: 012003.

19TH INTERNATIONAL MICROSCOPY CONGRESS

IMC19

Sydney 9-14 September 2018

International Convention Centre

INDUSTRY PARTNERS AND SPONSORS

School of Materials Science and Engineering
UNSW Australia
Sydney NSW 2052
Australia

Enquiries:
T: +61 (0)2 9385 7298
F: +61 (0)2 9385 6565
E: enquiries@materials.unsw.edu.au
W:materials.unsw.edu.au

Project Coordinator & Editor:
Joanne Hallis

Cover:
Background image by Arslan Khalid (Postgraduate Student)

Design:
Helena Brusic
The Imagination Agency Pty Ltd
hb.businessacc@gmail.com

Print:
FAASTPRINT

Cricos Provider Number: 00098G