





Facilitating **Access** to landmark scientific infrastructure

Engaging with **Industry** to enhance funding opportunities and ensure relevance of nuclear education and training

Providing an **effective Network** between all stakeholders of nuclear science and engineering

Stimulating and supporting students and early career researchers in pursuing a career in nuclear science and engineering

Playing a leading role in nuclear **Education** and training

Contents

AINSE 2015 Annual Report - From the President and the Managing Director	4
AINSE Board 2015	6
Vision, Mission and Strategic Priorities	7
Research Highlights	8
Early Career Researcher Talks	33
AINSE Winter School 2015	35
Asia Oceania Conference on Neutron Scattering (AOCNS)	37
Postgraduate Research Award Orientation "O" Week 2015	39
2015 Conferences and Workshops	40
2015 International Travel Scholarships	41
2015 Conferences and Workshops	42
AINSE Gold Medals Awards	43
2015 AINSE Outreach Activities	45
AINSE Council 2015 - Member Organisations and Representative at Council	46
AINSE Board Meetings	48
AINSE Staff	48
AINSE Winter School Committee	48
AINSE Specialist Committees - 2015	49
2015 AINSE Finances	50
Celebrating 58 Years - 1958 - 2016	79
AINSE Honours Scholarships	80
John Ferris Memorial Award	83
AINSE Postgraduate Research Awards	84
PhD theses of Postgraduate Scholars received during 2015	85
Postgraduate Scholars, and their projects, who were supported during 2015	86
AINSE Research Awards - 2015	91
Bragg Proposal Travel & Accommodation Support - 2015	100
AINSE Research Fellows	110
AINSE Supported Publications 2015	112
Member Codes	126
Contact AINSE Ltd	127

AINSE 2015 Annual Report

From the President and the Managing Director

The past year has been a turning point in the evolution of AINSE. The year marks fifty eight years of AINSE service to the nuclear science and engineering community and never before has there been a more significant change in how it operates. When reading through the fifty year history book of the Institute it is clear that AINSE has had periods of significant challenge throughout the decades. However throughout its course it has remained steadfast in its purpose of bringing the academic communities and ANSTO together in research collaboration.

In early years AINSE had a strong transactional focus on providing facility access for the university sector. AINSE continues to facilitate access to ANSTO capabilities and expertise but a greater emphasis is now via its early career research awards. This is through AINSE signature programs targeting senior undergraduate to postgraduate students. Collaboration is at the heart of what we do and one of AINSE's enduring principles is the awarding of travel grants to successful award recipients, regardless of their distance from Lucas Heights. This has not changed and reflects a proud tradition.

Close association and collaboration encourages important insights, discoveries and innovation. A significant change proposed this year has been the introduction of industry and individual member categories. Developing the structure that encourages an expanded membership base will ensure AINSE is even more inclusive of our entire community and puts our researchers in close contact with our industry partners.

From the beginning of 2016 the determination of member subscriptions for the university sector changes. Previously subscriptions were calculated using a retrospective benefit formula determined over the past three years. This meant individual membership levels potentially moved up or

down a level corresponding to awards received. The new institutional subscription model is based on the Research Block Grant funding allocation for Australian universities and the Performance-Based Research Fund for New Zealand universities.

The basic tenant is that those members who receive greater government appropriation have a capacity to participate more than those universities with a smaller research funding allocation. We also believe this to be an enduring principle of equity and fairness that will stand the test of time and allows our members to forecast their budgets with greater certainty and transparency.

Despite the changes that have been implemented this year, members of AINSE continue to have access to the established programs they appreciate. Facility access to the equipment and capabilities of ANSTO have been harmonised through the new ANSTO Research Portal. One user office for all points of enquiry now removes the varied and multiple entry points to ANSTO for our users. Simplification of processes and clarification of responsibility should now be of benefit for everyone.

The Winter School continues to inspire students to consider further education and training in nuclear science and engineering. A record number of participants attended this year; forty four students from almost every AINSE member. 2013 and 2014 held the previous participation record at forty two students. Introduced for the first time this year was the production of a student research project book. This book listed various project proposals recommended by ANSTO scientists for students to potentially undertake if interested in pursuing a career in research. The Secretariat continues to refine the Winter School program based on student feedback.

The Honours and Postgraduate Research Awards (PGRA) also go from strength to strength and are vitally important in ensuring a strong talent pipeline exists into the future. In 2014 AINSE awarded nine honours scholarships to students from eight different institutions. In 2015, the number of grants awarded tripled to twenty eight. Similarly, the PGRA program continues to grow in popularity and success. Between 2013 and 2014 AINSE doubled the number of awards to eighteen students. Thirty five new projects were awarded in 2015, almost another doubling in awards offered. AINSE has now helped train three hundred and seventy one students since the program began and continues to attract the best and brightest of students to our community.

This year also saw the introduction of a new program, the Postgraduate Research Award Orientation "O" Week. Similar to the successful Winter School program, the 2015 PGRA cohort attended a week long orientation at AINSE that included site tours, presentations, networking and social activities. By every account, the event proved most worthwhile.

Finally, as AINSE continues to transition and evolve, we need to balance these requirements with benefits flowing to members. Despite new initiatives and resources required to effect these changes, our financial position remains strong. The work and dedication of the AINSE Board, Specialist Committees and our members generally have been instrumental throughout this change program. The AINSE Secretariat deserves a very special mention. This group is small in number, loyal and hardworking. How they have performed and handled themselves in ambiguous times is testament to a great team and a belief and passion in what AINSE is and strives to be.



E/Professor Robert Burford - President



Dr Paul Di Pietro - Managing Director

***Enhancing Australia's capability in
nuclear science and engineering by
facilitating world-class
research and education***

AINSE Board 2015



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Vision, Mission and Strategic Priorities

Vision

AINSE will be a leading authority and resource in addressing Australia's societal challenges through nuclear science and engineering





Research Highlights

Archaeology and Geosciences	p. 9
Biotechnology and Biomedical Sciences	p. 15
Environmental Sciences	p. 19
Materials Science and Engineering	p. 28

Improving the periodisation of Myanmar's early urban system

Bob Hudson, University of Sydney

Figure 1 Pyu jewellery included miniature gold conch beads. A rice grain gives an idea of their size.



In 2014, three ancient walled settlements in Myanmar (formerly Burma) were inscribed on the UNESCO World Heritage list. As a group, Halin, Beikthano and Sriksetra are noted for their role in blending Indian-influenced architecture and religion, particularly Buddhism, with the indigenous culture. Stone and bronze sculpture, gemstones, golden Buddha images and jewellery (Figure 1) are still being recovered today from both official and unofficial archaeological digs.

Scholars had generally placed this wealthy culture, attributed to people known as the Pyu, in the first millennium CE. For World Heritage nomination, more precision in the dating of the sites proved valuable. Radiocarbon dates have placed the construction of the brick walls and gates at Halin between the First and Third Centuries CE. This dating was made possible by an act of violence and vandalism. At some stage, the city was attacked. At least six gates and the wooden gatehouses built above them were burnt and never repaired. The debris from the fires, including huge wooden beams, provided charcoal for the dating program (Figure 2).

The dating of a cremation site at Beikthano to the same period supported earlier radiocarbon dates done in the 1970s, but with the added precision of AMS. At the 14 square kilometre site of Sriksetra, which had previously not been scientifically dated, an iron slag heap in the centre of the city turned out to have been created by as-yet unexcavated furnaces between the First and Fourth centuries CE. This is so far the earliest known iron production site in Myanmar. The program has provided absolute dates to demonstrate that the major cities of the Pyu urban system were all operational in the First to Third century period CE.

There are only around 60 radiocarbon dates so far for all of Myanmar, a relatively tiny number. Over 30 of these have come through ANSTO. Several resulted in the first radiocarbon dating of the city of Bagan by Barbetti & Grave in the early 1990s. Inspired by these pioneers, Bob Hudson from the Archaeology Department / Asian Studies Program at Sydney University has been working with Geraldine Jacobsen at ANSTO for more than ten years, turning well-provenanced charcoal samples into valuable archaeological and historical data on the world's newest emerging democracy, Myanmar. •

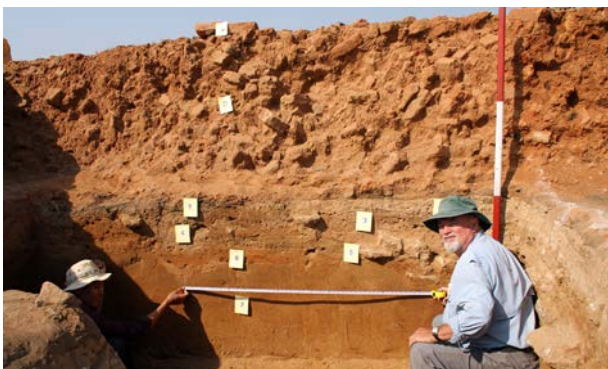


Figure 2 Debris from the Halin fire sits on a compacted roadway that led through the city gate. The road width was the ancient world standard, 1.4 metres, or 4' 8 1/2".

Did human occupation of Australia irrevocably alter tropical terrestrial ecosystems?

Peter Ridd¹, Sean Ulm¹, Jon Luly¹, Chris Wurster¹, Vladimir Levchenko²

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The nature and magnitude of the environmental impact of human arrival in Australia over 40,000 years ago, and subsequent human dispersal across the continent is one of the most fundamental unresolved issues in Australian prehistory and ecology.

The current situation can be summarized as follows: yes, humans had arrived on the continent in time to cause the demise of the megafauna and to modify vegetation through the use of fire to a degree that may have had a large scale impact on climate boundary conditions across much of interior Australia. However, neither of these impacts has yet been conclusively demonstrated. These issues go to the heart of the question 'what is natural?' in the Australian context, but they will not be resolved until continuous terrestrial palaeo-environmental records from Australian tropical savanna regions become available.

Comparison of geological maps and satellite imagery of the 'Top End' of the Northern Territory has indicated that a subset of the many lakes that cover the region are located in sinkholes of considerable depth and antiquity. Some of these sinkholes are up to 60m deep and thus represent persistent long-term sediment sinks akin to the volcanic craters of the Atherton Tablelands. This project was exploratory and was designed to test the suitability of a large number of the potential lake sediment targets in the Northern Territory. It was also designed to determine the likely sedimentation rates in the lakes to support further deep coring of the most prospective targets.

The project was successful, with more than ten targets visited for reconnaissance coring. Cores ranged from 2-5m

in length, and yielded dates ranging up to 6845 +/- 50 BP (OZS010). The dates enabled calculation of sedimentation rates of between ~0.3 and 1.5 metres per thousand years. In one case (Lake Evella) it was possible to demonstrate that while sedimentation rate in the upper part of the core was 1.5m/ka, this reduced substantially by 3.3m depth to 0.7m/ka, indicating a compaction effect and possibly increased sedimentation rates in the recent past as the town of Gapuwiyak is adjacent to this site. For both the surface lake sediments and the ancient sediments that were dated, results were also obtained for pollen, charcoal, pyrogenic carbon by hydrogen pyrolysis, carbon isotope composition of organic carbon, pyrogenic carbon and biomarker n-alkanes in order to link proxy records to local vegetation types and fire regimes.

On the basis of this preliminary research, deep coring of Giraween Swamp – a large sinkhole lake in the Darwin region – yielded a 19.2m core in August 2015. This represents the first long continuous terrestrial record from the Australian savannas, close to the known sites of early occupation in Arnhemland. Dating of preliminary samples is currently underway at ANSTO, but the core is likely to at least extend through the period of earliest human occupation of the continent, enabling us to begin to determine the extent to which human occupation of the Australian tropics resulted in lasting changes to tropical savanna ecosystems.

This research was supported by the Australian Research Council (DP130100334 and FL140100044) and AINSE (ALNGRA13507). We are grateful to local landowners and the Northern Land Council for allowing us access to the sites that formed part of this investigation. •



Figure 1 Coring platform in position for coring in Giraween Swamp in August, 2015.

Improved quaternary age models for ocean drilling program cores from the southern Australian dust corridor

Zanna Chase and Taryn Noble, University of Tasmania

The objective of this project was to use radiocarbon dating to develop and refine age models for sediment cores from the Australian region recovered by the Ocean Drilling Program. The age models allowed us to estimate the magnitude of dust deposition to this region since the peak of the last ice age, in order to constrain the magnitude of iron fertilization on biological carbon uptake during cold glacial climates.

This project generated 12 new radiocarbon dates from mixed planktonic foraminifera, from three sediment cores (4 dates per core). The radiocarbon ages were converted to calendar years using OxCal 4.2 with the Marine13 calibration curve (Reimer et al. 2013), assuming no offset from the global reservoir correction ($\Delta R = 0$). The new dates allowed us to construct age models for 3 IODP/DSDP cores used to study dust deposition from Australia during the last glacial-interglacial transition (Figure 1). From the age models we calculated low sedimentation rates of 1-5 cm/ky at these sites. Using these age models we have reconstructed terrigenous matter input based on the flux of ^{232}Th , which is highly insoluble in sea-water and therefore reflects solely a terrigenous source (Brewer et al. 1980), and on the flux of terrestrial plant-wax compounds, the n-alkanes (Martínez-García et al. 2009). The flux of both components was normalized using ^{230}Th to correct for post-depositional sediment redistribution (Francois et al. 2004). We found that both indicators of terrigenous material show a greater flux during the LGM compared to the Holocene (Figure 2). Overall this pattern is consistent with the terrigenous material being transported by wind, as opposed to, for example, supply through redistribution of shelf sediments by ocean currents. There are, however, interesting differences between the two proxies (not shown), with the n-alkane flux showing a more pronounced glacial enhancement. This may reflect a climate-driven change in

the production of n-alkanes (Daly 1963).

The ^{232}Th -based fluxes can be compared directly with modelled dust flux estimates (Albani et al. 2011), and these show a similar geographic pattern as the modelled fluxes (Figure 1), being smallest at the site furthest south (1171). At all sites, however, the sediment-based lithogenic flux is about twice that of the model. This is a common offset for the region (Lamy et al. 2014), but it's not yet clear if the offset is because the modelled fluxes are too low, or because the sediment-based fluxes are too high, perhaps because they include a component of the flux that is not Aeolian. Looking at the ratio of LGM-Holocene lithogenic flux, we see the SW Pacific sites show a 2-3 fold increase in flux at the LGM, relative to the Holocene (Figure 2, bottom). This glacial-enhancement ratio is the same as that found by Lamy et al. (2014) in the eastern Subantarctic Pacific. In fact, considering all of the available Th-normalised data across the Pacific sector, north of the Polar Front there is a near-uniform increase of lithic flux of 2-3 fold during the LGM relative to the Holocene (Figure 2). This is intriguing, because if increased dust generation from Australia were the main cause of the Pacific increase in lithic flux, as hypothesized by Lamy et al (2014), one would expect sites closer to Australia, that is the sites examined in this study, to show a greater LGM-Holocene increase in dust flux relative to sites further east. In fact, close inspection of the model results of Albani et al. (2011) shows if anything a smaller LGM:Holocene dust flux ratio in the western Pacific, as seen in our results (Figure 2, top). Together these results raise the possibility that some of the dust reaching the eastern Pacific during the LGM may in fact be from south America, as suggested recently by Lambert et al. (2015). Further isotope and chemical fingerprinting can be used to test this hypothesis.

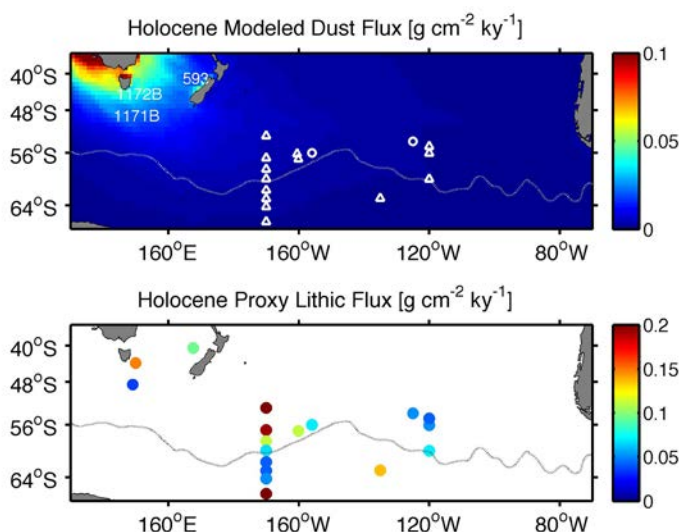
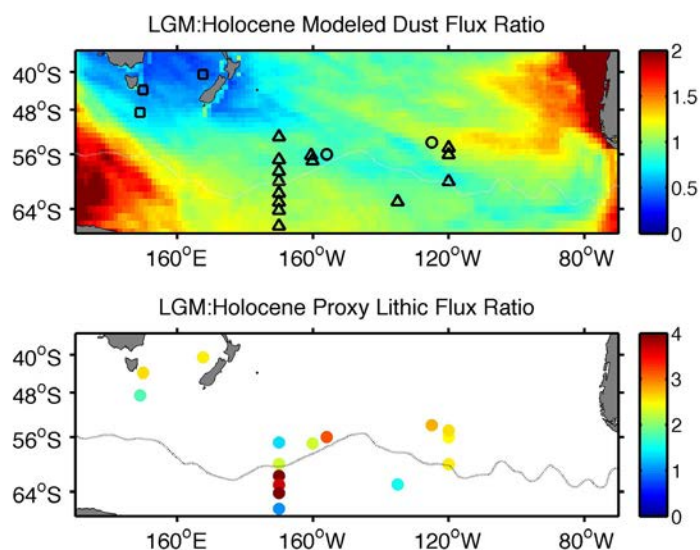


Figure 1 Location of DSDP (593) and ODP (1171 and 1172) cores used in this study, with Holocene modelled dust flux from Albani et al. (2011), Top. Also shown are locations of previously-published data from Chase et al. (2003) (triangles) and Lamy et al. (2014) (circles). Note that core-top lithic fluxes (bottom) are about 2-fold greater than modelled dust flux.

Figure 2 The ratio of LGM:Holocene lithogenic flux from the new *Th*-normalized data from this study (squares) together with data from Chase *et al.* (2003) (triangles) and Lamy *et al.* (2014) (circles). The ratio of modelled LGM:Holocene dust deposition is from Albani *et al.* (2011).



Acknowledgements

This project was made possible by the input of ANSTO's Institute for Environmental Research (Geraldine Jacobsen) and through assistance by Helen Bostock, NIWA, in foraminiferal picking, Antoni Rosell-Mele, who made the *n*-alkane measurements, IMAS honours student Priya Kitchener, and PhD candidate Axel Durand, who both assisted with laboratory work, and Ashley Townsend, UTAS Central Science Laboratory, Les Kinsey, ANU and Samuel Jaccard, University of Bern, for assistance with mass spectrometry.

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Dating prehistoric human occupation along the Madang coast of Papua New Guinea

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The expansion of Austronesian speaking communities out of Island South East Asia and into the Pacific occurred between 4000-3000 years ago and was a pivotal time of culture change in the region. The interaction between these Austronesian speakers and the already established Papuan communities went hand in hand with dramatic innovations in material culture, subsistence systems, and settlement patterns. Establishing the exact timing of this movement by radiocarbon dating, using accelerator mass spectrometry (AMS), is crucial to understanding the human past of our nearest neighbours.

The aim of this project was to target an archaeologically

If early Austronesian speakers did pass along the Madang coast over 3000 years ago, the evidence remains to be found. These results instead demonstrate that the arrival of the Austronesian speakers onto the coast was very recent, by Bel communities, who had a profound effect on the region's culture. The dates support oral history and geological evidence of tsunami events which suggest the Bel previously lived on a large island named Yomba in the Bismarck Volcanic Arc, but, due to coseismic tidal waves, were forced to flee their island onto the New Guinea mainland. It is along the coast that the Bel became dominant traders in the area, exchanging unique



Figure 1 and 2 - excavation at Nunguri on Bilbil Island, and Tilu at Malmal village.

unchartered area of the New Guinea coastline for dating, where it was posited that Austronesian speakers might have passed on their route into the Pacific. The project, supervised by Professor Summerhayes, is currently being carried out as a Master of Arts project by Dylan Gaffney at the University of Otago. In June 2014, Summerhayes, Gaffney, and their team undertook excavations at two key archaeological sites along the Madang coast: Nunguri on Bilbil Island, and Tilu at Malmal village (Figures 1 and 2).

The material recovered from excavation documents a full range of Austronesian-style artefacts: pottery, shell adzes and axes, stone artefacts, cooking stones, shell arm bands and ornaments, and domesticated pig and dog bone. Thirteen carbonised wood charcoal fragments collected during excavation were submitted to ANSTO for AMS dating. The results showed that this Austronesian occupation along the Madang coast only stretched back 600-500 years old.

red-slipped pottery to other groups. Their impressive trading networks were remarked upon by early European explorers such as Nikolai Miklouho-Maclaray and Otto Finsch in the late 19th century.

The recent human past along the Madang coast is rich in archaeological data, which gives insight into important changes in culture and society in the human past. These histories are important to understanding the people who live along the coast today. Radiocarbon dating remains an integral archaeological tool for refining chronologies and establishing when important events happened in the past.

The AINSE Research Award provided funding for radiocarbon dating, completed by Geraldine Jacobsen at ANSTO. •



Figure 3 Professor Glenn Summerhayes travelling to Bilbil Island.



Figure 4 Professor Glenn Summerhayes on Bilbil Island.

Engineering stent based delivery system for oesophageal cancer using Docetaxel

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Abstract

Oesophageal cancer patients are often diagnosed as 'advanced' cases. These patients are subjected to palliative stenting using Self Expanding Metallic Stents (SEMS) to maintain oral alimentation. Unfortunately, SEMS get re-occluded due to tumor growth, in and over the stent struts. To investigate potential solution to this problem, Docetaxel (DTX) delivery films were prepared using PurSil AL 20 (PUS) which can be used as a covering material for the SEMS. Drug-polymer miscibility and interactions were studied. Bilayer films were prepared by adhering the blank film to the DTX loaded film in order to maintain the unidirectional delivery to the oesophagus. *In-vitro* release and the local DTX delivery were studied using *in-vitro* permeation experiments. It was found that DTX and PUS were physically and chemically compatible. The bilayer films exhibited sustained release (>30 days) and minimal DTX permeation through oesophageal tissues *in-vitro*. Rate determining step for the DTX delivery was calculated. It was found that >0.9 fraction of rate control lies with the oesophageal tissues suggesting that DTX delivery can be sustained for longer periods as compared to the *in-vitro* release observed. Thus, the bilayer films can be developed as a localized sustained delivery system in combination with the stent.

Conclusions

In conclusion, DTX loaded PUS films were found to be physically and chemically stable. Bilayer architecture with minimal backside release and thickness as a primary release control was demonstrated. It was also demonstrated that

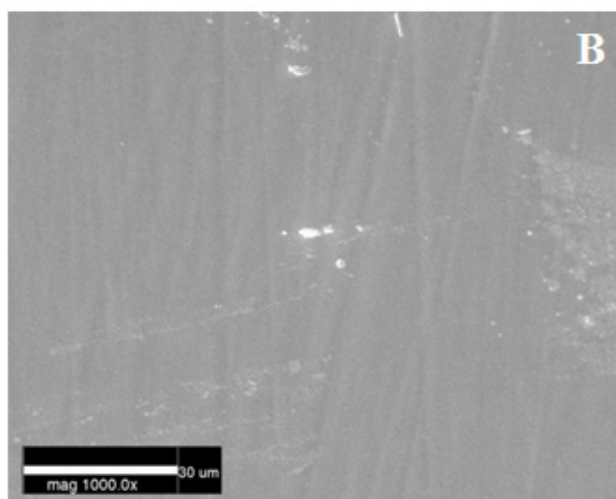
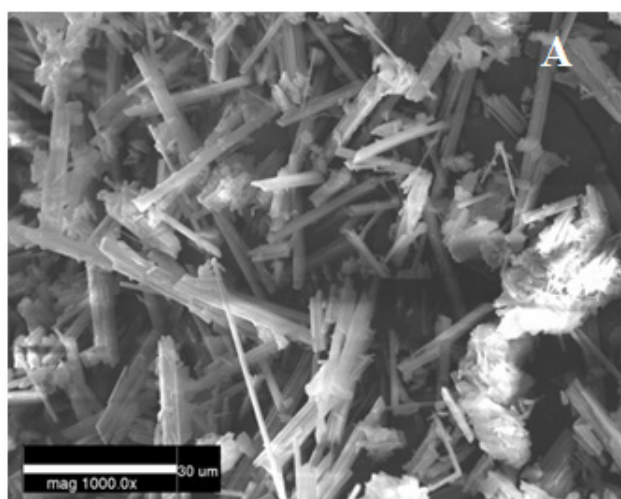
in-vitro release is not the correct estimate of DTX delivered. The rate control lies with the oesophageal tissues in the case of DTX delivery. These finding emphasizes the importance of permeability i.e. bioavailability guided dose selection for the stent application.

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The authors would like to acknowledge A/Prof Phillip Pendleton (School of Pharmacy and Medical Sciences, University of South Australia) for discussion on Fick's equation, Patrick O'Sullivan (School of Engineering, Mawson lakes, University of South Australia) for providing assembly to measure impedance, Prabhat Bhusal (School of Pharmacy, FMHS, University of Auckland) for tensile testing, DSM Biomedical for providing PurSil® polymers as well as discussion on the structure-morphology of silicone-polyurethanes, AINSE Ltd for the financial assistance (Award No ALNGRA14054) to enable SAXS measurements, SaSView software developers for providing free platform for SAXS data analysis (originally developed by DANSE project under the NSF award DMR-0520547).

Supporting information

HPLC method for analysis of release and stability samples, impedance measurement, release profile of gamma ray irradiated sample, calculation of SP, fitting parameters for diffusion measurement and rate limiting step for the DTX delivery. This information is available free of charge via the internet at <http://pubs.acs.org/>
DOI: 10.1021/mp500851u •



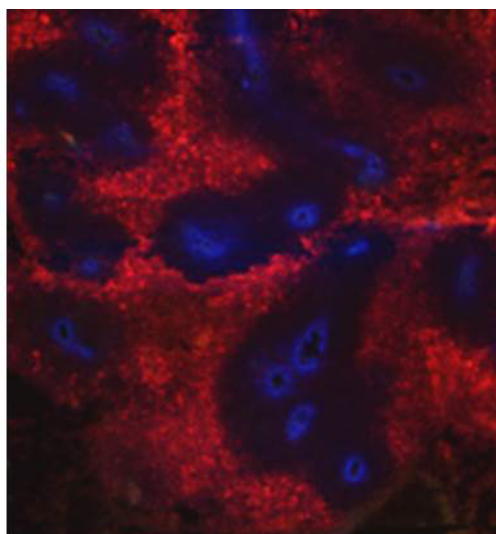
SEM image of (A) DTX and (B) 4.76% w/w DTX loaded film.

Reduction potentials of novel nitroimidazole radiosensitisers for stereotactic body radiotherapy

Michael Hay

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Improvements in accuracy and precision in the delivery of radiotherapy have resulted in the evolution of new treatment approaches. Stereotactic Body RadioTherapy (SBRT) uses a small (1-5) number of larger (5-25 Gy) fractions of radiation and is increasingly used to treat small tumours and metastases. The potential for shorter treatment times and reduction in health costs is offset by mounting evidence that the role of tumour hypoxia in radioresistance is accentuated with these schedules. Tumour hypoxia is a consequence of high metabolic demand and inadequate, disorganised vasculature within tumours and occurs at sites distal from blood vessels (Figure 1A). Since oxygen is required to oxidise DNA radicals caused by ionising radiation leading to DNA strand breaks and eventual cell death, tumour hypoxia limits the efficacy of radiotherapy and also is a negative prognostic factor in many tumour types.



A

Figure 1A Detection of hypoxic cells (red) and perfused blood vessels (blue) in a SiHa human cervical carcinoma xenograft grown subcutaneously in nude mice. The hypoxic marker EF5 (60 mg/kg) was administered intraperitoneally 1.5 h and blood vessel perfusion marker Hochest33342 (40 mg/kg) was administered intravenously 2 min before the mice were euthanized.

One approach to overcoming the influence of hypoxia is to use nitroimidazole compounds to mimic oxygen by reacting with DNA radicals to sensitise hypoxic cells to radiation therapy. One example of this class, nimorazole, has been demonstrated to provide an advantage in head and neck

cancer in combination with fractionated radiation.

Associate Professor Michael Hay along with a multidisciplinary team (Ms Cho Rong, Ms Way Wong, Drs Muriel Bonnet, Stephen Jamieson, Frederik Pruijn, Kevin Hicks and Professor Bill Wilson) from the Auckland Cancer Society Research Centre at the University of Auckland have identified a new class of nitroimidazole radiosensitiser and are exploring the activity of this class in combination with radiation (Figure 1B). Working in collaboration with Associate Professor Bob Anderson they have used the AINSE-supported Pulse Radiolysis Facility at the University of Auckland to measure the electron affinity [as the one electron reduction potential $E(1)$] of the novel synthetic compounds. Electron affinity is a key parameter and dominates the structure activity relationships for the radiosensitisers.

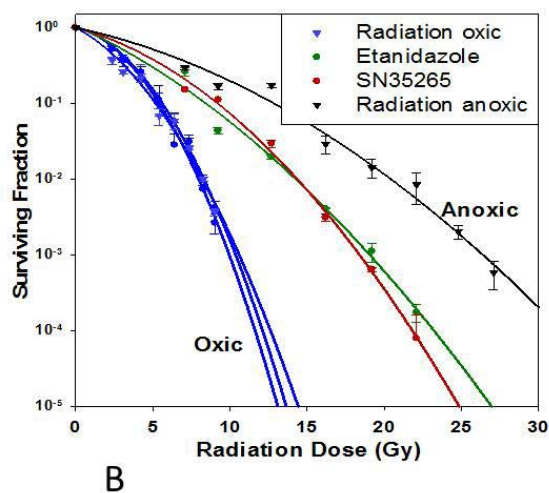


Figure 1B In vitro radiosensitisation of HCT116 human colorectal carcinoma cells by SN35265 and etanidazole under normoxic and anoxic conditions. Values are mean and SEM for 2-3 independent experiments. Lines show fitted survival curves for the linear-quadratic model.

Key to the development of bioreductive drugs targeting hypoxic cells in tumours is the balancing of reactivity (either as reductive metabolism or reaction with DNA radicals) with tissue diffusion. By integrating the electron affinity [$E(1)$] and diffusion parameters, measured in multicellular layers (Figure 1C), the most effective radiosensitisers from the class have been identified. These compounds radiosensitise hypoxic cells

in vitro and lead to increased hypoxic cell killing compared to etanidazole in human tumour xenograft models. Current studies are aimed to optimise the pharmacokinetic parameters of leading examples in the class to maximise their effect as radiosensitisers.

The authors acknowledge support from the Australian Institute of Nuclear Science and Engineering (AINSE), the University of Auckland’s Biopharma Thematic Research Initiative, UniServices Investment / Ministry of Business, Innovation and Employment Pre-Seed Accelerator Fund and the Cancer Society of New Zealand. •

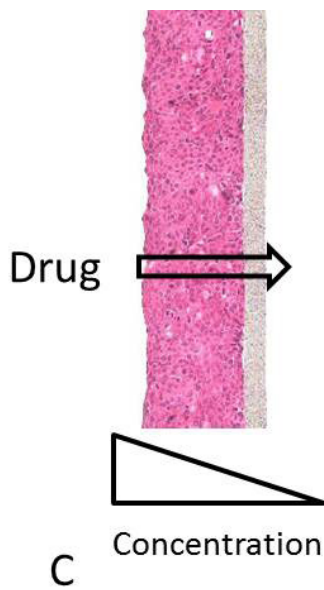


Figure 1C Multicellular layer culture of HT29 human colon carcinoma cells or leave out cells of approximate thickness 150 μm grown on a Millicell-CM teflon membrane support.

Investigating the role of cholesterol in the spontaneous membrane insertion of the protein CLIC1

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Sterols have been reported to modulate the conformation and function of several membrane proteins. One such group is the Chloride Intracellular Ion Channel (CLIC) protein family, composed of six family members (CLIC1-6) in humans. These proteins are unusual, existing as both monomeric soluble proteins and as membrane bound proteins. While the process that governs CLIC1's membrane interactions and conformational change is still not well understood, it is believed to be influenced by various factors including, redox environment, pH and membrane lipid composition. Recent studies have revealed that cholesterol regulates the ion channel activity of CLIC1 in model membranes. However, a detailed mechanism of this process remains unclear. Thus, the aim of this AINSE-supported study was to investigate the regulatory role of cholesterol in the spontaneous membrane insertion of CLIC1 protein into lipid monolayers.

Langmuir film experiments and neutron reflectometry were used to characterise the interactions of the protein CLIC1 with different lipid monolayers. Lipid monolayers were formed using 1-Palmitoyl-2-oleoyl-phosphatidyl-choline/serine (POPC/POPS) with or without cholesterol. The results showed that CLIC1 has a strong preference for associating with or inserting into lipid monolayers containing cholesterol

(Figure 1). Moreover, our results also suggest that the soluble and stable cytosolic CLIC1 binds to cholesterol via a putative cholesterol-binding domain for optimal membrane insertion. Cholesterol has been shown to induce membrane insertion of several other proteins, with studies identifying a cholesterol binding motif - GXXXG - in amyloid precursor proteins and others. Sequence analysis of the CLIC protein family revealed such a GXXXG motif (Figure 2), and appears to be conserved amongst all the human CLIC proteins. This GXXXG motif may well be the cholesterol binding site in the CLIC proteins and we are currently investigating the role of this motif in CLIC1's interaction with cholesterol.

This research has been undertaken by doctoral student Khondker Rufaka Hossain with her supervisors Dr Stella M Valenzuela from the University of Technology, Sydney, and Dr Stephen A Holt from ANSTO, Australia.

The authors thank the following organizations for financial support of this research: the Centre for Health Technologies, University of Technology Sydney; the Australian Research Council and the Australian Institute of Nuclear Science and Engineering (Postgraduate Research Award to KRH and AINSE Award to SMV, KRH). •

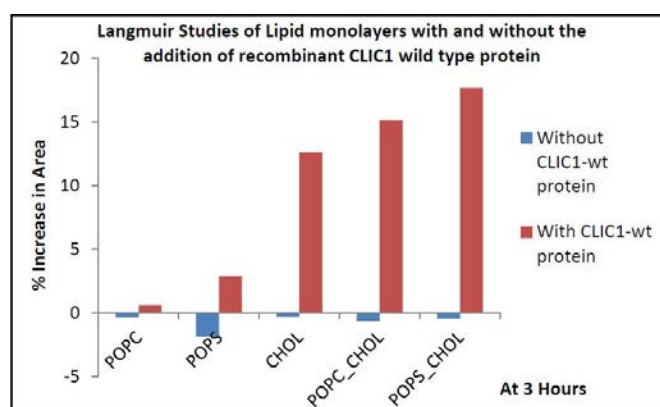


Figure 1 Percent area expansion profiles of different lipid monolayers without (white bars) and with (black bars) cholesterol after 3 hours following recombinant CLIC1 protein injection into the subphase. CLIC1 protein showed significant insertion and/or membrane interactions in monolayers containing cholesterol.

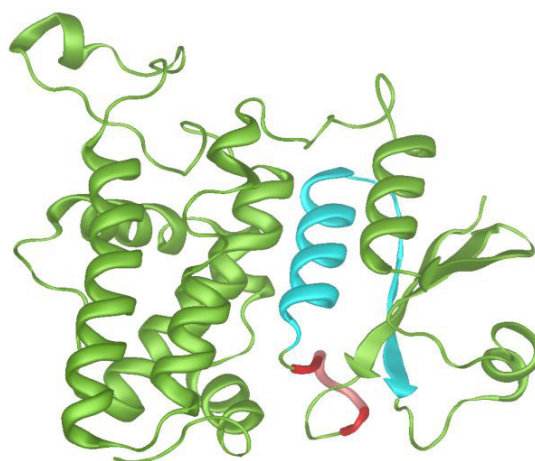


Figure 2 3D Model Structure of the reduced soluble CLIC1 protein indicating its putative transmembrane domain, shown in blue, and GXXXG motif shown in red.

The effect of soil temperature on the water and nitrogen use of grapevines

Simon Clarke, Charles Sturt University
 Suzy Rogiers, New South Wales Department of Primary Industries
 Linda Barry, Australian Nuclear Science and Technology Organisation (ANSTO)

Support from AINSE was received to complete a research project funded by the Australian Grape and Wine Research and Development Corporation (GWRDC, now Wine Australia). Further information on this and associated projects can be found on the Wine Australia research and development website and the peer-reviewed and industry journal articles listed below.

AINSE provided access to resources and expertise to complete a particular portion of this research. The overall aim of the research was to determine the effects of spring soil temperature on grapevine leaf water-use efficiency, reproductive growth development, and nutrient acquisition and partitioning. The overall objective was to identify for the Australian grape and wine industry the need to modify vineyard soil temperature through techniques such as soil shading by cover crops, row orientation and site selection based on aspect.



Figure 1 National Wine & Grape Industry Centre research fellow Simon Clarke assessing leaf greenness of grapevines subjected to soil temperature treatments (photo courtesy of Suzy Rogiers).

The research consisted of an outdoor potted grapevine experiment (Figure 1). Sixty Shiraz grapevines were grown at the National Wine & Grape Industry Centre, Wagga Wagga. A third of the plants were subjected to either a cool, ambient or warm root-temperature treatment by recirculating temperature-controlled water through pipes embedded in the potting soil. From budburst (dormant buds open) to fruit set (a few weeks after flowering), soil temperature in the cool treatment averaged approximately 17 °C, the ambient

23 °C and the warm 25 °C. For the remainder of the season, soil temperature was not controlled. At fruit set and berry maturity, grapevines from each temperature treatment were removed from the experiment and divided into gross tissue types – leaves, shoots, woody tissues, roots and bunches. With AINSE support, we worked closely with ANSTO stable isotope chemist Linda Barry to determine the relative contribution of fertiliser nitrogen taken up by grapevines under the different spring soil temperature treatments. This was achieved by fertilising the plants with a nutrient solution enriched in the heavy stable nitrogen isotope, ¹⁵N. The tissue samples were then dried and ground to a fine powder to be analysed by Linda for their ¹⁵N content in the ANSTO Institute for Environmental Research.

Additional information on tissue natural stable carbon isotope composition was obtained on tissues from plants destructively sampled at fruitset. The carbon isotopic composition of dormant wood and root tissues was similar at the start of the season (Figure 2, budburst). At fruitset, approximately two months later, there were small treatment differences in the carbon isotopic composition of the wood and root tissues but most strikingly, the root tissues had become isotopically depleted in ¹³C (more negative in ‰ notation) (Figure 2). This possibly reflects the isotopic effects of starch mobilisation from the root reserves. Our independent analyses indicate that plants in the warm treatment mobilised the most starch from their root reserves, which correlates well with the greater ¹³C depletion in the warm treatment. The carbon isotopic composition of the leaves and shoots exhibited a negative correlation with instantaneous leaf water use efficiency (data shown in our published work), which is in accord with theory on the effect of leaf gas exchange on isotopic discrimination during photosynthesis. From these results, we can conclude the carbon used to construct the foliage of the experimental plants at fruitset is likely to be a mixture of mobilised starch reserves and recently assimilated CO₂.

The nitrogen isotope results indicate that fertiliser was preferentially used to support the nutritional demands of annual tissues - grape bunches, leaves and shoots (Figure 3). Exposing roots to warm soil enhanced fertiliser uptake early in the season (measured at fruit set) but many of these contrasts were no longer apparent at the season end (berry maturity). This indicates that fertiliser nitrogen uptake was enhanced once the cool temperature stress was removed. At berry maturity, the tendency for the plant tissues from the

ambient soil temperature treatment to be high in fertiliser nitrogen were mirrored by a tendency for these tissues to have a relatively low total nitrogen content (independent results shown in our published work). This suggests that this treatment was particularly reliant on fertiliser-applied nitrogen to support the growth of annual tissues.

Overall, the results obtained from the carbon and nitrogen stable isotope analyses integrate well with the major findings of this research. Cool spring soils were generally stressful for the grapevines, being reflected in slower leaf emergence, shorter shoots, smaller leaves and reduced vegetative biomass. However, the leaves of these smaller canopies transpired water at a relatively efficient rate, a result reflected in the carbon isotope and leaf gas exchange measurements. Upon release of the cool soil temperature stress, many of the treatment differences began to disappear, including the relative importance of fertiliser nitrogen uptake inferred from the nitrogen isotope results. Viticultural implications of the work include (1) considering the effect of soil temperature when managing variability in grapevine growth and phenology within vineyards and between seasons, (2) recognition that soil temperature can have an impact on water and nitrogen resource use efficiency, and (3) acknowledgement that, given sufficient time, grapevine physiology can respond elastically to short-term seasonal variations in soil temperature.

This work was supported by the grape growers and winemakers of Australia through their investment body, the Australian Grape and Wine Authority, with matching funds from the federal government. Half of the isotope analyses were supported by a grant from the Australian Institute of Nuclear

Science & Engineering (ALNGRA12008P to SJC and SYR). The other half of the isotope analyses were made possible through collaboration with the Australian Nuclear Science and Technology Organisation. •

Associated publications

*Clarke SJ, Lamont KJ, Pan HY, Barry LA, Hall A, Rogiers SY (2015) Spring root-zone temperature regulates root growth, nutrient uptake and shoot growth dynamics in grapevines. *Australian Journal of Grape and Wine Research* 21, 479-489.

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*Supported by AINSE and ANSTO

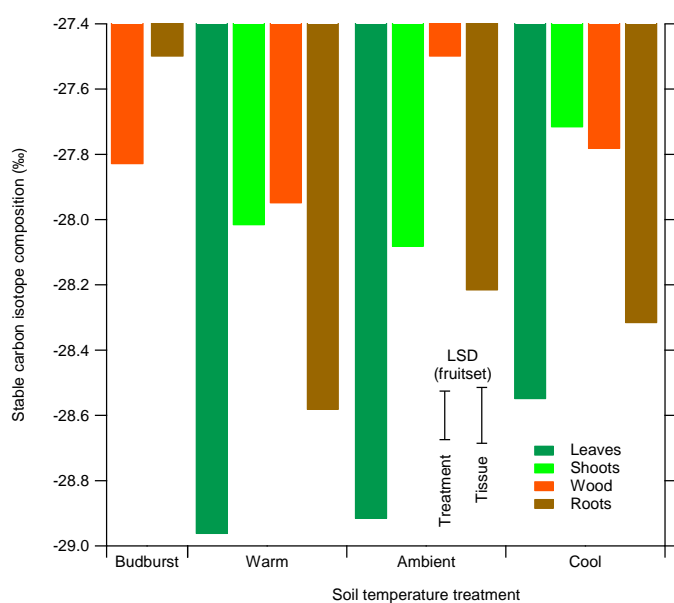


Figure 2 Stable carbon isotope composition of grapevine tissues at the start of the growing season (budburst) and at fruitset following the imposition of soil temperature treatments (warm, ambient, cool). LSD = least significant difference.

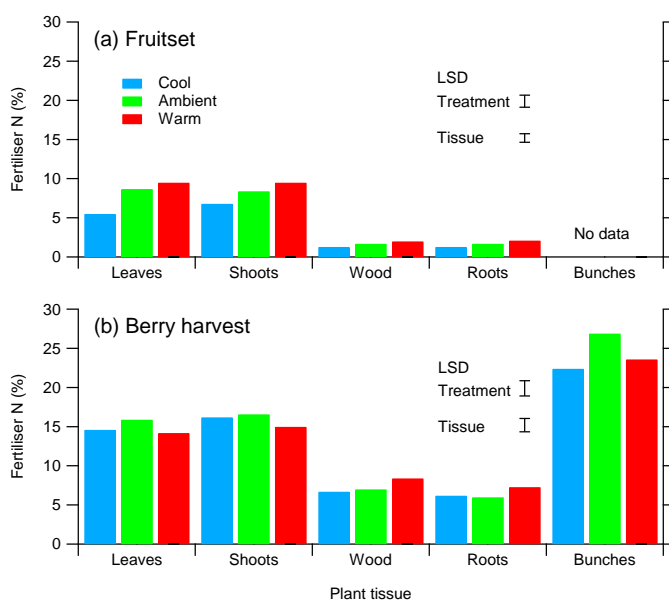


Figure 3 Fertiliser nitrogen uptake (as percentage of total nitrogen) by potted grapevines inferred from the abundance ^{15}N -labelled fertiliser. Plant tissues were sampled at fruitset (a) and berry harvest (b). Plants were subjected to soil temperature treatments from budburst to fruitset. LSD = least significant difference.

Understanding groundwater dynamics on barrier islands using geochronological data: An example from Stradbroke Island, Southeast Queensland

Harald Hofmann, The University of Queensland



Barrier island groundwater systems play an important role as a water resource for domestic and industrial use. They are equally important for groundwater dependent ecosystems. The freshwater lenses underneath such islands are dynamic systems affected by changing sea levels and groundwater use. They are vulnerable to contamination and over-abstraction. Constraining groundwater ages and flow paths are essential for understanding and managing groundwater resources.

Assessing residence time and recharge rates improve significantly our understanding of hydrological processes of coastal environments, which will in turn allow us to make more informed decisions on groundwater use and environmental protection.

This study used high precision Tritium (³H) and Carbon-14 (¹⁴C) concentrations to assess residence time of groundwater on North Stradbroke Island (NSI), located in Moreton Bay, South East Queensland, Australia. Groundwater Hydraulic properties, major ion geochemistry and stable isotope signatures were used to validate residence times and to investigate processes responsible for varying groundwater ages.

The results indicate that recharge occurs across the island and groundwater ages increase with depth. ³H ages range from 12 years to >100 years, with results strongly supporting a vertical stratification of the groundwater. While most of the groundwater on the island is younger than 80 years, results from ¹⁴C analysis show groundwater of up to ~2000 years in some deeper parts of the sand dune aquifer. A possible mixing of young water from modern recharge with old water leaking out of the the fractured Woogaroo Sandstone aquifer is a likely explanation.

Water management authorities and environmental protection agencies will benefit from these results to make more informed decisions on water extractions and environmental protection policies.

This project was strongly supported through collaborative links between the School of Earth Sciences (The University of Queensland), the ANSTO Institute for Environmental Research (Dioni Cendon), School of Earth, Atmosphere and Environment (Monash University, Ian Cartwright), CSIRO Land and Water (Matthias Raiber).

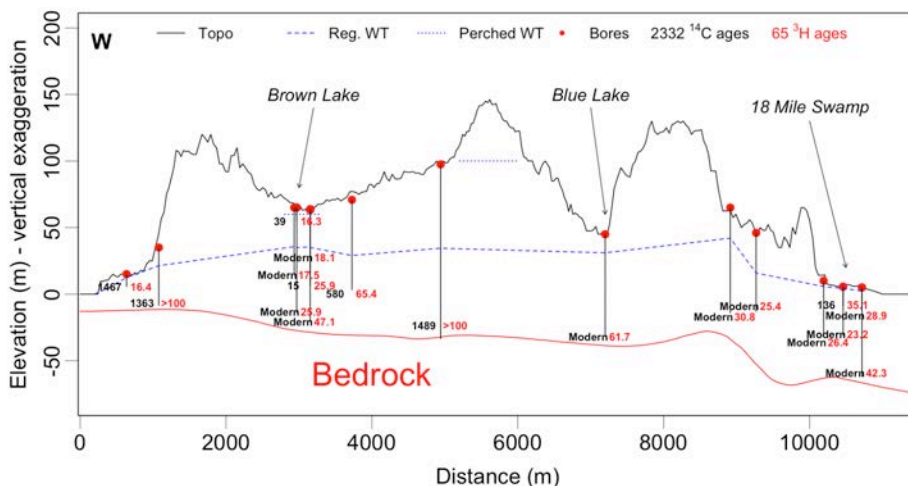


Figure 1 Elevation cross section across North Stradbroke Island from W to E. Vertical lines represent the sampled bores and the black numbers show calculated ¹⁴C ages while the red numbers show calculated Tritium ages.

Tropical vegetation dynamics and their impact on soil organic carbon pools

Prof Michael Bird, Earth and Environmental Sciences, James Cook University
 Dr Gustavo Saiz, Karlsruhe Institute of Technology Institute of Meteorology and Climate Research Garmisch-Partenkirchen, Germany
 Prof Jonathan Lloyd, School of Marine and Tropical Biology, James Cook University

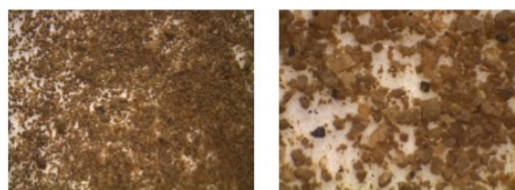
Tropical savannas are responsible for about 30% of primary production of all terrestrial vegetation and store 10-30% of all soil organic carbon (SOC). Such significance calls for a more comprehensive understanding of the impacts of future climate-driven changes in ecosystem distribution and its implications on SOC dynamics in savanna ecosystems.

A forest-savanna ecotone within the Sanaga basin in central Cameroon was chosen for this investigation because both anecdotal evidence and stable carbon isotopic analyses confirmed that forest vegetation has been encroaching into the savanna. Soil samples were collected 60 m inside the forest and 20 m into the savanna. Water-stable soil aggregates were sized separated and carbon content, $\delta^{13}\text{C}$ and ^{14}C analyses were conducted in each size fraction.

The relative distribution of SOC among the different size-separated aggregates is shown in Fig. 1a. The ^{14}C activity of all aggregate fractions was >100 pMC, indicating the presence of post-bomb carbon in the soil. However, the mean residence time of the different aggregate categories were unequally impacted. Forest encroachment did lead to an overall decrease in SOC in all size-aggregate categories with the largest loss of SOC occurring in the macroaggregate fraction, which also corresponds with the biggest change in C/N ratios (Fig. 1b). The most likely reason for this SOC loss is the aggregate disruption evidenced in Figure 2. Physical protection of SOM by aggregates plays a fundamental role in soil carbon stabilisation, and the disruption of aggregates renders SOC more susceptible to faster mineralization.

It is highly likely that a large shift in vegetation composition promotes a significant change not only in the quantity and quality of SOM inputs, but also in their mineralisation rates, as changes in soil environmental conditions may significantly influence key aggregation determinants like pH and redox potential.

• Forest



• Savanna

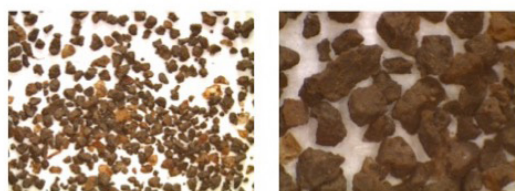


Figure 2 Image taken with an optical microscope showing the differences in soil aggregation patterns between forest and savanna. The samples correspond to the ones shown in Fig. 1. Aggregates are in all cases <500 μm . Vertically paired images are taken at the same optical resolution.

These observations further suggest that carbon transfers within the soil matrix are highly dynamic, especially if impacted by recent shifts in vegetation type (Saiz et al. 2015). Moreover, these findings, used in combination with soil mineralogical studies, may potentially have a fundamental impact in the advancement of our knowledge on the underlying physiochemical protection of SOC.

The authors would like to thank the Australian Institute of Nuclear Science and Engineering (AINSE Ltd) for providing financial assistance to enable work on radiocarbon analyses.

Saiz, G et al. (2015) The influence of C_3 and C_4 vegetation on soil organic matter dynamics in contrasting semi-natural tropical ecosystems. *Biogeosciences* 12, 5041-5059. •

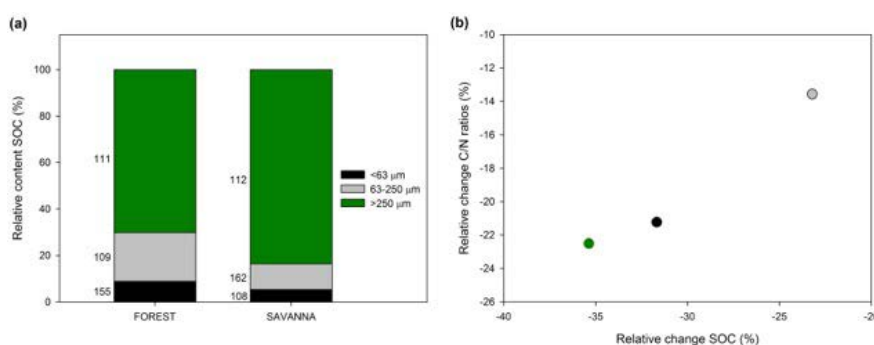


Figure 1 a) Relative SOC content observed for the different size separated water stable aggregates of samples collected at both ends of the transect. Values displayed at the left of each column indicate pMC (%); b) Relationship between relative changes in SOC and relative changes in C/N ratios; units show percentage of change relative to savanna. Coloured symbols denote the same fractions of those depicted in the bars.

Developing elemental tree-ring chronologies from multiple Tasmanian species for climate reconstruction

Kathryn Allen, Patrick Baker, Scott Nichols, Quan Hua, Patricia Gadd

Multi-century reconstructions of climate based on tree rings are relatively common in Europe and Northern America. These reconstructions are most often based on ring widths or maximum density and depend on annual rings that can be matched (cross-dated) across trees and sites. In Australia, many trees do not produce annual rings that can be readily cross-dated. Therefore, there are almost no published tree-ring chronologies from mainland Australia. This has limited our ability to understand long-term climate variability at annual resolution across the region.

Although dendrochronology has traditionally focused on ring widths, other parameters are known to contain climatic information. With support from an AINSE grant, we explored the potential of the ITRAX XRF core scanner at ANSTO to extract elemental traces from a number of Tasmanian tree species (*Lagarostrobos franklinii*, *Phyllocladus aspleniifolius*, *Athrotaxis selagnoides*, *Nothofagus cunninghamii*) from a single site. Our aim was to determine whether a climate signal can be detected in elemental counts of some Australian tree species. If so, this may extend the number of Australian tree species that can be used to reconstruct climate.

Tasmanian trees represent a 'simplest case' scenario at this early stage in the application of XRF to tree rings because we know that they have annual rings. As such, we can apply dates to the elemental traces, which allows us to compare trace patterns of different elements in time within individual trees and species. It also means that we can explore how different elements concentrate in earlywood or latewood (denser wood). Elements that concentrate in latewood are likely to be those that are bound in cell walls, and may provide strong summer climate signals. By comparing trace element characteristics for multiple species we can begin to understand differences amongst species.

Early results suggest there are likely to be relationships between wood density and some elements, most notably Calcium and Strontium. In tropical regions, these elements are often related to precipitation. This is particularly interesting because, to date, the long-lived (>300 years) Tasmanian trees have shown stronger temperature than precipitation signals in their ring widths. Other results show strong evidence that some elements are concentrated in the water conducting sapwood and others are more concentrated in the heartwood (non-functioning xylem) of the tree. Several species in the Northern Hemisphere also exhibit this characteristic. We also found that some elements have much higher counts in the sapwood than in the heartwood.

The information obtained in our preliminary study of trees with annual rings provides important background information for

future studies. It indicates that, due to the variability within trees of the same species at a single site, relatively large sample sizes will be required for future studies. In addition, the technique is not suitable for trees with very narrow rings or in which ring curvature occurs, due to the current resolution of the XRF facility. Further analysis of the data emerging from this study will help determine the merit of using some elements for climate reconstruction purposes. We are grateful for the excellent support provided by AINSE for this project. •

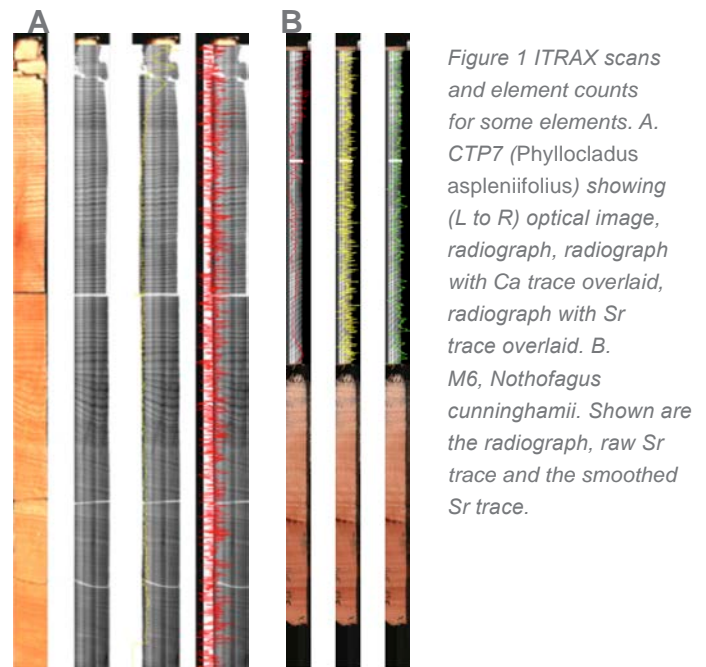


Figure 1 ITRAX scans and element counts for some elements. A. CTP7 (*Phyllocladus aspleniifolius*) showing (L to R) optical image, radiograph, radiograph with Ca trace overlaid, radiograph with Sr trace overlaid. B. M6, *Nothofagus cunninghamii*. Shown are the radiograph, raw Sr trace and the smoothed Sr trace.

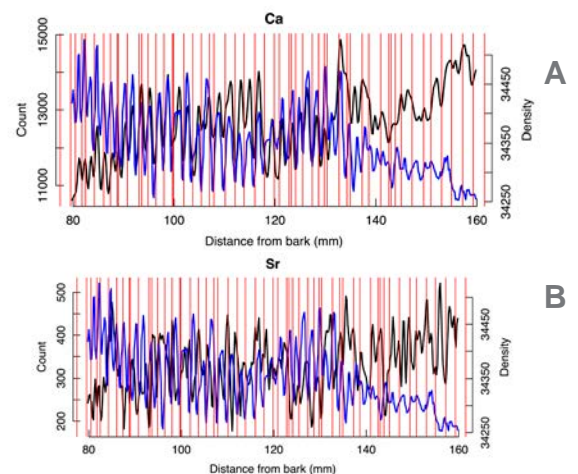


Figure 2 Smoothed traces for part of sample. A. Ca and B. Sr for Sample HP14 (*Lagarostrobos franklinii*). Blue line is smoothed density trace and will reflect annual rings. Black line shows smoothed element counts and vertical red lines show ring boundaries measured by method independent of ITRAX.

Lead-210 dating provides new insights into the timing and magnitude of European impacts in Australia

Craig Woodward (The University of Queensland), James Shulmeister (The University of Queensland)
Bob Haworth (University of New England)



Figure 1 Inset: Location of Little Llangothlin Lagoon on the New England Tablelands in Northern New South Wales, Australia. Main Image: Photo looking north across Little Llangothlin Lagoon.

Gale et al. (1995) measured the ^{210}Pb chronology of a lagoon edge core taken from a Ramsar wetland (Little Llangothlin Lagoon, Figure 1). Based on their data, Gale et al. (1995) proposed an early (ca 1830 AD) massive influx of sediment into the lagoon caused by European settlers. If correct, these results would have major implications for the European settlement history of Australia. Recent ^{210}Pb dates from cores collected within the lagoon (Woodward et al. 2011) contradicted the inference of early European catchment disturbance and indicated that Gale et al. (1995) incorrectly interpreted their ^{210}Pb data. The main objective for this project was to take replicate cores from Gale et al.'s (1995) master core site from Little Llangothlin Lagoon and produce ^{210}Pb age models from the replicate cores.

We were able to confirm that ^{210}Pb background occurred stratigraphically well above the highly organic layer that Gale et al. (1995) identified as an eroded soil layer caused by European impact in the catchment (Figure 2). Radiocarbon dates on the organic layer in the replicate cores also confirm that the organic layer was deposited well before European arrival in Australia and was in fact deposited before the mid Holocene (> 6000 cal yrs BP). Therefore the interpretation of a "false background" in the ^{210}Pb profile of Gale et al. (1995) (Figure 2) should be rejected and a much lower rate of post European impact sediment deposition accepted. Additionally the presence of abundant fossils from aquatic macrophytes in the organic layer (e.g. seeds from sedges) indicates that the highly organic layer was produced within the lagoon, not eroded into the lagoon.

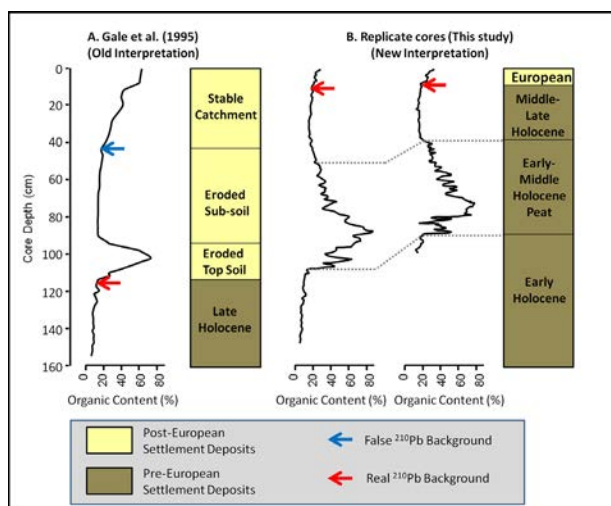


Figure 2 Organic content with respect to depth from (A) original master core taken by Gale et al. (1995) and (B) replicate cores taken from the same site for this study. Note that the peak in organic content is present in all cores. Gale et al. (1995) identified this organic layer as eroded soil due to European impact and attributed the "false background" in ^{210}Pb to a low ^{210}Pb activity in eroded sub-soil. The new data from our study showed that the "false background" was actually a real ^{210}Pb background. Gale et al.'s "eroded soil" and "sub-soil" does not represent a major erosion event and was deposited before European settlement.

The results from this work have contributed to several larger projects including a study on the effect of forest clearance on global wetlands (Woodward et al. 2014a) and a Holocene record of climate change from Little Llangothlin (Woodward et al. 2014b). This work was made possible by strong collaborative links at Lucas Heights between Scientists in the Institute for Environmental Research including Linda Barry (Environment Isotope Labs); David Child, Geraldine Jacobsen and Michael Hotchkiss (Accelerator Mass Spectrometry); Atun Zawadzki (Environmental Radioactivity). This work was funded by the Australian Institute of Nuclear Science and Engineering (AINSE) grants (ALNGRA11068 and ALNGRA12071) and an Australian Research Council grant (DP110103081). •

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Woodward C., Shulmeister J., Zawadzki A., Jacobsen G. (2014b) Major Disturbance to aquatic ecosystems in the South Island, New Zealand following human settlement in the late Holocene. *The Holocene* 24: 668-678.

Dating of sediments to aid in reconstruction of hydroclimatic variability in northwest Australia

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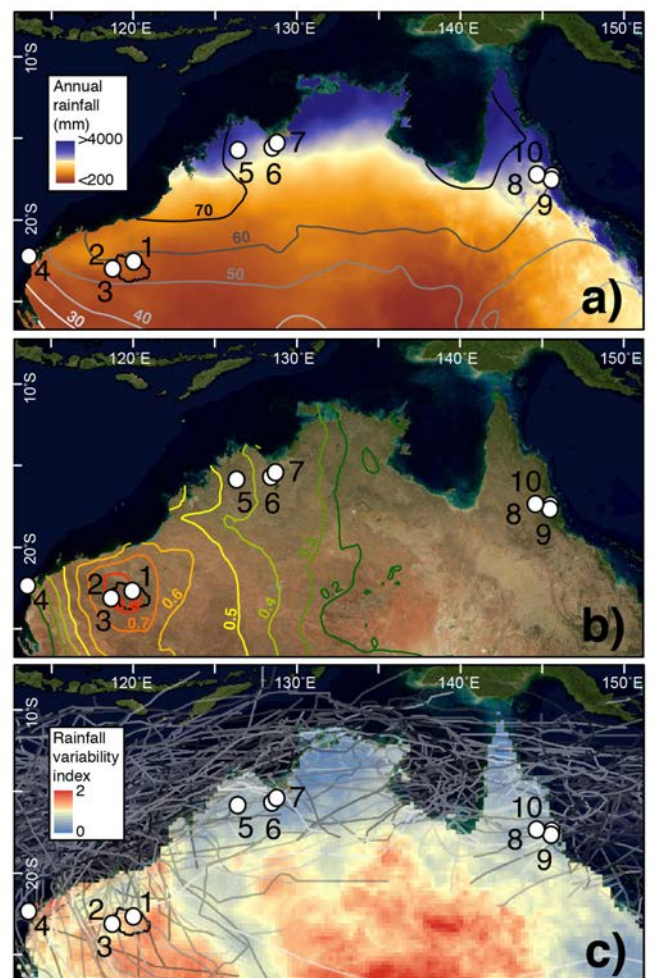
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New palaeoclimate records from the tropical and sub-tropical arid zones of Australia are essential to provide knowledge of long-term hydrological conditions prior to historical records. The objective of this study was to develop understanding of the frequency and intensity of extreme hydroclimatic variability in the Pilbara region of northwest Australia through the late Holocene.

We developed a ~2000-year palaeolimnological reconstruction of the flooding history of the Fortescue Marsh (Martuyitha), the largest inland wetland in the region, addressing a major gap in Australasian paleoclimatic reconstruction efforts (Fig. 1). We established a robust chronology for a sediment sequence from the Marsh based on AMS 14C and other radioisotopes, and inferred hydrological conditions using particle-size analysis, macrofossil enumeration and bulk sediment elemental and stable isotope characterisation. We describe four distinct hydroclimatic periods that reveal progressive wettening during the Late-Holocene (Fig. 2). Most remarkably, our results indicate a 400-year period (CE 1600–1990) of extreme variability but of exceptionally high intensity flood events (i.e., megafloods) during the Little Ice Age Chronozone (CE 1400–1850).

Figure 1 a) Annual rainfall (shading), proportion (%) of average annual rainfall that falls in Jan–Mar (isohyets, www.bom.gov.au) and locations of published terrestrial paleohydrological records in tropical and subtropical Australia with sub-centennial resolution discussed in the text, including (1) Fortescue Marsh, present study; (2) Juna Downs (Cullen and Grierson, 2007); (3) Hamersley Range (O'Donnell et al., 2015); (4) Cape Range and (8) Chillagoe (Haig et al., 2014); (5) Black Springs (McGowan et al., 2012); (6) KNI-51 (Denniston et al., 2013; 2015); (7) King River (Proske et al., 2014); (9) Bromfield Swamp and (10) Mount Quincan (Burrows et al., 2015); overlaid on Upper Fortescue River catchment (black line) and; b) April true colour MODIS composite image (Blue Marble Next Generation with Topography; www.visibleearth.nasa.gov/view.php?id=74318) and isohyets of the correlation strength (R²) between summer rainfall and Hamersley Range tree rings growth (modified from O'Donnell et al., 2015), and c) interannual variability in rainfall (www.bom.gov.au) and 1979–2012 TCs tracks (Tropical Cyclones Database; www.bom.gov.au/cyclone).



Our hydroclimatic reconstruction contributes an independent and complementary dataset that may be used to verify regional low frequency trends and significant spatial variability identified in annually-resolved coral, speleothem and dendrochronological records at tropical and subtropical latitudes as well as the sensitivity of these records to shifts in the different aspects of hydroclimate. For example, the megafloods period identified in the Fortescue Marsh sediments is coherent with other southern tropical datasets along the Intertropical Convergence Zone (ITCZ) over the last 2000 years, suggesting synchronous hydroclimatic changes across the subtropics.

Importantly, our study site, the Fortescue Marsh (Fig. 3), is a wetland of national ecological and heritage significance: the changes in hydrology revealed by our research provide a key framework into which regional ecological and archaeological data and regional models of occupation can be fitted. Our study constitutes the first palaeoclimatological record resolved over this period for the eastern Pilbara, a region that has been proposed previously as a climatic refuge for aboriginal people (Veth, 1989). The findings thus have significant implications for understanding past and future ecologic functioning of the Fortescue Marsh and its links to indigenous human history.

Acknowledgements: This research was supported by the Australian Research Council in partnership with Rio Tinto (LP120100310) and AINSE grant ALNGRA13043. A. Rouillard was supported by an International Postgraduate Research Scholarship (IPRS), an Australian Postgraduate Award (APA), and Natural Sciences and Engineering Research Council (NSERC) and Fonds québécois de la recherche sur la nature et les technologies (FQRNT) graduate scholarships. G. Skrzypek was supported by an ARC Future Fellowship (FT110100352). We thank Glenn Kirkpatrick, Douglas Ford, Ray Scott and Bill Wilson for field and technical support. We are grateful to Fortescue Metals Group Ltd for providing access to orthoimagery, digital elevation model (DEM) and field sites. We also acknowledge the kind field support of Murray and Ray Kennedy (Roy Hill Station), Sue and Lee Bickell (Marillana Station), Barry and Bella Grett (Ethel Creek Station) and Victor and Larissa Gleeson (Mulga Downs Station).

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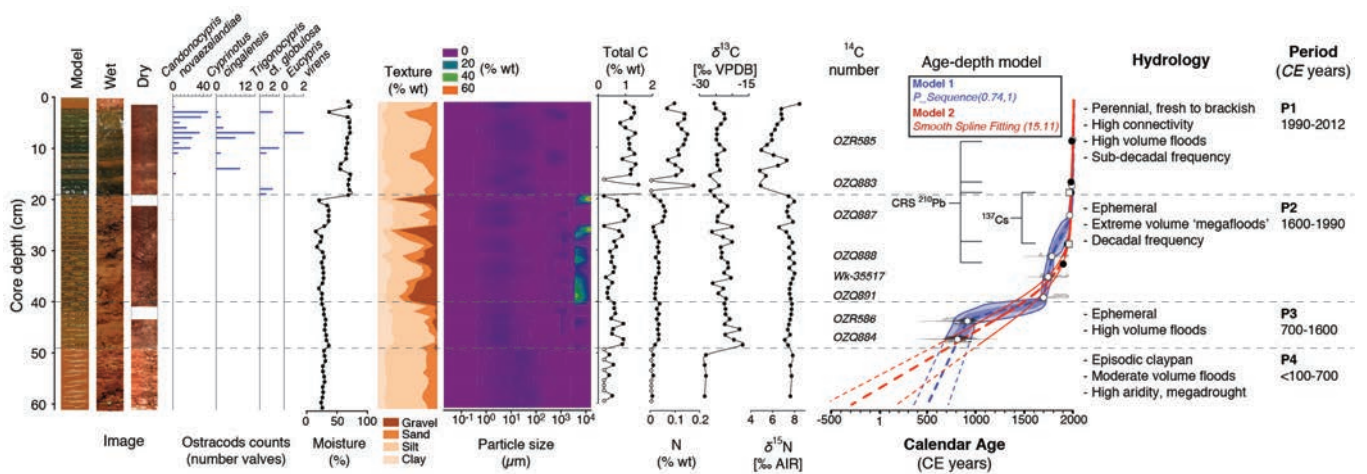


Figure 2 Stratigraphy of 14 Mile Pool core. From left to right: schematic representation (Model); high-resolution photographs (Wet and Dry); number of ostracod valves; moisture content (% weight); statistical grain-size parameters (gravel, sand, silt and clay fractions; % volume < 1 mm; % weight > 1 mm) (GRADISTAT 4.0; Blott and Pye, 2001); grain size 3D surface plots (z axis = % volume < 1 mm; % weight > 1 mm); total C and N content (% weight); bulk $\delta^{13}\text{C}$ [‰ VPDB] and $\delta^{15}\text{N}$ [‰ AIR], laboratory codes for AMS ^{14}C age estimates (^{14}C number); age-depth Bayesian P_Sequence Model 1 rived from ^{14}C ages only (blue series; OxCal v. 4.2; Bronk Ramsey, 2009) and Smooth Spline Fitting Model 2 based on all ages including ^{210}Pb , ^{137}Cs and ^{14}C (red series; CLAM; Blaauw, 2010), with respective 95% confidence intervals envelopes and model extrapolations (<48 cm depth), ^{14}C age estimates (open circles) and their probability distributions (2σ envelope in grey; OxCal v. 4.2), Constant Rate of Supply (CRS) ^{210}Pb (closed circles) and ^{137}Cs (squares) age estimates; hydrological interpretation; and time period (transitions estimated from the average values provided by Models 1 & 2 in the adjoining intervals).



Figure 3 The Fortescue Marsh (Martuyitha) is the largest inland wetland in subtropical northwest of Australia and a wetland of national ecological and heritage significance. For example (bottom right panel), the Marsh attracts myriads waterbirds following large inundations (e.g., 1999, 2000, 2003), which use the wetland en masse (>250 000) as nesting grounds (Halse et al., 2005).

Single-crystal diffraction reveals the complex crystal structures of brownmillerites oxides

Josie E. Auckett (University of Sydney), Chris D. Ling (University of Sydney), Garry J. McIntyre (ANSTO)

The brownmillerite structure is adopted by many mixed-metal oxide materials of the general form $A_2B_2O_5$, where A is an alkali earth metal and B is a transition or Group 3 metal. Members of the brownmillerite family have been investigated for a variety of interesting properties, especially fast oxide-ionic conduction, a vital characteristic of the cathode materials in solid oxide fuel cells (SOFCs) intended to power clean-energy vehicles of the future.

The general structure of brownmillerite consists of A cations sandwiched between alternating BO_6 (octahedral) and BO_4 (tetrahedral) layers, with rows of vacant O sites extending between the corner-linked BO_4 chains. However, slight structural variations can arise from ordered asymmetric "twisting" of the BO_4 chains along the crystallographic c axis. Most of these subtle variants are virtually indistinguishable using powder diffraction methods, especially x-ray diffraction, which is poorly sensitive to the positions of the oxygen atoms in the chains. Consequently, the authors of many previous studies have considered structural disorder or simple ordering schemes to approximate the average structures of their brownmillerite samples.

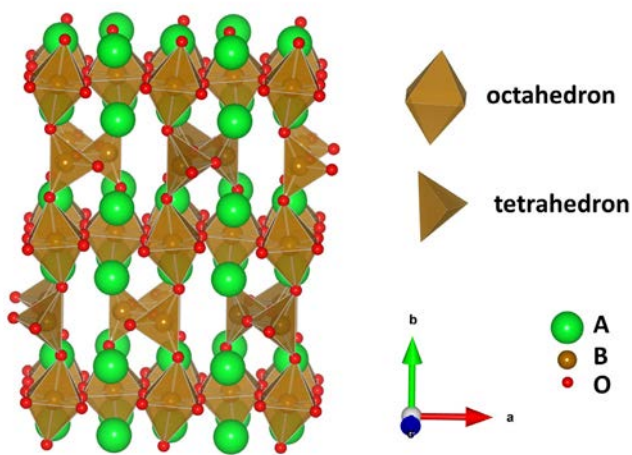


Figure 1 The general crystal structure of brownmillerite.

We have used single-crystal neutron scattering in combination with electron diffraction and other characterisation techniques to investigate the structural properties of several previously investigated brownmillerite phases in the $(Sr,Ca)_2(Fe,Co,Al)_2O_5$ series. Large single crystals were grown for this purpose using the optical floating-zone furnace facility at the University of Sydney. Our results showed clearly that the long-range structures of $Sr_2Fe_2O_5$,

Sr_2FeCoO_5 and Ca_2FeCoO_5 are best described using a chain-ordered supercell up to 750 °C, while additional complexities such as modulations, stacking faults and intergrowths are observed on the local scale. In the case of $Sr_2Fe_2O_5$, these results confirm the recent findings of D'Hondt et al. using electron diffraction and help to clear up a decades-long dispute over the true structure of this complex material.



Figure 2 A single crystal of Ca_2FeCoO_5 grown by the optical floating-zone method.

Importantly, our work highlights the need for careful structural characterisation of all brownmillerite phases, as both local and long-range structures have been frequently misidentified in previous studies utilising only laboratory x-ray powder diffraction. The presence of complex local oxygen order persisting to high temperatures is a critical consideration when discussing oxide ion mobility in brownmillerites like $Sr_2Fe_2O_5$ and Sr_2FeCoO_5 , which were once considered promising ionic-conductive materials for SOFC applications.

This project was supported by an Australian Postgraduate Award, University of Sydney Vice Chancellor's Research Scholarship and an AINSE PGRA. The input and support of the Bragg Institute instrument scientists, technical staff and User Office are gratefully acknowledged.

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Radiation modification of Polyoxazolines to create a new class of elastomers with biomedical applications

Jodie N. Haigh, Tim R. Dargaville - Queensland University of Technology

The enormous growth in three-dimensional (3D) printing has created huge opportunities for innovation in new plastics to expand the variety of materials suitable for printing. This is especially true in the field of biomedical science, which has been quick to embrace 3D printing as a means for making custom parts, including for implantation into the human body. One approach to making new materials is radiation-modification of plastics and polymers. This is a decades-old method that is a robust, quick and, is suitable for high throughput, yet it has been completely overlooked as a means of expanding the repertoire of materials for the new world of 3D printing.

The objective of this study was to initiate a programme investigating the effects of gamma-radiation on a relatively unexplored polymer, poly(2-oxazoline) (POz). POz is an especially interesting polymer as it is a biocompatible, hydrophilic pseudo-peptide with 'stealth-like' properties meaning it is not visible to biological systems making it less prone to rejection. The radiation-modification of POz was expected to yield polymers with new properties which may find use in the biomedical field, especially in the processing of 3D printed structures – for instance, we have recently devised a way to 3D print POz but lack a scalable method of crosslinking them to make them insoluble.

Initial investigations were on samples exposed to a range of gamma-radiation doses at ambient temperatures at ANSTO.

Characterisation of the materials using a variety of techniques including size exclusion chromatography and differential scanning calorimetry (see Figure 1) showed chain scission rather than joining together of chains via crosslinking. This was not unexpected given the low polymer chain mobility at room temperature, but when further experiments including a plasticiser to increase chain mobility also yielded chain scission, it led us to believe the radiation chemistry was less predictable than first thought. Further experiments using a combination of ultraviolet light and a sensitiser in place of the gamma-radiation proved that crosslinking is possible but it is highly dependent on temperature.

These experiments at ANSTO have provided key experimental data into the radiation chemistry of an interesting new polymer and we hope to continue this collaboration to ultimately be able to conveniently and cleanly process 3D printed materials to create new polymers with superior properties. We would like to thank AINSE Ltd for providing financial assistance (Award # ALNGRA14044) to enable all the irradiation work to be conducted, especially to Justin Davies and Connie Banos at ANSTO. Furthermore, this award helped support QUT Masters student Jodie Haigh, who is now in Würzburg, Germany on exchange completing further investigating into 3D printing techniques. Our long-term collaborator Richard Hoogenboom of Ghent University in Belgium, provided some characterisation data for this project. •

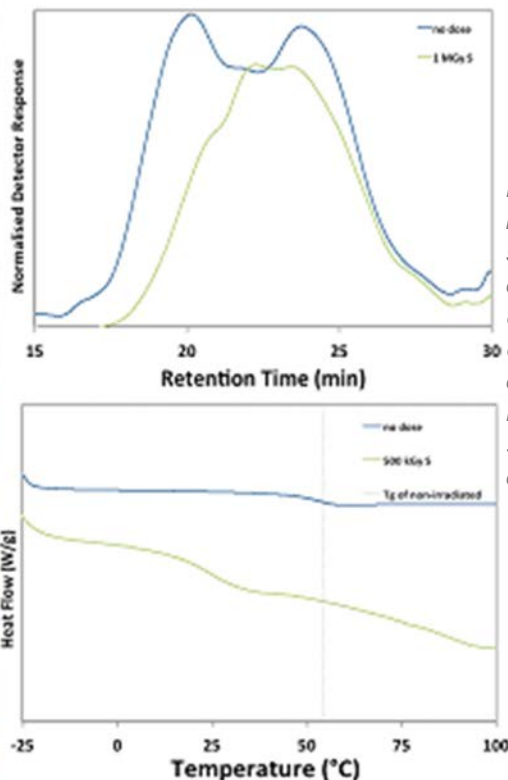
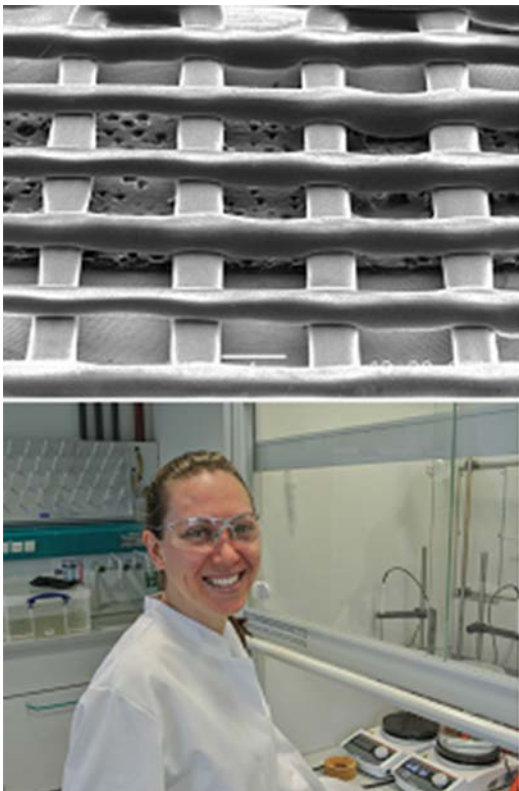


Figure 1 Clock-wise from top left: printed filaments of POz, size exclusion chromatogram of irradiated POz showing a decrease in molecular weight, differential scanning calorimetry of non-irradiated and irradiated POz, photograph of Masters student Jodie Haigh, currently on exchange at the University of Würzburg, Germany.

Using *in situ* gas-loading neutron powder diffraction to investigate carbon dioxide adsorption in coordination framework materials

Stephen H. Ogilvie (The University of Sydney), Samuel G Duyker (ANSTO), Peter D Southon (The University of Sydney), Vanessa K Peterson (ANSTO), Cameron J Kepert (The University of Sydney)

Over recent decades, we have observed a rapid increase in the concentration of atmospheric CO₂, causing the limitation of carbon emissions to become a subject of considerable scientific and technological importance. Coordination frameworks have recently risen to prominence as a result of their many attractive properties, particularly their ability to support porous voids and undergo cycled guest adsorption and desorption.

The main objective of this project was to investigate the nature of host-guest interactions that CO₂ displays upon adsorption into the Co(nlm)₂ (where nlm = 2-nitroimidazolate) material, which is structurally-analogous to a RHO-type zeolite (Figure 1). To achieve this, neutron powder diffraction on CO₂-loaded Co(nlm)₂, in conjunction with Fourier-difference analysis techniques, was used to determine the location of CO₂ adsorption sites within the pore space of the material. Results have made it readily apparent that the presence of pore surfaces with strong charge localisation, such as those provided by the nitro functional group of nlm bridging ligands, can be favourable adsorption locations for CO₂. During this study, five crystallographically-distinct CO₂ adsorption sites were observed. The strongest of these, site A (Figure 2), is found at the centre of the square pore windows, aligning itself parallel with the surrounding four nlm bridging ligands, effectively maximising electrostatic interactions between electron-rich O of the CO₂ molecule and the electron-deficient N of the nitro functional group.

Interestingly, some adsorption sites show no direct interaction with the nitro functional groups, instead forming quadrupole-quadrupole interactions with sites that already interact with a nitro functional group. For instance, at low loadings, Site D is found off the tail end of nlm ligands where there are no appreciable electrostatic host-guest interactions (Figure 3a). However, upon increasing the loading of CO₂ within the host material, site D migrates toward site C where it is able to form a favourable side-to-end quadrupole-quadrupole interaction (Figure 3b).

This research was supported by the Science and Industry Endowment Fund, the Australian Research Council and an Australian Institute of Nuclear Science and Engineering Postgraduate Research Award. •

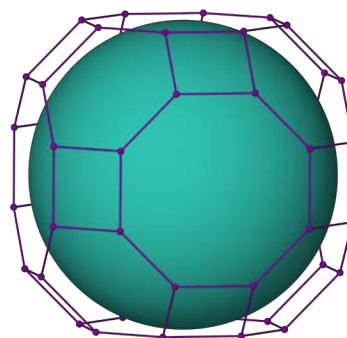


Figure 1 A simple stick representation of the largest pore space found in Co(nlm)₂. Bridging nlm ligands are omitted for clarity. The central green sphere represents the guest-accessible pore volume.

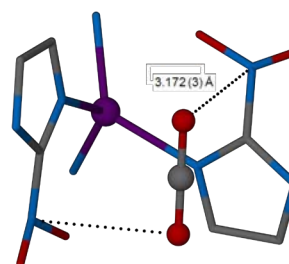


Figure 2 CO₂ interaction of Site A with two of four nlm bridging ligands that form the edges of the square pore windows. Shown are Co (purple), C (grey), N (blue), and O (red). H atoms have been omitted for clarity.

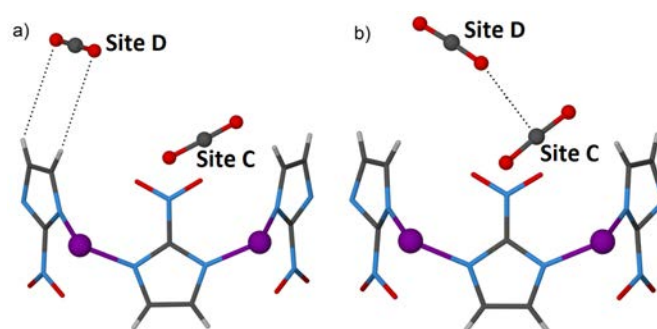


Figure 3 Structural representation of CO₂ adsorption sites C and D at a) low and b) high loadings of CO₂. Shown are Co (purple), C (grey), N (blue), and O (red).

Strain-induced magnetic phase transition in SrCoO_{3-δ} thin films

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²The Bragg Institute, Australian Nuclear Science and Technology Organisation (ANSTO)

³School of Materials Science and Engineering, The University of New South Wales

⁴Spintronic and Electronic Materials Group, Institute for Superconducting and Electronic Materials, Australian Institute for Innovative Materials, University of Wollongong

⁵Department of Physics and Materials Science, City University of Hong Kong

Transition metal oxides represent a wide set of materials with a broad range of functionalities, including superconductivity, magnetism, and ferroelectricity, which can be tuned by the careful choice of parameters such as strain, oxygen content, and applied electric or magnetic fields. Their tunability makes them ideal candidate materials for use in developing novel information and energy technologies. SrCoO₃ is a promising candidate for an entirely new class of multiferroic materials which would combine the control of spin order, charge order, and electric polarization through external strain. Recent theoretical calculations have predicted a magnetic phase transition in SrCoO₃ from antiferromagnetic to ferromagnetic accompanied by a metal-insulator transition and the onset of ferroelectric polarization upon applied biaxial strain [1,2].

We have achieved large in-plane tensile strain in SrCoO₃ by growing atomically precise thin films by Pulsed Laser Deposition with only 20 nm thickness on substrate materials with a desired lattice mismatch, i.e. cubic (100)-terminated SrTiO₃ and orthorhombic (110)-terminated DyScO₃ [3]. The SrCoO₃ thin film is under a 1.7% in-plane tensile strain when grown on SrTiO₃ and under a larger in-plane tensile strain of 2.8% on DyScO₃ substrate. The films on SrTiO₃ were 40 nm thick and were 20 nm thick in DyScO₃, with film thickness limited by the large degree of epitaxial strain. Neutron diffraction experiments were performed on the instrument TAIPAN at ANSTO where the high flux, low background, and subsequent excellent signal-to-noise ratio, allowed investigation of the magnetism in thin films just 20-40 nm thick, a world record for a neutron investigation of single thin-film sample to the best of our knowledge.

Under an intermediate amount of strain using a SrTiO₃ substrate the SrCoO₃ thin film has a ferromagnetic transition at ~170 K, consistent with previous reports. This is shown in Figure 1, which presents neutron diffraction data on the ferromagnetic (001) Bragg reflection. For samples under large tensile strain grown on DyScO₃ substrate the appearance of a (½ ½ ½) diffraction peak serves as direct evidence for G-type antiferromagnetic order (see Figure 2). The transition temperature was dependent on the sample aging time, indicating a change in oxygen

concentration over time. Our neutron diffraction experiments have therefore demonstrated that the magnetic properties of SrCoO₃ can be systematically through the application of biaxial strain, as predicted theoretically [1,2]. This offers new functionalities through combining control of spin order and electrical polarization state through the application of epitaxial strain, making SrCoO₃ a highly interesting material for future technological applications. •

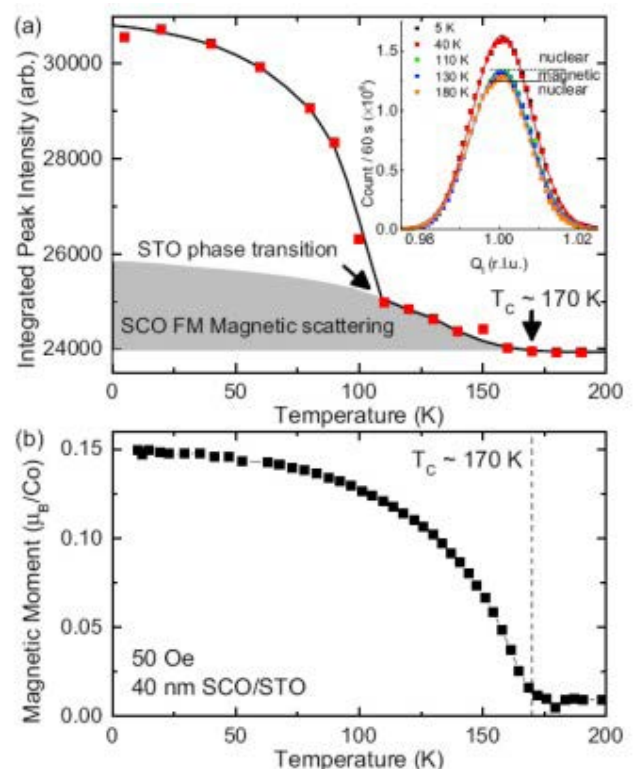


Figure 1 (a) Temperature dependence of the neutron diffraction intensity of the ferromagnetic (001) Bragg peak for the 40 nm thick SrCoO₃/SrTiO₃ sample. The black line serves as a guide to the eye (inset: raw data with Gaussian fits for selected temperatures). (b) In-plane measurement of the magnetic moment as a function of temperature.

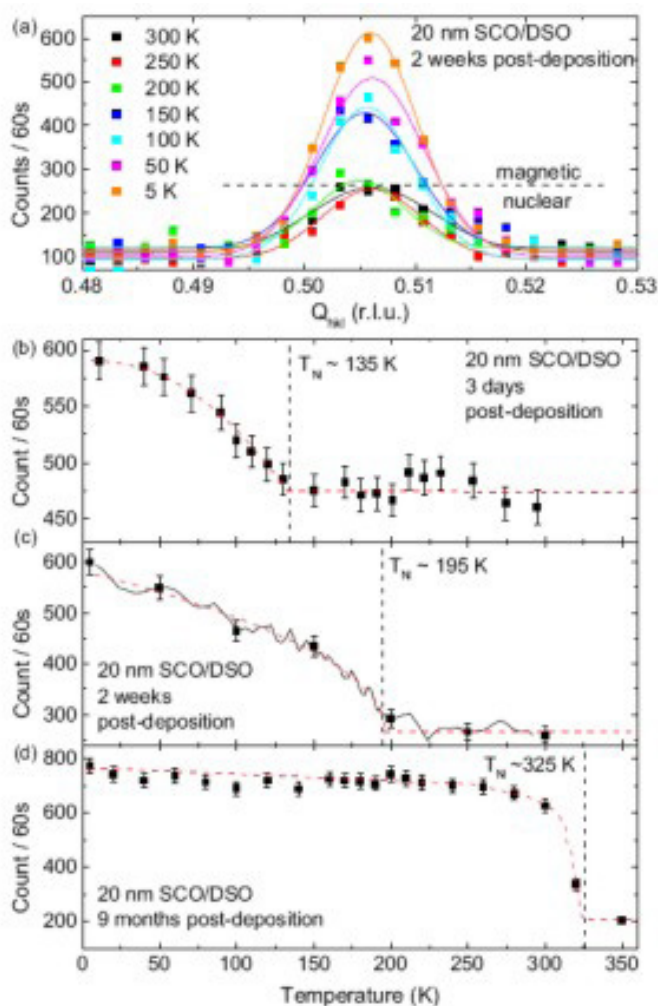


Figure 2 (a) Neutron diffraction scans of the $(\frac{1}{2} \frac{1}{2} \frac{1}{2})$ SCO Bragg peak of the 20 nm thick SCO film grown on DSO. Intensity of the $(\frac{1}{2} \frac{1}{2} \frac{1}{2})$ reflection of the SCO/DSO film (b) 3 days, (c) 2 weeks, and (d) 9 months postdeposition. The black squares are peak intensities of the scans derived from Gaussian fits to the data as indicated in (a). The solid line in (c) corresponds to the intensity of the peak maximum recorded as the temperature was raised from 5 K to room temperature. The dashed red lines serve as guides to the eye.

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Early Career Researcher Talks

AINSE offers its members and local community the opportunity to attend lunch time early career researcher talks throughout the year, allowing students to showcase their research and to meet fellow students and senior researchers from across disciplines and campuses. The talks are a success, building collaborations not only between speakers, but the nuclear science, technology and engineering community, including ANSTO scientists.

AINSE was fortunate to have a high standard of speakers, selected from the AINSE Postgraduate Research Award (PGRA) holders, who took time in their busy experimental visits to present their research. AINSE coordinated the students' ECR talks with their visit to ANSTO, making it economical for both AINSE and the students. The students that presented in 2015 included:

Catriona Vanston - University of Tasmania - "Catalytically relevant palladium hydride complexes"

Fenfen Chang - University of New South Wales - "Evolution of crystallographic and magnetic phase transition in $Cu_{1-x}Zn_xFe_2O_4$ studied by neutron powder diffraction"

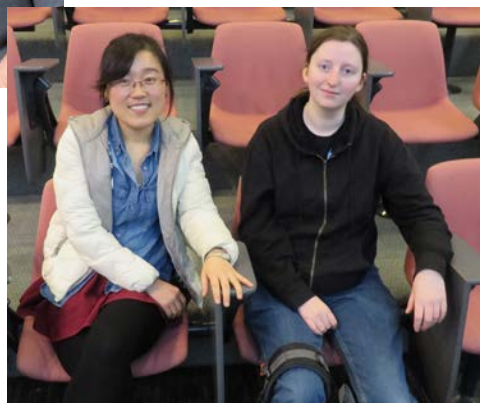
Tiago Freire - Southern Cross University - "Clear as Mud: Investigating complex mineral systems"

Emily Reynolds - The University of Sydney - " $SrRu_{0.5}Tc_{0.5}O_3$: Magnetism and structure"

Jimena Samper-Villarreal - The University of Queensland - "Dynamics of carbon storage in seagrass meadows"

Lydia Mackenzie - University of Queensland - "A history of swamp development and human occupation of Bentinck Island, northern Australia"

John Daniels - University of New South Wales - "Electro-mechanical materials: What scattering studies have provided and the future of these functional materials"



Clockwise from top left: Tiago, Emily, Jimena and Paul Di Pietro; Catriona presenting her work; Fenfen and Catriona before their presentations; Emily presenting her work in the AINSE Theatre.

“All the staff who gave tours/ presentations were super enthusiastic and great. The AINSE staff were amazing. Experiments were very engaging.”

“I did not realise the broad areas of research I could delve into. I have now seen several fields I could enter and apply nuclear techniques to geological studies.”

“I loved meeting such a broad range of personalities from so many varied fields of study. Thank you so much for the opportunity. I am so excited for the future and look forward to coming back one day.”

“Had a fantastic time, learnt a lot of new concepts and a lot of new ideas for the application of nuclear science in so many fields, in a group of motivated and dedicated like-minded students. A great week. Thanks AINSE!”



Clockwise from top left: 2015 Winter School Participants; students enjoying the AINSE Onesie on a cold evening on Sydney Harbour; students enjoying the research roundup and trivia night, one of many social activities during the week; Dr Adi Paterson presenting a winter school student with a certificate of participation.

AINSE Winter School 2015

Monday 13th July to Friday 17th July 2015

AINSE Winter School 2015 lived up to its name, offering the students the coldest week in Sydney for 15 years. However, the students stayed warm in their AINSE Winter School Onesie's! 44 students attended the AINSE Winter School 2015 with participation from almost every AINSE Member University and organisation. A lottery of reserve students was run to fill the vacant spaces, which was not offered in previous years. The purpose of the Winter School is to encourage undergraduates to take an interest in nuclear science and engineering and to learn how to apply these techniques in their future research.

The School opened with Josh Richards, who found his true calling in late 2012 when he discovered the Mars One project, and is now one of 100 worldwide astronaut candidates short-listed to travel to Mars. The school followed a planetary theme, finishing with a planetary panel consisting of high profile ANSTO and Australian Synchrotron scientists, and a certificate ceremony presented by Dr Adi Paterson. Dr Cathy Foley continued to inspire early career scientists with her presentation on women in science, and work life balance. The science talks and guest speaker presentations were opened to all local high school students, and many schools attended the events during the week.

This year's winter school introduced new social activities to the program, including a Movie and Trivia night which were well received. In conjunction with ANSTO Researchers, AINSE produced a student project booklet for students interested in pursuing a career in research, with over 20 ANSTO researchers attending the research roundup dinner on Thursday evening. Students were encouraged to discuss prospective projects with the researchers and many one on one meetings were coordinated during the week.

The Winter School was privileged to have AINSE PGRA, Honours and Masters Students assist during the week, mentoring and helping students during the activities, *"Seeing other students in action is inspiring. It also makes the whole experience less intimidating overall"*.

AINSE continues to encourage and promote nuclear science and engineering to senior undergraduate students through successful programs like the AINSE Winter School.

2015 attendance:

44 students

Previous year's attendance:

2014 – 42 students

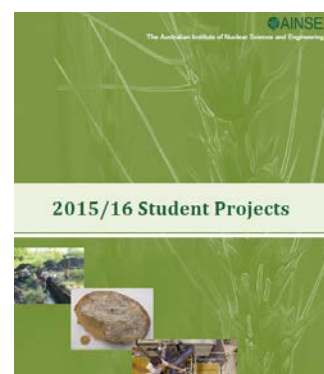
2013 – 42 students

2012 – 38 students

2011 – 41 students

2010 – 37 students

2009 – 33 students



2015 Students

Seamus Allen	Southern Cross University
Roshanak Armat	The University of South Australia
Felipe Barbosa Serpa	Australian Catholic University
Jarrad Barnes	Macquarie University
David Blyth	University of Southern Queensland
Maeve Burgess	Curtin University
Jay Chakrabarti	RMIT University
Catherine Clark	Massey University
Christian Clarke	University of Technology, Sydney
Maja Dunstan	The University of Melbourne
Katherine Gioseffi	Queensland University of Technology
Michael Grasso	James Cook University
Emily Hart	The University of New England
Anna Hawkins	University of Western Sydney
Stuart Hinchliff	James Cook University
Robert Jenkin	Flinders University
Stephanie Kaylock	Charles Sturt University
Stephanie Lambie	University of Otago
Scott Lamont	University of Canberra
Bijay Lamsal	Charles Darwin University
Christopher Liang	The University of New South Wales
Jessica Liddle	The University of Western Australia
Harriet Love	University of Otago
Tom Mallett	La Trobe University
Maria Marando	The Australian National University
Joshua McCann	Murdoch University
Felicity McKay	University of Tasmania
Rosemary Mwipiko	Victoria University of Wellington
Andrew Painting	Charles Sturt University
Molly Patton	Deakin University
Marlena Prentice	University of Waikato
Samantha Ridgway	Edith Cowan University
Lucas Rush	The University of Queensland
Isabelle Russell	University of the Sunshine Coast
Benjamin Sasse	Monash University
Jasmine Stewart	University of Sydney
Lauren Thompson	University of Adelaide
Elise Thornton	Federation University
Simone Waite	University of Newcastle
Samuel Watson	Griffith University
Benjamin Wilson	University of Canterbury
Hannah Wilson	CQUniversity
Alex Winnett	Swinburne University of Technology

Student Helpers

James Donlon	La Trobe University
Daniel King	IME, ANSTO
Lydia Mackenzie	The University of Queensland
Emily Reynolds	The University of Sydney
Mike Yang	University of New South Wales

Number of Disciplines / Area of Study

Archaeology	2
Biochemistry	1
Biology	3
Biotechnology	1
Chemical Engineering	3
Chemistry	13
Computing	1
Earth Science	1
Electrical and Electronic Engineering	3
Environmental Science	4
Geology	3
Law	1
Marine and Freshwater Science	1
Materials Chemistry	1
Materials Engineering	1
Medical Science	2
Nanotechnology	1
Nuclear Engineering	1
Nuclear Medicine	1
Oceanography	1
Organic Geochemistry	1
Physics	5
Software Engineering	1



Guest speaker Josh Richards talking to Winter School students, high school students and ANSTO staff.

Asia Oceania Conference on Neutron Scattering (AOCNS)

Sunday 19th July to Thursday 23rd July 2015



For AINSE, AOCNS 2015 was a great success! AINSE had a strong presence at the conference, including an extensive exhibitor booth, showcasing the opportunities AINSE provides and attracting researchers to specific facilities and projects. AINSE staff were able to network and market to over 300 delegates, from senior researchers to local and international students, throughout the week, including a presence at the conference dinner and satchel branding and insert. The strong focus on building healthy relationships with students progressed as AINSE staff ran the student evening and distributed a Student Projects Book.

There was a lot of interest in the onesie prize, which gave the staff an opportunity to attract people to the booth and also collect contact details from the delegates. Michelle was an asset to the booth, utilising her Japanese language skills to talk to the Japanese delegates. Overall, the contacts made with local and international delegates have put AINSE in a strong position for future endeavours and programs.



“I learnt so much about nuclear science and the program completely revolutionized some of my ideas, opinions and ways of thinking. Made so many new friends (and potential research collaborators) + lots of fun! It allowed me to get in touch with my co-supervisor which has really helped progress my research.”

“I found O Week to be very valuable in getting to know AINSE and ANSTO staff and procedures. I feel like it jump-started the process and I will now be able to get stuck into using the facilities without worrying about figuring out admin.”



Clockwise: 2015 PGRA students enjoying the mast climb on Sydney Harbour; students introducing themselves and presenting their projects to the whole group; first day - ice breaker games in the ANSTO Cafe.



Postgraduate Research Award Orientation “O” Week 2015

Sunday 18th – Wednesday 21st October 2015

Following the success of the AINSE Winter School, AINSE developed a new program this year for the recently awarded (2015) PGRA students. 35 postgraduate research awards were offered to students from AINSE member universities from Australia and New Zealand. The 2015 PGRA cohort was invited to attend an orientation week at AINSE, from 18 – 21 October 2015. It was designed to give the students an opportunity to meet with fellow students through several well planned social activities, network with each other, ANSTO and AINSE staff, to meet their ANSTO Co-supervisor and start planning their future visits to ANSTO. In addition, a tour to familiarise themselves with the ANSTO site and facilities was also organised.

The PGRA O Week was started with a welcome from the AINSE Managing Director, Dr Paul Di Pietro and the ANSTO CEO, Dr Adi Paterson. The program also included several high profile guest speakers, Hugh Kearns from Flinders University and Ed Lukaszewski from the University of New South Wales, to encourage and give practical advice on the students’ PhD journey. Other workshops during the week included practical advice on visiting and accessing the ANSTO facilities from the AINSE staff, best practice oral and poster presentations from a previous year’s PGRA student, Heather Haines, and writing for publication from an ANSTO staff member, Dr Tom Cresswell.

A highlight for the students was a cruise on Sydney Harbour, on a tall ship, where the students were able to climb the mast. A large group of students, as well as some ANSTO staff took up the challenge to climb the mast and enjoy the beautiful panoramic views of Sydney harbour as the sun went down.

Tim Payne, a contact scientist for AINSE found the event extremely useful, *“The highlight was talking with the enthusiastic young students and definitely they approached the whole thing in a most constructive fashion. They were willing to initiate interesting conversations, ensuring they benefitted from the occasion by learning about a broad range of ANSTO activities beyond just their own research areas. It was nice to meet them.”*

As part of the week, students gave a 5 minute presentation to the group to introduce themselves and discuss their project, giving everyone a great summary of the current research being conducted across Australia and New Zealand in the nuclear science arena. All the students are keen to keep in touch and continue with building lasting friendships and collaborations. Overall, the event exceeded all expectations, and fulfilled its objective by encouraging and supporting young nuclear science and engineering students.

“Let’s do things like that more often! An annual meeting / progress meeting for all PGRA’s starting in the same year.”



2015 Conferences and Workshops

2015 International Travel Scholarships

Throughout the year, students from AINSE member organisations are invited to apply for travel support to attend international conferences and workshops. AINSE conference support and international travel scholarships encourage students to attend and participate with conferences and workshops to exchange ideas and network with the nuclear science and engineering community. The international travel scholarship offers up to \$900 towards travel.

AINSE awarded eight (8) scholarships to students to present and attend several high profile international conferences in 2015.

Student	University	Conference Attended	Location of conference
Catherine Bland	Flinders University	Technology: Ideology, Economics & Power in the Andes	London
Bianca Petruselli	Flinders University	INQUA	Nagoya, Japan
Heather Haines	Griffith University	INQUA	Nagoya, Japan
Fenfen Chang	University of New South Wales	20 th International Conference on Magnetism	Barcelona
Hamid Shaikh	University of South Australia	42 nd Annual Meeting and Exposition of CRS	Edinburgh, Scotland
Krystina Lamb	University of the Sunshine Coast	Hands-on workshop density-functional theory and beyond	Berlin, Germany
Michele Vonci	The University of Melbourne	5 th European Conference on Molecular Magnetism (ECMM)	Zaragoza, Spain
Jakob Andersson	Flinders University	TethMem 2015	Singapore



The University of Edinburgh, Scotland. Photo courtesy of Rachel Caldwell.

2015 Conferences and Workshops

AINSE conferences play a major part in the information exchange process for scientific and technological information, providing a forum for debate and an opportunity for young researchers to present their work. In 2015 AINSE supported the following conferences, which included assisting with travel and accommodation to attend AINSE supported conferences.

Event	Date of Conference / Workshop	Venue	No. of Students Supported	Student Universities
Small Angle Scattering Workshop	11 - 13 February 2015	Deakin University	1	Curtin University
Rietveld Powder Diffraction School	10 - 12 March 2015	ANSTO B72 Training Rooms	5	The University of Melbourne Murdoch University
13th Australasian Environmental Isotope Conference	8 - 10 July 2015	Sydney Harbour Marriott Hotel	8	The University of Adelaide Flinders University Griffith University The University of Melbourne Monash University RMIT University Southern Cross University
Australian Nuclear Association Conference on Nuclear Science and Engineering (ANA 2015)	9 October 2015	Sydney Mechanics School of Arts, Sydney	2	Charles Darwin University Swinburne University of Technology
Inelastic Neutron Scattering School 2015	22-27 November 2015	AINSE / ANSTO	10	Murdoch University University of Sydney University of New South Wales Western Sydney University
7th AONSA Neutron School	1-5 December 2015	Materials & Life Science Experimental Facility, J-PARC, Japan	4	University of Sydney University of New South Wales Monash University The University of Queensland

ANSTO Bragg Institute PAC meetings

AINSE supported travel and accommodation for member representatives to attend the ANSTO Bragg Institute Program Advisory Committee meetings. These meetings provide recommendations to the Head of the Bragg Institute, concerning allocation of neutron beam time.

AONSA School 2015, Tokai, Japan



By Rachel Caldwell

I was privileged to attend the 7th AONSA Neutron School / the 3rd MLF School at J-PARC (Japan Particle Accelerator Research Centre), Japan, 2015. As a Biological Sciences student, it was a great introduction into the world of Neutron Scattering, theory and techniques, as well as my first trip to Japan. I have to admit that I was a little nervous attending the school, not having a strong chemistry or physics background, however the school eased us into the techniques and facilities, with some fantastic lectures from well versed Neutron scientists. It was also a great opportunity to spend some time with our current PGRA students and talk with them about their research who were funded by AINSE to attend the school in the

form of travel support. We were allocated our specified "beam line" to run experiments and data analysis for the last two days of the school. I was given BL03 (beam line 03) - Single Crystal Diffraction (iBIX - Ibaraki Biological Crystal Diffractometer). I was very fortunate to have a small group on the instrument, it was just myself and a Chinese student Dan Li, with 3 scientists to show us the ropes! Some of the calculations were difficult, but in the end we produced a beautiful model of the Bovine pancreatic Rnase A enzyme. The school ended with a presentation from all the attending students on their instrument (23 beam lines), which was a great overview of all the instruments from the students perspective. I would like to thank AINSE for giving me the opportunity to attend the school, and also a big thank you to the event organisers of the school, who looked after us so well. Rachel Caldwell, Communications and Events Coordinator.

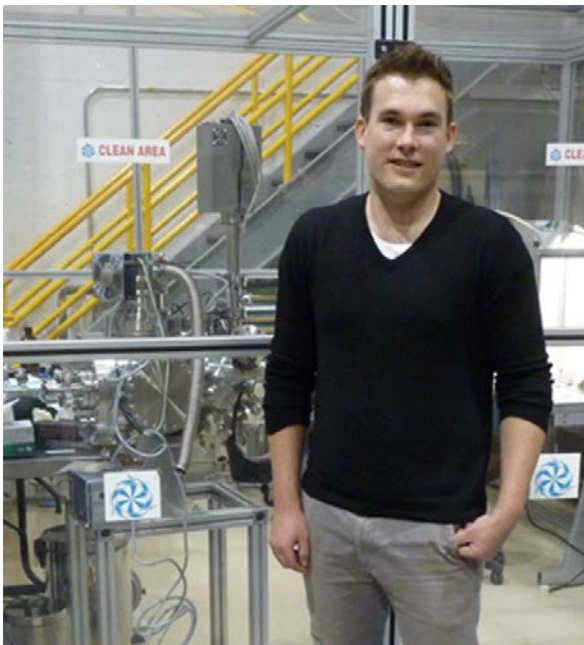
AINSE Gold Medals Awards



The AINSE Gold Medal is awarded for excellence in research, based on publications over the last five years which acknowledge AINSE support. The AINSE Gold Medal may be awarded jointly to collaborating researchers and one medal is reserved for graduate students, including those who have recently completed their PhD projects. Nominees for awards are submitted to the AINSE Council by the Specialist Committees for consideration at the December meeting each year. Awards are usually presented in the following May at the time of the Council AGM, and at the presentation of the medal, Gold Medallists give an address on their research. Five students were awarded the AINSE Gold Medal at the AINSE AGM in May 2015.

AINSE Gold Medal Awards - Awarded in May 2015

Year	Recipient	Awarded
2014	Dr David Cortie, University of Wollongong (Student)	2014
2014	Dr Nisa Salim, Deakin University (Student)	2014
2014	Dr Robert Hayes, The University of Newcastle (Student)	2014
2013	Dr Joel Pedro, University of Tasmania (Student)	2013
2013	Dr Arthur Smith, The University of Queensland (Student)	2013



Dr David Cortie.



Dr Nisa Salim. Photo courtesy of Deakin University.

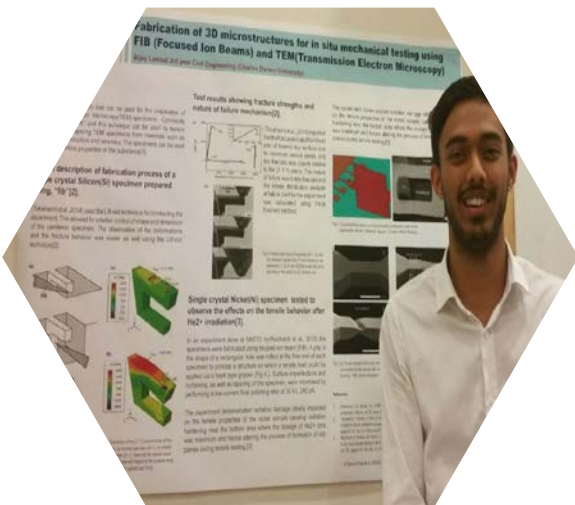


2015 AINSE

August 2015

AINSE Roadshows

Two roadshows were run in Melbourne (Monash University & The University of Melbourne) to speak to the Victorian members.



October 2015

Australian Nuclear Association - ANA Conference

AINSE staff attended the annual ANA conference, as well as supporting several students in travel support to attend the event.

Throughout the year

NZ and interstate visits / AINSE Presentations to various events

AINSE staff were invited to attend and present at a number of events throughout the year.



Outreach Activities



March 2015

Science Meets Parliament

Michelle Durant (Business Manager & Scientific Coordinator) and Robert Burford (AINSE President) attended this event on behalf of AINSE.



Photographs courtesy of Lorna Sim at Science Meets Parliament 2015



November 2015

BioMetals Symposium

Paul Di Pietro (Managing Director) attended and presented at this event in honour of Emeritus Professor James Camakaris to mark his retirement and celebrate his achievements.



November 2015

EMBL Australia PhD Symposium

Rachel Caldwell (Communication and Events Coordinator) attended and presented a poster at this event to target Life Sciences PhD students.



AINSE Council 2015 Member Organisations and Representative at Council

Two Meetings of Council were held in 2015. There was an Annual General Meeting on the 27th May 2015 and a general meeting held on the 1st December 2015.

Abbreviations	Organisation	Membership Commenced	Councillor	Meetings Attended
ACU	Australian Catholic University	2001	Dr Brian Bicknell	1
ADE	The University of Adelaide	1958	Emeritus Professor Richard Keene	1
AKL	The University of Auckland	1995	Professor James Metson Professor Jadranka Travas-Sejdic	1 1
ANS	ANSTO	1958	Dr Richard Garrett	2
ANS	ANSTO, Finance Procurement and Quality	1958	Mrs Roslyn Hatton	2
ANS	ANSTO, Institute for Materials Engineering	1958	Professor Lyndon Edwards	2
ANU	The Australian National University	1958	Professor Keith Fifield	1
CAN	University of Canterbury	2005	A/Professor Greg Russell	2
CBR	University of Canberra	1996	Professor Bill Maher	0
CDU	Charles Darwin University	1995	A/Professor Krishnan Kannoorpatti	2
CQU	CQ University	1991	A/Professor Owen Nevin	1
CSI	CSIRO	2010	Dr Patrick Hartley	1
CSU	Charles Sturt University	1995	Dr Padraig Strappe	0
CUR	Curtin University of Technology	1989	Professor Craig Buckley	1
DEA	Deakin University	1997	Professor Lee Astheimer	0
ECU	Edith Cowan University	1996	A/Professor Stephen Hinckley	1
FED	Federation University Australia	1997	Dr Jessica Reeves	1
FLI	Flinders University	1966	A/Professor Claire Lenehan	2
GNS	GNS Science	2005	Dr Christopher Daughney	0
GRI	Griffith University	1975	Professor Greg Hope	1
JAM	James Cook University	1970	A/Professor Scott Smithers	1
LAT	La Trobe University	1966	Dr Andy Herries	1
MAC	Macquarie University	1966	Prof Barbara Messerle	0
MAS	Massey University	2014	Professor Richard Haverkamp	2
MEL	The University of Melbourne	1958	A/Professor Damian Myers	1
MON	Monash University	1961	Prof Ian Smith	0
MUR	Murdoch University	1985-1997 rejoined 1998	Dr Aleks Nikoloski	2
NCT	The University of Newcastle	1965	Professor Erich Kisi	0
NSW	The University of New South Wales	1958	Professor Justin Gooding	0
OTA	University of Otago	2007	Professor Gary Wilson	1
QLD	The University of Queensland	1958	Professor Ian Gentle	2
QUT	Queensland University of Technology	1992	Professor Godwin Ayoko	2
RMI	Royal Melbourne Institute of Technology	1988	Professor Suresh Bhargava Professor Gary Bryant	1 1
SCU	Southern Cross University	1994	Professor Bill Boyd	2

Abbreviations	Organisation	Membership Commenced	Councillor	Meetings Attended
SYD	The University of Sydney	1958	Professor Jill Trehwella Professor Laurent Rivory	0 0
SYN	Australian Synchrotron	2010	Professor Andrew Peele	0
TAS	University of Tasmania	1958	Professor Andrew McMinn	2
UNE	The University of New England	1958	Dr Chris Fellows	2
USA	University of South Australia	1991	Professor Namita Choudhury	1
USC	University of Sunshine Coast	2010	Professor John Bartlett	0
USQ	University of Southern Queensland	1996	A/Professor Joachim Ribbe	1
UTS	University of Technology Sydney	1988	Professor Michael Cortie	2
UWA	The University of Western Australia	1958	A/Professor Pauline Grierson	1
UWS	University of Western Sydney	1993	A/Professor Gary Dennis	1
VUW	Victoria University of Wellington	2010	Professor Mike Wilson	1
WAI	The University of Waikato	2011	A/Professor Graham Saunders	2
	AINSE		Dr Paul Di Pietro, Managing Director	2
	Independent Director		E/Professor Robert Burford, President	2
	Independent Director		Dr Peter Coldrey, Independent	1

Alternate Representatives and other attendees

Abbreviations	Organisation		
ACU	Australian Catholic University	Dr Duncan Cook	1
CUR	Curtin University of Technology	Dr Alison Blyth	1
MAC	Macquarie University	Professor Robert Willows	2
NSW	University of New South Wales	A/Professor John Stride	1
UWA	The University of Western Australia	Dr Greg Skrzypek	1
AUT	Auckland University of Technology	Dr Andrew Hilton (o)	1
AKL	The University of Auckland	Professor Jadranka Travas-Sejdic (o)	1

(o) denotes observer



AINSE Building, Lucas Heights, Sydney

AINSE Board Meetings

Six Board Meetings, including extra board meetings were held in 2015.

Executive Member	Office/Position	Organisation	Meetings Attended
Professor Robert Burford	President	Independent Director	6
Dr Paul Di Pietro	Managing Director	AINSE	6
Professor Lyndon Edwards	ANSTO Representative	ANSTO	5
Dr Richard Garrett	ANSTO Representative	ANSTO	5
Dr Peter Coldrey	Independent	Independent Director	4
Ms Roslyn Hatton	ANSTO Representative	ANSTO	6
A/Professor Claire Lenehan	University Representative	Flinders University	6
Professor Ian Gentle	University Representative	The University of Queensland	6
Professor Ian Smith	University Representative	Monash University	3
Observers			
Mr Robert Burdock		AINSE Consultant	3

AINSE Staff

Managing Director

Dr Paul Di Pietro, BE (Hons), PhD, MAICD

Secretariat

Ms Michelle Durant, BSc, BFinAdmin
 Ms Rachel Caldwell, BMarSc
 Mrs Sandy O'Connor (part-time)
 Mrs Nerissa Phillips (part-time)
 Mr Chris Munn (casual), BExSc
 Ms Jessica Haines (casual)



Starting from the front: Sandy O'Connor, Paul Di Pietro, Michelle Durant, Nerissa Phillips, Rachel Caldwell, Chris Munn.

AINSE Winter School Committee

Professor Thomas Millar	University of Western Sydney
Dr Paul Di Pietro	AINSE
Ms Michelle Durant	AINSE
Ms Rachel Caldwell	AINSE
Ms Connie Banos	ALS, ANSTO
Dr Ben Fraser	ALS, ANSTO
Dr Andrew Studer	Bragg, ANSTO
Dr Tamim Darwish	Bragg, ANSTO
Mr Rob Russell	Bragg, ANSTO
Mr Rod Dowler	Discovery Centre
Dr Rachel Popelka-Filcoff	Flinders University
Dr Mihail Ionescu	IER, ANSTO
Ms Patricia Gadd	IER, ANSTO
Ms Danielle Fierro	IER, ANSTO
Dr Henk Heijnis	IER, ANSTO
Ms Atun Zawadzki	IER, ANSTO
Dr Gordon Thorogood	IME, ANSTO
Mr Robin Foy	SERA, ANSTO
Ms Tina Paneras	SERA, ANSTO
Mr Ralph Blake	ANSTO

AINSE Specialist Committees - 2015

The Managing Director, AINSE, is an ex-officio (non-voting) member of all Committees. Committees met in May and in October. (a) indicates 'alternate' (c) indicates 'Councillor'

Archaeology and Geosciences Committee

Professor Keith Fifield (c) – Convenor	The Australian National University
Professor Glenn Summerhayes	University of Otago
Dr Jessica Reeves (c)	Federation University
Dr John Bennett	ANSTO
Dr Quan Hua	ANSTO
Dr Michael-Shawn Fletcher	The University of Melbourne
Dr Craig Sloss	Queensland University of Technology
A/Professor Patrick Moss	The University of Queensland

Biotechnology and Biomedical Sciences Committee

A/Professor Damian Myers (c) – Convenor	The University of Melbourne
Professor Pam Sykes	Flinders University
Professor Roger Price	University of Western Australia
Dr Ben Fraser	ANSTO
Dr Guo Jun Liu	ANSTO

Environmental Sciences Committee

Dr Greg Skrzypek – Convenor	University of Western Australia
A/Professor Paul Augustinus	The University of Auckland
Professor Andrew McMinn (c)	The University of Tasmania
Professor Isaac Santos	Southern Cross University
Professor James Goff	The University of New South Wales
Dr Dioni Cendon	ANSTO
Dr Henk Heijnis	ANSTO

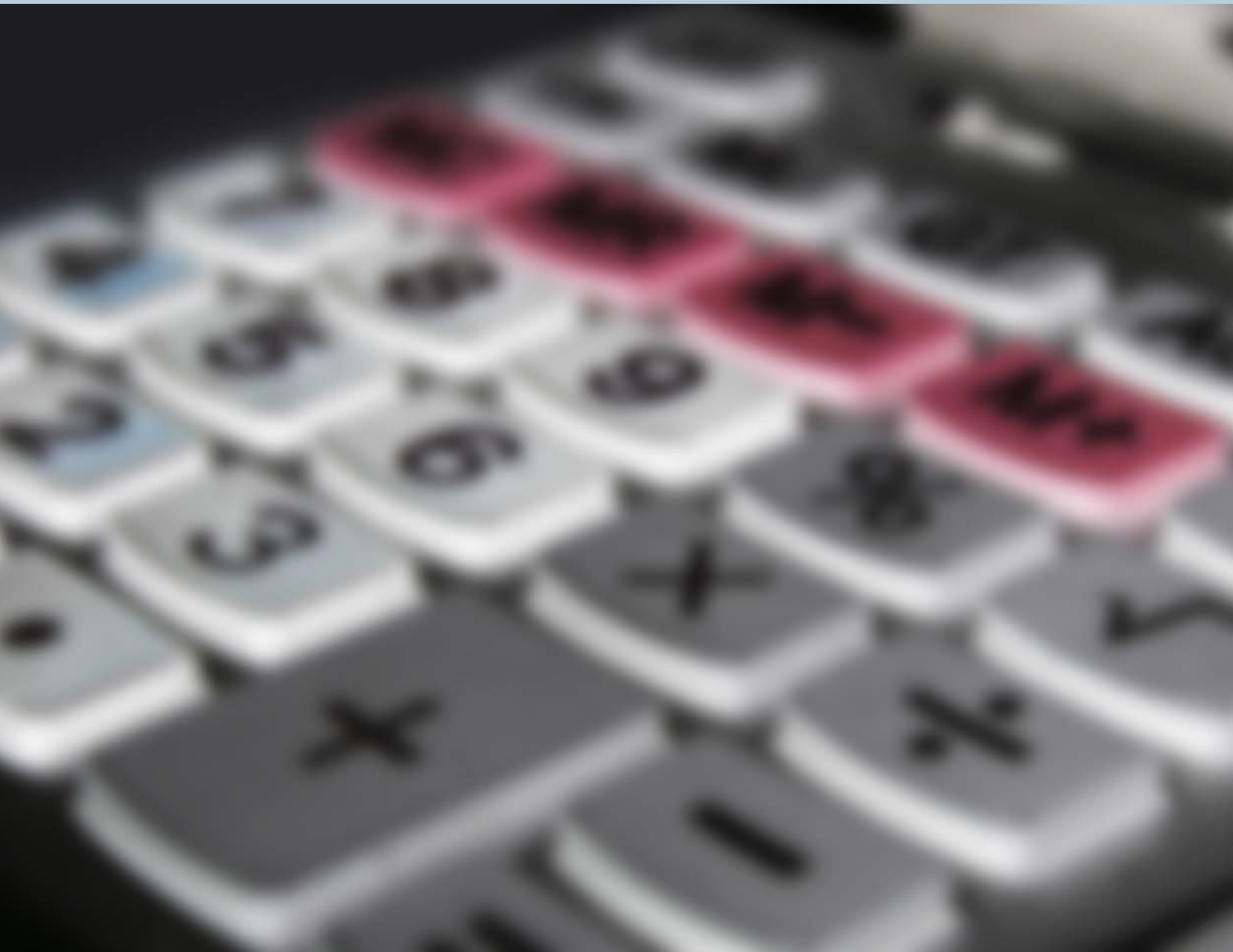
In late 2015 the materials committees were consolidated into one committee. The new committee was rebranded: Materials Science and Engineering. The new committee consists of committee members from the former materials committees.

Materials – Properties and Engineering Committee

Dr Leigh Sheppard - Convenor	University of Western Sydney
Professor Raman Singh	Monash University
Dr Aleks Nikoloski (c)	Murdoch University
Dr Mihail Ionescu (a)	ANSTO
Dr Greg Lumpkin (a)	ANSTO
Dr David Cohen	ANSTO

Materials – Structures and Dynamics Committee

Professor Gary Bryant (c) – Convenor	RMIT University
Dr Stephen Holt - Convenor	ANSTO
Professor Roland De Marco	University of Sunshine Coast
Dr Ludovic Dumeé	Deakin University
Dr Victor Streltsov	CSIRO
Dr Garry McIntyre	ANSTO



2015 AINSE Finances

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Financial Statements
For the Financial Year Ended 31 December 2015

Contents

Director's Report	52-58
Auditor's Independence Declaration	59
Statement of Comprehensive Income – by Nature	60
Statement of Financial Position	61
Statement of Changes in Equity	62
Cash Flow Statement	63
Notes to the Financial Statements	64-72
Director's Declaration	73
Independent Auditor's Report to the Members	74-75
Auditor's Disclaimer	76
Detailed Profit & Loss Statement	77-78

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Director's Report
For the Financial Year Ended 31 December 2015

Your Directors present their report on the Company for the financial year ended 31 December 2015.

Directors

The names of Directors in office at any time during or since the end of the year are:

Emeritus Professor Robert Burford
Dr Paul Di Pietro
Professor Lyndon Edwards
Professor Ian Smith
Professor Ian Gentle
Dr Peter Coldrey
Ms Roslyn Hatton
Associate Professor Claire Lenehan
Dr Richard Garrett

Directors have been in office since the start of the financial year to the date of this report unless otherwise stated.

Principal Activities

The principal activities of the company during the financial year was to advance research, education and training in the field of nuclear science and engineering and related fields within Australasia by being, in particular, the key link between universities, ANSTO, other member organisations and major nuclear science and associated facilities.

The company's short-term objectives are to:

- Offer Research Grants, Postgraduate top up Scholarships, and Honours Scholarships to people in 45 member institutions for the conduct of research principally at ANSTO
- Organise conferences in specific areas relating to nuclear science and engineering and in related fields that utilise nuclear techniques and analysis
- Support travel and accommodation for students and academics to present their AINSE supported research at conferences both within Australia and overseas

The company's long-term objectives are to:

- Be an effective link between all stakeholders of nuclear science and engineering
- Play an advocacy role for the Australasian nuclear community
- Play a leading role in nuclear education and training
- Facilitate the development of multilateral and multidisciplinary strategic research initiatives
- Utilise new streams of funding to increase its impact

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Director's Report
For the Financial Year Ended 31 December 2015

STRATEGIC PLAN

OUR VISION

AINSE will be a leading authority and resource in addressing Australia's societal challenges through nuclear science and engineering

OUR MISSION

AINSE will reach its vision through

- being an effective link between all stakeholders of nuclear science and engineering
- playing an advocacy role for the Australasian nuclear community
- playing a leading role in nuclear education and training
- facilitating the development of multilateral and multidisciplinary strategic research initiatives
- Utilising new streams of funding to increase its impact

STRATEGIC CONTEXT

AINSE has identified the following key trends and uncertainties influencing the future environment in which AINSE will operate.

Trends

- Integration of technologies at discipline boundaries
- Increasing role of science and technology in addressing grand societal challenges
- Ever-increasing flood of big data
- Increasing importance of large-scale strategic research
- Increasing importance of metric-driven funding
- Declining international competitiveness of the Australian manufacturing industry
- Increasing risks related to capex investments
- Declining industry R&D
- Low level of innovation in some Australian companies
- Evolution of the CRC system as a funding model

Uncertainties

- Ongoing funding for established infrastructure (both ANSTO and Universities)
- Ongoing debate about nuclear energy
- Industry appetite for nuclear research
- State of the Australian Research Council
- Research environment in nuclear areas in Asia
- Changes in geopolitical priorities
- AINSE/ANSTO relationship
- Rate of employment
- Stability of financial markets (domestic and international)
- Incentives for researchers to engage with industry

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Director's Report
For the Financial Year Ended 31 December 2015

STRATEGIC PRIORITIES

AINSE has defined the following seven strategic priorities for its Strategic Plan. These will drive our focus, resource allocation and how we monitor our success over the life of the Strategic Plan.

- 1. Effectively communicate AINSE's purpose to a wide range of different stakeholders**
 - Clearly enunciate AINSE's value proposition and align it with the priorities of Government, ANSTO and the Universities.
 - Enhance AINSE's outreach activities to reach a wider audience beyond nuclear scientists and engineers.
 - Work with outcome-focused advocacy groups to enhance the impact of nuclear technology.
 - Re-evaluate the metrics AINSE uses to measure and demonstrate its performance.
 - Constantly review how we best serve our stakeholders.

- 2. Create an appropriate balance between funding project-based research and funding/facilitating multilateral and multidisciplinary collaboration**
 - Explore future opportunities for funded collaborative projects through workshops related to thematic areas.
 - Ensure continued relevance of AINSE programs.
 - Consider focused program style grants in strategic areas.
 - Maintain small grants opportunities.
 - Encourage a broad engagement within member organisations.

- 3. Demonstrate leadership in the education of Australasia's next generation of scientists with and interest in nuclear science and engineering**
 - Expand AINSE's role in engaging the next generation of scientist with an interest in nuclear science.
 - Engage with Universities at the executive level to be aware of, and align with, Universities' strategic priorities.
 - Consider University accreditation for some AINSE activities (e.g. short/intensive courses).

- 4. Develop AINSE's role as a credible advocate for the Australasian nuclear science and engineering community**
 - Maintain and strengthen AINSE's independence while providing value to ANSTO.
 - Speak with a coherent voice representing universities on nuclear aspects.
 - Become a facilitator of increasing industry awareness (e.g. promotions, training courses, education, and professional development).
 - Maintain and further develop a network of experts to communicate the state of the art in nuclear science and technology.
 - Draw on AINSE alumni as a resource of support and expertise.
 - Develop and maintain a catalogue of key messages that decision makers should be aware of.
 - Provide leadership in the development of a decadal plan for nuclear infrastructure investment.

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Director's Report
For the Financial Year Ended 31 December 2015

5. Provide an effective and efficient link between different capabilities related to nuclear science and engineering

- Support the user base across the facilities at ANSTO, Australian Synchrotron, and other AINSE-supported facilities.
- Become a facilitator for collaboration and complementary use of scientific infrastructure.
- Effectively access the expertise within AINSE to facilitate optimum use of capabilities.
- Make effective use of the expertise and enthusiasm of ANSTO staff.
- Re-establish AINSE's reputation with the ARC and NHMRC as credible lead organisation for funding proposals (e.g. LIEF, Centres of Excellence).

6. Seize new opportunities for funding beyond AINSE's traditional sources

- Be prepared to take advantage if/when new funding opportunities arise.
- Develop links with the philanthropy community through the AINSE Trust.
- Exploit our developed authority to leverage joint industry/government funding for innovation initiatives.
- Use our wide membership base and coherence as a credible argument to demonstrate an effective and efficient return on government/industry investment.

7. Diversify AINSE's membership and stakeholder base

- Increase the range of opportunities for existing members through flexible membership arrangements and new services.
- Review our membership fee calculation.
- Explore how to expand our stakeholder base, e.g. medical research organisations, international and environmental organisations, industry.

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Director's Report
For the Financial Year Ended 31 December 2015

Information on Directors

The Directors in office at the date of this report are listed below with particulars of qualifications, experience and special responsibilities (if any).

Robert Burford – President

Board Member since May 2014

36 years at UNSW.

Most recent appointment was at the University of Technology Sydney as Head of School, The School of Mathematical and Physical Sciences.

BSc (Hons), PhD, FRACI, FIEAust, FICChemE

Paul Di Pietro – Managing Director

Board Member since June 2014

21 years' experience in engineering, scientific research and research management.

BE (Hons), PhD, MAICD

Lyndon Edwards – Board Member

Board Member since 2008

32 years' experience in academia and scientific research in Australia and UK.

MA, DPhil(Oxon), FIMMM, CEng

Roslyn Hatton – Board Member

Independent Board Member until September 2014

Board Member representing ANSTO since December 2014

26 years in public (ANAO) and private (Ernst & Young) sector audit and 8 years at the Commonwealth Bank in a financial accounting role.

Currently the Manager – Government and Financial Reporting at ANSTO.

BComm (Accounting, finance and information systems) UNSW

FCA

Richard Garrett – Board Member

Board Member since January 2015

31 years' experience in synchrotron radiation research and research management in Australia and the USA.

BSc (Hons), PhD

Peter Coldrey – Board Member

Board Member since August 2012

28 years' experience in the industrial research in chemical and ophthalmic lens industry.

FTSE, BE, PhD, BCom,

Claire Lenehan – Board Member

Board Member since March 2014

17 years' experience in scientific research.

BSc (Hons), PhD, MRACI

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Director's Report
For the Financial Year Ended 31 December 2015

Information on Directors continued

Ian Smith – Board Member

Board Member since August 2014

41 years' experience in Medical Research,

Research Administration and Industry Engagement,

most recently as Vice Provost (Research and Research Infrastructure)

Monash University

UK and Australia

PhD

Ian Gentle – Board Member

Board Member since August 2014

33 years' experience in academia and scientific research and research management.

BSc (Hons), PhD

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Director's Report
For the Financial Year Ended 31 December 2015

Meetings of Directors

During the financial year, 6 meetings of directors were held. Attendances by each director were as follows:

	<u>Number eligible to attend</u>	<u>Number attended</u>
Emeritus Professor Robert Burford	6	6
Dr Paul Di Pietro	6	6
Professor Lyndon Edwards	6	5
Associate Professor Claire Lenehan	6	6
Professor Ian Smith	6	3
Professor Ian Gentle	6	6
Dr Peter Coldrey	6	4
Ms Roslyn Hatton	6	6
Dr Richard Garrett	6	5



The Company is incorporated under the Corporations Act 2001 and is a company limited by guarantee. If the company is wound up, the constitution states that each member is required to contribute a maximum of \$10 each towards meeting any outstanding obligations of the entity. At 31 December 2015, the total amount that members of the company are liable to contribute if the company is wound up is \$450 (2014: \$450).

Auditors Independence Declaration

The lead auditor's independence declaration for the year ended 31 December 2015 has been received and can be found on page 59 of the report.

Signed in accordance with a resolution of the Board of Directors.

Richard Garrett
Director

Paul Di Pietro
Director

Dated this 15th day of APRIL 2016

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Auditor's Independence Declaration to the Directors
For the Financial Year Ended 31 December 2015

In accordance with the requirements of section 60-40 of the *Australian Charities and Not-for-profits Commission Act 2012*, I declare that, to the best of my knowledge and belief, during the year ended 31 December 2015 there have been no contraventions of:

- i. The auditor independence requirements as set out in the *Australian Charities and Not-for-profits Commission Act 2012* in relation to the audit; and
- ii. Any applicable code of professional conduct in relation to the audit.

Escott Aston
Chartered Accountants



David G Aston
Partner

RIVERWOOD NSW 2210

Dated 17th February 2016

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Statement of Comprehensive Income – by Nature
For the Financial Year Ended 31 December 2015

	Note	2015 \$	2014 \$
Revenue	2	3,339,715	3,578,579
Other income	2	108,572	98,362
Employee benefits expense		(513,467)	(497,728)
Depreciation expense	3	(12,813)	(11,305)
Doubtful debts expense	3	-	(150,502)
Audit, legal and consultancy expense		(141,716)	(29,927)
AINSE Awards		(2,180,840)	(1,961,276)
Other expenses		<u>(308,081)</u>	<u>(281,269)</u>
Surplus/(deficit) before income tax		291,370	744,934
Income tax expense		<u>-</u>	<u>-</u>
Surplus for the year		<u>291,370</u>	<u>744,934</u>

The accompanying notes form part of these financial statements.

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Statement of Financial Position
As At 31 December 2015

	Note	2015 \$	2014 \$
ASSETS			
CURRENT ASSETS			
Cash and cash equivalents	4	2,946,748	2,778,760
Trade and other receivables	5	183,665	174,505
Other	6	<u>14,981</u>	<u>55,202</u>
TOTAL CURRENT ASSETS		<u>3,145,394</u>	<u>3,008,467</u>
NON-CURRENT ASSETS			
Property, plant and equipment	7	<u>34,142</u>	<u>46,810</u>
TOTAL NON-CURRENT ASSETS		<u>34,142</u>	<u>46,810</u>
TOTAL ASSETS		<u>3,179,536</u>	<u>3,055,277</u>
LIABILITIES			
CURRENT LIABILITIES			
Trade and other payables	8	281,518	465,280
Employees provisions	9	<u>74,326</u>	<u>61,153</u>
TOTAL CURRENT LIABILITIES		<u>355,844</u>	<u>526,433</u>
NON-CURRENT LIABILITIES			
Employees provisions	9	<u>8,236</u>	<u>4,758</u>
TOTAL NON-CURRENT LIABILITIES		<u>8,236</u>	<u>4,758</u>
TOTAL LIABILITIES		<u>364,080</u>	<u>531,191</u>
NET ASSETS		<u>2,815,456</u>	<u>2,524,086</u>
EQUITY			
Awards reserve	12	723,887	2,205,514
Accumulated surplus		<u>2,091,569</u>	<u>318,572</u>
TOTAL EQUITY		<u>2,815,456</u>	<u>2,524,086</u>

The accompanying notes form part of these financial statements.

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Statement of Changes in Equity
For the Financial Year Ended 31 December 2015

	Awards Reserve \$	Accumulated Surplus \$	Total \$
Balance at 1 January 2014	1,747,664	31,488	1,779,152
Net surplus/(deficit) attributable to the company	-	744,934	744,934
Transfers to and from awards reserve	457,850	(457,850)	-
Balance at 31 December 2014	<u>2,205,514</u>	<u>318,572</u>	<u>2,524,086</u>
Net surplus/(deficit) attributable to the company	-	291,370	291,370
Transfers to and from awards reserve	(1,481,627)	1,481,627	-
Balance at 31 December 2015	<u>723,887</u>	<u>2,091,569</u>	<u>2,815,456</u>

The accompanying notes form part of these financial statements.

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Cash Flow Statement
For the Financial Year Ended 31 December 2015

	Note	2015 \$	2014 \$
CASH FLOWS FROM OPERATING ACTIVITIES			
Receipts from operations		2,262,270	3,505,950
Interest received		82,081	67,588
Award related payments		(1,195,104)	(2,056,578)
Payments to suppliers and employees		<u>(964,985)</u>	<u>(698,681)</u>
Net cash generated from operating activities		<u>184,262</u>	<u>818,279</u>
CASH FLOWS FROM INVESTING ACTIVITIES			
Payment for property, plant and equipment		<u>(16,274)</u>	<u>-</u>
Net cash used in investing activities		<u>(16,274)</u>	<u>-</u>
Net increase in cash held		167,988	818,279
Cash and cash equivalents at beginning of financial year		<u>2,778,760</u>	<u>1,960,481</u>
Cash and cash equivalents at end of financial year		<u>2,946,748</u>	<u>2,778,760</u>

The accompanying notes form part of these financial statements.

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Notes to and forming part of the Financial Statements
For the Financial Year Ended 31 December 2015

Note 1 – Statement of Significant Accounting Policies

The financial statements cover The Australian Institute of Nuclear Science and Engineering Limited as an individual entity. The Australian Institute of Nuclear Science and Engineering Limited is a Company limited by guarantee, incorporated and domiciled in Australia.

Basis of Preparation

The Australian Institute of Nuclear Science and Engineering Limited applies the Australian Accounting Standards – Reduced Disclosure Requirements as set out in AASB 1053: Application of Tiers of Australian Accounting Standards and AASB 2010-2: Amendments to Australian Accounting Standards arising from Reduced Disclosure.

The financial statements are general purpose financial statements that have been prepared in accordance with Australian Accounting Standards – Reduced Disclosure Requirements of the Australian Accounting Standards Board and the *Australian Charities and Not-for-profits Commission Act 2012*. The Company is a not-for-profit entity for financial reporting purposes under Australian Accounting Standards.

Australian Accounting Standards set out accounting policies that the AASB has concluded would result in financial statements containing relevant and reliable information about transactions, events and conditions. Material accounting policies adopted in the preparation of these financial statements are presented below and have been consistently applied unless stated otherwise.

The financial statements, except for the cash flow information, have been prepared on an accruals basis and are based on historical costs, modified, where applicable, by the measurement at fair value of selected non-current assets, financial assets and financial liabilities. The amounts presented in the financial statements have been rounded to the nearest dollar.

The financial statements were authorised for issue on 31 March 2016 by the directors of the Company.

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Notes to and forming part of the Financial Statements
For the Financial Year Ended 31 December 2015

Significant Accounting Policies

Revenue and Other Income

Grant revenue is recognised in the statement of comprehensive income when the Company obtains control of the grant, it is probable that the economic benefits gained from the grant will flow to the Company and the amount of the grant can be measured reliably.

If conditions are attached to the grant which must be satisfied before it is eligible to receive the contribution, the recognition of the grant as revenue will be deferred until those conditions are satisfied.

When grant revenue is received whereby the Company incurs an obligation to deliver economic value directly back to the contributor, this is considered a reciprocal transaction and the grant revenue is recognised in the statement of financial position as a liability until the service has been delivered to the contributor, otherwise the grant is recognised as income on receipt.

Donations and bequests are recognised as revenue when received.

Interest revenue is recognised using the effective interest method, which for floating rate financial assets is the rate inherent in the instrument.

Revenue from the rendering of a service is recognised upon the delivery of the service to the customers.

All revenue is stated net of the amount of goods and services tax.

Property, Plant and Equipment

Each class of property, plant and equipment is carried at cost or fair value as indicated less, where applicable, any accumulated depreciation and impairment losses.

Plant and Equipment

Plant and equipment are measured on the cost basis and are therefore carried at cost less accumulated depreciation and any accumulated impairment losses. In the event the carrying amount of plant and equipment is greater than its estimated recoverable amount, the carrying amount is written down immediately to its estimated recoverable amount and impairment losses are recognised either in profit or loss or as a revaluation decrease if the impairment losses relate to a revalued asset. A formal assessment of recoverable amount is made when impairment indicators are present.

Plant and equipment that have been contributed at no cost, or for nominal cost, are valued and recognised at the fair value of the asset at the date it is acquired.

Depreciation

The depreciable amount of all fixed assets including buildings and capitalised leased assets, but excluding freehold lands, are depreciated on a straight line or diminishing value basis over their useful lives to the Company commencing from the time the asset is held ready for use. Leasehold improvements are depreciated over the shorter of either the unexpired period of the lease or the estimated useful life of the improvement.

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Notes to and forming part of the Financial Statements
For the Financial Year Ended 31 December 2015

The depreciation rates used for each class of depreciable asset are:

Plant & equipment	15-35%
Motor vehicles	25%
Furniture and fittings	10-25%

The asset's residual values and useful lives are reviewed, and adjusted if appropriate, at the end of each reporting period.

Gains and losses on disposals are determined by comparing proceeds with the carrying amount. These gains or losses are included in the statement of comprehensive income. When revalued assets are sold, amounts included in the revaluation reserve relating to that asset are transferred to retained earnings.

Financial Instruments

The Company's financial instruments consist mainly of deposits with banks, local money market instruments, short-term investments and accounts receivable and payable.

Initial Recognition & Measurement

Financial assets and financial liabilities are recognised when the Company becomes a party to the contractual provisions to the instrument. Financial Instruments are initially measured at fair value plus transaction costs, except where the instrument is classified "at fair value through profit or loss" in which case transaction costs are recognized immediately as expenses in profit or loss. Subsequent to initial recognition these instruments are measured as set out below.

Classification and Subsequent Measurement

Financial instruments are subsequently measured at either fair value, amortised cost using the effective interest method, or cost. Where available, quoted prices in an active market are used to determine fair value. In other circumstances, valuation techniques are adopted.

Amortised cost is calculated as the amount at which the financial asset or financial liability is measured at initial recognition less principal payments and any reduction for impairment, and adjusted for any cumulative amortisation of the difference between that initial amount and the maturity amount calculated using the effective interest method.

Fair Value

Fair value is determined based on current bid prices for all quoted investments. Valuation techniques are applied to determine the fair value for all unlisted securities, including recent arm's length transactions, reference to similar instruments and option pricing models.

Loans and Receivables

Loans and receivables are non-derivative financial assets with fixed or determinable payments that are not quoted in an active market and are subsequently measured at amortised cost. Gains or losses are recognized in profit or loss through the amortization process and when the financial asset is derecognized.

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Notes to and forming part of the Financial Statements
For the Financial Year Ended 31 December 2015

Held-to-Maturity Investments

Held-to-maturity investments are non-derivative financial assets that have fixed maturities and fixed or determinable payments, and it is the entity's intention to hold these investments to maturity. They are subsequently measured at cost. Gains and losses are recognised in profit and loss through the amortisation process and when the financial asset is derecognized.

Financial Liabilities

Non-derivative financial liabilities (excluding financial guarantees) are subsequently measured at amortised cost. Gains or losses are recognised in profit or loss through the amortization process and when the financial liability is derecognized.

Impairment of Assets

At the end of each reporting period, the Company assesses whether there is objective evidence that a financial asset has been impaired. A financial asset (or a group of financial assets) is deemed to be impaired if, and only if, there is objective evidence of impairment as a result of one or more events (a "loss event") having occurred, which has an impact on the estimated future cash flows of the financial asset(s).

In the case of financial assets carried at amortised cost, loss events may include: indications that the debtors or a group of debtors are experiencing significant financial difficulty, default or delinquency in interest or principal payments; indications that they will enter bankruptcy or other financial reorganisation; and changes in arrears or economic conditions that correlate with defaults.

For financial assets carried at amortised cost (including loans and receivables), a separate allowance account is used to reduce the carrying amount of financial assets impaired by credit losses. After having taken all possible measures of recovery, if management establishes that the carrying amount cannot be recovered by any means, at that point the written off amounts are charged to the allowance account or the carrying amount of impaired financial assets is reduced directly if no impairment amount was previously recognized in the allowance account.

When the terms of financial assets that would otherwise have been past due or impaired have been renegotiated, the Company recognises the impairment for such financial assets by taking into account the original terms as if the terms have not been renegotiated so that the loss events that have occurred are duly considered.

Employee Benefits

Provision is made for the Company's liability for employee benefits arising from services rendered by employees at the end of the reporting period. Employee benefits that are expected to be settled within one year have been measured at the amounts expected to be paid when the liability is settled. Other employee benefits payable later than one year have been measured at the present value of the estimated future cash outflows to be made for those benefits.

Cash and Cash Equivalents

Cash and cash equivalents include cash on hand, deposits held at-call with banks, other short-term highly liquid investments with original maturities of three months or less, and bank overdrafts. Bank overdrafts are shown within short term short term borrowings in current liabilities on the statement of financial position.

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Notes to and forming part of the Financial Statements
For the Financial Year Ended 31 December 2015

Goods and Services Tax (GST)

Revenues, expenses and assets are recognised net of the amount of GST, except where the amount of GST incurred is not recoverable from the Australian Taxation Office (ATO).

Receivables and payables are stated inclusive of the amount of GST receivable or payable. The net amount of GST recoverable from, or payable to, the ATO is included with other receivables or payables in the statement of financial position.

Cash flows are presented on a gross basis. The GST components of cash flows arising from investing or financing activities which are recoverable from, or payable to, the ATO are presented as operating cash flows included in receipts from customers or payments to suppliers.

Income Tax

AINSE Limited is exempt from income tax under section 50-5 of the *Income Tax Assessment Act 1997* as the Company is established for the purpose of enabling scientific research to be conducted in Australia.

Trade and Other Payables

Trade and other payables represent the liabilities for goods and services received by the Company during the reporting period that remain unpaid at the end of the reporting period. The balance is recognised as a current liability with the amounts normally paid within 30 days of recognition of the liability.

Description of Awards Reserve

The awards reserve represents the future commitments for funding to scientists for research in three categories: Research awards, Postgraduate research awards and Fellowships. Research awards provide opportunities twice a year for academics to apply for funding for a period of 12 months. Postgraduate research awards provide support to post graduate students at an entry point in their qualification and last for the duration of their underlying primary scholarship. Fellowships are for a three-year appointment extendable to five years. AINSE currently has 2 Fellows but has not offered any new Fellowships since 2013.

Comparative Figures

When required by Accounting Standards, comparative figures have been adjusted to conform to changes in presentation for the current financial year.

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Notes to and forming part of the Financial Statements
For the Financial Year Ended 31 December 2015

	Note	2015 \$	2014 \$
Note 2 – Revenue and Other Income			
Revenue			
Payments from members		<u>3,339,715</u>	<u>3,578,579</u>
		<u>3,339,715</u>	<u>3,578,579</u>
Other income			
Conference registrations		33,450	18,847
Sponsorships		-	4,636
Interest Received		<u>75,122</u>	<u>74,879</u>
		<u>108,572</u>	<u>98,362</u>
Total revenue and other income		<u>3,448,287</u>	<u>3,676,941</u>
Note 3 – Surplus for the Year			
The surplus for the year has been determined after charging as expenses:			
Depreciation of property, plant and equipment		<u>12,813</u>	<u>11,305</u>
Bad and doubtful debts		<u>-</u>	<u>150,502</u>
Note 4 – Cash and Cash Equivalents			
Cash at bank		2,945,748	2,777,760
Cash on hand		<u>1,000</u>	<u>1,000</u>
Total cash and cash equivalents		<u>2,946,748</u>	<u>2,778,760</u>
Note 5 – Trade and Other Receivables			
Trade receivables		145,776	268,755
Less: Provision for impairment		<u>-</u>	<u>150,502</u>
		<u>145,776</u>	<u>118,253</u>
Other receivables		<u>37,889</u>	<u>56,252</u>
Total trade and other receivables		<u>183,665</u>	<u>174,505</u>

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Notes to and forming part of the Financial Statements
For the Financial Year Ended 31 December 2015

	Note	2015 \$	2014 \$
Note 6 – Other Current Assets			
Accrued interest		11,047	18,007
Prepayments		<u>3,934</u>	<u>37,195</u>
Total other current assets		<u>14,981</u>	<u>55,202</u>
Note 7 – Property, Plant and Equipment			
Plant and equipment – cost		11,831	11,831
Less: Accumulated depreciation		<u>(2,802)</u>	<u>(1,208)</u>
		<u>9,029</u>	<u>10,623</u>
Furniture and fittings – cost		10,485	10,340
Less: Accumulated depreciation		<u>(2,097)</u>	<u>-</u>
		<u>8,388</u>	<u>10,340</u>
Motor vehicles – cost – cost		45,613	45,613
Less: Accumulated depreciation		<u>(28,888)</u>	<u>(19,766)</u>
		<u>16,725</u>	<u>25,847</u>
Total property, plant and equipment		<u>34,142</u>	<u>46,810</u>

(a) Movements in Carrying Amounts

Movements in the carrying amounts for each class or property, plant and equipment between the beginning and the end of the current financial year.

	Plant & Equipment \$	Furniture & Fittings \$	Motor Vehicles \$	Total \$
Balance at 1 January 2015	10,623	10,340	25,847	46,810
Additions	-	145	-	145
Disposals	-	-	-	-
Depreciation	<u>(1,594)</u>	<u>(2,097)</u>	<u>(9,122)</u>	<u>(12,813)</u>
Balance at 31 December 2015	<u>9,029</u>	<u>8,388</u>	<u>16,725</u>	<u>34,142</u>

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Notes to and forming part of the Financial Statements
For the Financial Year Ended 31 December 2015

	Note	2015 \$	2014 \$
Note 8 – Trade and Other Payables			
Trade and other payables		280,723	461,644
Employees – accrued salary and wages		795	-
Revenue in advance		<u>-</u>	<u>3,636</u>
Total trade and other payables		<u>281,518</u>	<u>465,280</u>
Note 9 – Employee Provisions			
CURRENT			
Annual leave		34,115	22,660
Long service leave		<u>40,211</u>	<u>38,493</u>
		<u>74,326</u>	<u>61,153</u>
NON CURRENT			
Long service leave		<u>8,236</u>	<u>4,758</u>
		<u>8,236</u>	<u>4,758</u>
Total employee provisions		<u>82,562</u>	<u>65,911</u>

Note 10 – Key Management Personnel Compensation

Any person(s) having authority and responsibility for planning, directing and controlling the activities of the entity, directly or indirectly, including any director (whether executive or otherwise) of that entity is considered key management personnel.

The totals of remuneration paid to key management personnel (KMP) of the Company during the years are as follows:

Key management personnel compensation	<u>233,728</u>	<u>304,377</u>
---------------------------------------	----------------	----------------

Compensation includes salary and wages, superannuation, fringe benefits and secondment.

Key management personnel compensation includes a rate of \$1,000 per meeting provided to Independent Board Members and secondment of ANSTO employee.

Note 11 – Other Related Party Transactions

There were no related party transactions during the financial year.

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Notes to and forming part of the Financial Statements
For the Financial Year Ended 31 December 2015

	Note	2015 \$	2014 \$
Note 12 – Awards Reserve			
Opening balance at 1 January		2,205,514	1,747,664
Transfer to other comprehensive income		<u>(1,481,627)</u>	<u>457,850</u>
Balance as at 31 December		<u>723,887</u>	<u>2,205,514</u>

The awards reserve was established to provide for the value of unexpected grants at the end of each year. It consists of commitments for Research awards up to 6 months in advance (2013: 6 months in advance), Fellowships and Postgraduate awards.

Note 13 – Financial Risk Management

The Company's financial instruments consist mainly of deposits with banks, local money market Instruments, short-term investments, accounts receivable and payable, and leases.

The carrying amounts of each category of financial instruments, measured in accordance with AASB 139 as detailed in the accounting policies to these financial statements, are as follows:

Financial Assets			
Cash and cash equivalents		2,946,748	2,778,760
Trade and other receivables		<u>183,665</u>	<u>174,505</u>
Total financial assets		<u>3,130,413</u>	<u>2,953,265</u>
Financial Liabilities			
Trade & other payables		<u>281,518</u>	<u>465,280</u>
Total financial liabilities		<u>281,518</u>	<u>465,280</u>

Note 14 – Events after the Reporting Date

The Directors are not aware of any significant events since the end of the reporting period.

Note 15 – Company Details

The principal place of business of the Company is:

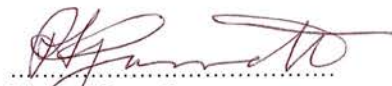
The Australian Institute of Nuclear Science and Engineering Limited
 New Illawarra Road
 LUCAS HEIGHTS NSW

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Directors' Declaration
For the Financial Year Ended 31 December 2015


The Directors of the Company declare that:

1. The financial statements and notes, as set out on pages 60 to 72 satisfy the requirements of the *Australian Charities and Not-for-profits Commission Act 2012* and *Not-for-profits Commission Regulation 2013*, and;
 - (a) comply with Australian Accounting Standards – Reduced Disclosure Requirements, and
 - (b) give a true and fair view of the financial position as at 31 December 2015 and of its performance for the year ended on that date.
2. In the directors' opinion there are reasonable grounds to believe that the Company will be able to pay its debts as and when they become due and payable

This declaration is made in accordance with a resolution of the Board of Directors.



Richard Garrett
Director



Paul Di Pietro
Director

Dated this *1st* day of *April* 2016

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Independent Auditor's Report to the Members of
The Australian Institute of Nuclear Science and Engineering Limited
For the Financial Year Ended 31 December 2015

Report on the Financial Report

We have audited the accompanying financial report of The Australian Institute of Nuclear Science and Engineering Limited (the Company), which comprises the statement of financial position as at 31 December 2015, the statement of comprehensive income, statement of changes in equity and statement of cash flows for the year ended on that date, a summary of significant accounting policies and other explanatory notes and the directors' declaration, as set out on pages 60 to 73.

Directors Responsibility for the Financial Report

The directors of the Company are responsible for the preparation of the financial report that gives a true and fair view in accordance with Australian Accounting Standards – Reduced Disclosure Requirements, the *Australian Charities and Not-for-profits Commission Act 2012*, the *Not-for-profits Commission Regulation 2013*, and for such internal control as the directors determine is necessary to enable the preparation of the financial report that is free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express an opinion on the financial report based on our audit. We conducted our audit in accordance with Australian Auditing Standards. These standards require that we comply with relevant ethical requirements relating to audit engagements and plan and perform the audit to obtain reasonable assurance whether the financial report is free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial report. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial report, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the Company's preparation of the financial report that gives a true and fair view in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by the directors, as well as evaluating the overall presentation of the financial report.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Independence

In conducting our audit, we have complied with the independence requirements of the *Australian Charities and Not-for-profits Commission Act 2012* and *Not-for-profits Commission Regulation 2013*. We confirm that the independence declaration required by the *Australian Charities and Not-for-profits Commission Act 2012*, which has been given to the directors of The Australian Institute of Nuclear Science and Engineering Limited would be in the same terms if given to the directors as at the time of this auditor's report.

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Independent Auditor's Report to the Members of
The Australian Institute of Nuclear Science and Engineering Limited
For the Financial Year Ended 31 December 2015

Audit Opinion

In our opinion, the financial report of The Australian Institute of Nuclear Science and Engineering Limited is in accordance with the *Australian Charities and Not-for-profits Commission Act 2012* and *Not-for-profits Commission Regulation 2013*, including:

- (i) Giving a true and fair view of the Company's financial position as at 31 December 2015 and of its performance for the year then ended on that date; and
- (ii) Complying with Australian Accounting Standards – Reduced Disclosure Requirements and in accordance with Division 60 of the *Australian Charities and Not-for-profits Commission Act 2012*.

Escott Aston
Chartered Accountants



David G Aston
Partner

RIVERWOOD NSW 2210

Dated 1st April 2016

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Auditor's Disclaimer
For the Financial Year Ended 31 December 2015

The additional data presented in the Detailed Profit & Loss Statement is in accordance with the books and records of The Australian Institute of Nuclear Science and Engineering Limited (our client) which have been subjected to the auditing procedures applied in the statutory audit of the Company for the year ended 31 December 2015. It will be appreciated that the statutory audit did not cover all details of the financial data and no warranty of accuracy or reliability is given. Neither the firm nor any member or employee of the firm undertakes responsibility in any way whatsoever to any person (other than our client) in respect of such data, including any errors or omissions therein however caused.

Escott Aston
Chartered Accountants



David G Aston
Partner

RIVERWOOD NSW 2210

Dated 1st April 2016.

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Detailed Profit & Loss Statement
For the Financial Year Ended 31 December 2015

	2015 \$	2014 \$
Operating Revenue		
Payments from Members	3,339,715	3,578,579
Interest Received	75,122	74,879
Sponsorships		
NCTA Conference	-	3,636
AANSS	-	1,000
		4,636
Conference Registrations	33,450	18,847
Total Operating Revenue	3,448,287	3,676,941
Operating Expenses		
Wages & Salaries	442,030	427,904
Superannuation	71,437	69,824
AINSE Awards		
Postgraduate Awards		
ANSTO Facility Costs	400,881	280,833
Travel & Accommodation	63,484	46,044
Stipends	507,311	95,205
	971,676	422,082
Winter School	5,844	10,385
Research Fellowships	224,744	363,489
Research Awards		
ANSTO Facility Costs	715,850	909,678
Minor Equipment & Materials	3,000	4,500
Travel Accommodation	254,226	236,492
Other Costs	5,500	14,650
	978,576	1,165,320
Conference Subsidies	104,189	97,785
External Grants	-	(2,483)
Conference Management	8,189	2,210
Publication & Promotions	28,264	17,724
Meetings & Committees	110,108	104,892
Doubtful Debt	-	150,502
AINSE Secretariat		
Audit Fees	15,963	13,370
Bank Charges	980	1,973
Depreciation	12,813	11,305
Office Supplies	4,264	2,349
Postage & Telephone	1,155	1,546
Insurance	9,262	13,532
Entertaining	1,831	1,168
Books & Software	2,627	-
Office Equipment & Repairs	(1,892)	3,305

The Australian Institute of Nuclear Science and Engineering Limited
ABN: 18 133 225 331
Detailed Profit & Loss Statement
For the Financial Year Ended 31 December 2015

	2015 \$	2014 \$
Administration & Staff Training	12,981	2,819
Travel & Accommodation	18,651	11,232
Vehicle Expenses	12,893	11,000
Consultancy Fees	116,042	3,474
Staff Recruitment	-	240
Loss on Disposal of Assets	-	4,137
FBT Expense & Payments	3,427	6,013
Credit Card Expense	660	10
Legal Expenses	9,711	13,083
Miscellaneous	(9,508)	1,817
	211,860	102,373
Total Operating Expenses	3,156,917	2,932,007
Surplus for the Year	291,370	744,934

Celebrating 58 Years

1958 - 2016



E A (Bill) Palmer.



AINSE livery used for publications, late 60s.



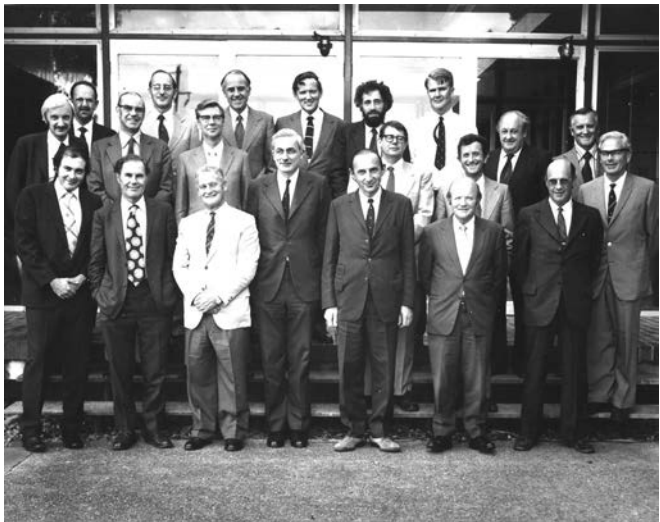
Official opening of the AINSE Building at Lucas Heights in 1960.



The AINSE theatre in the 60s. Note the ashtrays! Courtesy of ANSTO.



AINSE Council May 2008.



AINSE Council 1976.



AINSE Honours Scholarships

In 2015 AINSE continued the Honours program which first commenced in 2011. This program provides Honours Scholarships to a small number of excellent students who have a project which utilises the research facilities at ANSTO. The scholarships provide a stipend of \$5,000.

The purpose of the scholarships are to provide a link between the Winter School and the other AINSE programs. There were 44 applications from 21 Universities received in 2015.

The 28 successful students and their projects were:

Ruth Bajo, Australian Catholic University

Determining feeding habitat of insectivorous bats living on inland river systems

Briony Chamberlayne, The University of Adelaide

2000 years of hydrological variability in the Coorong Lagoon, South Australia: evidence from molluscan geochemistry

Lachlan Clement, The University of New South Wales

The Sedimentological and Environmental History of Little Turriell Bay, Port Hacking

Emily Crawley, Flinders University

Impact of drought conditions on the uptake of trace metals by diatoms

James Donlon, La Trobe University

Neutron microtomography of Brecciated microfossils From the Cradle of Humankind

Marcus Giansiracusa, The University of Melbourne

Ligand field splitting of Lanthanoid-Polyoxometalate Single-Molecule Magnet

Dana Goodacre, The University of Auckland

Neutron and Electron Diffraction Studies on $MTaO_2N$ (M=Ca, Sr or Ba)

Damian Goonetilleke, The University of New South Wales

Developing new materials for energy generation and storage

Haley Gray, University of Canterbury

ATP-Phosphoribosyltransferase: a potential target of new anti-tuberculosis drugs

Samantha Grimm, The University of New South Wales

The structure and material properties of Al-Mg₅ aluminium alloy reactor components subject to a Cryogenic and Neutron Irradiation environment

Haihui Jiang, The University of Sydney

Ionic liquids in solution: Hydrotropes, Cosurfactants or Surfactants?

Eliza Lockier, The University of Adelaide

hydroclimate variability during the past millennium: a new record from West Basin Lake, Victoria

Jessica McNeil, The University of Queensland

Dating occupation pulses at Madjedbebe, Australia's oldest Aboriginal site

Gurinder Nagra, The University of New South Wales

Igniting the hidden wildfires of the past: searching for a geochemical fire signature in speleothems

Huu Nguyen, Swinburne University of Technology

Dynamics of bacterial microstructure formation within hydrogels in the hydrated state

Aine Nicholson, University of Tasmania

Analysis of sediment cores for Clarke Island

Alex Pearse, Deakin University
Carbon sequestration by wetlands

Palalle Perera, Swinburne University of Technology
Dynamics of bacterial microstructure formation within hydrogels in the hydrated state

Matthew Plowman, University of Canterbury
A molecular pendulum?- Molecular gymnastics of α -isopropylmalate synthase

Ashleigh Rogers, The University of Queensland
Prehistoric human impact of marine shellfish in Hawaiian Islands

Osha-Ann Rudduck, University of Tasmania
Distribution and toxicology of plastic fragments in the Tasman Sea: implications for Australia's flesh-footed shearwaters (*Puffinus carneipes*)'

Nicholas Shepherd, University of Western Sydney
Self assembly of coordination cages with 3d and 5f metal ions

Keyun Shou, The University of Sydney
Self-assembled monolayer via halogen bonding

Jeanna Un, The University of Auckland
Synthesis of self-assembly perpendicular silica thin film using phospholipid bilayers as a template- mimic of silica deposit vesicle (SDV) in diatoms

Divya Vinod, University of Technology, Sydney
Selenium toxicity and accumulation in selected plants, selenium speciation, and possible incorporation of selenium into proteins using plant tissue culture and proteomics

Cheryl Wong, The University of Sydney
Long-range-ordered magnetism in layered oxides with honeycomb lattices

Adelle Wright, The Australian National University
Modelling magpie plasma

Jessica Zhong, The University of Sydney
Functional structure and dynamics of haemoglobins

John Ferris Memorial Award

Continuing to Honour the life and work of Dr John Ferris

Dr John Ferris was a cherished identity at ANSTO. He graduated from the University of Adelaide in South Australia with a B.Sc (Hons) and from the University of Tasmania in 1986 with a Ph.D in Limnology. John joined ANSTO in 1991, following post-doctoral work with the Australian Antarctic Division and the Centre for Water Research at the University of Western Australia. He brought considerable expertise in ecosystem studies involving algae which was to be the basis of both his research contributions within ANSTO's Institute for Environmental Research and more recently in environmental management in safety and radiation services. John became involved in biomonitoring and environmental management at ANSTO and was responsible for ANSTO's Annual Environmental Report for many years. He was a significant contributor to ANSTO's ISO 14001 certification. In more recent times, John's research interests focussed on radiation effects on non-human biota and his work contributed to international thinking in this area.

While John will be remembered for his passionate commitment to environmental protection and environmental research at ANSTO, John was also appreciated for his sense of wit and humour, his lively and enquiring mind and his love of music and poetry.

First established in 2008 following a generous contribution from John's family and many contributions from John's friends and colleagues to the AINSE Trust, a John Ferris Memorial Award was established to honour John's life and work. The award is designed to assist in supporting the best post-graduate student whose application is in environmental sciences.

John Ferris Memorial postgraduate scholars

2008-9 Jamie Howarth, University of Otago
2010-11 John Dawson, James Cook University
2013-2015 Lydia Mackenzie Queensland University



Dr John Ferris



AINSE PGRA Stephanie Duce and field volunteer Bevan Yiu collecting coral cores from the spur and groove zone of Moorea, French Polynesia. Stephanie will be radio carbon dating these samples to determine how the spur and groove zone forms and evolves over time.

Photograph by Valere Sabatie

AINSE Postgraduate Research Awards

An AINSE Postgraduate Research Award (PGRA) is a top-up scholarship. To be eligible for one of these awards, an applicant must hold an Australian Postgraduate Award (APA) or equivalent scholarship. The PGRA may be held until the expiry of the primary scholarship.

In addition to providing a student with a stipend of \$7,500 pa, the award provides access to ANSTO's world-class facilities and expertise. An allowance for travel expenses for two visits and a total of one month's accommodation to Lucas Heights per annum is also awarded.

35 new AINSE postgraduate research projects were supported by a PGRA in 2015. 21 projects were finalised and continue without funding until a thesis is provided. The total number of scholars supported in 2015 were 69. AINSE received 13 theses and has now helped train 371 students through its PGRA program, in aspects of nuclear science and associated techniques of analysis. Many more students have been assisted with their research by gaining access to Lucas Heights facilities through AINSE Awards made to their supervisors. The Council believes that one of the most valuable roles fulfilled by AINSE is the provision of these scholarships.

PhD theses of Postgraduate Scholars received during 2015

The roles of epitaxy, chemistry and magnetic fields in multiferroic systems investigations with neutron scattering

Joel Bertinshaw, Physics, University of New South Wales
Commenced 01/07/2012

Adsorption of CO₂ by coal and activated carbon: A study using in-situ small-angle x-ray scattering and sorption manometry

Tara Congo, Nanoscale Science and Technology Centre, Griffith University
Commenced 01/07/2007

Assessing the vulnerability of reef islands to climate change: a spatial-temporal sediment budget model approach

John Dawson, School of Earth and Environmental Sciences, James Cook University
Commenced 01/07/2009

Impact of changing landuse on groundwater/surface water, SW Vic

Joshua Dean, Environmental Geoscience, La Trobe University
Commenced 01/07/2010

Localisation of the molecular chaperone site of 14-3-3Zeta; An intracellular protein associated with toxic neurological protein aggregates

Katy Goodwin, Chemistry, University of Adelaide
Commenced 01/07/2011

Modelling and measurement of 3D fields in stellarators and tokamaks

Shaun Haskey, Physical Sciences and Engineering / Plasma Physics, Australian National University
Commenced 01/07/2010

Structure in ionic liquids

Robert Hayes, Environment & Life Sciences, University of Newcastle
Commenced 01/07/2011

Biomarkers and stable isotopic compositions associated with sulfide-rich ancient deposits from mass extinction events

Ines Melendez, Chemistry, Curtin University
Commenced 01/07/2012

Aluminium geochemistry in coastal lowland acid sulfate soils (CLASS): speciation, reactivity and mobility

Yliane Yvanes-Giuliani, Civil and Environmental Engineering, University of New South Wales
Commenced 01/07/2011

Structural and physical studies of oxide ionic-conductive brownmillerite single crystals

Josie Auckett, School of Chemistry, The University of Sydney
Commenced 01/07/2012

Lanthanoid complexes of tetrazolyl-functionalised Calix[4]arenes

Daniel D'Alessio, Chemistry, Curtin University
Commenced 01/07/2012

Functional coordination materials from scorpionate and heterotopic ligands

Gregory Hall, Chemistry, Monash University
Commenced 01/07/2010

Electrochemical sensing of oxygen gas in ionic liquids on screen printed electrodes

Junqiao Lee, Chemistry, Curtin University
Commenced 01/07/2010

Postgraduate Scholars, and their projects, who were supported during 2015

Biofilm inhibition by immobilisation of antimicrobial proteins
Peter Akers, School of Chemical Sciences, University of Auckland
 Commenced 1/7/2012

Revealing nanoscale interactions and electro-migration mechanisms during desalination by electro-dialysis in mixed solvents by SANS
Francois-Marie Allieux, Institute for Frontier Materials, Deakin University
 Commenced 1/7/2015

Development of a platform for rapid antibiotic viability testing
Jakob Andersson, Chemical & Physical Sciences, Flinders University
 Commenced 1/7/2015

Resolving changes in hydration state and the role of nanoparticles during the nucleation, growth and evolution of calcium carbonate minerals
Jonathan Avaro, Southern Cross Geoscience, Southern Cross University
 Commenced 1/7/2015

Morphology effect of novel poly(p-phenylene vinylene) brush thin films on their photoluminescence in solid-state
Paul Baek, School of Chemical Science, University of Auckland
 Commenced 1/7/2014

The potential of Corchia Cave (Italy) speleothem trace element and radiocarbon variations as indicators of past environmental change
Petra Bajo, Resource Management & Geography, University of Melbourne
 Commenced 1/7/2011

Compartmentalisation in protic ionic Liquids: implications for synthetic and non-aqueous lifeforms
Saffron Bryant, Chemistry, University of Sydney
 Commenced 1/7/2014

A coherent inelastic neutron scattering investigation of Polycrystalline Magnesium Deuteride
Andrew Buckley, Imaging & Applied Physics, Curtin University
 Commenced 1/7/2012

The Last Interglacial: an analogue for future climate change?
Micheline Campbell, School of Earth and Environment, University of Western Australia
 Commenced 1/7/2015

Novel oxynitride photocatalysts for solar hydrogen production
Andrew Chan, School of Chemical Sciences, University of Auckland
 Commenced 1/7/2015

Search for novel multiferroic materials: magnetic and structure phase transition study in $\text{Cu}_{1-x}\text{Zn}_x\text{Fe}_2\text{O}_4$ and SrCoO_{3-x}
Fenfen Chang, Physics, University of New South Wales
 Commenced 1/7/2014

Neutron and electron diffraction studies of anion order in perovskite oxynitrides
Wan-Ting Chen, Chemistry, University of Auckland
 Commenced 1/7/2015

Materials for new generation of batteries
James Christian, Chemistry, University of New South Wales
 Commenced 1/7/2015

Late Holocene hydroclimate at Kangaroo Island, South Australia
Bronwyn Dixon, Earth Science, University of Melbourne
 Commenced 1/7/2015

Spur and groove evolution, formation and Paleoclimate: Great Barrier Reef and French Polynesia
Stephanie Duce, School of Geosciences, University of Sydney
 Commenced 1/7/2015

Using stable isotope analysis and carbon 14 to assess the feeding ecology of Southern Hemisphere humpback whales
Pascale Eisenmann, SOPOPP, Griffith University
 Commenced 1/7/2014

Designed nanoparticles for dual-modality imaging and drug/radiopharmaceutical delivery: combining SPECT/PET and MRI
Lars Esser, Monash Institute of Pharmaceutical Sciences, Monash University
 Commenced 1/7/2014

Holocene drivers of environmental change from high-resolution lake sediment sequences in northern New Zealand
Gianna Evans, School of Environment, University of Auckland
 Commenced 1/7/2015

Assessing terrestrial climate variability over the last glacial-interglacial transition: a new quantitative, high-resolution, multi-proxy record from south-eastern Australia
Georgina Falster, Earth Sciences, University of Adelaide
 Commenced 1/7/2015

Unlocking the Kimberley's environmental past: Late quaternary multi-proxy analysis of tropical mound spring peat cores
Emily Field, Geography, Planning and Environmental Management, University of Queensland
 Commenced 1/7/2015

Stable carbon isotope analysis of Pandanus sp. drupes: A proxy for ancient foraging practices at Madjedbebe (Malakunanja II)
Stephanie Florin, Social Sciences, University of Queensland
Commenced 1/7/2015

Surface chemistry of a complex mineral system: mineralogy and sorption processes in modified bauxite refinery residues
Tiago Freire, School of Environment, Science and Engineering, Southern Cross University
Commenced 1/7/2012

Structure-property relationships in thermoplastic nanocomposites
Jamie Gilbert, Institute of Frontier Materials, Deakin University
Commenced 1/7/2015

Reconstructing the post-glacial history of the subantarctic Auckland Islands from marine sediment cores using ITRAX XRF and AMS Radiocarbon
Greer Gilmer, Geological Sciences, University of Otago
Commenced 1/7/2015

Understanding the mode of action of analgesic conotoxin Vc1.1 and other analgesic conotoxins
Ellen Gleeson, Chemistry, Monash University
Commenced 1/7/2014

Impact of gamma-irradiation of human cells upon nuclear versus mitochondrial forensic genotyping and relationship to oxidative stress biomarkers
Corey Goodwin, Forensic Studies, University of Canberra
Commenced 1/7/2015

Developing the first long-term (>150yrs) rainfall record for Southeast Queensland
Heather Haines, Australian Rivers Institute, Griffith University
Commenced 1/7/2014

Investigating the role of cholesterol in the metamorphic protein CLIC1's membrane interactions
Khondker Rufaka Hossain, Medical & Molecular Biosciences, University of Technology Sydney
Commenced 1/7/2013

Oxygen ordering induced magnetic phase transition in strain tuned SrCoO_{3-x} thin film
Songbai Hu, Materials Science and Engineering, University of New South Wales
Commenced 1/7/2014

Investigating accumulation of trace metals in a colonial and solitary marine invertebrate using radioisotope tracers
Rebecca Hull, Bioscience (Zoology), University of Melbourne
Commenced 1/7/2015

Mineral controls on soil carbon stability along the subtropical giant podzol Cooloola chronosequence
Andrew Jones, School of Agriculture and Food Science, University of Queensland
Commenced 1/7/2015

Hydrogen depth profiling of high strength steels
Oluwole Kazum, Chemical Engineering, James Cook University
Commenced 1/7/2015

Pb210 and radiocarbon dating reveal history of carbon sequestration in coastal wetlands
Jeffrey Kelleway, Plant Functional Biology and Climate Change Cluster, University of Technology Sydney
Commenced 1/7/2015

Tomographic imaging of residual elastic strain fields in whole components via Strain Tomography
Henry Kirkwood, Chemistry and Physics, La Trobe University
Commenced 1/7/2015

Synthesis and photophysics of metal-fluorine(18) radiopharmaceutical complexes as optical-positron emission multimodal diagnostic agents
Mitchell Klenner, Chemistry, Curtin University
Commenced 1/7/2015

In-situ investigation of the mechanism of proton conduction in phosphotungstic acid impregnated mesoporous silica based proton exchange membranes for high temperature direct alcohol fuel cells
Krystina Lamb, Faculty of Science, Health, Education & Engineering, University of The Sunshine Coast
Commenced 1/7/2013

Digging up the Yarra's dirty past: High resolution sediment core analysis using the ITRAX micro-XRF core scanner for identifying the water quality of historical floods in the Yarra catchment
Anna Lintern, Faculty of Engineering, Monash University
Commenced 1/7/2014

Holocene environments, human arrival and rates of environmental change in tropical northern Australia, South Wellesley Island
Lydia Mackenzie, Geography, Planning & Environment Management, University of Queensland
Commenced 1/7/2013

Particle-size dependence on arsenic distribution in historical gold mine wastes: Investigating the pathways for human exposure
Rachael Martin, School of Science, Information Technology & Engineering, Federation University
Commenced 1/7/2013

Investigation and development of molten salt reactor designs
Lance Maul, Mechanical & Manufacturing Engineering, University of New South Wales
Commenced 1/7/2014

Structure-stimulus relations in responsive polymer brushes
Timothy Murdoch, Chemical Engineering, University of Newcastle
Commenced 1/7/2015

Structural investigations of actinide derived materials: Thorium and plutonium oxides

Gabriel Murphy, Chemistry, University of Sydney
Commenced 1/7/2015

Complex magnetism in metal-ion battery cathode materials

Pierre Naeyaert, Chemistry, University of Sydney
Commenced 1/7/2015

Making low cost Australian carbon fibres

Srinivas Nunna, Institute of Frontier Materials, Deakin University
Commenced 1/7/2014

Coordination frameworks: Host-guest chemistry and associated structural dynamics

Stephen Ogilvie, Chemistry, University of Sydney
Commenced 1/7/2013

Lowering the barriers to interstitial oxide and superoxide anions: a new route to improved solid-state ionic conductors

Julia Polt, Chemistry, University of Sydney
Commenced 1/7/2015

Inter-aquifer connectivity - investigating groundwater movement through regional aquitards utilising uranium isotopes

Stacey Priestley, School of the Environment, Flinders University
Commenced 1/7/2014

Plasma equilibrium and stability in presence of flow and pressure anisotropy in a linear pinched helicon discharge

Zhisong Qu, Plasma Research Laboratory, Australian National University
Commenced 1/7/2014

III-V group semi-conductor nanowires characterization with Atom Probe Tomography

Jiangtao Qu, Physics, University of Sydney
Commenced 1/7/2015

Structural, magnetic and electronic properties of technetium oxides

Emily Reynolds, Chemistry, University of Sydney
Commenced 1/7/2013

Use of small angle x-ray and neutron scattering techniques to construct quantitative models that correlate the morphology fluctuations of graphene-based disordered lamellar structures with the transport of liquids, ions, and gasses within these materials

Ashley Roberts, Materials Engineering, Monash University
Commenced 1/7/2014

Carbon burial and vertical accretion rates in seagrass sediments in Moreton Bay

Jimena Samper-Villarreal, Marine Spatial Ecology Lab, University Of Queensland
Commenced 1/7/2012

Synthesis and stabilities of heavy main group metal hydrides

Ryan Schwamm, SCPS, Victoria University of Wellington
Commenced 1/7/2015

Neutron reflectometry for the kinetic study of biomimetic calcium phosphate growth on a zein protein template

Rayomand Shahlori, School of Chemical Sciences University of Auckland
Commenced 1/7/2014

Determining and controlling residual stress in parts made from Selective Laser Melting (SLM)

Tim Slingsby, Materials Engineering, Monash University
Commenced 1/7/2013

Development of imaging agents to target tumour hypoxia

Deborah Sneddon, Eskitis Institute for Drug Discovery, Griffith University
Commenced 1/7/2015

Nanostructure at complex surfactant-polymer interfaces

Kristian Tangso, Drug Delivery Disposition & Dynamics, Inst Pharmaceutical, Monash University
Commenced 1/7/2012

An archaeological and palaeoenvironmental investigation into prehistoric occupation of the Namadgi Ranges in the southeast Australian uplands

Fenja Theden-Ringl, Archaeology and Natural History, Australian National University
Commenced 1/7/2013

Radio frequency wave dynamics in the H-1 Helic and MagPIE

Alexander Thorman, Plasma Research Laboratory, Australian National University
Commenced 1/7/2014

Sourcing historical contamination in the Gippsland Lakes, Victoria

Adam Trewarn, Applied and Biomedical Science, Federation University
Commenced 1/7/2015

Location and conformation of encapsulated amphipathic peptides within bicontinuous cubic lipidic mesophases

Leonie van 't Hag, Manufacturing Flagship, CSIRO
Commenced 1/7/2015

Neutron scattering techniques to probe hydride ligand dynamics in catalytically relevant metal hydrides

Catriona Vanston, School of Chemistry, University of Tasmania
Commenced 1/7/2012

Inelastic neutron scattering studies of crystal field splitting in lanthanoid-polyoxometalate single-molecule magnets

Michele Vonci, Chemistry, University of Melbourne
Commenced 1/7/2014

Reorientation of mesochannels templated from hexagonal lyotropic liquid crystals under electric field and its structure reconstruction

Guang Wang, Institute for Frontier Materials, Deakin University
Commenced 1/7/2015

Structure-function relationships in metal hydrides: origin of pressure hysteresis

Timothy Webb, Queensland Micro-and Nanotechnology Centre, Griffith University
Commenced 1/7/2012

Development of a radiocarbon-based chronology for Tel Azekah, Israel

Lyndelle Webster, Ancient History, Macquarie University
Commenced 1/7/2015

The character and evolution of upland chain-of-ponds: Developing a geomorphic framework for conservation and rehabilitation

Rory Williams, Environment & Geography, Macquarie University
Commenced 1/7/2014

A combined experimental and computational approach to understanding and developing new solid-state ionic conductors

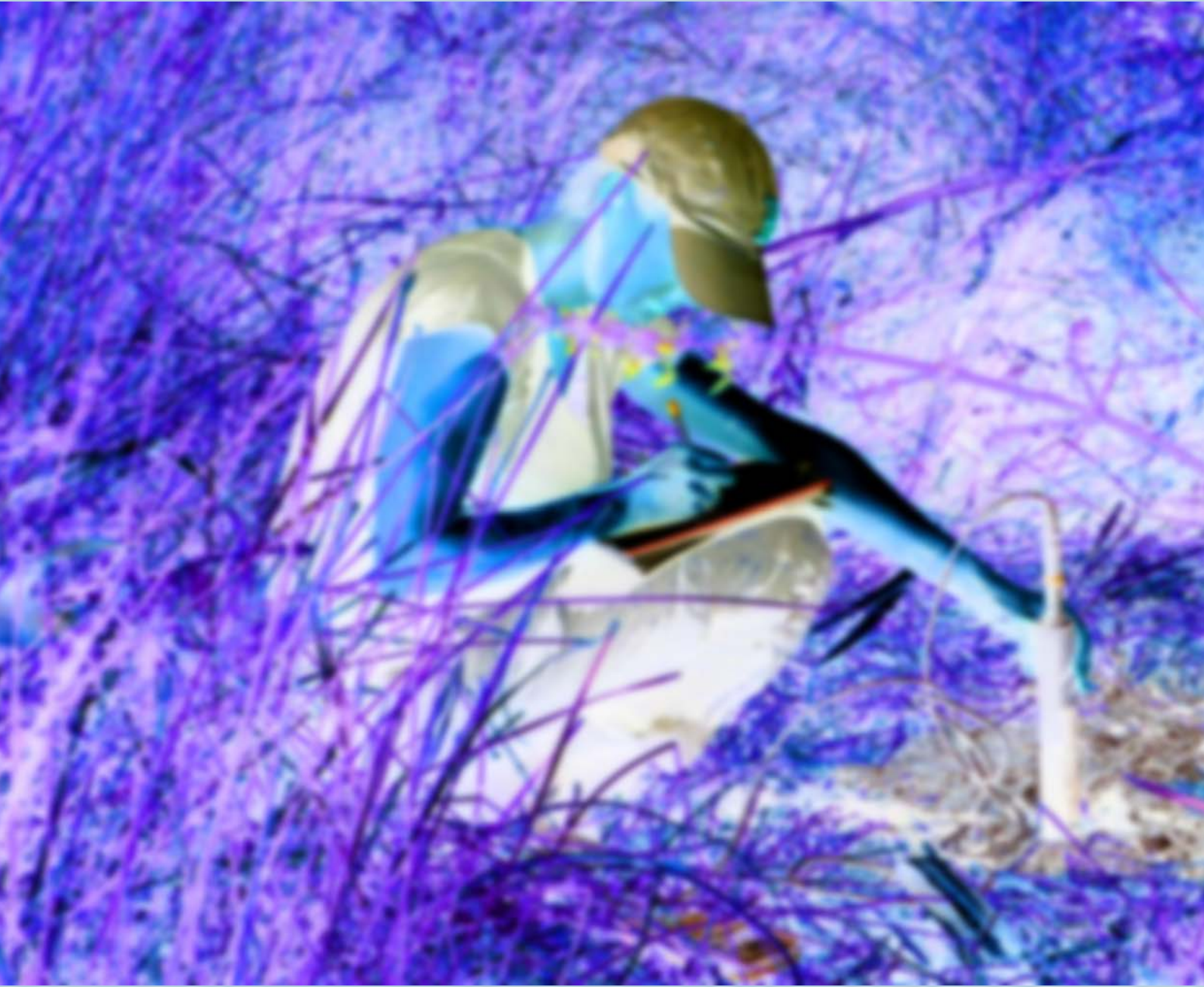
Julia Wind, Chemistry, University of Sydney
Commenced 1/7/2015

Investigation of metal oxides as high energy density cathode materials in lithium-ion batteries

Ross Wood, Science & IT, University of Newcastle
Commenced 1/7/2015



AINSE PGRA Stephanie Duce and field volunteer Bevan Yiu collecting coral cores from the spur and groove zone of Moorea, French Polynesia. Stephanie will be radio carbon dating these samples to determine how the spur and groove zone forms and evolves over time.
Photograph by Valere Sabatie



AINSE Research Awards & Bragg Travel Support

AINSE Research Awards - 2015

Australian National University

ALNGRA15033	DC Bear McPhail	\$6,875
The tritium composition of rainwater, surface water and groundwater in southeastern Australia: the Lake George Basin, NSW, Part 2		
ALNGRA15535	Larissa Schneider Guilhon	\$3,415
History of mercury contamination in Molonglo River as a result of historical gold mining activities in Captains Flat, NSW, Australia		
Australian National University Total		\$10,290

Charles Darwin University

ALNGRA15543	Krishnan Kannoorpatti	\$18,585
Evaluation of corrosion resistance of surface-hardened steel treated by ion beam irradiation and hardfacing		
Charles Darwin University Total		\$18,585

Curtin University of Technology

ALNGRA15010	Alison Blyth	\$5,415
Testing the validity of organic palaeo-proxy records in speleothems using low abundance radiocarbon dating		
ALNGRA15541	Charlie Ironside	\$4,660
Neutron transmutation doping of isotopically enriched Zinc Oxide		
Curtin University of Technology Total		\$10,075

Deakin University

ALNGRA15530	Peter Macreadie	\$11,625
Is restoration of blue carbon ecosystems for carbon offsetting feasible?		
ALNGRA15055	Ludovic Dumeé	\$3,255
Assessment of sub-micron thick corrosion resistant coatings across porous metal substrates towards improved hybrid ion exchange membranes		
ALNGRA15539	Ludovic Dumeé	\$5,760
Surface grafting of thin-film composite membranes via gamma ray irradiation		
ALNGRA15529	Rebecca Lester	\$9,000
Quantifying carbon sequestration in freshwater wetlands of South-West Victoria		
ALNGRA15048	Nisa Salim	\$4,465
Investigating the enhanced dispersion of carbon nanoparticles in PAN via block copolymer encapsulation		
Deakin University Total		\$34,105

Edith Cowan University

ALNGRA15540	Steven Hinckley	\$7,790
Elucidation of the gamma irradiation damage mechanism in optical fibre Bragg grating sensors		
Edith Cowan University Total		\$7,790

Federation University

ALNGRA15512	Jessica Reeves	\$11,965
The floors of Lake Mungo: What was happening when Mungo Man and Lady were alive?		
Federation University Total		\$11,965

Flinders University

ALNGRA15004	Eddie Banks	\$9,115
Use of carbon isotopes to constrain groundwater recharge rates in temperate and arid zone environments		
ALNGRA15053	Jacqueline Knobloch	\$7,200
Investigating the interaction of polypyridylruthenium(II) complexes with biomimetic cellular membranes		
ALNGRA15036	Sophie Leterme	\$13,406
Impact of ocean acidification on the uptake of trace metals by diatoms		
ALNGRA15034	Matthew McDowell	\$8,640
Faunal change and the demise of the megafauna: a palaeoecological study of Madura Cave, south-eastern Western Australia		
ALNGRA15011	Rachel Popelka-Filcoff	\$8,910
Profiling signature analytical techniques for the determination of UOC provenance in nuclear forensic science		
ALNGRA15047	Rachel Popelka-Filcoff	\$17,425
Characterisation of radiation-damaged crystalline nuclear fuel materials		
ALNGRA15510	Rachel Popelka-Filcoff	\$10,870
A comparative analysis between global sites with a cultural heritage of ochre use		
ALNGRA15511	Rachel Popelka-Filcoff	\$7,510
Establishing artwork connections: Elemental characterization of Aboriginal Australian mineral pigments from art centres by NAA		
ALNGRA15032	Vincent Post	\$10,803
Using environmental isotopes to investigate freshwater lens dynamics		
ALNGRA15018	Amy Roberts	\$5,245
Radiocarbon dating of human skeletal samples to improve the chronological resolution of the Fenix-3 Site, Central Chile		
Flinders University Total		\$99,124

Griffith University

ALNGRA15506	Jon Knight	\$13,341
Establishing an Australian Plutonium reference profile from an undisturbed alpine peat mire in Eastern Australia		
ALNGRA15021	Sally-Ann Poulsen	\$14,640
Synthesis and characterisation of second generation PET agents for imaging of hypoxic tumors		
ALNGRA15041	Jeffrey Shellberg	\$2,790
ITRAX x-ray scanning of Eucalyptus Microtheca tree ring density and element composition		
ALNGRA15044	Jim (Colin) Webb	\$5,060
The Role of spillover in the Hydrogen adsorption of transition metal doped graphene		
Griffith University Total		\$35,831

James Cook University

ALNGRA15002	Michael Bird	\$6,950
High resolution monsoon record from a Maar Lake in cantorial Burma		
ALNGRA15542	Mohan Jacob	\$9,210
Irradiation of polymer thin films to develop Carbon nano-clusters		
James Cook University Total		\$16,160

La Trobe University

ALNGRA15014	Jillian Garvey	\$6,820
Comparing C ¹⁴ dating of charcoal and bivalves from the late Quaternary of the Central Murray River Corridor, Northwest Victoria and the implications for human subsistence strategies		
ALNGRA15016	Agathe Lise-Pronovost	\$6,420
Dating the ancient harbor of Rome sediments for geoarchaeological and paleomagnetic investigations		
La Trobe University Total		\$13,240

Macquarie University

ALNGRA15035	Kirstie Fryirs	\$5,200
Surface water-subsurface water interactions in endangered upland swamp systems		
ALNGRA15527	Kirstie Fryirs	\$7,560
The hydrological function of endangered upland swamp systems in the Sydney water supply catchment		
ALNGRA15504	Paul Hesse	\$5,580
Dating a palaeodust and palaeoecological record from the Falkland Islands		
ALNGRA15537	Paul Hesse	\$10,420
Chronology, core scanning and stable isotope analysis of wetlands in the Pilliga forest		
ALNGRA15505	Dorrit Jacob	\$7,450
Novel growth rate determination method for human kidney stones		

ALNGRA15531	Peter Nelson	\$16,800
Identification of aerosol sources by positive matrix factorisation (PMF) of elemental concentration data: Suva, Fiji		
ALNGRA15532	Peter Nelson	\$12,400
Radiocarbon determination of fossil and modern carbon contribution to aerosol in Suva, Fiji		
ALNGRA15534	Neil Saintilan	\$7,380
Isotope training set for Blue Carbon		
Macquarie University Total		\$72,790

Monash University

ALNGRA15518	Jonathan Baell	\$13,680
Fluorinated ligands of the tyrosine kinase, MER TK, as diagnostic radiotracers of multiple sclerosis pathogenicity		
ALNGRA15009	Jessie Birkett-Rees	\$2,880
Archaeology at altitude: highland settlement in the South Caucasus		
ALNGRA15057	Yao Dong	\$2,620
Investigating the non-equilibrium behaviour of lipid-based liquid crystalline systems during pH and metal ion-triggered transformation		
ALNGRA15058	Gil Garnier	\$6,665
Cellulose films to study the interaction of polyelectrolyte/protein with cellulose		
Monash University Total		\$25,845

Murdoch University

ALNGRA15051	Manickam Minakshi	\$20,190
Nanostructured maricite material for securing future renewable energy supply		
ALNGRA15545	Vedapriya Pandarinathan	\$25,050
Characterization of Electrolytic Manganese Dioxide (EMD) synthesized in the presence and absence of surfactants used for hybrid capacitor applications		
Murdoch University Total		\$45,240

Queensland University of Technology

ALNGRA15040	Malcolm Cox	\$5,540
The Condamine River headwaters: estimation of recharge rates and alluvium-bedrock connectivity to increase confidence in predictions of potential CSG impacts		
ALNGRA15025	Konstantin Momot	\$10,225
3D architecture of articular cartilage: comparison of collagen fibre orientation distributions from SAXS and MRI		
ALNGRA15508	Luke Nothdurft	\$11,115
Initiation and growth of Mid-Holocene coral reefs, Moreton Bay Queensland		
ALNGRA15513	Craig Sloss	\$14,520
Holocene climate and sea-level change and its influence on landscape evolution in the southern Gulf of Carpentaria		
Queensland University of Technology Total		\$41,400

RMIT University

ALNGRA15026	Moshi Geso	\$9,095
Production of radioactive bimetallic nanoparticles by neutron irradiations and feasibility of employing them as theranostic agents		
RMIT University Total		\$9,095

Southern Cross University

ALNGRA15538	Richard Bush	\$8,930
Effect of arsenic on the crystal structure of 2-line ferrihydrite and hematite: Implications for environmental contamination		
ALNGRA15042	Malcolm Clark	\$8,490
Identification of scorodite in a contaminated Far North Coast cattle dip site soil using Transmission Electron Microscopy		
ALNGRA15059	Malcolm Clark	\$8,220
Transmission electron microscopy of novel fertiliser structures before during and after microbial attack		
ALNGRA15031	Dirk Erler	\$6,945
Mapping the change in tropical oceanic N fixation over the Holocene		
ALNGRA15017	Renaud Joannes-Boyau	\$7,745
Understanding the human journey: non-destructive elemental mapping of hominin fossil teeth using high-resolution microPIXE analyses		
ALNGRA15507	Damien Maher	\$18,600
Are mangrove carbon exports, old or modern? A C-14 analysis of particulate organic carbon (POC), dissolved organic carbon (DOC), and dissolved inorganic carbon (DIC)		
ALNGRA15054	Ellen Moon	\$5,060
Nanostructural changes associated with formation, growth and aging of the iron sulfide mineral greigite (Fe ₃ S ₄) in an iron-rich acid sulfate soil wetland		
Southern Cross University Total		\$63,990

Swinburne University of Technology

ALNGRA15544	Pandiyan Mugugaraj	\$14,925
Fabrication of phosphorous doped carbon nanostructures within polymer matrices by 'reactive ion beam irradiation' technique		
Swinburne University of Technology Total		\$14,925

The University of Adelaide

ALNGRA15517	Mohammed Alsharifi	\$13,275
Gamma-irradiated virus vaccines: concepts and parameters		
ALNGRA15524	Cameron Barr	\$9,895
A high-resolution quantitative rainfall record over the last 1000 years from the Australian sub-tropics		
ALNGRA15514	John Tibby	\$13,155
Environmental change before and after human arrival and the last megafaunal extinctions in Australia		
The University of Adelaide Total		\$36,325

The University of Auckland

ALNGRA15546 **Geoff Waterhouse** \$10,510
 HRTEM, STEM/HAADF and EDS studies of Pd-Au/TiO₂ photocatalysts for solar hydrogen production:
 Understanding the structure and function of Pd-Au alloy co-catalysts

The University of Auckland Total \$10,510

The University of Melbourne

ALNGRA15003 **Michael-Shawn Fletcher** \$7,765
 What is the role of fire in driving long-term coupled terrestrial-aquatic ecosystem dynamics?
 An integrated biophysical and geochemical analysis

ALNGRA15030 **Michael-Shawn Fletcher** \$9,290
 ITRAX and Lead-210 dating to gain a better understanding of how airborne heavy metal (Lead)
 pollution is transported and deposited in complex environments

ALNGRA15038 **Craig Nitschke** \$10,105
 Tree fern growth rates as drivers of stand dynamics in southeastern Australian temperate forests

The University of Melbourne Total \$27,160

The University of New England

ALNGRA15027 **Eleanor Hobley** \$10,495
 Contribution of pyrogenic carbon to long-term soil carbon storage

The University of New England Total \$10,495

The University of New South Wales

ALNGRA15023 **Kelly Clemens** \$15,000
 Changes in nicotine and dopamine receptor density across extended nicotine exposure in rats

ALNGRA15519 **Blake Cochran** \$13,000
 Determining the utility of the TSPO radioligand 18F-PBR111 as a pre-atherosclerotic lesion detection agent

ALNGRA15039 **Richard Collins** \$8,055
 Complexation and lability characteristics of aluminium-natural organic matter complexes in drainage
 waters from acid sulfate soil environments

ALNGRA15024 **Anthony Granville** \$12,500
 Investigating the radioisotope binding and retention capability of new mussel-inspired polymers

ALNGRA15019 **Scott Mooney** \$6,200
 Date What? V2 Radiocarbon ages of various fractions in peat and organic sediment

ALNGRA15052 **Clemens Ulrich** \$9,000
 X-ray diffraction and reflection study of strain induced magnetic phase transitions in SrCoO₃ thin film systems

ALNGRA15523 **Orazio Vittorio** \$9,000
 Copper metabolism as a target for neuroblastoma treatment: effect of Dextran-Catechin

The University of New South Wales Total \$72,755

The University of Newcastle

ALNGRA15528	Troy Gaston	\$9,132
Assessing the efficacy of sanctuary zones in estuarine systems: evidence from stable isotope analyses		
ALNGRA15520	Eugene Nalivaiko	\$9,850
Is TSPO protein involved in control of thermogenesis by brown fat?		
The University of Newcastle Total		\$18,982

The University of Queensland

ALNGRA15001	Chris Clarkson	\$7,395
Dating occupation pulses at Madjedbebe, Australia's oldest Aboriginal site		
ALNGRA15008	James Shulmeister	\$10,815
Holocene history of Lake Cootapatamba		
ALNGRA15037	Bradd Witt	\$11,440
Improving the precision and reliability of dating <i>Acacia cambagei</i> (gidgee) for the purpose of extending proxy climate records for central Australia beyond the instrumental record		
ALNGRA15516	Craig Woodward	\$5,645
An Environmental history of Lake Ellesmere/Te Waihora, New Zealand		
The University of Queensland Total		\$35,295

The University of Sydney

ALNGRA15022	Georgios Angelis	\$22,500
Advanced dynamic positron emission tomography imaging for ligand displacement studies on awake and freely moving animals		
ALNGRA15501	Brit Asmussen	\$7,200
Assessing the impact of ENSO-induced subsistence risk on Aboriginal hunting strategies in the Central Queensland Highlands via Macropod tooth eruption patterns		
ALNGRA15029	Feike Dijkstra	\$10,110
Drought impacts on tree-grass competition for ¹⁵ N and ³² P		
ALNGRA15015	Thomas Hubble	\$5,600
Extracting a Holocene palaeoflood record for the Darling River catchment from the 'Lake Mannum' laminate sequence		
ALNGRA15012	Bob Hudson	\$3,100
Improving the periodisation of Myanmar's First Millennium AD World Heritage Sites		
ALNGRA15521	David Pattison	\$12,020
Assessing the fate of tryptophan radicals in peptides and proteins: the influence of nearby reactive amino acid residues		
ALNGRA15509	Dan Penny	\$4,020
An AMS ¹⁴ C chronology for Holocene-aged records of tropical forest dynamics from the core region of the Asian monsoon		
ALNGRA15522	Binh Pham	\$10,000
Radiolabelling of iron oxide nanoparticles as multimodality imaging agents		

ALNGRA15536	Balwant Singh	\$6,200
Effect of land use and clay mineralogy on the stabilisation of soil organic carbon		
ALNGRA15013	Jim Specht	\$5,820
Refining the age of the Makekur Lapita pottery site, Papua New Guinea		
ALNGRA15043	Willem Vervoort	\$2,340
Identifying groundwater surface water interaction near Cootamundra, NSW, to better understand variations in stream salt load		
The University of Sydney Total		\$88,910

The University of Western Australia

ALNGRA15020	Joe Dortch	\$6,755
Establishing a chronology of Holocene environmental changes and human habitation in the northern Swan Coastal Plain, Southwestern Australia		
ALNGRA15526	Carole Elliott	\$8,690
Use of radiocarbon dating and dendrochemical analysis of the threatened species <i>Ricinocarpos brevis</i> (Euphorbiaceae) to better inform conservation efforts		
ALNGRA15028	Grzegorz Skrzypek	\$9,020
ITRAX high resolution scanning of calcrete profiles from the Hamersley Basin for investigation of formation processes of calcrete		
ALNGRA15515	Ingrid Ward	\$5,450
Re-evaluating an offshore source for Eocene chert artefacts in Southwestern Australia - a pilot study		
The University of Western Australia Total		\$29,915

University of Otago

ALNGRA15005	Ian Barber	\$7,800
Vegetation change and the chronology of Chatham Islands colonisation, southern Polynesia		
ALNGRA15006	Christopher Moy	\$10,305
Evaluating postglacial changes in the intensity of the Southern Hemisphere Westerly winds using ITRAX XRF and AMS radiocarbon		
ALNGRA15007	Glenn Summerhayes	\$8,680
Dating the nature of occupation along the Madang coast and Bilbil Island, Papua New Guinea		
University of Otago Total		\$26,785

University of South Australia

ALNGRA15049	Eric Charrault	\$2,195
PALS under stress: investigating the structure/properties relationship of amorphous dielectric and metallic films with positrons		
ALNGRA15045	Drew Evans	\$2,195
Positron annihilation lifetime spectroscopy studies of semi-metallic polymers		

ALNGRA15056	Surya Subianto	\$5,150
SAXS and TEM characterisation of the effect of crosslinker and additives in self-assembled nanophase particle-based coatings		

ALNGRA15060	Krasimir Vasilev	\$4,380
Revealing the levels of dehydrogenation during plasma polymer film growth		

University of South Australia Total	\$13,920
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University of Tasmania

ALNGRA15503	David Bowman	\$9,535
Age determination of a pollen-rich sediment core on Clarke Island (Iungtalanana), in Bass Strait that spans the mid-Holocene from continuous to transient Aboriginal occupation		

ALNGRA15533	Bernadette Proemse	\$8,005
Tracing water quality changes in water level manipulated lakes in central Tasmania using high resolution core scanning and isotopic dating techniques		

University of Tasmania Total	\$17,540
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University of Technology Sydney

ALNGRA15525	Luigi De Filippis	\$8,850
Selenium (Se) accumulation, translocation and biological speciation in selected plants using tissue culture and radiolabelled Se salts		

University of Technology Sydney Total	\$8,850
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University of Western Sydney

ALNGRA15050	Wenxian Li	\$10,500
Generation and characterization of surface and subsurface defects for high performance TiO ₂ photocatalysts		

ALNGRA15046	Janusz Nowotny	\$12,600
Application of PIXE and RBS analysis for the determination of the segregation-induced concentration gradients of tantalum and chromium in TiO ₂ -based semiconductors		

University of Western Sydney Total	\$23,100
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Victoria University of Wellington

ALNGRA15502	Helen Bostock	\$26,101
Detailed chronology and environmental changes in marine sediment cores from the southwest Pacific during Marine Isotope Stage 3 (24,000-60,000yrs)		

Victoria University of Wellington Total	\$26,101
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Total In-Kind value of AINSE research awards funding approved in 2015

\$977,093

Bragg Proposal Travel & Accommodation Support - 2015

The University of Adelaide

ALNBRG153505	Gordon Churchman	\$928
Different types of surface water on clays from a nanotubular halloysite sample		
ALNBRG153886	Marc Jones	\$393
The tooth anatomy of a bizarre 150 million year old fossil reptile that chewed on plants		
The University of Adelaide Total		\$1,321

The University of Auckland

ALNBRG154493	Peter Akers	\$3,586
Evaluation of aptamers as biorecognition elements in biosensors using NR		
ALNBRG153539	Peter Akers	\$2,598
probing the structure of surface immobilised PAMAM dendrimers		
ALNBRG153864	Paul Baek	\$2,354
Is self-assembly of novel poly(p-phenylene vinylene) brush thin films controlled by solvent quality?		
ALNBRG154576	Duncan McGillivray	\$2,883
Mechanistic study of mesoporous silica SBA-15 thin films grown at the air/water interface		
ALNBRG154569	Duncan McGillivray	\$4,268
Mimicking the silica deposition vesicle - using phospholipid as a biological template for silica thin films		
ALNBRG154399	Duncan McGillivray	\$2,444
Stabilisation of Calcium Phosphate Pre-Nucleation Clusters using Biomolecules		
ALNBRG154121	Tilo Soehnel	\$3,324
Structure and Magnetism of Fe Spinel Phases		
ALNBRG154542	Anton Stampfl	\$842
The vibrational modes of porphyrin-fullerene co-crystallates studied using the Be-filter spectrometer		
ALNBRG154649	Geoffrey Waterhouse	\$360
Copy of 4401: Neutron diffraction studies of anion order in perovskite and oxynitride phosphoroxynitrides		
ALNBRG154488	Yuanyuan Xu	\$480
Effects of polysaccharide overall and local charge densities on the nanostructure of protein/polysaccharide complex		
ALNBRG154512	Yuanyuan Xu	\$2,517
One sugar unit can make a big difference: effects of oligosaccharide chain length on the nanostructure of protein/oligosaccharide complex		
ALNBRG154011	Zhigang Xu	\$2,214
<i>In-situ</i> neutron diffraction study of phase transition in Fe-Mn-Si elemental compacts during vacuum sintering		

ALNBRG154297	Yang Xun	\$1,969
Characterisation of high-pressure denatured model proteins		

The University of Auckland Total		\$29,839
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Australian National University

ALNBRG153946	John Carver	\$320
The role of beta-synuclein in prevention of misfolding of alpha-synuclein.		

ALNBRG153946	John Carver	\$538
The role of beta-synuclein in prevention of misfolding of alpha-synuclein.		

ALNBRG153823	Vincent Craig	\$1,081
Nanobubbles in bulk		

ALNBRG153922	Stephen Hyde	\$80
Photonic crystals in nature		

ALNBRG154332	Yun Liu	\$1,171
Dynamics of the Rigid Unit Modes in AlPO_4 Framework Materials by inelastic neutron scatterings		

ALNBRG154561	Julien Louys	\$1,394
Tomographic analysis of Permian fossil bearing rocks from Timor-Leste		

ALNBRG154555	Teng Lu	\$868
Temperature and electric field induced phase transition in doped silver niobate		

ALNBRG154427	John White	\$800
Kinetics of human serum albumin silica aggregation		

ALNBRG154398	John White	\$1,731
Macro structures in Human serum albumin aggregation reactions		

ALNBRG154118	John White	\$320
Structure of HS-40 silica nanoparticles with Fatted native human serum albumin		

ALNBRG154142	John White	\$1,563
Deuterium Isotope effects on nanoparticle protein interaction.		

Australian National University Total		\$9,866
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CSIRO

ALNBRG154469	Charles Cranfield	\$300
Structural Changes within the Tethering Elements of tBLMs under the Effect of Bias Potentials		

ALNBRG154410	Michael Dolan	\$2,732
Powder diffraction study of vanadium-based hydrides		

ALNBRG154323	Amy Logan	\$2,217
Modelling the Milk Fat Globule Membrane		

ALNBRG154472	Claudio Delle Piane	\$3,230
Texture of calcite gouge		

ALNBRG154225	Claudio Delle Piane	\$1,531
Crystallographic preferred orientation of shale		

ALNBRG154378	Richard Sakurovs	\$1,533
The ultrafine structure of cokes used in blast furnaces		
ALNBRG154064	Richard Sakurovs	\$480
Pore collapse in brown coals: improving efficiency of brown coal combustion processes		
CSIRO Total		\$12,023

Deakin University

ALNBRG154666	Thomas Dorin	\$1,791
Carbides precipitation kinetics in direct strip cast steels		
ALNBRG154660	Ludovic Dumeé	\$1,468
Assessment of free volume across ion exchange materials exposed to organic mixed solvents		
ALNBRG154605	Ludovic Dumeé	\$662
Assessment of sub-micron thick corrosion resistant coatings across porous metal substrates towards improved hybrid ion exchange membranes		
ALNBRG154306	George Greene	\$2,129
Surface adsorption and inter-chain interactions in a bio-active polymer brush - lubricin		
ALNBRG153860	Nicole Stanford	\$1,776
Characterising nano-precipitates in strip cast steels using SANS		
ALNBRG154509	Zhifeng Yi	\$2,663
SANS and USANS Investigation of Charge Screening Effects on the Growth of Mesoporous Silica Nanoparticles		
ALNBRG153509	Jin Zhang	\$892
Observing the Water/moisture Transfer through Silkworm Cocoons by Neutron Imaging		
Deakin University Total		\$11,381

Flinders University

ALNBRG154138	Jackie Knobloch	\$891
Improving Model Membrane hydration		
ALNBRG153894	Jackie Knobloch	\$3,138
Investigating the interaction of daptomycin with biomimetic cellular membranes		
ALNBRG154662	Ingo Koeper	\$1,287
Nanoparticles for Medical Applications		
ALNBRG154446	Ingo Koeper	\$427
Influence of lipid composition on drug-membrane interactions		
ALNBRG154444	Ingo Koeper	\$1,128
Development of a platform for rapid antibiotic viability testing based on tethered lipid bilayer membranes		
ALNBRG154046	Allan Pring	\$800
Porosity and Inclusions in copper iron sulfide minerals: Clues to formation		
ALNBRG154046	Allan Pring	\$4,008
Porosity and Inclusions in copper iron sulfide minerals: Clues to formation		
Flinders University Total		\$11,679

Griffith University

ALNBRG154453	Evan Gray	\$1,200
<i>In-situ</i> high-resolution study of hydrogen-modified Ti-based Magneli phases		
Griffith University Total		\$1,200

La Trobe University

ALNBRG154156	James Donlon	\$953
Mummification Process, Dental Decay and Possible Evidence of Interceptive Orthodontic treatment in a Mummified Child from Graeco-Roman Egypt		
ALNBRG154148	Christopher Davey	\$640
Strain scanning of Two Cypriot Bronze Age Ceremonial Burial Knives		
La Trobe University Total		\$1,593

The University of Melbourne

ALNBRG153903	Charlotte Conn	\$1,224
Location of encapsulated amphipathic peptides within bicontinuous cubic lipidic mesophases		
ALNBRG154362	Marcus Giansiracusa	\$500
Understanding Single-Molecule magnet behaviour through Crystal Field Splitting of Lanthanoid-Polyoxometalate complexes		
ALNBRG153890	Frances Separovic	\$812
The orientation of the deuterated antimicrobial peptide maculatin in anionic bilayer membranes.		
ALNBRG154095	Jin Shang	\$3,566
The mechanism of CO ₂ /N ₂ /CH ₄ separation in zeolite A: influence of presorbed species		
ALNBRG153888	Michele Vonci	\$458
Crystal Field Splitting of Lanthanoid-Polyoxometalate Single-Molecule Magnets		
The University of Melbourne Total		\$6,560

Monash University

ALNBRG154131	Will Gates	\$716
Cement Paste Grain Size as a function of cure time		
ALNBRG153676	Estela Garcez	\$1,599
Curing, pores, voids, cracks and imperfection in concrete		
ALNBRG154654	Gil Garnier	\$2,951
Protein interactions with a cellulose surface		
ALNBRG154531	Dan Li	\$655
Structural characterisation of graphene cellular elastomers during compressive deformation		
ALNBRG153792	Will Gates	\$560
Solute profile in confinement - Neutron diffraction of oriented organo-clay films		

ALNBRG153950	Lizhong He	\$2,457
Interfacial structure of proteins anchored by designer biosurfactant proteins at an oil-water interface		
ALNBRG154507	Christopher Hutchinson	\$749
Mn partitioning during cementite precipitation in 3rd generation advanced high strength steels		
ALNBRG154334	Dan Li	\$560
Applied Neutron Diffraction and Scattering to Determine the Structure and Dynamics of Hydrated Graphene-Based Membranes		
ALNBRG154528	Yogita Ahuja	\$1,153
Neutron imaging and residual stress measurement of copper composites fabricated by Friction Stir Forming		
ALNBRG153871	Hsin-Hui Shen	\$1,869
Roles of beta-barrel Assembly Machinery Complex in Protein Biogenesis: Molecular Architecture and Its Mechanism of Action		
ALNBRG154367	Jeffrey Stilwell	\$2,129
Earliest Fossiliferous Amber and Associated Plants from the Late Cretaceous–early Paleogene South Polar Greenhouse of Australia and Chatham Islands		
ALNBRG153505	Estela Garcez	\$1,122
Different types of surface water on clays from a nanotubular halloysite sample		
ALNBRG154021	Rico Tabor	\$2,128
Photoswitchable aggregation of sugar surfactants		
ALNBRG154318	Chris Wilson	\$1,439
Comparison of texture development between monomineralic and polymineralic rocks, and relationship to Himalayan Orogeny		
Monash University Total		\$20,087

The University of Newcastle

ALNBRG154452	Rob Atkin	\$886
Effect of solvate ionic liquid structure on the conformation of poly(ethylene oxide)		
ALNBRG154413	Erich Kisi	\$1,055
<i>In situ</i> phase scanning of thermal storage materials		
ALNBRG154105	Erich Kisi	\$800
Deformation and Texture in Clay Soils		
ALNBRG154229	Erich Kisi	\$1,120
Understanding Stress Distributions in Granular Materials		
ALNBRG154651	Erich Kisi	\$1,187
Understanding Stress Distributions in Granular Materials		
ALNBRG154450	Leo Anderberg	\$240
Diffraction and Near-IR spectra of serpentine minerals under conditions relevant to the small bodies of the asteroid belt.		
ALNBRG154275	Grant Webber	\$800
Structural changes in thermoresponsive polymer brushes		
ALNBRG154308	Christopher Wensrich	\$600
Deformation and Texture in Clay Soils 2: Effects of Load Path		
The University of Newcastle Total		\$6,688

The University of New South Wales

University of New South Wales ADFA

ALNBRG153978	Jan Hinterstein	\$1,676
Time resolved texture analysis on piezoceramics.		
ALNBRG154150	Wayne Hutchison	\$1,218
Magneto-structural studies of magnetocaloric Ni doped MnCoGe		
ALNBRG154544	Wayne Hutchison	\$2,281
Investigation of Magnetic Structures of the Hexagonal and Orthorhombic Phases in MnCoGe based alloys by Polarised Neutron diffraction Technology		
ALNBRG154504	Wayne Hutchison	\$537
Very low temperature magnetic order in cubic NdTi ₂ Al ₂ O		
ALNBRG154169	Narendrakumar Narayanan	\$1,128
Quantum Critical Endpoint in hexagonal ErMnO ₃ and HoMnO ₃		
ALNBRG154163	Jianli Wang	\$336
Structural and magnetic properties of RCo ₂ Mn and RCo ₂ compounds		

University of New South Wales

ALNBRG154548	Sean Cadogan	\$1,113
Magnetism in the Olivine structure		
ALNBRG154494	Sean Cadogan	\$518
Effect of Lu substitution on the magnetic structure of Ho ₂ Fe ₂ Si ₂ C		
ALNBRG154304	Jan Hinterstein	\$3,100
Development of next-generation <i>in situ</i> characterisation methods for functional materials design		
ALNBRG154143	Stuart Prescott	\$1,310
Understanding the structures of low volume-fraction gels		
ALNBRG154643	Stuart Prescott	\$640
Structure-stimulus relations in responsive polymer brushes: specific ion effects in polybasic brushes		
ALNBRG154658	Stuart Prescott	\$1,300
Structure-stimulus relations in responsive polymer brushes: hydrophobically modulated specific ion effects in polybasic brushes		
ALNBRG153956	Othman Al Bahri	\$187
The relationship between battery history and conditions and crystal structure evolution		
ALNBRG154650	Othman Al Bahri	\$160
Thermal expansion of intercalated ZrW ₂ O ₈		
ALNBRG154287	Glen Stewart	\$1,730
Towards a crystal field interpretation of bulk magnetic behaviour across the intermetallic series RNiAl ₄ (R = rare earth)		

The University of New South Wales Total \$17,234

The University of Queensland

ALNBRG153973	Pratheep Annamalai	\$1,718
Small-angle neutron scattering study of cellulose nano-fibers from Australian native arid grass 'Spinifex'		
ALNBRG154015	Paul Burn	\$360
Structure of Non-stabilised Nanoparticles for Eco-friendly Solar Cell Fabrication		
ALNBRG154014	Paul Burn	\$2,166
Effect of Humidity on the Ionic-Electronic Conductor Melanin for Bioelectronic Transducers		
ALNBRG154373	Jack Clegg	\$2,442
Further investigations into the oxidation state of bis(diphenylglyoximato) cobalt dihalide complexes by SCND		
ALNBRG153797	Jack Clegg	\$2,063
Investigating the oxidation state of bis(diphenylglyoximato) cobalt dihalide catalysts by single crystal neutron diffraction		
ALNBRG154490	Andrew Clulow	\$2,469
Steric Control of Fullerene Distribution and Diffusion in Efficient Organic Solar Cells		
ALNBRG153994	Andrew Clulow	\$1,864
Nanoscale Structural Evolution in Polymer/Non-fullerene Blends for Optoelectronics		
ALNBRG154261	David Fengwei Xie	\$3,497
Using water/ionic liquid mixtures to regulate the transition temperature of starch, a natural semi-crystalline polymer: understanding the underlying mechanism by simultaneous Rapid Visco Analysis and small-angle neutron scattering		
ALNBRG154564	Ian Gentle	\$4,487
Investigating film structure of solution-processed OLEDs		
ALNBRG154505	Ian Gentle	\$1,910
Investigating polymer/inorganic electrode interfaces		
ALNBRG154126	Ian Gentle	\$1,996
The effect of steric bulk on interlayer diffusion in organic thin films		
The University of Queensland Total		\$24,972

Queensland University of Technology

ALNBRG154499	Tomas Blach	\$1,007
Fluid transport and pore accessibility in the Early Carboniferous Laurel Formation; a potential shale gas play in the Canning Basin, Australia		
ALNBRG153661	Stephen Hughes	\$1634
Use of neutron tomography to map the density of water close of hydrophilic and hydrophobic interfaces		
Queensland University of Technology Total		\$2,641

RMIT University

ALNBRG154114	Gary Bryant	\$320
New insights into colloidal phase transitions using neutron scattering.		
ALNBRG154114	Gary Bryant	\$711
New insights into colloidal phase transitions using neutron scattering.		
ALNBRG154534	Stephen Sun	\$240
Evaluation of residual stress on Additive Manufactured Fe-Cr-Mo-Nb-B steel for high wear resistant component		
ALNBRG154227	Stephen Sun	\$1,039
Residual stress measurements for Aermet100 steel cylindrical clad with PCHT		
RMIT University Total		\$2,310

Southern Cross University

ALNBRG154218	Malcolm Clark	\$2,312
Bauxite refinery and sugar cane bagasse fly ash residues as pore fillers in controlling water flow in cement pastes and mortars		
ALNBRG154442	Andrew Rose	\$1,151
Characterisation of physical density, hydration state, and nanoparticle structure during the initial steps of calcium carbonate mineral formation		
Southern Cross University Total		\$3,463

Swinburne University of Technology

ALNBRG153925	Andrew Ang	\$1,221
Characterisation of residual stress profile of high entropy alloy coatings produced by atmospheric plasma spray		
ALNBRG154529	Elena Ivanova	\$1,491
Dynamics of bacterial microstructure formation within hydrogels in the hydrated state		
ALNBRG153990	Syed Riza	\$889
Investigation of residual stresses in laser generated high strength steel alloys in as-cladded and heat treated conditions		
ALNBRG154215	Ryan Cottam	\$757
Investigation of phase equilibria in duplex stainless steels at high temperatures		
Swinburne University of Technology Total		\$4,358

The University of Sydney

ALNBRG153852	Chiara Neto	\$668
Self-assembled monolayers based on halogen bonding		
ALNBRG154085	Greg Warr	\$280
Ionic Liquids in Solution: Hydrotropes, Cosurfactants or Surfactants?		
The University of Sydney Total		\$948

University of Tasmania

ALNBRG154432	Pavel Nesterenko	\$3,122
Investigation of the fine structure of synthetic diamond by small-angle scattering		
University of Tasmania Total		\$3,122

University of South Australia

ALNBRG154485	Naba Dutta	\$3,927
Fundamental understanding of the effect of solvent choice in the catalyst ink dispersion on the morphology of the solid MEA and its influence on fuel cell performance		
ALNBRG154033	Naba Dutta	\$1,310
Structural analysis of Fuel cell Ink Engineered using directed self-assembly of biomimetic polymer template		
ALNBRG153876	Phillip Pendleton	\$1,673
Phase behaviour and local structure of bulk and confined [Emim][Zn(TFSI) ₃] ionic liquid		
ALNBRG154119	Phillip Pendleton	\$3,336
Interfacial effects of water and carbon dioxide absorption and desorption into [Emim][Zn(TFSI) ₃] ionic liquid thin films		
ALNBRG154420	Phillip Pendleton	\$1,578
Phase behaviour and local structure of bulk and confined [Emim][Zn(TFSI) ₃] ionic liquid		
ALNBRG154492	Surya Subianto	\$3,035
USANS, SANS, and SAXS investigation of the structure and formation of Poly(ionic liquid) gels and emulsions		
University of South Australia Total		\$14,859

University of Technology Sydney

ALNBRG154473	Charles Cranfield	\$280
Structural Changes within the Tethering Elements of tBLMs under the Effect of Transmembrane Potentials		
ALNBRG153967	Charles Cranfield	\$240
Effects of Bias Potentials on Tethered Lipid Bilayers		
University of Technology Sydney Total		\$520

The University of Western Australia

ALNBRG154123	Mikhail Kostylev	\$1,722
<i>In-situ</i> studies of hydrogen absorption and changes of the ferromagnetic resonance in Co/Pd thin films		
The University of Western Australia Total		\$1,722

Victoria University of Wellington

ALNBRG154591	Anna Alipooramirabad	\$560
The economics of post-weld heat treatment to remove residual stresses of welded structures: an <i>in-situ</i> neutron diffraction analysis and finite modelling simulations		
ALNBRG153926	Martyn Coles	\$3,010
Towards Understanding Hydrogen-Bonding in Guanidine Substituted Superbases		
ALNBRG154491	Jennifer Fulton	\$2,603
Charge density studies - comparisons of lone pair properties of tin and lead complexes		
ALNBRG153862	Jennifer Fulton	\$3,267
Charge density studies - comparisons of lone pair properties in post-transition metal complexes		
ALNBRG154099	Simon Granville	\$1,302
Magnetic disorder and growth conditions for half-metallic, ferromagnetic Co ₂ MnSi thin films		
Victoria University of Wellington Total		\$10,742

Total AINSE Bragg Support funding approved in 2015 **\$ 199,128**



AINSE Research Fellows

AINSE, in conjunction with the Australian Nuclear Science and Technology Organisation (ANSTO) in 2006 established a Fellowship Scheme to add impetus to member Universities' growing stature in nuclear science and engineering and in related fields. The first two Fellowships were awarded in 2006. Fellowships are for a three-year appointment in the first instance with the possibility of an extension to five years where subsequent continuing appointment at the university is foreseen. The AINSE Board decided not to offer any more new Research Fellowships from 2013.

Since the commencement of the program in 2006 AINSE has awarded the following Fellowships:

2006 Darren Goossens The Australian National University

Study of the nature and role of nanoscale order in complex materials

Concluded November 2011

Dr Goossens is employed in the Research School of Chemistry, ANU as a research associate.

2006 Daniel Riley The University of Melbourne

Use of ultra-fast in-situ diffraction in the development of advanced materials

Concluded June 2010

Dr Riley is employed at ANSTO as a research scientist in the Institute of Materials Science.

2007 Duncan McGillivray The University of Auckland

Probing the mechanisms of biomembrane interactions

Concluded December 2010

Dr McGillivray is employed as a senior lecturer in the School of Chemistry at The University of Auckland.

2007 Moeava Tehei University of Wollongong

Study of relationships between function, structure and dynamics of biological molecules by neutron scattering

Concluded March 2013

Dr Tehei is employed as the Scientific Leader Diagnostics and Therapeutics at IHMRI.

2008 Lizhong He The University of Queensland

The physical states of pharmaceutical proteins and self-assembled proteins

Concluded December 2011

Dr He is employed as a senior lecturer School of Chemical Engineering at Monash University.

2008 Helen McGregor University of Wollongong

El Niño in context: reading the coral record of past climate extremes

Concluded October 2013

Dr Helen McGregor is employed as ARC Future Fellow at University of Wollongong

2009 David Turner Monash University

Structural studies of metal organic materials for gas storage and anion exchange

Concluded December 2012

Dr Turner is employed as ARC Future Fellow at Monash University.

2009 John Daniels The University of New South Wales

Application of advanced diffraction techniques for component and material design in functional, biological and structural applications

Concluded February 2015

A/Professor John Daniels is employed as a senior lecturer in the School of Materials Science and Engineering at University of New South Wales

2010 Rachel Popelka-Filcoff Flinders University

Geochemical characterisation of Australian ochre by k⁰-neutron activation analysis for characterisation and sourcing of aboriginal Australian mines and artefacts

2010 Roman Dronov Flinders University

Design of advanced optical biosensors through neutron based surface analysis

Concluded October 2013

2011 Alison Blyth Curtin University of Technology

Molecular, stable isotopic and radiocarbon analyses of organic matter preserved in terrestrial records

2012 Dr Neeraj Sharma The University of New South Wales

Developing improved materials for energy generation and storage

Concluded December 2015

Dr Neeraj Sharma is employed as a lecturer in the School of Chemistry at University of New South Wales

AINSE Supported Publications 2015

	Year	Author(s)	Title of Paper	Journal	Vol	Pages	DOI / HTML
Australian Catholic University	2015	Bajo, R.M., Taylor, J.E., Mazumder, D., Ellis, M., and Monamy, V.	Using $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ Stable Isotopes to determine Foraging Habitat of Insectivorous Bats	Poster Presentation, 13th Australian Environmental Isotope Conference, 8-10 July 2015, Sydney, NSW			
	2015	Bajo, R. M.	Using stable isotopes of carbon and nitrogen to determine foraging habitat and relative trophic position of insectivorous bats in Central-Western NSW, Australia	Honours Thesis			
The University of Adelaide	2015	Jonathan J. Tyler, Keely Mills, Cameron Barr, J.M. Kale Sniderman, Peter A. Gell and David J. Karoly	Identifying coherent patterns of environmental change between multiple, multivariate records: an application to four 1000-year diatom records from Victoria, Australia	Quaternary Science Reviews	119	94-105	10.1016/j.quascir.2015.04.010
	2015	Cameron Barr, Patricia Gadd, Henk Heijnis, Geraldine Jacobsen, Meredith-maya Legras Dharmaraja, Patrick Moss and John Tibby	A high-resolution record of millennial-scale climate variability and landscape change over the past 70,000 years from sub-tropical eastern Australia	Quaternary Perspectives on Climate Change, Natural Hazards and Civilization. XIX INQUA 2015 Nagoya Japan, 26 Jul- 2 Aug 2015			
	2015	Katy Goodwin	Localisation of the molecular chaperone site of 14-3-3Zeta; An intracellular protein associated with toxic neurological protein aggregates	PhD Thesis			
The University of Auckland	2015	Peter W. Akers, Andrew R.J. Nelson, David E. Williams, Duncan J. McGilivray	Formation of hydrated layers in PMMA thin films in aqueous solution	Applied Surface Science	353	829-834	10.1016/j.apsusc.2015.06.199
	2014	M. Allison, S. Liu, G. Stewart, C. Ling and T. Söhnle	Exploring the Properties of Complex Layered Tin Cluster Compounds	Proceedings- 38th Annual Condensed Matter and Materials Meeting			
	2015	Chan, A., Chen, W-T., Idriss, H., Waterhouse, G. I. N.	H ₂ Production from Biofuels: Alcohol Photo-reforming over Bimetallic Pd-Au/TiO ₂ Photocatalysts	Oral Presentation, 9th CIGR Section VI International Technical Symposium, Auckland, New Zealand, 16-20 November 2015			
	2015	Gang Chen, Klaus-Dieter Liss and Peng Cao	An in situ Study of NiTi Powder Sintering Using Neutron Diffraction	Metals	5	530-546	10.3390/met5020530
	2015	Zakiya H.N. Al-Azri, Wan-Ting Chen, Andrew Chan, Vedran Jovic, Toshiaki Ina, Hicham Idriss, Geoffrey I.N. Waterhouse	The roles of metal co-catalysts and reaction media in photocatalytic hydrogen production: Performance evaluation of M/TiO ₂ photocatalysts (M = Pd, Pt, Au) in different alcohol-water mixtures	Journal of Catalysis	329	355-367	10.1016/j.jcat.2015.06.005
	2015	Gang Chen, Klaus-Dieter Liss and Peng Cao	An <i>In Situ</i> Study of Sintering Behaviour and Phase Transformation Kinetics in NiTi Using Neutron Diffraction	Metallurgical and Materials Transactions A	46	5887-5899	10.1007/s11661-015-3156-1
	2015	Chen, W-T, Waterhouse, G. I. N	Ni/TiO ₂ -Solar Hydrogen (H ₂) Production from Water and Wine	Oral Presentation, 9th CIGR Section VI International Technical Symposium, Auckland, New Zealand, 16-20 November 2015			
	2015	Chen, W-T, Waterhouse, G. I. N	Ni/TiO ₂ -Low Cost Photocatalysts for Solar H ₂ Production	Poster Presentation, 9th CIGR Section VI International Technical Symposium, Auckland, New Zealand, 16-20 November 2015			
	2014	H.-B. Kang, C.D. Ling and T. Söhnle	Exploring the Structural and Magnetic Phase Transition of Cu _{1-x} CoxSb ₂ O ₆	Proceedings- 38th Annual Condensed Matter and Materials Meeting			

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The University of Auckland	2015	Shahlori, Rayomand	Advanced Materials and Nanotechnology	Oral presentation AMN7 conference, February 8-12, 2015, Nelson, New Zealand			
	2015	Shahlori, Rayomand	PhD Showcase	Oral presentation, The School of Chemical Sciences Centenary Celebration, March 13-14 2015, Auckland, New Zealand			
	2015	Shahlori, Rayomand		Oral presentation, 9th CIGR Section VI Technical Symposium 2015, November 16-20 2015, Auckland, New Zealand			
	2015	Rayomand Shahlori, Geoffrey I. N. Waterhouse, Andrew R. J. Nelson and Duncan J. McGillivray	Morphological, chemical and kinetic characterisation of zein protein-induced biomimetic calcium phosphate films	Journal of Materials Chemistry B	3	6213-6223	10.1039/C5TB00702J
	2014	D. J. Wilson and T. Söhnle	Synchrotron and Neutron Powder Diffraction and XANES Studies of $\text{Cu}_5\text{-xMn}_x\text{SbO}_6$	Proceedings- 38th Annual Condensed Matter and Materials Meeting			
The Australian National University	2015	S R Haskey, M J Lanctot, Y Q Liu, C Paz-Soldan, J D King, B D Blackwell and O Schmitz	Effects of resistivity and rotation on the linear plasma response to non-axisymmetric magnetic perturbations on DIII-D	Plasma Physics and Controlled Fusion	57		10.1088/0741-3335/57/2/025015
	2015	C. Paz-Soldan, R. Nazikian, S. R. Haskey, N. C. Logan, E. J. Strait, N. Ferraro, J. M. Hanson, J. D. King, M. J. Lanctot, R. Moyer, M. Okabayashi, J-K. Park, and M. Shafer.	Observation of multi-component plasma response and its relationship to density pumpout and edge-localized mode suppression.	Physical Review Letters	114	105001	10.1103/PhysRevLett.114.105001
	2015	S R Haskey, B D Blackwell, C Nührenberg, A Könies, J Bertram, C Michael, M J Hole and J Howard	Experiment-theory comparison for low frequency BAE modes in the strongly shaped H-1NF stellarator	Plasma Physics and Controlled Fusion	57		10.1088/0741-3335/57/9/095011
	2014	Short, M., McPhail, D.C. and Hollins, S.	Constraining hydrochemical pathways in a small internally draining basin (Lake George basin, NSW) using isotopes of the water molecule.	Geological Society of Australia Abstracts No110		225-226	
	2015	D.C. McPhail, Sargent, R., Short, M. and Hollins, S.	Groundwater recharge and flow in alluvial aquifers: Bungendore, NSW, Australia.	Australasian Environmental Isotope Conference, Sydney, July 2015			
	2015	Z.S. Qu, M.J. Hole and M. Fitzgerald	Modeling the effect of anisotropic pressure on tokamak plasmas normal modes and continuum using fluid approaches	Plasma Physics and Controlled Fusion	57	095005	10.1088/0741-3335/57/9/095005
	2015	Larissa Schneider, William Maher, Jaimie Potts, Graeme Batley, Anne Taylor, Frank Krikowa, Anthony Chariton, Atun Zawadzki, Henk Hejnis, Bernd Gruber	Use of a multi-proxy method to support the restoration of estuaries receiving inputs from industry	Ecological Engineering	85	247-256	10.1016/j.ecoleng.2015.09.070
	2015	Jaime Swift, Matthew L. Copper, Alan Greig, Michael C. Westaway, Chris Carter, Calogero M. Santoro, Rachel Wood, Geraldine E. Jacobsen and Fiona Bertuch	Skeletal Arsenic of the Pre-Columbian Population of Caleta Vitor, Northern Chile	Journal of Archaeological Science	58	31-45	10.1016/j.jas.2015.03.024
	2015	Wright, Adelle	Modelling MAGPIE Plasmas	Honours Thesis			
CSIRO	2015	Andrew R. Jones, Jonathan Sanderman, Diane Allen, Ram Dalal and Susanne Schmidt	Subtropical giant podzol chronosequence reveals that soil carbon stabilisation is not governed by litter quality	Biogeochemistry	124	205-217	10.1007/s10533-015-0093-4

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Charles Sturt University	2015	S.J. Clarke , K.J. Lamont, H.Y. Pan, L.A. Barry, A. Hall and S.Y. Rogiers	Spring root-zone temperature regulates root growth, nutrient uptake and shoot growth dynamics in grapevines	Australian Journal of Grape and Wine Research	21	479-489	10.1111/ajgw.12160
Curtin University	2015	Alison J. Blyth , David Fuentes, Simon C. George and Herbert Volk	Characterisation of organic inclusions in stalagmites using laser-ablation-micropyrolysis gas chromatography-mass spectrometry	Journal of Analytical and Applied Pyrolysis	113	454-463	10.1016/j.jaap.2015.03.009
	2015	D'Alessio, Daniel	Lanthanoid complexes of tetrazolyl-functionalised Calix[4]arenes	PhD Thesis			
	2015	Daniel D'Alessio , Brian W. Skelton, Nigel A. Lengkeek, Benjamin H. Fraser, Anwen M. Krause-Heuer, Sara Muzzioli, Stefano Stagni, Massimiliano Massi & Mark I. Ogden	Ionophoric properties of a tetra-tetrazole functionalised calix[4]arene	Supramolecular Chemistry	27	787-791	10.1080/10610278.2015.1075536
Deakin University	2015	Li He, Ludovic F. Dumée , Dan Liu, Leonora Velleman, Fenghua She, Connie Banos, Justin B. Davies and Lingxue Kong	Silver nanoparticles prepared by gamma irradiation across metal organic framework templates	RSC Advances	5	10707-10715	10.1039/C4RA10260F
	2015	Peter I. Macreadie , Stacey M. Trevathan-Tackett, Charles G. Skilbeck, Jonathan Sanderman, Nathalie Curlevski, Geraldine Jacobsen, Justin R. Seymour	Losses and recovery of organic carbon from a seagrass ecosystem following disturbance	Proceedings Royal Society B	282	20151537	10.1098/rspb.2015.1537
Federation University	2015	Shahad Ibraheem, Sheila. Devasahayam, Owen Standard and Sri Bandyopadhyay	Use of Secondary Ion Mass Spectrometry (SIMS) to identify Fly Ash Mineral spatial and particulate distribution in Epoxy Polymer	International Journal of Mineral Processing	142	139-146	10.1016/j.minpro.2015.04.025
	2015	G. R. Kattel , X. Dong, and X. Yang	A century scale human-induced hydrological and ecological changes of wetlands of two large river basins in Australia (Murray) and China (Yangtze): development of an adaptive water resource management framework	Hydrology and Earth System Sciences	12	8247-8287	10.5194/hessd-12-8247-2015
	2015	Rachael Martin , Kim Dowling, Dora C. Pearce, Singarayer Florentine, John W. Bennett, Attila Stopic	Size-dependent characterisation of historical gold mine wastes to examine human pathways of exposure to arsenic and other potentially toxic elements	Environmental Geochemistry and Health		1-18	10.1007/s10653-015-9775-z
Flinders University	2015	Jacqueline J. Knobloch , Andrew R. J. Nelson, Ingo Köper, Michael James, and Duncan J. McGillivray	Oxidative Damage to Biomimetic Membrane Systems: In Situ Fe(II)/Ascorbate Initiated Oxidation and Incorporation of Synthetic Oxidized Phospholipids	Langmuir	31	12679-12687	10.1021/acs.langmuir.5b02458
	2015	Matthew C. McDowell , Gavin J. Prideaux, Keryn Walshe, Fiona Bertuch and Geraldine E. Jacobsen	Re-evaluating the Late Quaternary fossil mammal assemblage of Seton Rockshelter, Kangaroo Island, South Australia, including the evidence for late-surviving megafauna	Journal of Quaternary Science	30	355-364	10.1002/jqs.2789
	2015	E. Donner, K. Scheckel, R. Sekine, R.S. Popelka-Filcoff , J.W. Bennett, G. Brunetti, R. Naidu, S.P. McGrath and E. Lombi	Non-labile silver species in biosolids remain stable throughout 50 years of weathering and ageing	Environmental Pollution	205	78-86	10.1016/j.envpol.2015.05.017
	2015	Diana A Fusco, Matthew C McDowell, Gavin J Prideaux	Late-Holocene mammal fauna from southern Australia reveals rapid species declines post-European settlement: Implications for conservation biology	The Holocene			10.1177/0959683615618261

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Griffith University	2015	Nathan English, Heather Haines , Henk Heijnis, Quan Hua, Jon Olley and Jonathan Palmer	Identifying Flood and Drought Events Using a 500-Year Reconstruction of Rainfall in the Australian Subtropics as Determined from Hoop Pine (<i>Araucaria cunninghamii</i>) Tree Rings	Quaternary Perspectives on Climate Change, Natural Hazards and Civilization. XIX INQUA 2015 Nagoya Japan, 26 Jul- 2 Aug 2015			
	2015	K. Alsabawi, T.A. Webb , E.MacA. Gray, C.J. Webb	The effect of C60 additive on magnesium hydride for hydrogen storage	International Journal of Hydrogen Energy	40	10508-10515	10.1016/j.ijhydene.2015.06.110
	2015	T.A. Webb , C.J. Webb, A.K. Dahle, E. MacA. Gray	In-situ neutron powder diffraction study of Mg-Zn alloys during hydrogen cycling	International Journal of Hydrogen Energy	40	8106-8109	10.1016/j.ijhydene.2015.03.170
	2015	Shine, Denis; Marshal, Melissa; Wright, Duncan ; Denham, Tim; Hiscock, Peter; Jacobsen, Geraldine; Stephens, Sean-Paul	The archaeology of Bindjarran rockshelter in Manilkarr Country, Kakadu National Park, Northern Territory	Australian Archaeology	80	104-111	ISSN:0312-2417
James Cook University	2015	G. Saiz, M. Bird , C. Wurster, C. A. Quesada, P. Ascough, T. Domingues, F. Schrodt, M. Schwarz, T. R. Feldpausch, E. Veenendaal, G. Djagbletey, G. Jacobsen, F. Hien, H. Compaore, A. Diallo, and J. Lloyd	The influence of C ₃ and C ₄ vegetation on soil organic matter dynamics in contrasting semi-natural tropical ecosystems	Biogeosciences	12	5041-5059	10.5194/bg-12-5041-2015
	2015	John Dawson	Assessing the vulnerability of reef islands to climate change: a spatial-temporal sediment budget model approach	PhD Thesis			
	2015	Daniel S. Grant, Kateryna Bazakaa, Rainer Siegele, Stephen A. Holt, and Mohan V. Jacob	Ion Irradiation as a Tool for Modifying the Surface and Optical Properties of Plasma Polymerised Thin Films	Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms	360	54-59	10.1016/j.nimb.2015.07.109
	2015	Stephen E. Lewis , Raphael A.J. Wüst, Jody M. Webster, John Collins, Shelley A. Wright, Geraldine Jacobsen	Rapid relative sea-level fall along north-eastern Australia between 1200 and 800 cal. yr BP: An appraisal of the oyster evidence	Marine Geology	320	20-30	10.1016/j.margeo.2015.09.014
	2015	A. Matmon, J. Quade, C. Placzek , D. Fink, ASTER Teame, M. Arnold, G. Aumaitre, D. Bourlés, K. Keddadouche, A. Copeland and J.W. Neilson	Seismic origin of the Atacama Desert boulder fields	Geomorphology	231	28-39	10.1016/j.geomorph.2014.11.008
	2015	G. Saiz , M. Bird, C. Wurster, C. A. Quesada, P. Ascough, T. Domingues, F. Schrodt, M. Schwarz, T. R. Feldpausch, E. Veenendaal, G. Djagbletey, G. Jacobsen, F. Hien, H. Compaore, A. Diallo, and J. Lloyd	The influence of C ₃ and C ₄ vegetation on soil organic matter dynamics in contrasting semi-natural tropical ecosystems	Biogeosciences Discuss	12	8085-8130	10.5194/bgd-12-8085-2015
La Trobe University	2015	J. F. Dean , J. A. Webb, G. E. Jacobsen, R. Chisari and P. E. Dresel	A groundwater recharge perspective on locating tree plantations within low-rainfall catchments to limit water resource losses	Hydrology and Earth System Sciences	19	1107-1123	10.5194/hess-19-1107-2015
	2014	J. F. Dean , J. A. Webb, G. E. Jacobsen, R. Chisari and P. E. Dresel	Biomass uptake and fire as controls on groundwater solute evolution on a southeast Australian granite: aboriginal land management hypothesis	Biogeosciences	11	4099-4114	10.5194/bg-11-4099-2014
	2015	Joshua Dean	Impact of changing landuse on groundwater/surface water, SW Vic	PhD Thesis			

	Year	Author(s)	Title of Paper	Journal	Vol	Pages	DOI / HTML
	2015	Donlon, James	The use of neutron Tomography for the virtual excavation of fossiliferous Plio-Pleistocene calcified sediments from South Africa	Honours Thesis			
	2014	Martin Lawler, Ron Arnold, Kasey F. Robb, Andy I.R. Herries , Tya Lovett, Christine Keogh, Matthew Phelan, Steven E. Falconer, Patricia L. Fall, Jacqueline Turnney, Rhiannon Stammers, Tiffany James-Lee and Ilya Berelov	The Browns Creek Community Archaeology Project: preliminary results from the survey and excavation of a late Holocene shell midden on the Victorian coast	The Third Colloquium on Victorian Archeology, La Trobe University, Feb, 2014	3		
	2015	Doran, T.L., Herries, A.I.R. , Hopley, P., Sombroek, H., Hellstrom, J., Hodge, E., Kuhn, B.F.	Assessing the palaeoenvironmental potential of Pliocene to Holocene tufa deposits along the Ghaap Plateau escarpment (South Africa) using stable isotopes.	Quaternary Research	84	133-143	10.1016/j.yqres.2015.04.008
	2015	G. R. Summerhayes , J. R. Bird, R. Fullgar, C. Gosden, J. Specht, and R. Torrence	Application of PIXE-PGME to Archaeological Analysis of Changing Patterns of Obsidian Use in West New Britain, Papua New Guinea	Archaeological Obsidian Studies			
Macquarie University	2015	Cynthia F Isley , Peter F Nelson, Mark P Taylor, David Cohen, Eduard Stelcer, Armand Atanacio, Francis Mani and Matakite Maata	Elemental Carbon in Aerosol: Suva, Fiji	11th Annual ANZAA Workshop - 22-24 July, 2015, Newcastle NSW			
	2015	Cynthia F Isley , Peter F Nelson, Mark P Taylor, David Cohen, Eduard Stelcer, Armand Atanacio, Francis Mani and Matakite Maata	Ambient and Indoor Aerosol Air Quality in Suva, Fiji	22nd International Clean Air and Environment Conference, 20 - 23 September 2015, Melbourne, Vic (CASANZ).			
	2014	Nathan Nagle	Distribution and dispersal of legacy sediment and contamination from historical gold mining at Hill End, New South Wales, Australia.	Masters Thesis			
	2014	C F Isley, P F Nelson , M P Taylor, D D Cohen, G Jacobsen, E Stelcer and A Antanacio	Use of IBA and AMS techniques for source apportionment of ambient and indoor airborne particulate in Suva, Fiji	13th South Pacific Environmental Radioactivity Association Conference. 1st to 3rd September 2014, Darwin			
	2014	C F Isley, P F Nelson , M P Taylor, F Mani and M Maata	Waste disposal challenges in Pacific Island Countries.	Cities in future earth: Third Australian Earth System Outlook Conference. 8th to 9th December 2014, Canberra			
	2015	C F Isley , P F Nelson, M P Taylor, D D Cohen, E Stelcer, A Antanacio, F Mani and M Maata	Ambient and indoor particulate air quality and emission sources in Suva, Fiji	New frontiers: 22nd International Clean air and Environment Conference. 20th to 23rd September 2015, Melbourne			
	2015	Adam S. Wethered, Timothy J. Ralph , Hugh G. Smith, Kirstie A. Fryirs, Henk Heijnis	Quantifying fluvial (dis)connectivity in an agricultural catchment using a geomorphic approach and sediment source tracing	Journal of Soils and Sediments	15	2052-2066	10.1007/s11368-015-1202-7
	2014	Nagle, N., Ralph, T. , Gore, D. and Fryirs, K.	Characterisation of sediment from historical gold mining using XRF, XRD and OSL.	Proceedings of the Australian X-ray Analytical Association Workshops, Conference and Exhibition from Minerals to Materials, 9-13 February 2014, Perth, Western Australia			

	Year	Author(s)	Title of Paper	Journal	Vol	Pages	DOI / HTML
The University of Melbourne	2014	Nagle, N., Ralph, T. , Gore, D. and Fryirs, K.	Tracing legacy sediment and contaminants from historical gold mining using XRF, XRD and pOSL.	Proceedings of the 63rd Annual Conference on Applications of X-ray Analysis, 28 July to 1 August 2014, Big Sky, Montana, U.S.A			
	2015	Michael-Shawn Fletcher , Alexa Benson, Hendrik Hejnis, Patricia S. Gadd, Les C. Cwynar, Andrew B.H. Rees	Changes in biomass burning mark the onset of an ENSO-influenced climate regime at 42 degrees S in southwest Tasmania, Australia	Quaternary Science Reviews	122	222-232	10.1016/j.quascir ev.2015.05.002
	2015	Marcus Giansiracusa	Correlating Single-Molecule Magnet Behaviour to the Coordination Environment of Rare Earth Containing Polyoxometalates	Honours Thesis			
	2015	Annabelle L. Rodd , Katherine Ververis, Dheeshana Sayakkara, Abdul W. Khan, Haloom Rafahi, Mark Ziemann, Shanon J. Loveridge, Ross Lazarus, Caroline Kerr, Trevor Lockett, Assam El-Osta, Tom C. Karagiannis and Louise E. Bennett	RNA sequencing supports distinct reactive oxygen species-mediated pathways of apoptosis by high and low size mass fractions of Bay leaf (<i>Lauris nobilis</i>) in HT-29 cells	Food and Function	6	2507-2524	10.1039/c5fb00467e
	2015	Michele Vonci , Marcus J. Giansiracusa, Robert W. Gable, Willem Van den Heuvel, Kay Latham, Boujemaa Moubaraki, Keith S. Murray, Dehong Yu, Richard A. Mole, Alessandro Soncini and Colette Boskovic	<i>Ab initio</i> calculations as a quantitative tool in the inelastic neutron scattering study of a single-molecule magnet analogue	Chemical Communications		1-4	10.1039/c5cc07541f
Monash University	2015	Dominic Agyei and Lizhong He	Evaluation of cross-linked enzyme aggregates of <i>Lactobacillus</i> cell-envelope proteinases, for protein degradation	Food and Bioproducts Processing	94	59-69	10.1016/j.fbp.2015.01.004
	2015	Kristian J. Tangso, Hetika Patel, Seth Lindberg, Patrick G. Hartley, Robert Knott, Patrick T. Spicer, and Ben J. Boyd	Controlling the Mesostucture Formation within the Shell of Novel Cubic/Hexagonal Phase Cetyltrimethylammonium Bromide-Poly(acrylamide-acrylic acid) Capsules for pH Stimulated Release	Applied Materials & Interfaces	7	24501-24509	10.1021/acsami.5b05821
	2015	P. L. M. Cook , M. Jennings, D. P. Holland, J. Beardall, C. Briles, A. Zawadzki, P. Doan, K. Mills, and P. Gell	Blooms of cyanobacteria in a temperate Australian lagoon system post and prior to European settlement	Biogeosciences Discussions	12	18829-18853	10.5194/bgd-12-18829-2015
	2015	Hall, Greg	Functional coordination materials from scorpionate and heterotopic ligands	PhD Thesis			
	2015	Wenjuan Yang, Jingxiong Lu, Elliot Paul Gilbert, Robert Knott, Lizhong He , and Wenlong Cheng	Probing Soft Corona Structures of DNA-capped Nanoparticles by Small Angle Neutron Scattering	The Journal of Physical Chemistry	119	18773-18778	10.1021/acs.jpcc.5b04494
	2015	Roberts, A B , Garvey, C, Li, D, Simon, GP.	Structural Investigation of Graphene-Based Disordered Lamellar Structures using of Small Angle X-ray and Neutron Scattering Techniques	Australian Angle Scattering Workshop, Deakin Campus, Waurn Ponds			
	2015	Zhengyang Zhao, Wei Shen, Lizhong He , Junfei Tian	Printed two-dimensional micro-ring film plate for spot assays and its functionalization by immobilized enzymes	Sensors and Actuators B: Chemical	219	268-275	10.1016/j.snb.2015.05.033

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	2015	Ana Deletic, Patricia Gadd, Henk Heijnen, Paul J Leahy, Anna Lintern and David T McCarthy	A strategy for identifying the sources of urban lake contaminants	Quaternary Perspectives on Climate Change, Natural Hazards and Civilization. XIX INQUA 2015 Nagoya Japan, 26 Jul- 2 Aug 2015			
	2015	Anna Lintern , Marion Anderson, Paul Leahy, Ana Deletic, David McCarthy	Using sediment cores to establish targets for the remediation of aquatic environments	Water Science & Technology			10.2166/wst.2015.525
	2014	Roberts, AB , Garvey, C, Li, D, Simon, GP.	Use of Small Angle X-ray and Neutron Scattering Techniques to Correlate Morphology Fluctuations of Graphene-Based Disordered Lamellar Structures with Transport of Liquids, Ions and Gasses	XRM 2014 Conference, Melbourne, AU.		26-31	
	2015	Stefan Salentinig , Nageshwar Rao Yepuri, Adrian Hawley, Ben J. Boyd, Elliot Gilbert, Tamim A. Darwish	Selective deuteration for molecular insights into the digestion of medium chain triglycerides	Chemistry and Physics of Lipids	190	43-50	10.1016/j.chemphyslip.2015.06.007
	2015	Jielong Su , Christopher J. Garvey, Stephen Holt, Rico F. Tabor, Bjorn Winther-Jensen, Warren Batchelor and Gil Garnier	Adsorption of cationic polyacrylamide at the cellulose-liquid interface: a neutron reflectometry study	Journal of Colloid and Interface Science	448	88-99	10.1016/j.jcis.2015.02.008
	2015	Matthew J. Pottage, Tamar L. Greaves, Christopher J. Garvey, Stephen T. Mudied and Rico F. Tabor	Controlling the characteristics of lamellar liquid crystals using counterion choice, fluorination and temperature	Soft matter	11		10.1039/c4sm02109f
	2015	Vanessa N.L. Wong , Scott G. Johnston, Edward D. Burton, Phillip Hirst, Leigh A. Sullivan, Richard T. Bush and Mark Blackford	Seawater inundation of coastal floodplain sediments: short-term changes in surface water and sediment geochemistry	Chemical Geology	398	32-45	10.1016/j.chemgeo.2015.01.016
Murdoch University	2015	Dario Delgado , Manickam Minakshi, Gamin Senanayake and Dong-Jin Kim	Modified electrolytic manganese dioxide (MEMD) for oxygen generation in alkaline medium	Journal of Solid State Electrochemistry	19	1133-1142	10.1007/s10008-014-2727-1
	2013	Z. Khan, D. Khushalani, M. Ionescu and M. Minakshi	The weird, but wonderful, maricite NaNiPO ₄ : synthetic strategy for supercapacitor applications	Souvenir (EEMR2013), International Conference on Frontiers in Energy, Environment, Health, and Materials Research, Bhubaneswar, India			
The University of Newcastle	2014	Hayes, Robert	Structure in ionic liquids	PhD Thesis			
The University of New South Wales	2015	R. A. Susilo, J. M. Cadogan , R. Cobas, W. D. Hutchison, M. Avdeev, and S. J. Campbell	Magnetic ordering in Ho ₂ Fe ₂ Si ₂ C	Journal of Applied Physics	117	17C113-1-17C113-4	10.1063/1.4913302
	2015	Beer, J., Chagué-Goff, C. , Andrew, A., Barry, L.	Insights from stable isotopes for evaluating weed invasion in urban bushland.	13th Australasian Environmental Isotope Conference, Sydney, Australia, 8-10 July 2015, Programme and Abstracts,			
	2015	Xue Y, Jones AM, Fink D, Kinsela AS and Collins R N	Speciation of Al, Fe, trace metals and REEs in coastal lowland acid sulfate soil drainage waters	Proceedings of the 2015 International Symposium on Environmental Science and Technology, November 1-3, Chongqing, China			
	2015	Jette Oddershede, Marta Majkut, Qinghua Cao, Soren Schmidt, Jonathan P. Wright, Peter Kenesei and John E. Daniels	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	10.1107/S1600576715007669

Year	Author(s)	Title of Paper	Journal	Vol	Pages	DOI / HTML
2015	Neamul H. Khansur, Hideto Kawashima, Satoshi Wada, Jessica M. Hudspeth, John Daniels	Enhanced extrinsic domain switching strain in core-shell structured BaTiO ₃ -KNbO ₃ ceramics	Acta Materialia	98		10.1016/j.actamat.2015.07.034
2015	Neamul H. Khansur, Tadej Rojac, Dragan Damjanovic, Christina Reinhard, Kyle G. Webber, Justin A. Kimpton, and John E. Daniels	Electric-Field-Induced Domain Switching and Domain Texture Relaxations in Bulk Bismuth Ferrite	Journal of the American Ceramic Society	98	3884-3890	10.1111/jace.13839
2015	Neamul H. Khansur, Manuel Hinterstein, Zhiyang Wang, Claudia Groh, Wook Jo, and John E. Daniels	Electric-field-induced strain contributions in morphotropic phase boundary composition of (Bi _{1/2} Nb _{1/2})TiO ₃ -BaTiO ₃ during poling	Applied Physics Letters	107	242902	10.1063/1.4937470
2015	S. J. Callori, S. Hu , J. Bertinshaw, Z. Yue, S. Danilkin, X. L. Wang, V. Nagarajan, F. Klose, J. Seidel and C. Ulrich	Strain-induced magnetic phase transition in SrCoO _{3-δ} thin films	Physical Review B	91		10.1103/PhysRevB.91.140405
2015	W.D. Hutchison , G.A. Stewart and J.M. Cadogan	Magnetic Ground State of Dy ³⁺ in DyNiAl ₄	Proceedings - 39th Annual Condensed Matter and Materials Meeting, 3-6 February 2015, Wagga Wagga, NSW, Australia			
2015	R. White, W.D. Hutchison and T. Mizushima	Magnetic Structure of TbRu ₂ Al ₁₀	Proceedings - 39th Annual Condensed Matter and Materials Meeting, 3-6 February 2015, Wagga Wagga, NSW, Australia			
2014	Len Martin, Scott Mooney and James Goff	Sedimentation rates in eastern Australia: evidence for rapid change from 12 - 6 Ka (mid- to early-Holocene)	Australian Quaternary Association (AQUA) meeting, in July 2014			
2015	Len Martin, Scott Mooney and James Goff	Long moisture records from sensitive peat-forming environments in eastern Australia: LGM to present.	2015 INQUA XIX International Quaternary Association (INQUA) Congress in Nagoya, Japan			
2015	James C. Pramudita, Daniele Pontiroli, Giacomo Magnani, Mattia Gaboardi, Mauro Ricc , Chiara Milanese, Helen E. A. Brand and Neeraj Sharma	Graphene and Selected Derivatives as Negative Electrodes in Sodium- and Lithium-Ion Batteries	ChemElectroChem	2	600-610	10.1002/celec.201402352
2015	M. V. Reddy, Neeraj Sharma , Stefan Adams, R. Prasada Rao, Vanessa K. Peterson and B. V. R. Chowdari	Evaluation of undoped and M-doped TiO ₂ , where M = Sn, Fe, Ni/Nb, Zr, V, and Mn, for lithium-ion battery applications prepared by the molten-salt method	Royal Society of Chemistry	5	29535-29544	10.1039/C5RA00206K
2015	Wei Kong Pang, Sujith Kalluri, Vanessa K. Peterson, Neeraj Sharma , Justin Kimpton, Bert Johannessen, Hua Kun Liu, Shi Xue Dou, and Zaiping Guo	Interplay between Electrochemistry and Phase Evolution of the P2-type Na _x (Fe _{1/2} Mn _{1/2})O ₂ Cathode for Use in Sodium-Ion Batteries	Chemistry of Materials	77	3150-3158	10.1021/acs.chemmater.5b00943
2014	W. K. Pang, N. Sharma , V. K. Peterson, J.-J. Shiu, S.-H. Wu	In-situ neutron diffraction study of the simultaneous structural evolution of a LiNi _{0.5} Mn _{1.5} O ₄ cathode and a Li ₄ Ti ₅ O ₁₂ anode in a LiNi _{0.5} Mn _{1.5} O ₄ Li ₄ Ti ₅ O ₁₂ full cell	Journal of Power Sources	246	464-472	10.1016/j.jpowsour.2013.07.114
2014	J. Rana, S. Glatthaar, H. Gesswein, N. Sharma , J. R. Binder, R. Chemikov, G. Schumacher, J. Banhart	Local structural changes in LiMn _{1.5} Ni _{0.5} O ₄ spinel cathode material for lithium-ion batteries	Journal of Power Sources	255	439-449	10.1016/j.jpowsour.2014.01.037
2014	W. K. Pang, V. K. Peterson, N. Sharma , C. Zhang, Z. Guo	Evidence of Solid-Solution Reaction upon Lithium Insertion into Cryptomelane K _{0.25} Mn ₂ O ₄ Material	Journal of Physical Chemistry C	118	3976-3983	10.1021/jp411687n

Year	Author(s)	Title of Paper	Journal	Vol	Pages	DOI / HTML
2014	R. Aughterson, G. Lumpkin, M. de los Reyes, N. Sharma , C. D. Ling, G. Thorogood, B. Gault, K. Smith, M. Avdeev, J. Cairney	Crystal structures of orthorhombic, hexagonal, and cubic compounds of the $\text{Sm}_{1-x}\text{Yb}_{2-x}\text{TiO}_5$ series	Journal of Solid State Chemistry	213	182-192	10.1016/j.jssc.2014.02.029
2014	W. K. Pang, V. K. Peterson, N. Sharma , J.-J. Shiu, S.-H. Wu	Lithium Migration in $\text{Li}_4\text{Ti}_5\text{O}_{12}$ Studied Using in Situ Neutron Powder Diffraction	Chemistry of Materials	26	2318-2326	10.1021/cm5002779
2014	P. Serras, V. Palomares, T. Rojo, H. E. A. Brand, N. Sharma	Structural evolution of high energy density $\text{V}^{3+}/\text{V}^{4+}$ mixed valent $\text{Na}_3\text{V}_2\text{O}_x(\text{PO}_4)_{2-x}$ ($x = 0.8$) sodium vanadium fluorophosphate using <i>in situ</i> synchrotron X-ray powder diffraction	Journal of Materials Chemistry A	2	7766-7779	10.1039/C4TA00773E
2014	N. Sharma , Paula Serras, Veronica Palomares, Helen E. A. Brand, Javier Alonso, Pierre Kubiak, Maria L. Fdez-Gubieda, Teófilo Rojo	Sodium Distribution and Reaction Mechanisms of a $\text{Na}_3\text{V}_2\text{O}_7(\text{PO}_4)_2\text{F}$ Electrode during Use in a Sodium-Ion Battery	Chemistry of Materials	26	3391-3402	10.1021/cm5005104
2014	N. Sharma	<i>In situ</i> experimentation with batteries using neutron and synchrotron X-ray diffraction	Ceramics for Environmental and Energy Applications II: Ceramic Transaction	246	167-179	10.1002/9781118771327.ch18
2014	W. K. Pang, V. K. Peterson, N. Sharma , J.-J. Shiu, S.-H. Wu	Structure of the $\text{Li}_4\text{Ti}_5\text{O}_{12}$ Anode during Charge-Discharge Cycling	Powder Diffraction	29	S59-S63	10.1017/S0885715614001067
2014	M. Alam, T. Hanley, W. K. Pang, V. K. Peterson, N. Sharma	Comparison of the so-called CGR and NCR cathodes in commercial lithium-ion batteries using <i>in-situ</i> neutron powder diffraction	Powder Diffraction	29	S35-S39	10.1017/S088571561400102X
2014	J. C. Pramudita, S. Schmid, T. Godfrey, T. Whittle, M. Alam, T. Hanley, H. E. A. Brand, N. Sharma	Sodium uptake in cell construction and subsequent <i>in operando</i> electrode behaviour of Prussian blue analogues, $\text{Fe}[\text{Fe}(\text{CN})_6]_{1-x}\cdot y\text{H}_2\text{O}$ and $\text{FeCo}(\text{CN})_6$	Physical Chemistry Chemical Physics	16	24178-24187	10.1039/c4cp02676d
2014	G. Du, B. R. Winton, I. M. Hashim, N. Sharma , K. Konstantinov, M. V. Reddy, Z. Guo	Mass production of $\text{Li}_4\text{Ti}_5\text{O}_{12}$ with a conductive network <i>via in situ</i> spray pyrolysis as a long cycle life, high rate anode material for lithium ion batteries	RSC Advances	4	38568-38574	10.1039/C4RA05178E
2015	J. C. Pramudita, R. Aughterson, W. M. Dose, S. W. Donne, H. E. A. Brand, N. Sharma	Using in situ synchrotron X-ray diffraction to study lithium- and sodium-ion batteries: A case study with an unconventional battery electrode, Gd_2TiO_5	Journal of Materials Research	30	381-389	10.1557/jmr.2014.311
2015	R.P. Rao, W. Gu, N. Sharma , V.K. Peterson, M. Avdeev, S. Adams	<i>In situ</i> Neutron Diffraction Monitoring of $\text{Li}_7\text{La}_3\text{Zr}_2\text{O}_{12}$ formation: Towards a Rational Synthesis of Garnet Solid Electrolytes	Chemistry of Materials	27	2903-2910	10.1021/acs.chemmater.5b00149
2015	W. K. Pang, S. Kalluri, V. K. Peterson, N. Sharma, J. Kimpton, B. Johannessen, H. K. Liu, S. X. Dou, Z. P. Guo	Interplay between electrochemistry and phase evolution of the P2-type $\text{Na}_x(\text{Fe}_{1/2}\text{Mn}_{1/2})\text{O}_2$ cathode for use in sodium-ion batteries	Chemistry of Materials	27	3150-3158	10.1021/acs.chemmater.5b00943
2015	R. Petibon, Jing Li, Neeraj Sharma , Wei Kong Pang, Vanessa K. Peterson and J.R. Dahna	The use of deuterated ethyl acetate in highly concentrated electrolyte as a low-cost solvent for <i>in situ</i> neutron diffraction measurements of Li-ion battery electrodes	Electrochimica Acta	174	417-423	10.1016/j.electacta.2015.05.169
2015	Neeraj Sharma , Wei Kong Pang, Zaiping Guo, and Vanessa K. Peterson	<i>In Situ</i> Powder Diffraction Studies of Electrode Materials in Rechargeable Batteries	ChemSusChem	8	2826-2853	10.1002/cssc.201500152

Year	Author(s)	Title of Paper	Journal	Vol	Pages	DOI / HTML
2015	Jing Li, Remi Petibon, Stephen Glazier, Neeraj Sharma , Wei Kong Pang, Vanessa K. Peterson, J.R. Dahn	<i>In-situ</i> Neutron Diffraction Study of a High Voltage Li (Ni _{0.42} Mn _{0.42} Co _{0.16})O ₂ /Graphite Pouch Cell	Electrochimica Acta	180	234-240	10.1016/j.electacta.2015.08.122
2015	Irin Sultana, Md Mokhlesur Rahman, Thrinathreddy Ramireddy, Neeraj Sharma , Debasis Poddar, Abbas Khalid, Hongzhou Zhang, Ying Chen, and Alexey M. Glushenkov	Understanding Structure-Function Relationship in Hybrid Co ₃ O ₄ -Fe ₂ O ₃ /C Lithium-Ion Battery Electrodes	American Chemical Society Applied Materials and Interfaces	7	20736-20744	10.1021/acsami.5b05658
2015	Neeraj Sharma , Elena Gonzalo, James C. Pramudita, Man Huon Han, Helen E. A. Brand, Judy N. Hart, Wei Kong Pang, Zaiping Guo, Teófilo Rojo	The Unique Structural Evolution of the O3-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	4994-5005	10.1002/adfm.201501655
2015	V. Palomares, P. Serras, H. E. A. Brand, T. Rojo and N. Sharma	Structural evolution of mixed valent (V ³⁺ /V ⁴⁺) and V ⁴⁺ sodium vanadium fluorophosphates as cathodes in sodium-ion batteries: comparisons, overcharging and mid-term cycling	Journal of Materials Chemistry A	3	23017-23027	10.1039/C5TA03780H
2015	Neeraj Sharma , Nuria Tapia-Ruiz, Gurpreet Singh, A. Robert Armstrong, James C. Pramudita, Helen E. A. Brand, Juliette Billaud, Peter G. Bruce, and Teófilo Rojo	Rate Dependent Performance Related to Crystal Structure Evolution of Na _{0.67} Mn _{0.8} Mg _{0.2} O ₂ in a Sodium-Ion Battery	Chemistry of Materials	27	6976-6986	10.1021/acs.chemmater.5b02142
2015	S. Hu , J. Seidel, Z. Yue, X. Wang, J. S. Lim, C.-H. Yang, S. J. Callori, J. Bertinshaw, C. Ulrich, A. Ikeda-Ohno and T. Ohkochi	Growth and Properties of Fully Strained SrCoO _x (x ≈ 2.8) Thin Films on DyScO ₃	Advanced Materials Interfaces	2		10.1002/admi.201500012
2015	S. J. Callori, J. Bertinshaw, C. Ulrich, S. Hu , J. Seidel, V. Nagarajan, Z. Yue, X. Wang, S. Danilkin and F. Klose	Strain-induced magnetic phase transition in SrCoO _{3-δ} thin films	Physical Review B	91	140405-1-140405-5	10.1103/PhysRevB.91.140405
2015	W.D. Hutchison, G.A. Stewart , J.M. Cadogan	The magnetic ground state of Dy ³⁺ in DyNiAl ₄	Proceedings of the 39th Annual Condensed Matter & Materials Meeting, Wagga Wagga, Australia, 3 - 6 February, 2015			ISBN 978-0-646-59459-0
2015	S. J. Callori, S. Hu, J. Bertinshaw, Z. Yue, S. Danilkin, X. L. Wang, V. Nagarajan, F. Klose, J. Seidel, and C. Ulrich	Strain-induced magnetic phase transition in SrCoO _{3-δ} thin films	Physical Review B Rapid Communications	91		10.1103/PhysRevB.91.140405
2015	Andrew J. Clulow , Elliot P. Gilbert, Pascal Wolfer, Paul L. Burn, and Ian R. Gentle	Clustering of High Molecular Weight PCDTBT in Bulk-Heterojunction Casting Solutions	Macromolecules	48	8331-8336	10.1021/acs.macromol.5b02040
2015	Guia Morelli , Massimo Gasparon	Depositional variability of estuarine intertidal sediments and implications for metal distribution: an example from Moreton Bay (Australia)	Continental Shelf Research	108	41-54	10.1016/j.csr.2015.07.017
2015	Patrick Moss , Lydia Mackenzie, Sean Ulm, Craig Sloss, Daniel Rosendahl, Lynda Petherick, Lincoln Steinberger, Lynley Wallis, Henk Heijnis, Fiona Petchey and Geraldine Jacobsen	Environmental context for late Holocene human occupation of the South Wellesley Archipelago, Gulf of Carpentaria, northern Australia	Quaternary International	385	136-144	10.1016/j.quaint.2015.02.051

The University of Queensland

	Year	Author(s)	Title of Paper	Journal	Vol	Pages	DOI / HTML
	2015	Gilbert J. Price , Julien Louys, Jonathan Cramb, Yue-xing Feng, Jian-xin Zhao, Scott A. Hocknull, Gregory E. Webb, Ai Duc Nguyen, Renaud Joannes-Boyau	Temporal overlap of humans and giant lizards (Varanidae; Squamata) in Pleistocene Australia	Quaternary Science Reviews	125	98-105	10.1016/j.quascir.2015.08.013
	2015	Wright, D.K., Thompson, J.C. , Choi, J.-H., Schilt, F., Bravo Foster, M., Fink, D., Nightingale, S.N., Heimsath, A., Arrowsmith, R., Cohen, A., and Gomani-Chindebvu, E	Alluvial fan sedimentation and Late Pleistocene climate change in the northern Malawi Rift: context and evidence for Middle Stone Age demographic change	Paleoanthropology Society conference, 14-15 April 2015, San Francisco, California, USA.			
	2015	Nightingale, S., Bravo Foster, M., Thompson, J.C. , Choi, J.-H., Wright, D.K., Schilt, F., Welling, M., and Gomani-Chindebvu, E.	Spatial and chronological components of Middle Stone Age artifact assemblage variability in deeply buried alluvial fan contexts	80th annual Society for American Archaeology conference, 15-19 April 2015, San Francisco, California, USA.			
	2015	Quan Hua, Gregory E. Webb , Jian-xin Zhao, Luke D. Nothdurft, Matthew Lybolt, Gilbert J. Price, Bradley N. Opdyke	Large variations in the Holocene marine radiocarbon reservoir effect reflect ocean circulation and climatic changes	Earth and Planetary Science Letters	422	33-44	10.1016/j.epsl.2015.03.049
	2014	Woodward C. , Shulmeister J., Zawadzki A., Jacobsen G	Major Disturbance to aquatic ecosystems in the South Island, New Zealand following human settlement in the late Holocene	The Holocene	24	668-678	10.1177/0959683614526935
	2014	Woodward C. , Shulmeister J., Larsen J., Jacobsen G. Zawadzki A	The hydrological legacy of deforestation on global wetlands	Science	346	844-847	10.1126/science.1260510
Queensland University of Technology	2015	Clément Duvert , Dioni I. Cendón, Matthias Raiber, Jean-Luc Seidel and Malcolm E. Cox	Seasonal and spatial variations in rare earth elements to identify inter-aquifer linkages and recharge processes in an Australian catchment	Chemical Geology	396	83-97	10.1016/j.chemgeo.2014.12.022
	2015	A. C. King , M. Raiber, D. I. Cendón, M. E. Cox, and S. E. Hollins	Identifying flood recharge and inter-aquifer connectivity using multiple isotopes in subtropical Australia	Hydrology and Earth System Sciences	19	2315-2335	10.5194/hess-19-2315-2015
	2015	Glen J. Oberman , Troy W. Farrell	Modelling of the evaporation of a droplet suspended in a binary atmosphere	International Journal of Heat and Mass Transfer	92	381-393	10.1016/j.ijheatmasstransfer.2015.08.080
	2015	M. Raiber , J.A. Webb, D.I. Cendón, P.A. White and G.E. Jacobsen	Environmental isotopes meet 3D geological modelling: Conceptualising recharge and structurally-controlled aquifer connectivity in the basalt plains of south-western Victoria, Australia	Journal of Hydrology	527		10.1016/j.jhydrol.2015.04.053
RMIT University	2015	Ben Kent, Thomas Hauß, Bruno Demé, Viviana Cristiglio, Tamim Darwish, Taavi Hunt, Gary Bryant , and Christopher J. Garvey	Direct Comparison of Disaccharide Interaction with Lipid Membranes at Reduced Hydrations	Langmuir	31	9134-9141	10.1021/acs.langmuir.5b02127
Southern Cross University	2014	Renaud Joannes-Boyau	PIXE et obsidiennes: l'exemple du site Néolithique de Renaghju (Sartène, Corse-du-Sud)	IBAF (Ion Beam Analysis Francophone) conference in Obernai, France, 7th-10th October 2014			
	2015	Moon, E.M. , Bush, R.T., Mata, J.P.	The oxidative disintegration of greigite: Insights from XAS and SAXS	Oral presentation at Goldschmidt 2015, Prague, Czech Republic, 16-21 August			
Swinburne University of Technology		Duy Nguyen	Fabrication of nano- and micro-scale platforms to monitor bacterial metabolic activities	Honours Thesis			

	Year	Author(s)	Title of Paper	Journal	Vol	Pages	DOI / HTML
The University of Sydney	2015	J. E. Auckett, G. J. McIntyre, M. Avdeev, H. De Bruyn, T. T. Tan, S. Li and C. D. Ling	Neutron Laue diffraction study of the complex low-temperature magnetic behaviour of brownmillerite-type $\text{Ca}_2\text{Fe}_2\text{O}_5$	Journal of Applied Crystallography	48	273-279	10.1107/S1600576714027976
		Josie Auckett	Structural and physical studies of oxide ionic-conductive brownmillerite single crystals	PhD Thesis			
	2009	A.Y.G. Betts, V.N. Yagodin, S.W. Helms, G. Khozhaniyazov, S. Amirov and M. Negus-Clearyu	Karakalpak-Australian excavations in ancient chorasmlia, 2001–2005: interim report on the fortifications of kazakli'yatkan and regional survey	The British Institute of Persian Studies	47	33-55	http://www.jstor.org/stable/25651463
	2015	Mark J. Hackett, Jade B. Aitken, Fatima El-Assaad, James A. McQuillan, Elizabeth A. Carter, Helen J. Ball, Mark J. Tobin, David Paterson, Martin D. de Jonge, Rainer Siegele, David D. Cohen, Stefan Vogt, Georges E. Grau, Nicholas H. Hunt and Peter A. Lay	Mechanisms of murine cerebral malaria: Multimodal imaging of altered cerebral metabolism and protein oxidation at hemorrhage sites	Science Advances	1	e1500911	10.1126/sciadv.1500911
	2015	Daniel L. Harris, Jody M. Webster, Ana Vila-Concejo, Quan Hua, Yusuke Yokoyama and Paula J. Reimer	Late Holocene sea-level fall and turn-off of reef flat carbonate production: Rethinking bucket fill and coral reef growth models	Geology	43	175-178	10.1130/G35977.1
	2015	D.L. Harris, A. Vila-Concejo, J.M. Webster and H.E. Power	Spatial variations in wave transformation and sediment entrainment on a coral reef sand apron	Marine Geology	363	220-229	10.1016/j.margeo.2015.02.010
	2015	Bob Hudson	Five new radiocarbon dates from Myanmar. AINSE grant 15012, Run 436, via the University of Sydney from the Australian Institute of Nuclear Science and Engineering, processed at ANSTO, the Australian Nuclear Science and Technology Organisation	A report to the Myanmar Department of Archaeology & Ministry of Culture			http://www.academia.edu/12984564/Hudson_Bob_2015_Five_new_radiocarbon_dates_from_Myanmar
	2015	Haihui Joy Jiang	Amphiphilic Self-assembly in Protic Ionic Liquids and Their Mixtures	Honours Thesis			
	2014	Polkinghorne, M., Vincent, B., Thomas, N. and Bourgarit, D	Casting for the Court: The Royal Palace Bronze workshop of Angkor Thom	Bulletin l'École Française d'Extrême-Orient (BEFEO)	100		
	2015	Jim Specht, Carol Lentfer, Chris Gosden, Geraldine Jacobsen and Sue Lindsay	Pre-Lapita decorated wood from Apalo, West New Britain, Papua New Guinea	Archeology in Oceania	50	105-110	10.1002/arco.5057
2015	J. Wind, J. E. Auckett, R. L. Withers, R. O. Piltz, A. Majjuk and C. D. Ling	Type II $\text{Bi}_{1-x}\text{W}_x\text{O}_{1.5+1.5x}$: a (3 + 3)-dimensional commensurate modulation that stabilizes the fast-ion conducting delta phase of bismuth oxide	Acta Crystallographica Section B	B71	679-687	10.1107/S2052520615018351	
The University of Tasmania	2015	Cédric Haverkamp, Lynda D. Prior, Bruno Fogliani, Laurent L'Huillier, Marion Anquez, Quan Hua, David M.J.S. Bowman	Effect of landscape fires on the demography of the endangered New Caledonian conifer <i>Callitris sulcata</i>	Biological Conservation	191	130-138	10.1016/j.biocon.2015.06.012
	2015	Zanna Chase, Axel Durand, Priya Kitchener, Taryn Noble, Antoni Rosell-Melé, Xavier Ruiz, Ashley Townsend.	Dust deposition to the South West Pacific ocean over the last glacial-interglacial transition.	Abstract presented at Goldschmidt 2015, Prague.			
	2015	Alexander J. Ferry, Xavier Crosta, Patrick G. Quilty, David Fink, William Howard, Leanne K. Armand	First records of winter sea ice concentration in the southwest Pacific sector of the Southern Ocean	Paleoceanography	30	1525-1539	10.1002/2014PA002764

	Year	Author(s)	Title of Paper	Journal	Vol	Pages	DOI / HTML
The University of South Australia	2015	Jasmin L. Whittaker, Naba K. Dutta, Robert Knott, Gordon McPhee, Nico Voelcker, Chris Elvin, Anita Hill, Namita Roy Choudhury	Tuneable Thermo-responsiveness of Resilin via Co-assembly with Rigid Biopolymers	Langmuir	31	8882-8891	10.1021/acs.langmuir.5b01014
	2015	Rajkamal Balu, Robert Knott, Nathan P. Cowieson, Christopher M. Elvin, Anita J. Hill, Namita R. Choudhury & Naba K. Dutta	Structural ensembles reveal intrinsic disorder for the multistimuli responsive bio-mimetic protein Rec1-resilin	Scientific Reports	5	10896	10.1038/srep10896
	2015	Mohsin Shaikh, Namita Roy Choudhury, Robert Knott and Sanjay Garg	Engineering Stent Based Delivery System for Esophageal Cancer Using Docetaxel	Molecular Pharmaceutics	12	2305-2317	10.1021/mp500851u
University of Southern Queensland	2015	Cottrill, D.A.; Ribbe, J. , Maron, M., and Jacobson, G.	A Palaeoclimatic Rainfall History from Lake Broadwater, Southeast Queensland, Australia.	Proceedings of the Royal Society of Queensland	119	35-43	
University of Technology Sydney	2015	Hossain K. , Holt SA, Al khamici H, Valenzuela S.	Elucidating the Mechanism for Sterol Regulation of Chloride Intracellular Ion Channel Protein Interactions with Lipid Membranes	2nd Asia-Oceania Conference on Neutron Scattering, 19-23 July 2015, Sydney, Australia			
	2015	Peter I. Macreadie , Timothy C. Rolph, Claudia Schröder-Adams, Ron Boyd and Charles G. Skilbeck	Holocene record of Tuggerah Lake estuary development on the Australian east coast: Sedimentary responses to sea-level fluctuations and climate variability	GeoResJ	5	57-73	10.1016/j.grj.2015.01.002
	2015	Jeffrey J. Kelleway, Neil Saintilan, Peter I. Macreadie , Charles G. Skilbeck, Atun Zawadzki, Peter J. Ralph	Seventy years of continuous encroachment substantially increases 'blue carbon' capacity as mangroves replace intertidal salt marshes	Global Change Biology			10.1111/gcb.13158
	2015	Meissner, Katrin; Abram, Nerilie; Armand, Leanne; Chase, Zanna; De Deckker, Patrick; Ellwood, Michael; Exon, Neville; Gagan, Michael; Goodwin, Ian; Howard, Will; Lough, Janice; McCulloch, Malcolm; McGregor, Helen; Moy, Andrew; O'Leary, Mick; Phipps, Steven; Skilbeck, Greg ; Webster, Jody; Welsh, Kevin and Zinke, Jens.	Dealing with climate change: Palaeoclimate research in Australia	Quaternary Australasia	32	19-24	<http://search.informit.com.au/documentSummary;dn=347210916841030;res=IELHSS>
	2015	Heba Al Khamici, Louise J. Brown, Khondker R. Hossain, Amanda L. Hudson, Alxcia A. Sinclair-Burton, Jane Phui Mun Ng, Elizabeth L. Daniel, Joanna E. Hare, Bruce A. Cornell, Paul M. G. Curmi, Mary W. Davey and Stella M. Valenzuela	Members of the Chloride Intracellular Ion Channel Protein Family Demonstrate Glutaredoxin-Like Enzymatic Activity	PLOS one	10		10.1371/journal.pone.0115699
The University of Western Australia	2015	Sven S. Kampmann, Brian W. Skelton, George C. Yeoh, Lawrence J. Abraham, Nigel A. Lengkeek, Keith A. Stubbs, Charles H. Heath, Scott G. Stewart	The synthesis and fluorescence profile of novel thalidomide analogues	Tetrahedron	71	8140-8149	10.1016/j.tet.2015.08.036
Western Sydney University	2015	Daniel J. Fanna, Yingjie Zhang, Li Li, Inna Karatchevitseva, Nicholas D. Shepherd , Abdul Azim, Jason R. Price, Janice Aldrich-Wright, Jason K. Reynolds and Feng Li	3d transition metal complexes with a julolidine-quinoline based ligand: structures, spectroscopy and optical properties†	Inorganic Chemistry Frontiers			10.1039/C5QI00200A

	Year	Author(s)	Title of Paper	Journal	Vol	Pages	DOI / HTML
University of Wollongong	2009	Angel, Brad	Trace metal behaviour in an industrialised estuarine system and the toxicity of pulsed copper exposures	PhD Thesis			http://ro.uow.edu.au/theses/798/
	2015	Brent Koppel, Katherine Szabó, Mark W. Moore and Michael J. Morwood	Untangling time-averaging in shell middens: Defining temporal units using amino acid racemisation	Journal of Archaeological Science			10.1016/j.jasrep.2015.08.040
	2015	Helen V. McGregor, Michael N. Evans, Hugues Goosse, Guillaume Leduc, Belen Martrat, Jason A. Addison, P. Graham Mortyn, Delia W. Oppo, Marit-Solveig Seidenkrantz, Marie-Alexandrine Sicre, Steven J. Phipps, Kandasamy Selvaraj, Kaustubh Thirumalai, Helena L. Filipsson and Vasile Ersek	Robust global ocean cooling trend for the pre-industrial Common Era	Nature Geoscience	8	671-677	10.1038/NGEO2510
	2015	M. Petasecca, S. Alhujaili, A. H. Aldosari, I. Fuduli, M. Newall, C. S. Porumb, M. Carolan, K. Nitschke, M. L. F. Lerch, J. Kalliopuska, V. Perevertaylo and A. B. Rosenfeld	Angular independent silicon detector for dosimetry in external beam radiotherapy	Medical Physics	42	4708	10.1118/1.4926778
	2015	M. Shahbazi, X.L.Wang, S.R.Ghorbani, S.X.Dou, C.T.Lin	Thermally activated flux flow in Fe _{1.06} Te _{0.6} Se _{0.4} single crystal	PhysicaC: Superconductivity and its applications	519	60-64	10.1016/j.physc.2015.08.006
	2015	Brent Koppel, Katherine Szabó, Mark W. Moore, Michael J. Morwood	Isolating downward displacement: The solutions and challenges of amino acid racemisation in shell midden archaeology	Quaternary International			10.1016/j.quaint.2015.09.052
	2015	Sianne Oktaria, Stéphanie Corde, Michael L F Lerch, Konstantin Konstantinov, Anatoly B Rosenfeld and Moeava Tehei	Indirect radio-chemo-beta therapy: a targeted approach to increase biological efficiency of x-rays based on energy	Physics in Medicine & Biology	60	7847–7859	10.1088/0031-9155/60/20/7847
ISIS	2015	Anton P. Le Brun, Luke A. Clifton, Stephen A. Holt, Peter J. Holden, Jeremy H. Lakey	Deuterium Labeling Strategies for Creating Contrast in Structure-Function Studies of Model Bacterial Outer Membranes Using Neutron Reflectometry	Methods in Enzymology			10.1016/bs.mie.2015.05.020

Member Codes

ACU	Australian Catholic University	MON	Monash University
ADE	The University of Adelaide	MUR	Murdoch University
AKL	The University of Auckland	NCT	The University of Newcastle
ANS	ANSTO	NSW	The University of New South Wales
ANU	The Australian National University	OTA	University of Otago
CAN	University of Canterbury	QLD	The University of Queensland
CBR	University of Canberra	QUT	Queensland University of Technology
CDU	Charles Darwin University	RMI	RMIT University
CQU	CQUniversity	SCU	Southern Cross University
CSU	Charles Sturt University	SYN	Australian Synchrotron
CSI	CSIRO	SYD	The University of Sydney
CUR	Curtin University of Technology	SWI	Swinburne University of Technology
DEA	Deakin University	TAS	University of Tasmania
ECU	Edith Cowan University	USA	University of South Australia
FED	Federation University	USC	University of the Sunshine Coast
FLI	Flinders University	USQ	University of Southern Queensland
GNS	GNS Science	UNE	The University of New England
GRI	Griffith University	UTS	University of Technology, Sydney
JAM	James Cook University	UWA	The University of Western Australia
LAT	La Trobe University	UWS	Western Sydney University
MAC	Macquarie University	VUW	Victoria University of Wellington
MAS	Massey University	WAI	The University of Waikato
MEL	The University of Melbourne		

Specialist Areas

AGS	Archaeology and Geosciences
BBS	Biotechnology and Biomedical Sciences
ENV	Environmental Science
MPE	Materials - Properties and Engineering
MSD	Materials - Structures and Dynamics
MSE	Materials Science and Engineering (the two materials committees were consolidated into one materials group in late 2015)

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