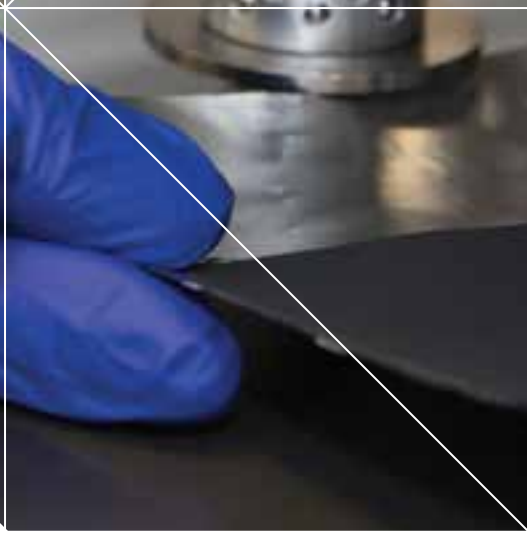
INSTITUTE FOR FRONTIER MATERIALS

ANNUAL REPORT | 2016







IFM
INSTITUTE FOR FRONTIER MATERIALS

DEAKIN UNIVERSITY

Geelong & Melbourne | Victoria | Australia

YEAR AT A GLANCE

166
HDR students

28
countries - our students come from

$7.4m
ARC Training Centre

334
scientific journal papers published

36
PhD completions

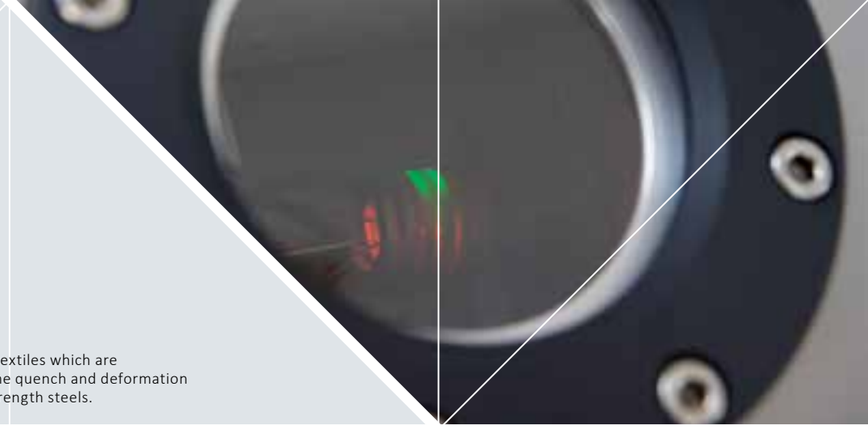
$13.7m
research income

165
employees, including 117 researchers

Below: Dr Christopher Hurren and industry partner Nathan Edwards, Draggin Jeans; researchers in the BatTRI-Hub; sample for scanning electron microscope.

IFM
INSTITUTE FOR FRONTIER MATERIALS

CONTENTS



Left: IFM researchers are creating smart textiles which are super-repellent to water and oil. **Right:** The quench and deformation dilatometer - used to characterise high strength steels.

CHAIR'S REPORT

Once again, IFM researchers celebrated many achievements in 2016. Personally, I was delighted with the successful bid for an ARC Industrial Transformation Training Centre. The ARC Training Centre in Alloy Innovation for Mining Efficiency, to be led by Prof Matthew Barnett, will be Deakin's first such centre, working on innovative research for the mining sector and providing an important training ground for new researchers.

Deakin restructured its research this year with the creation of two new research institutes – the Institute for Physical Activity and Nutrition (IPAN); and the Institute for Intelligent Systems Research and Innovation (IISRI). While this restructure may create greater competition for internal funding, I hope it will also open up greater opportunities for collaboration and cross fertilisation of ideas between researchers in different institutes.

In 2016, work began on Manufutures – a new high tech manufacturing hub in Geelong – with significant investment from the University and about six companies now co-located on the Geelong Waurn Ponds Campus. The facility provides companies and entrepreneurs with ready access to Deakin's research infrastructure and many IFM researchers will be involved with companies and projects in this hub.

IFM researchers in the energy space continue to play a leading role, with the establishment of the new BatTRI-Hub, a collaborative venture with CSIRO, which is advancing our knowledge and partnering with industry in the very topical area of energy storage.

Deakin's standing in international world rankings continues to rise. In 2016 we entered the top 300 in both the Academic Ranking of World Universities and the Times Higher Education rankings for the first time, reflecting our commitment to cutting edge research and academic excellence. Meanwhile, the Australian government (and governments around the world) are looking for more tangible impacts from the research they fund. Our researchers must recognise this challenge and continue to pursue excellence while also focusing on the translation of their research.

An area of particular focus and success for Deakin is connecting researchers with SMEs, we have a successful program for engaging with Geelong business and are working to extend the program to other regional hubs in Victoria.

We are also working to improve our international research visibility and impact. A major emphasis of the University research plan is our ability to forge strong collaborations and partnerships while maintaining our very high ambitions for exploratory and discovery research.

Professor Peter Hodgson

Deputy Vice-Chancellor Research
Chair, IFM Board

IFM plays an important role in the University's research plan 'to deliver and translate high quality research and research training outcomes that are relevant and meaningful to improving the future of our communities'.

IFM has also played a leading role in the implementation of the PhDXtra plan across the University and I commend the HDR team for their work.

In conclusion, I am proud of the achievements of the IFM team this year and I look forward to their continued contribution to research which will help address the world's major challenges.

★★★★★

TOP 300

in world university rankings for Deakin

DIRECTOR'S REPORT

Overall, IFM had an exciting year in 2016, with strong industry engagement, excellent HDR training and many research highlights. In October, the Member for Corangamite, the Hon Sarah Henderson and ARC CEO Ms Leanne Harvey officially launched the ARC Future Fibres Hub with many of our industry partners present.

Major renovation works in our electromaterials laboratories at Burwood were completed and the group also moved into a new office space.

The new Battery Innovation Hub (BatTRI-Hub) began operations, in collaboration with CSIRO. The centre focuses on advanced battery prototyping and the commercialisation of energy storage technologies. A key goal of the hub is to help leverage opportunities for industries across the whole energy value chain. It will allow us to scale up our lab-based research and work with new industry partners, as well as extending existing relationships. The hub is a first step in the expected development of a full pilot scale facilty for producing batteries in Geelong.

Our metals research received a major boost with the announcement of the ARC Industrial Transformation Training Centre in Alloy Innovation for Mining Efficiency to be led by Prof Matthew Barnett. The centre, with funding of $7.4m over five years, will officially begin operations in 2017, once all the agreements are signed.

Two teams were also successful in the ARC Discovery round: A/Prof Jenny Pringle will lead a project on 'Increasing solid electrolyte conductivity through defect design and A/Prof Joe Razal heads a project on 'Understanding the true potential and limitations of novel fibres.

Our researchers received a number of awards and other recognition during the year. Significant among them, Prof Tong Lin received the International Association of Advanced Materials (IAAM) medal for his contribution in the field of advanced materials science and technology; Dr Shayan Seyedin received the IAAM Young Scientist Medal and Prof Maria Forsyth received the Galileo Galilei award for her contributions to the understanding of ion-conducting materials. Two IFM researchers, Dr Haijin Zhu and Ms Azam Oroumei, were awarded Endeavour Fellowships for 2017.

IFM hosted a number of international conferences during the year, including the 3rd Sodium Battery Conference, the Gaseous Electronics Meeting (GEM 2016) and the ACES Electromaterials Symposium.

LAUNCH

of ARC Future Fibres Hub

Professor Xungai Wang

Alfred Deakin Professor
Director, IFM

INTERNATIONAL ACTIVITIES

Development of IFM strategic international partnerships has led to the establishment of significant academic and research programs with leading international institutions which will facilitate sustained international collaboration.

NEW PROJECTS

We have welcomed the first group of five joint Deakin-WTU (Wuhan Textile University) PhD students who are undertaking their first year at IFM while the second group of five are being interviewed and will join us in 2017. We also commenced the Deakin-IIT Madras joint PhD program in materials engineering with some of the 18 students arriving in Geelong. IFM has also been the theme leader on membranes in the TERI-Deakin Nanobiotechnology Centre which will house more than 50 Deakin PhD research students.

Funded by the German Research Foundation, a group of 10 PhD students and their supervisor, Dr Enrico Bruder, from the Technical University Darmstadt, visited IFM for two weeks in March and 10 IFM metals group students and research fellows made an exchange visit to Darmstadt Technical University in June for two weeks (see page 13).

The visits signalled the beginning of a relationship that will extend Deakin and Darmstadt students' understanding of steel roll forming and advanced manufacturing, embed intercultural experience, and lead to long-term collaboration between both universities.

RESEARCH PROGRAMS

In collaboration with leading international strategic partners, IFM secured a number of significant research grants in different theme areas. A few of these are listed below and others are described in the following pages of this report.

Supported by DFAT-Australia India Strategic Research Foundation with a grant of almost $1 million, Prof Maria Forsyth, A/Prof Patrick Howlett and Prof Ian Chen, together with colleagues at Monash University, the Indian Institute of Science, Bangalore (IISc) and the Indian Institute of Technology, Bombay (IIT-B) will work on a project to increase the potential of renewable energy with the development of improved energy storage solutions.

Led by IFM researchers Dr Matthias Weiss, Dr Ilana Timokhina, Prof Lingxue Kong and Prof Peter Hodgson, two new projects were commenced in 2016 within the Deakin-WISCO Centre for Automotive Steel Research and

Innovation (CASRI) on flexible roll forming of WISCO high strength steels ($220K over two years) and cluster strengthened steels ($280K over two years). These two projects will jointly develop next generation alloys through cluster strengthening and future metal forming process by introducing flexible roll forming.

Professor Jeong Yoon was awarded a new project from Hyundai Motor Company ($US180K over three years) to study a thermo-mechanical deformation model for hot rolling process.

A collaborative project began with RWTH Aachen University funded by the Australian-Germany Joint Research Cooperation Scheme. The IFM team of A/Prof Rimma Lapovok, Dr Ilana Timokhina and Dr Jiangting Wang are investigating 'Enhanced properties of TWIP steels by asymmetric rolling'.

Top left: Students from Darmstadt University at IFM with metals group researchers and students. **Top right:** Mr Muzaffar Siddique from the Bangladesh Garment Manufacturers & Exporters Association and IFM Director, Prof Xungai Wang. **Inset:** Director Deakin Research Commercial, Dr Ben Spincer signs a Memorandum of Understanding with Mr Gang Wang, Secretary General, R&D Centre, Wuhan Iron and Steel (Group) Corporation.

OUR VISION

To lead and inspire innovations in materials science and engineering that have a transformational benefit to society.

OUR MISSION

To foster innovation and excellence in materials science and engineering research with the aim of developing:

- **Innovative manufacturing technologies**
- **Energy efficiency, resource and infrastructure sustainability.**

We aspire to provide the highest quality research training and education to sustain the advancement of society.

IFM staff and students.

BOARD MEMBERS 2016

The IFM Board is responsible for the governance and oversight of the research, development and commercialisation activities of IFM.

PROFESSOR JANE DEN HOLLANDER
Vice-Chancellor

PROFESSOR PETER HODGSON
Chair and Deputy Vice-Chancellor Research

PROFESSOR BRENDAN CROTTY
Executive Dean, Faculty of Health

PROFESSOR TREVOR DAY
Executive Dean, Faculty of Science Engineering & Built Environment

PROFESSOR XUNGAI WANG
Director IFM

PROFESSOR MARIA FORSYTH
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PROFESSOR LEE ASTHEIMER
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PROFESSOR GORDON WALLACE
External Independent Director

DR LEONIE WALSH
External Independent Director

MR DAVID MARINO
External Independent Director

MR DEREK BUCKMASTER
Director Carbon Nexus

DR BEN SPINCER
Director Deakin Research Commercial

IFM EXECUTIVE TEAM

PROFESSOR XUNGAI WANG
Alfred Deakin Professor, Director IFM

PROFESSOR MARIA FORSYTH
Australian Laureate Fellow, Deputy Director IFM

PROFESSOR PETER HODGSON
Deputy Vice Chancellor Research

PROFESSOR MATTHEW BARNETT
Alfred Deakin Professor and ARC Future Fellow

PROFESSOR LINGXUE KONG
Professor (Research)

PROFESSOR IAN (YING) CHEN
Chair Nanotechnology

PROFESSOR RUSSELL VARLEY
Professor of Composite Materials

MR DEREK BUCKMASTER
Director Carbon Nexus

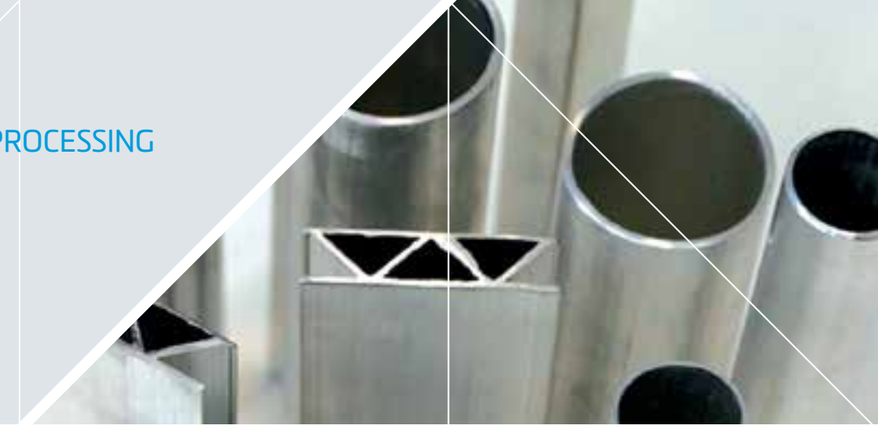
MS VIRGINIE HOAREAU
General Manager IFM

MRS DARLENE BARNETT
Senior Manager, Technical and Academic Support IFM

DR BREE GORMAN-HOLZ
Research Manager IFM

KEY RESEARCH AREAS

- > Alloy design and processing
- > Biomaterials and biomimicry
- > Corrosion and protection
- > Materials and process modelling
- > Fibres, polymers, composites and textiles
- > Electromaterials and membranes
- > Nanotechnology and plasma technology



ALLOY DESIGN AND PROCESSING

METALS

Metals research at IFM focuses on the next generation of automotive steels and light alloys, novel manufacturing and forming techniques, and new surface technologies.

NEW PROJECTS

- A collaborative project began with RWTH Aachen University funded by the Australian-Germany Joint Research Cooperation Scheme. The IFM team of A/Prof Rimma Lapovok, Dr Ilana Timokhina and Dr Jiangting Wang are investigating 'Enhanced properties of TWIP steels by asymmetric rolling'.
- A/Prof Rimma Lapovok received a grant of $110K from the US Airforce for a two-year project on 'Shear induced solid-state joining of dissimilar titanium alloys'. The work will investigate the joining of dissimilar titanium alloys using asymmetric rolling, for many aerospace applications.
- Following a visit by WISCO general manager Mr Jixin Zou and other senior WISCO staff, two new projects were signed. A project on flexible roll forming of high strength steels will be led by Dr Matthias Weiss ($200K over two years) and another on cluster strengthened steels will be led by Dr Ilana Timokhina ($280K over two years).
- Dr Daniel Fabijanic is leading two new Innovation Connections projects; the first project with a West Australian company, Callidus Pty Ltd is focused on novel surface modifications of titanium; the second project with FMP Bendix Pty Ltd aims to develop new copper-free brake materials.
- A collaborative project with DSTO ($30K) on 'Recycling of Titanium-machined swarf to form high-quality powder for additive manufacturing' led by A/Prof Rimma Lapovok and Dr Ilana Timokhina.

GRANTS AND AWARDS

A major announcement was our successful bid for an ARC Industrial Transformation Training Centre in Alloy Innovation for Mining Efficiency (MineAlloy). The centre, with funding of $4.8 million from the ARC, will be led by Professor Matthew Barnett, train 14 PhD students and provide work for five postdoctoral research fellows over its five-year duration.

The industry partners are Keech Castings Australia, Gekko Systems, Weir Minerals, IXL Metal Castings, Cast Bonding Australia, Hycast Metals, Trelleborg Engineered Systems and Newcrest Mining. The other chief investigators are Prof Ming-Xing and Dr Jeffrey Gates from the University of Queensland, Prof Christopher Hutchinson from Monash University, and Dr Daniel Fabijanic and Prof Peter Hodgson from Deakin.

IFM researchers will also play a key role in another ARC Training Centre: Prof Matthew Barnett, A/Prof Bernard Rolfe, Dr Minoo Naebe, Dr Luke Henderson and Dr Matthias Weiss are all part of the ARC Training Centre in Lightweight Automotive Structures, led by RMIT and involving a number of industry partners including Ford Australia, Australian Rollforming Manufacturers and Quickstep.

The centre will develop new lightweight materials, advanced manufacturing processes, energy storage designs and rapid non-destructive evaluation techniques.

Top: A range of extruded profiles.
Right: Prof Matthew Barnett (far right) at the announcement of the ARC Training Centre. *Credit: Australian Research Council.*

- Prof Hodgson and Dr Thomas Dorin were successful in their ARC Linkage project to develop novel, high-performance aluminium alloys containing scandium with partners Monash University, Clean Teq Ltd and Universal Alloy Corporation. They receive ARC funding of $400K for the three-year project which aims to develop a new generation of aerospace aluminium alloys containing scandium.
- PhD student Nima Haghdadi received the 'Best student research award' at the Recrystallization and Grain Growth (REX & GG) conference, Pittsburgh, USA for his presentation on 'The effect of phase transformation path on the austenite-austenite CSL boundaries characteristics in duplex stainless steels'.
- Balaji Trichy Narayanaswamy won the Victorian International Education Awards International Student of the Year – Regional award and Andreas Kupke was a finalist in the same awards. The award, which includes a prize of $10K, recognises students studying outside of Melbourne who have demonstrated outstanding success both in and out of the classroom. Balaji also received a Deakin University 'Students helping students' award for his contribution to the Students helping students strategy.
- Students Lu Jiang and Nima Haghdadi received IFM student travel awards to work with IFM international collaborators. Lu Jiang spent one month at the Central Iron and Steel Research Institute (CISRI) in Beijing using their state-of-the-art thermodynamic databases for kinetic modelling of precipitation in steels in strip casting conditions. Nima spent three months at the Department of Mining and Materials Engineering, McGill University in Canada pursuing his PhD research in the field of steel deformation and phase transformation.
- PhD student Nima Haghdadi was awarded a bursary from the Australian Microscopy and Microanalysis Society (AMMS) to attend the society's conference in Melbourne. Nima presented a paper on 'Five parameter characterisation of austenite-ferrite interfaces'.

STUDENT COMPLETIONS

- Alireza Vahidgolpayegani – Biocompatible and biodegradable Mg/Mg composite foam for bone tissue engineering.
- Hussan Ramadan Faraj Zaid – The effect of Nb addition on the annealing behaviour of Fe-30Mn-TWIP steel.
- Jascha Marnette – The production of novel structures from high strength and ultrafine-grained sheet metal through roll forming.
- Dongmei Zhang – Effect of elemental metals an dstrontium coated surface on biocompatibility of titanium-based biomaterials.

- Balaji Trichy Narayanaswamy – Study on microstructure characteristics of steel in two-body abrasive wear.
- Jithin Joseph – Study of direct laser fabricated high entropy alloys.

Top: Mr Balaji Narayanaswamy at the Victorian Education Awards ceremony at Government House, Victoria.
Right: Lu Jiang (left) and Nima Haghdadi (right) with plasma group student, Xiao Chen, received IFM student travel awards.

Case Study

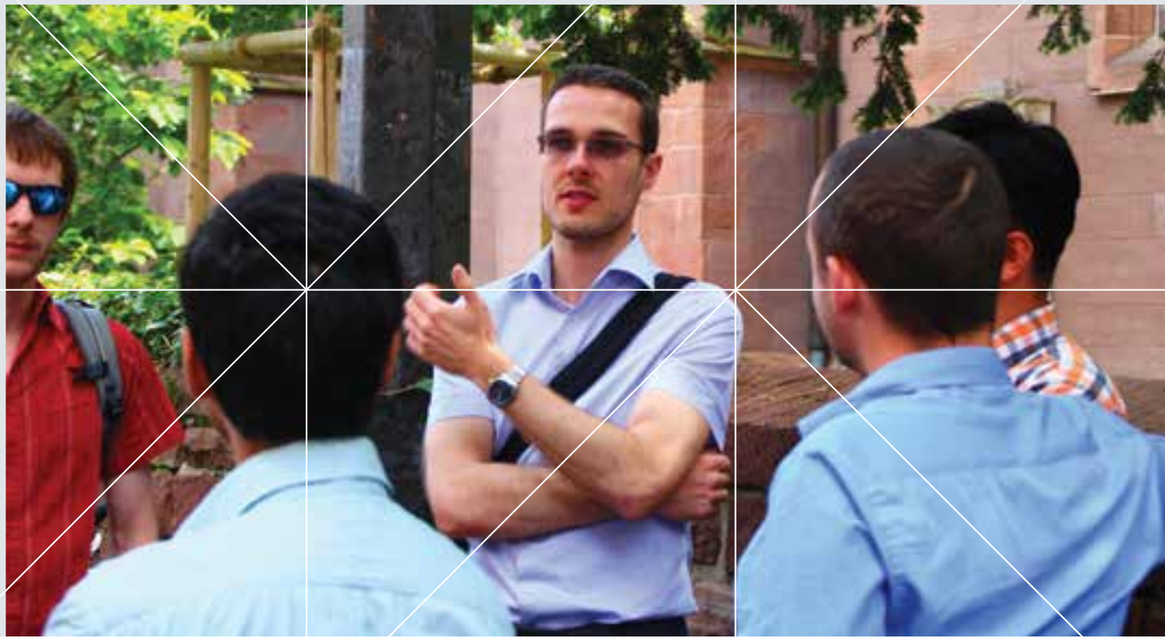
GERMAN CONNECTIONS ON A ROLL

A highlight of the year was the 'summer school' exchange program of researchers and students with the Technical University Darmstadt, Germany. A group of 10 PhD students and their supervisor, Dr Enrico Bruder visited IFM for two weeks in February/March while the IFM students, with their supervisor Dr Matthias Weiss visited Darmstadt in June.

The students are researching ways to retain the properties of steel, while allowing it to be shaped through roll forming and roll splitting to achieve value added and lightweight components.

With the trend towards more flexible roll forming, this research is highly relevant, with potential applications in industries such as automotive, construction and solar technology.

Dr Bruder said Deakin was the ideal partner for his team at Darmstadt, "There is a strong overlap between our institutions, especially in the areas of mechanical and advanced engineering and we each have complementary strengths."



EVENTS

Dr Ross Marceau presented an invited lecture at the Australian Academy of Science Theo Murphy Australian Frontiers of Science symposium in January. The theme of this year's symposium was materials science and Ross spoke on the topic of 'Materials science using atom probe tomography: 3D analysis of chemistry and nanostructure with near-atomic spatial resolution'.

Prof Matthew Barnett gave the annual Materials Australia Gifkins Lecture, which was entitled: 'The Matter with Microstructures'. IFM hosted the event.

Dr Ilana Timokhina gave three presentations at Thermec 2016, PRICM 2016, and CAMS international conferences. She also delivered invited lectures at Kagoshima University, Aachen University, University of Sao Carlos, and University of Beunos Aires, Tinaris (Argentina).

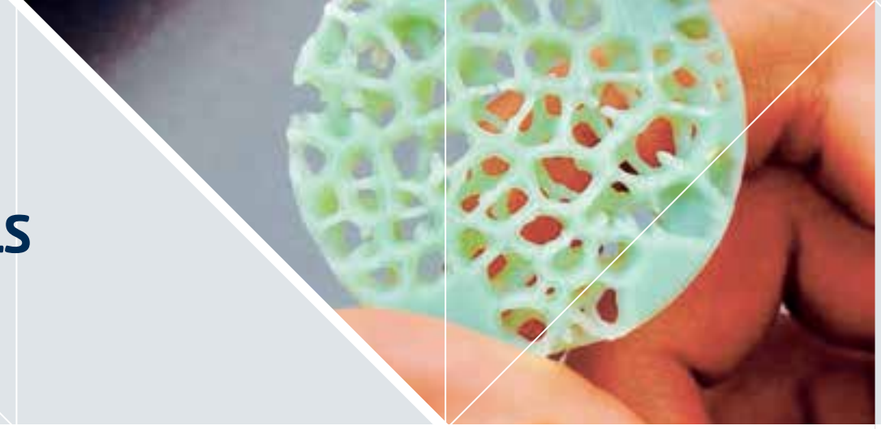
RESEARCH HIGHLIGHTS

A new collaborative program has begun between TATA Steel and IFM, led by Dr Ilana Timokhina and Dr S. Mukherjee, one PhD student from TATA steel has been awarded a scholarship to study at Deakin University.

NEW STAFF

Two new research engineers joined the metals group: Dr Mohammad Imran and Dr Santiago Corujeira-Gallo are both working as part of the additive manufacturing team.

Above: Dr Enrico Bruder, Technical University of Darmstadt with the IFM team in Heidelberg, Germany.



BIOMATERIALS
AND BIOMIMICRY

BIOMATERIALS

IFM's biomaterials researchers use naturally occurring elements and processes as the catalyst for solving complex problems.

RESEARCH HIGHLIGHT

Dr Alessandra Sutti was featured on the ABC TV News where she spoke about being a researcher and working with industry to generate new jobs, in a special feature with Vice-Chancellor Jane den Hollander, focusing on Geelong.

AWARDS

The short fibres team was awarded the 2016 Vice-Chancellor's Award for Outstanding Contribution to Partnerships (Team members: Dr Alessandra Sutti, Dr Marzieh Parhizkar, Dr Teo Slezak, Dr Danielle Bassanese, Dr Rongliang He, Dr Paul Collins, Ms Rebecca Short, Mr David Rubin de Celis Leal, Mr Keiran Pringle, Ms Magenta Perus, Mr Mark Boyanton, Mr Patrick Phillips, Mr Graeme Keating, Dr Andreea Voda).

PhD student Keiran Pringle received 3rd prize in the Deakin University Postgraduate Chemistry Society poster competition for his poster 'An Investigation into Short Ultrafine Fibre Production in Fluid Systems'. Keiran also represented IFM in the finals of the Three Minute Thesis competition.

INDUSTRY ENGAGEMENT

Dr Alessandra Sutti visited HeiQ Materials AG in their Swiss Headquarters for the inaugural HeiQ Innovation Summit in July 2016, and Prof. Uwe Pieles, collaborator on the ARC Future Fibres Hub.

Case Study

NEW TECHNOLOGY RELEASE

Industry partner HeiQ Ltd has launched a new textile finishing technology known as 'HeiQ Real Silk' based on the short polymer fibres developed at IFM.

Describing it as a perfect treatment for the fashion industry, HeiQ Ltd says the technology transfers the characteristics and feel of silk to other fabric types like polyester, cotton or blends. HeiQ Australia CEO, Dr Murray Height said the Real Silk market launch was a significant milestone for the advancement of the short polymer fibre technology developed at Deakin.

"By applying silk to the surface, the tactile properties of silk are reproduced in a cost-effective way," says Dr Height.

"This advanced functional fibre material opens new opportunities for innovative textile technologies, enabling HeiQ to enlarge its wide range of high-performance textile finishes."

HeiQ and the IFM short fibres group continue to work closely together to further advance the short polymer fibre technology and bring new generations of innovative products to market.

Above: The short fibres group and their state-of-the-art machine.

CORROSION AND PROTECTION

CORROSION AND PROTECTION

The Deakin Corrosion Research Centre's focus is on corrosion engineering and infrastructure durability studies.

In 2016 we continued progress on major research programs with particular emphasis on the reliability, durability and protection of critical industrial infrastructure, such as energy pipelines, through the research, development and application of corrosion control technologies such as corrosion monitoring and testing, coating and cathodic protection.

Major efforts were made in developing facilities to provide research and development support to Australian industries, supporting initiatives in the new Australian Centre for Infrastructure Durability (ACID), developing strategic industry and international collaborations, and in linking-up with undergraduate and postgraduate teaching programs.

RESEARCH HIGHLIGHTS

Significant progress has been made on existing major research projects (see Energy Pipelines CRC report on page 38).

The team of Mr Ivi Cicak, Dr Bob Varela, Dr Daniel Fabijanic and Prof Mike Tan received a Vice-Chancellor's award for Industry Engagement in Research (Highly Commended) for the development of the National Facility for Pipelines Coating Assessment and industry engagement in energy pipeline research.

Prof Mike Tan was appointed as Asia-Pacific editor of *Corrosion Engineering, Science and Technology.*

PUBLICATION HIGHLIGHTS

Some ten journal papers were published / accepted in major international journals in 2016.

STUDENT NEWS

- Ying Huo completed his thesis examination. Ying is now working as a research fellow on two Energy Pipelines CRC supported projects on assessing coating integrity and cathodic protection efficiency under complex pipeline conditions and evaluating cathodic protection on shore-crossing pipelines.
- Faribra Mahdavi has submitted her thesis, which is a novel study of new methods for evaluating cathodic disbondment of polymer coatings.
- Some eight mechanical/civil engineering students successfully carried out their final year projects in the new National Facility for Pipeline Coating Assessment (NFPCA) and corrosion laboratory. All the projects were directly linked with industry needs.
- Shyama Renade won second place in the Australasian Corrosion Association's Brian Cherry student forum competition for her talk on 'The influence of applied strain on coating morphology and its relation to the electrochemical properties of the coating'.

NEW PROJECTS

- Dr Anthony Somers ($50K) Department of Defence, Science and Technology Group (DSTG) for a project on corrosion inhibitors.
- Evaluating cathodic protection on shore-crossing pipelines ($60K).
- A total 18 pipeline coating testing and assessment industry projects has been completed by Ivi Cicak over the year (approximately $100K).

Top: Corrosion damage on a concrete wall of a floating barge. **Left:** Point Henry Pier.

MATERIALS AND PROCESS MODELLING

MOLECULAR MODELLING AND SIMULATION

IFM's molecular modelling researchers use high performance computing to predict the structure and properties of materials at the molecular level. Their research can guide solutions to complex scientific problems in a strategic and targeted way.

RESEARCH HIGHLIGHTS

In 2016, the group made significant progress in using advanced molecular simulations to predict, for the first time, how to design peptides that can act as 'green' agents to grow, disperse and catalytically activate gold nanoparticles in aqueous media. These discoveries, funded by the US Air Force Office of Scientific Research, were made in partnership with our experimentalist collaborators in the US at the University at Buffalo SUNY and the University of Miami.

In the polymer modelling space, the group made substantial progress in establishing computational methodologies for generating epoxy polymer structures, and interfacing these with approaches to predict the structure and thermo-mechanical properties of carbon fibre reinforced polymer composites. This work is supported by an ARC Discovery Project grant and is part of a wider collaboration with Carbon Nexus researchers.

EVENTS/CONFERENCES

Prof Walsh served as a co-Chair of the International Materials Research Congress in Cancun, Mexico, for the Symposium 'BioNano Design'.

Top: Molecular modelling - gold nanoparticle.

NEW PROJECTS

- Prof Walsh was made an Associate Investigator with the ARC Centre of Excellence for Nanoscale Biophotonics, and has initiated several collaborative projects with the experimental teams in this centre, including molecular modelling to help design imaging nanoprobes to detect polysialic acid, which is associated with proteins such as the neural cell adhesion molecule in the brain, and is of relevance to adult brain plasticity and regeneration.
- Prof Walsh initiated collaborations with Dr Chun-Long Chen and Prof Jim de Yoreo at Pacific-Northwest National Labs in the US to model the use of peptoids as shape-directing growth agents to produce gold nanorods in aqueous media for advanced plasmonics applications.
- Following a publication of a key methodological paper in 2016 regarding thermoset polymers, PhD student Baris Demir and Prof Tiff Walsh were approached to collaborate with the NanoHeat group at HUST in Wuhan, China, to translate their methodology into modelling hydrogel materials for biomedical applications. This collaboration is currently underway.

GRANTS AND AWARDS

Prof Tiff Walsh received a grant from the Asian Office of Aerospace Research and Development ($133K) for a project on 'Integration of experiment and modelling to advance biosensor design based on conformational switching of surface-adsorbed nucleic acids.

PUBLICATION HIGHLIGHTS

- Bedford, N.M., Hughes, Z.E., Tang, Z., Li, Y., Briggs, B.D., Ren, Y., Swihart, M.T., Petkov, V.G., Naik, R.R., Knecht, M.R. and Walsh, T.R. (2016) Sequence-dependent structure/function relationships of catalytic peptide-enabled Au nanoparticles generated under ambient synthetic conditions. *Journal of the American Chemical Society* **138**, 540–548.
- Bedford, N.M., Showalter, A.R., Woehl, T.J., Hughes, Z.E., Lee, S., Reinhart, B., Ertem, S.P., Coughlin, E.B., Ren, Y., Walsh, T.R. and Bunker, B.A. (2016) Peptide-directed PdAu nanoscale surface segregation: toward controlled bimetallic architecture for catalytic materials. *ACS Nano* **10**, 8645–8659.

NEW APPOINTMENTS

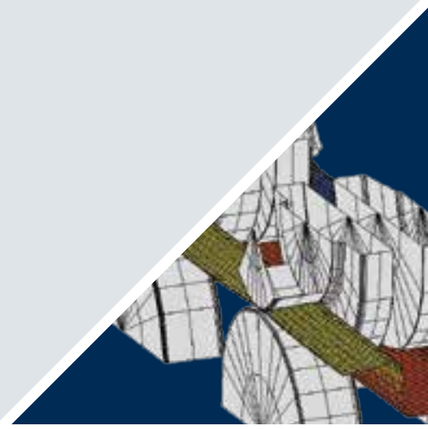
Prof Tiff Walsh was appointed as a director to the veski board. Prof Walsh, a former veski Innovation Fellow, will serve on the board for two years as a representative of the veski alumni. She also serves as member of the Victoria Prize and Victoria Fellowships Life Sciences selection panel.

STUDENT COMPLETIONS

- Aaron Brown – Learning from nature: Polymorph-selective binding of the nacre peptide n16N.
- Kurt Drew – Investigation of conformationally switchable biomolecular ligands at aqueous metallic interfaces.
- Jasmine Desmond (University of Warwick, UK) – Using molecular dynamics to investigate the interactions of biomolecules with inorganic surfaces.

MATERIALS AND PROCESS MODELLING

NUMERICAL MODELLING AND DESIGN OF MATERIALS FOR LIGHTWEIGHT STRUCTURES



Using computer-aided engineering techniques to model materials we can conduct very fast virtual prototyping to decrease design and physical testing times.

NEW PROJECTS

Professor Jeong Yoon has a new project with Hyundai Motor Company on Thermo-mechanical deformation model for hot rolling process ($US180K over three years).

The aim of the project is to develop a model, which will be used for a new on-line feedback system to control process parameters within 30 seconds. Hyundai is joining the Deakin-General Motors International Centre for Innovative Manufacturing (ICIM) with this generic project.

GRANTS AND AWARDS

A/Prof Rolfe and Dr Matthias Weiss received a Vice-Chancellor's Award for international research collaboration.

A/Prof Rolfe is a chief investigator on the new ARC Industrial Transformation Training Centre for Lightweight Automotive Structures.

Adrien Pradeau, a cotutelle student with the University of South Brittany received an IFM student travel award for a placement at the Korea Advanced Institute of Science and Technology. Adrien also gave a presentation at the Asia-Pacific Symposium on Engineeering Plasticity and its Applications, in Hiroshima, Japan.

Top: Formation of an automotive structural component - simulation is used to validate the production process. **Above:** Senior managers from Ford US with IFM staff inspect the proof-of-concept building.

NEW APPOINTMENTS

A/Prof Bernard Rolfe was appointed to a newly formed academic advisory board for the British based International Federation of Automotive Engineering Societies (FISITA). Representing more than 210,000 engineers in 37 countries, FISITA is a major international network for automotive engineers.

PUBLICATION HIGHLIGHTS

Abdollahpoor, A., Chen, X., Pereira, M.P., Xiao, N. and Rolfe, B.F. (2016). Sensitivity of the final properties of tailored hot stamping components to the process and material parameters. *Journal of Materials Processing Technology* **228**, 125–136.

This paper, the result of a collaboration with the Institute of Metal Research, Chinese Academy of Sciences, reports on a simulation of hot stamping, and is one of the first to investigate the overall sensitivity of that process.

VISITORS AND TRAVELLERS

A/Prof Bernard Rolfe spent four months on academic study leave, visiting Carnegie Mellon University, Pittsburgh, Pennsylvania where he worked with Prof Tony Rollett, starting the development of some models for cluster hardening steels. They also discussed a collaboration on constitutive modelling for Ti alloys. A/Prof Rolfe also visited the University of Waterloo in Canada and the automotive and lightweight section of the National Institute of Standards and Technology (NIST) in Washington DC.

ARC ADDITIVE MANUFACTURING HUB

As part of the ARC Additive Manufacturing Hub, the group met with a number of companies, including Lockheed Martin, COMAC and Mitsubishi Heavy Industries, which are interested in the software produced by the IFM team – combining topology optimisation and 3D printing knowledge to develop novel lightweight part designs.

The group finished redesigning some parts for the hub's major aerospace partner, Safran-Microturbo SAS. These parts have now been validated with experimental testing and give weight savings of more than 10% over current parts.

FIBRES, POLYMERS,
COMPOSITES AND TEXTILES

CARBON FIBRES AND COMPOSITES

Our research focuses on reducing the cost of carbon fibre, increasing its performance and reducing manufacturing time, as well as improving the fundamental understanding of carbon fibre.

RESEARCH HIGHLIGHTS

THINKER IN RESIDENCE

Dr Santhana Krishnan visited IFM as a Thinker in Residence for five weeks in November - December. Dr Krishnan who is a principal scientist at the CSIR-National Aerospace Laboratories in Bangalore, was hosted by Dr Minoo Naebe. During his visit, Dr Krishnan gave a seminar about his work and discussed future possible collaborations. His area of research interest is wet spinning of polyacrylonitrile (PAN) to produce white fibre.

INDUSTRY ENGAGEMENT

D4 READY TO ROLL

A pilot prototype piece of equipment developed by the Deakin armour team, led by Dr Minoo Naebe in partnership with Defense Materials and Technology Centre (DMTC) has been installed in building Ni. Following seven years of development and four laboratory-scale concept demonstrators, the D4 pilot prototype contains a number of key innovations developed over the years. It can manufacture a ballistic helmet shell in only 20 minutes. The next stage is to extend this rapid composite forming capability to other applications.

COMPOSITE SEAT PROJECT SUCCESS

An Excellerate Australia (formerly Auto CRC) project with Futuris for a new composite seat structure design was completed with outstanding results.

The project, led by Dr Tim De Souza and Prof Bronwyn Fox, resulted in a 69% weight reduction compared to the metallic design, and significant improvements in pull test results and part counts. Futuris already has a pipeline to use the technology in the market.

NEW PROJECTS

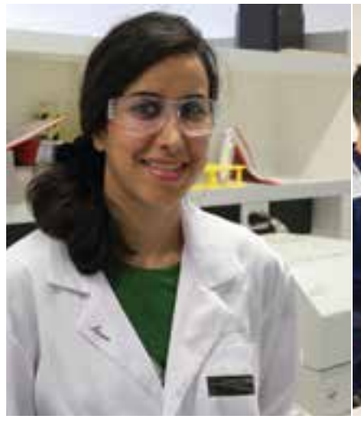
- Investigation of high modulus carbon fibres from PAN precursor with Ford USA ($126K), Dr Minoo Naebe and Mr Steve Atkiss.
- Improved design of a composite front seat back for higher production at lower cost, Excellerate Australia – ($279K), Dr Claudia Creighton, Dr Mandy De Souza, Prof Russell Varley.
- The development of low diameter carbon fibres, US Dept of Defence ($655K), A/Prof Luke Henderson.

GRANTS AND AWARDS

PhD student Azam Oroumei received an Endeavour Fellowship to carry out research on lignin-based precursor for the production of carbon fibre.

A/Prof Luke Henderson received an IFM impact grant for a project on 'Developing additives to initiate rapid curing in epoxy resins'.

PhD student Kathleen Beggs received an honourable mention at Fresh Science 2016 where she spoke about her research to a mixed audience. Kathleen's presentation was titled 'Doing chemistry with carbon fibre in a microwave'.



Top: Dr Tim De Souza, Dr Mandy De Souza, Dr Claudia Creighton and Jon Partington - part of the team that received a Vice-Chancellor's Award for Industry Engagement in Research. **Above (left):** Ms Azam Oroumei will take up her Endeavour Fellowship in 2017; **(right)** Carbon Nexus technical officer Katrina Robertson helps two of the Gordon students with their composites manufacturing.

Dr Mandy de Souza, Dr Claudia Creighton, Dr Tim De Souza, Jon Partington, Peter Bruchmuller, Matthew Jennings and Alexis Leblais received a Vice-Chancellor's Award for Industry Engagement in Research, for their outstanding collaboration with industry partners to develop an automotive car seat of the future, described as a 'revolutionary step change' by industry.

NEW APPOINTMENTS

Professor Russell Varley joined IFM as leader of the composites group in July. Prof Varley comes to IFM with a wealth of experience in composites research from CSIRO where he was leader of the composites team. Russell's research focus has been the network and engineering of polymers to improve their performance.

TRAINING

NEW COURSE GIVES SKILLS IN CARBON FIBRE PROCESSING

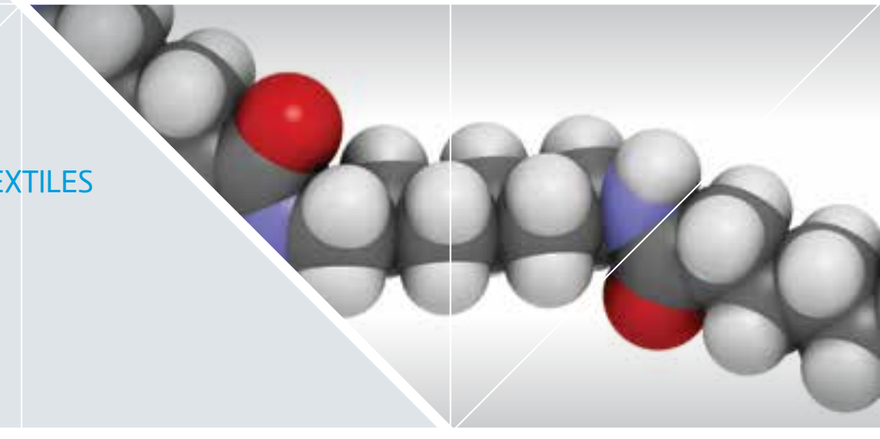
Carbon Nexus is assisting with a pilot for a new course at the Gordon aimed at giving manufacturing workers skills in carbon fibre processing. The Australian-first TAFE course focuses on carbon fibre composites manufacturing processes and materials.

The course was developed with the help of local companies, including Quickstep Technologies, Carbon Revolution, Sykes and RPC Technologies. During the course, the students worked with technical staff and researchers at Carbon Nexus.

Left: Carbon Revolution Design Director Ashley Denmead with Prof Russell Varley at the launch of the ARC Future Fibres Hub.

FIBRES, POLYMERS,
COMPOSITES AND TEXTILES

POLYMERS



GRANTS AND AWARDS

Prof Qipeng Guo is part of a new ARC Industrial Transformation Research Hub for Nanoscience Based Construction Material Manufacturing to be led by Monash University. This research hub aims to develop novel construction materials, including binders, cement additives, high-performance concrete materials, concrete structural systems, polymer composites and pavement materials.

PUBLICATION HIGHLIGHTS

- Guo, Q. (2016) Polymer Morphology: principles, characterization and processing. *Wiley*. With a focus on structure-property relationships, this book describes how polymer morphology affects properties and how scientists can modify them. The book covers structure development, theory, simulation and processing; and discusses a broad range of techniques and methods.

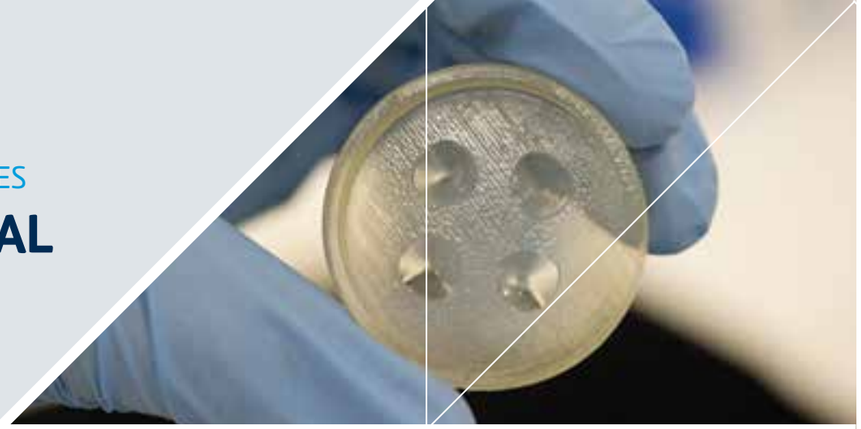
STUDENT COMPLETIONS

- Tao Zhang – Polymer organogels stabilised HIPE organogels and applications in oil fields.

Above: A long-chain polymer.

FIBRES, POLYMERS, COMPOSITES AND TEXTILES

GREEN NATURAL FIBRES



This area deals with the properties, processing, and value-adding applications of a range of natural fibres such as silk, wool and cotton.

Silk is the only natural fibre that has FDA approval for biomedical related applications and our research in silk based biomaterials continues to attract international attention. We are also addressing significant public health and safety issues with our expertise in the natural fibre area through the ARC Future Fibres Hub, in collaborations with our long standing industry partners ESIA, Draggin Jeans, and HeiQ. A significant development in this area is our increasing research effort to address the environmental issues associated with natural fibre processing as well as in the recycling of used natural fibres and fibre blends.

RESEARCH HIGHLIGHTS

Work by our silk research team (Dr Ben Allardyce, Dr Rangam Rajkhowa, Prof Xungai Wang), in collaboration with ESIA, is likely to receive a funding boost from the UK based Wellcome Trust. Key members of the ESIA and Deakin team were interviewed in London in July 2016 for a Wellcome Trust project to take the work to clinical trials, and we expect the new project to commence within the current financial year.

We were also short listed and interviewed for a H&M Foundation Global Change Award, for our project on environment-friendly recycling and processing of denim products. This project involves Prof Xungai Wang, Dr Rangam Rajkhowa, Dr Nolene Byrne, Dr Christopher Hurren and Dr Rebecca Van Amber.

Dr Christopher Hurren and Dr Liz de Rome were awarded the tender to develop a rating system for motorcycle protective clothing for NSW. The tender was awarded through Transport for NSW, which is coordinating the Australia and New Zealand wide development of test protocols and a rating system which will take account of both safety and thermal comfort of motorcycle clothing.

This first stage will involve developing test protocols to measure the level of protection provided by motorcycle clothing in a crash, comfort levels under different riding conditions, and a rating system to compare the results.

NEW PROJECTS

Prof Xungai Wang, A/Prof Joselito Razal, Dr Rangam Rajkhowa and Dr Christopher Hurren have a new project with Lincoln Agritech Limited (NZ$675K) to examine fibre deconstruction and reassembly. This project is also opening up other collaborative opportunities.

Dr Jinfeng Wang, Dr Jing Wang and Dr Xungai Wang have a new project with BOHN Environmental Engineering & Complete Equipment Corp ($105K) to develop a novel photocatalyst modified metal foam for controlling industrial odour. This work evolved from our earlier work on the odour absorption properties of different fibre materials. We have also been working on a photocatalyst for waste water treatment for several years and are now developing the novel technology to control air quality by removing odour. The industry partner BOHN is one of the top two companies for odour removal technologies in China.

The company hopes to improve efficiency and find a method that is applicable to many different types of odour by using the IFM technology.

Dr Rangam Rajkhowa and Dr Stuart Gordon from CSIRO have a new project with the Cotton R&D Corporation (CRDC) to develop an eco-friendly treatment to improve the look and handle of cotton fabric. The project is worth $222K over three years. Cotton Incorporated USA is also providing in-kind support to the project. Dr Rajkhowa and Dr Gordon have another project with new industry partner Cotton Incorporated. The project will investigate improving efficiency and reducing salt use during reactive dyeing of cotton knits by chemical modification of cotton using an environmentally friendly process.

Dr Rangam Rajkhowa secured an industry grant from TFS Corporation Ltd ($135K) to develop skin care applications from wool powder and Indian sandalwood oil.

GRANTS AND AWARDS

- A/Prof Joselito Razal, Dr Maryam Naebe and Prof Xungai Wang, ARC Discovery Project ($275K, 2017-2019) ‘Understanding the true potential and limitations of novel fibres.
- Dr Jinfeng Wang, IFM impact grant ‘Immobilising powdery photocatalyst to support waste water treatment’.
- Dr Esfandiar Pakdel, Alfred Deakin post-doctoral fellowship (2017-2018) ‘Heat and UV blocking fabrics for enhanced well-being and reduced energy consumption’.

Top: Work on development of a silk membrane to repair burst eardrums is moving closer to clinical trials.

NEW STAFF

Dr Rebecca Van Amber joined the group as a research fellow working on natural fibres. Dr Van Amber was previously a postdoctoral fellow at the University of Otago, Dunedin, New Zealand, where she also completed her PhD. Her research interests are wool and other natural protein fibres, socks and sock fabrics, the effect of textiles on human health, and the performance and mechanical properties of fabrics.

Dr Liz de Rome joined as a part-time research fellow, working with Dr Christopher Hurren on motorcycle protective clothing research. Dr de Rome, who is an epidemiologist and behavioural scientist, is an expert on the effect of thermal management on brain function. She is also working with other IFM researchers on construction and design features of clothing with good thermal management.

Below: PhD student Saeed Dadvar is using waste natural fibre materials through advanced technologies such as 3D printing, to produce value-added products.

PUBLICATION HIGHLIGHTS

- Allardyce, B.J., Rajkhowa, R., Dilley, R.J., Xie, Z., Campbell, L., Keating, A., Atlas, M.D., von Unge, M., Wang, X. (2016) Comparative acoustic performance and mechanical properties of silk membranes for the repair of chronic tympanic membrane perforations. *Journal of the Mechanical Behavior of Biomedical Materials* **64**, 65–74.
- De Silva, R., Vongsanga, K., Wang, X., Byrne, N. (2016) Understanding key wet spinning parameters in an ionic liquid spun regenerated cellulosic fibre. *Cellulose* **23**, 2741–2751.
- Du, S., Zhang, J., Zhou, W.T., Li, Q.X., Greene, G.W., Zhu, H.J., Li, J.L., Wang, X. (2016) Interactions between fibroin and sericin proteins from antheraea pernyi and bombyx mori silk fibers. *Journal of Colloid and Interface Science* **478**, 316–323.
- Singh, C., Wang, X. (2016) A biomechanically optimized knitted stent using a bio-inspired design approach. *Textile Research Journal* **86**, 380–392.
- Allardyce, B.J., Rajkhowa, R., Dilley, R., Atlas, M., Kaur, J., Wang, X. (2016) The impact of degumming conditions on the properties of silk films for biomedical applications. *Textile Research Journal* **86**, 275–287.
- Zhou, H., Wang, H., Niu, H., Zeng, C., Zhao, Y., Xu, Z., Fu, S., Lin, T. (2016) One-way water-transport cotton fabrics with enhanced cooling effect. *Advanced Materials Interfaces* **3**, 1–6.

STUDENT COMPLETIONS

- Wanjie Xie – Photocatalytic TiO_2/porous BNNSs composites for textile dyeing wastewater treatment (Masters thesis).
- Xing Jin – Heat and moisture transfer through silkworm cocoon walls.
- Rasike de Silva – Separation and development of polymer blends: an environmentally friendly approach.
- Badar Zaidi – Flax yarn polymer matrix composites: effects of yarn structure and pre-stressing.

FIBRES, POLYMERS,
COMPOSITES AND TEXTILES

NANOFIBRES AND FUNCTIONAL FIBRES

Our researchers are developing new functional materials with enhanced properties, such as non-wettability, self-cleaning and needle stick resistance.

The group is also exploring novel, unique functions and applications of nanofibres and developing new methods of nanofibre production and assembly, including large-scale production of electrospun nanofibres and short nanofibres.

INDUSTRY ENGAGEMENT

Prof Tong Lin organised the establishment of the "Deakin-Nantong Joint Institute of Advanced Fibers" in Nantong, China. This is a joint research institute between Deakin University and Nantong Textile & Silk Industrial Technology Research Institute, which aims to transfer advanced fibres/materials technology to industry.

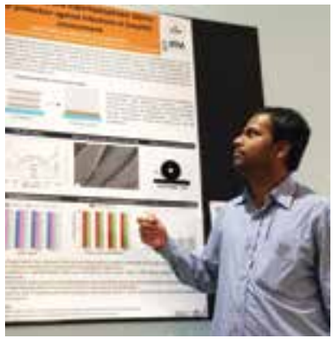
GRANTS AND AWARDS

- Prof Tong Lin – International Association of Advanced Materials (IAAM) Medal in recognition of his 'notable and outstanding contribution in the field of Advanced Materials Science and Technology'.
- Dr Jian Fang – IFM impact grant for a project on 'High performance carbon fibre electrodes for electrochemical energy storage'.
- Dr Hua Zhou – Alfred Deakin Postdoctoral Research Fellowship (2017–2019) 'Directional liquid transport fibrous membranes for oil-water separation and fuel recovery'.
- Dr Shayan Seyedin – Alfred Deakin Postdoctoral Research Fellowship (2017–2019) 'Can we access the maximum potential of 2D Nanosheets in solution processed materials?'
- Dr Shayan Seyedin – IFM impact grant, 'Scaled-up fabrication of conductive stretchable fibres for wearable strain sensors'.
- PhD student Amol Patil, outstanding poster presentation award from the 9th Textile Bioengineering and Informatics Symposium/6th Asian Protective Clothing Conference (TBIS-APCC 2016). Amol's poster was titled 'Antimicrobial and superhydrophobic fabrics for protection against infection in hospital environments'. Amol also received first prize for this poster and a prize of $2K in the Deakin University Postgraduate Chemistry Society poster competition.

PUBLICATION HIGHLIGHTS

- Shao, H., Fang, J., Wang, H., Dai, L. and Lin, T. (2016) Polymer-metal Schottky contact with direct-current outputs. *Advanced Materials* **28**, 1461–66 was reported on the Materials Views China website (www.materialsviewschina.com).

  The paper reports on a study where the researchers developed new mechanical energy to electricity devices that can directly generate a DC voltage with an output high current density solely from gentle mechanical deformation.
- Lang, C., Fang, J., Shao, H., Ding, X. and Lin, T. (2016) High-sensitivity acoustic sensors from nanofibre webs. *Nature Communications* **7**, doi:10.1038/ncomms1108.



The paper describes the group's work with electrospun piezoelectric nanofibre webs showing for the first time their strong acoustic-to-electric conversion ability.

- Lin, T. and Fang, J. (2016) Fundamentals of Electrospinning and Electrospun Nanofibers. This book highlights the fundamental science and industrial applications, which cover almost all aspects of electrospinning and electrospun nanofibres. It can be a textbook for students who study in materials science and engineering, nanotechnology, fibres and textiles, or related areas, as well as people who have started working or are interested in these fields.

STUDENT COMPLETIONS

- Chao Zeng – Superhydrophobic coating and directional water-transfer fabrics
- Licheng Zhu – Bifacial fabric structures and properties
- Zengxiao Cai – Biological response of myoblasts to three-dimensional electrically conductive fibrous scaffolds
- Yao Yu – UV interactions with fibres and fibrous structures.

Top: Electrospinning is being used to create the next generation of nanofibres. **Inset:** PhD student Amol Patil's poster attracted the judge's attention in two poster competitions.

ELECTROMATERIALS
AND MEMBRANES

ELECTROMATERIALS

Developing new energy technologies through the creation of new electroactive materials.

RESEARCH HIGHLIGHTS

The new BatTRI-Hub started operations in December, in collaboration with CSIRO and based at IFM, Waurn Ponds. The centre focuses on advanced battery prototyping and the commercialisation of energy storage technologies.

A key goal of the hub is to help leverage opportunities for industries across the whole energy value chain. It will allow us to scale up our lab-based research and work with new industry partners, as well as extending existing relationships.

The hub is a first step in the expected development of a full pilot scale facilty for producing batteries in Geelong.

GRANTS AND AWARDS

A grant from the Australia India Strategic Research Foundation of almost $1 million to Prof Maria Forsyth, A/Prof Patrick Howlett, Prof Ian Chen and colleagues at Monash University, Indian Institute of Science, Bangalore and Indian Institute of Technology, Bombay for a project to increase the potential of renewable energy with the development of improved energy storage solutions (see case study opposite).

Top: The 11th Annual International Electromaterials Science Symposium was hosted by IFM. **Right:** The project will develop safer, more stable energy storage materials and technologies to enable the full potential of renewable energy to be realised.

Case Study

AUSTRALIA–INDIA BATTERY RESEARCH

The electromaterials team has received a major grant of almost $1 million for a collaborative project with India to develop new lithium and sodium prototype batteries using new electromaterials which are more stable and have longer life times than batteries currently on the market.

Working with researchers at the Indian Institute of Science, Bangalore and the Indian Institute of Technology, Bombay, the focus will be on stationary, large-scale applications, such as electricity grids.

"With the support of exceptional researchers at IISc and IIT-B, along with our team here, we are confident that this grant will lead to significant improvements to remote or stand-alone renewable energy installations, such as those located in isolated communities or rural areas, which are of major importance in both India and Australia," said Prof Forsyth.

The group hosted Dr Sagar Mitra for a half day discussion on the project as part of the 3rd International Sodium Battery Conference held in Geelong in December. Prof Forsyth has met with Prof Amita Chandra from Delhi University to plan for a workshop for women in energy research, to encourage Indian women in science. Dr Xiaoen Wang, Dr Gaetan Girard and PhD student Urbi Pal are now working on the project at Deakin.

A/Prof Jenny Pringle; Prof Peter Bruce; Dr Anthony Hollenkamp received an ARC Discovery Project 'Increasing solid electrolyte conductivity through defect design ($322K over three years).

Prof Maria Forsyth received the Galileo Galilei award at the International Symposium on Polymer Electrolytes (ISPE-12). Awarded by the Scientific Committee of the symposium, the prize recognises scientists who, through brilliant and innovative research outcomes, have made essential contributions to the understanding and improvement of ion-conducting materials.

Dr Haijin Zhu was awarded an Endeavour Fellowship to visit the University of the Basque Country in Spain. Haijin will work with Prof David Mecerreyes on innovative polymer materials for energy applications.

PhD students Lane McDonald and Yundong Zhou received IFM student travel awards to work with IFM international collaborators. Lane visited Tecnalia in Spain investigating the performance of organic ionic plastic crystalline membranes in real world applications. Yundong also visited Tecnalia and also the CIC Energigune and University of Nantes analysing the role of microstructure and surface chemistry on the cycling performance of lithium batteries.

Dr Madeleine DuPont received first prize for the best poster presentation at the Emerging Energy Technologies Summit and Exhibition (EETSE 2016) in Melbourne recently. Madeleine's poster was titled 'Optimising the Performance of Thermoelectrochemical Cells'.

A great friend and colleague of the group, Deakin Adjunct Prof Michel Armand received an honorary doctorate from Deakin University in recognition of his significant contributions as a researcher in the field of energy storage technologies, with particular emphasis on lithium battery development and research in ionic liquids.

INDUSTRY ENGAGEMENT

A Memorandum of Understanding (MoU) was signed by Deakin University and Hydro-Québec IREC in December 2016 to provide a basis for licensing and technology transfer of lithium metal polymer batteries, and for common research to develop and prototype sodium batteries. Hydro-Québec has a keen interest in developing new materials for transport electrification, and together with IFM, have identified potential business opportunities for developing sodium batteries to supply various modes of transport. The MoU formalises an agreement to collaboratively develop a joint research project in this area.

PUBLICATION HIGHLIGHTS

- Jin, L., Greene, G.W., MacFarlane, D.R., and Pringle, J.M. (2016) Redox-Active Quasi-Solid-State Electrolytes for Thermal Energy Harvesting. *ACS Energy Lett* **1(4)**, 654–658.
- McDonald, J.L., MacFarlane, D.R., Forsyth, M. and Pringle, J.M. (2016) A novel class of gas separation membrane based on organic ionic plastic crystals. *Chemical Communications* **52**, 12940–12943.
- Shah, A.H., Li, J., Yang, H., Rana, U.A., Ranganathan, V., Siddigi, H., MacFarlane, D.R., Forsyth, M. and Zhu, H. (2016). Enhancement of 'dry' proton conductivity by self-assembled nanochannels in all-solid polyelectrolytes. *Journal of Materials Chemistry A* **4**, 7615–7623.

EVENTS

- International Electromaterials Science Symposium – More than 200 people attended the 11th Annual International Electromaterials Science Symposium hosted by IFM as part of the ARC Centre of Excellence for Electromaterials Science and held at the Melbourne, Burwood Campus in February.
- Prof Maria Forsyth was formally inducted as a Fellow of the Australian Academy of Science at the Academy's annual Science at the Shine Dome event, where she gave a presentation titled 'Materials for Advanced Energy Storage'.
- 3rd International Sodium Battery Conference – about 90 people from the USA, France, Japan, India, Spain, Sweden, China, Canada and all parts of Australia came to Geelong in December to attend the conference. A highlight was the Industry Forum on Energy Storage hosted by ACES and Deakin.

STUDENT COMPLETIONS

- Nicolas Goujon – Development of nanostructured polymeric materials using polymerizable lyotropic liquid crystals.
- Gaetan Girard – Investigation of Phosphonium Bis (fluorosulfonyl) imide-based ionic liquid electrolytes for lithium batteries.
- Jenny Yan – Ionic liquid electrolytes in Mg-air batteries.

Top: Prof Maria Forsyth, Prof Michel Armand and HydroQuebec's Dr Karim Zagib at the 3rd Sodium Battery Conference.

Case Study

NEW DEVICE TO POWER WEARABLE TECHNOLOGIES

Wearable technologies, like those used to monitor movement during training, are a step closer to reality following demonstration of a flexible thermocell made from a solid state, cellulose-based electrolyte.

Thermocells generate energy from waste heat using two electrodes in contact with an electrolyte.

The advantage of the thermocell is that the device never needs to be recharged – energy conversion is instant and continuous as long as one electrode is heated and the other is kept cold. These devices are being developed within the ARC Centre of Excellence for Electromaterials Science (ACES).

ACES Chief Investigator A/Prof Jenny Pringle, who led the work, said that most previous research has been on thermocells made from liquid electrolytes.

But, solid state electrolytes have a number of advantages over their liquid state rivals when it comes to powering small wearable devices.

"In order to generate energy from a waste heat source, like the body, we need a thermocell sensitive enough to respond to lower temperatures. It's also got to be flexible so it can contour to the body, and yet still be strong enough to make a device," she said.

"Making a thermocell using a solid state electrolyte allows us to achieve these three aims while giving us the extra advantage of being able to promise no leaks," she said. "Using a naturally-occurring polymer such as cellulose is also an important first step towards biocompatibility."

The cellulose-based electrolytes, used for making solid state, flexible thermocells by IFM researcher Dr Liyu Jin, are reported in ACS Energy Letters. While this work demonstrates the promise of a single cellulose-based cell, the next step towards application is to combine multiple cells together into arrays to increase the power.

"One of the advantages of being part of ACES is that because of the diversity of our network we will be able to follow this research through—we will work with our 3D printing experts to print the cells we create into an array, before integrating them into devices," says A/Prof Pringle.

Thermocells generate energy from waste heat using two electrodes in contact with an electrolyte.

ELECTROMATERIALS AND MEMBRANES

MEMBRANES

The development of nanoporous membrane materials is helping to address future biomedical and environmental challenges.

GRANTS AND AWARDS

- Dr Ludovic Dumée received an IFM impact grant for research on next generation graphene enhanced orthodontic and dental implant accessories. Dr Dumée also received a Vice-Chancellor's Early Career Researcher Award for Research Excellence.
- PhD student James Maina received an AINSE postgraduate research award. James will use the award to access ANSTO facilities for his PhD research investigating properties of nanoparticles across metal organic frameworks.
- Elise des Ligneris received a $3K IFM student travel award. Elise used her award to visit the National Institute of Scientific Research in Quebec to further her research on assessing the behaviour of metal nanofibre membranes for treating industrial effluent under realistic conditions. She also presented a poster at the American Institute of Chemical Engineers (AIChE) conference in San Francisco.
- Francois-Marie Allioux was a finalist in the Victorian International Education awards in the International Student of the Year – Research category.

INDUSTRY ENGAGEMENT

Dr Mary She and Dr Ludovic Dumée received a Research Connections grant for a project with industry partner Gale Pacific.

Gale Pacific manufactures outdoor fabrics, such as tarpaulins and sunshades and has already worked with the IFM team on a project to recycle tarpaulins. The new $100K project will develop robust liquid repellent surfaces suited to poly(propylene) based materials. The new materials will be kept clean by simple de-wetting procedures. A novel combination of physical surface texturation and chemical grafting is being tested with the aim of developing low-cost, highly water repellent surfaces.

Dr Mary She, Prof Frank Collins, and Prof Lingxue Kong received another Research Connections grant of $100K from the Department of Industry, Innovation and Science to work with industry partner GT Recycling on transforming carpet waste into a commercial admixture for concrete that will enhance crack resistance, durability, and sustainability.

EVENTS

Prof Lingxue Kong was one of the chairs for the inaugural International Symposium on Carbon-based Materials for Water Transfer (2016) (CarbonWater16) held in Shanghai, China together with Prof Wanqin Jin, the Deakin China Fellow and Prof Haiping Fang from the Chinese Academy of Sciences. Prof Kong and Dr Ludovic Dumée both delivered invited lectures on unique flexible graphene conductive materials and water transport through graphene capillaries: Surface/interface effect and confinement effect at the nanoscale, respectively.

Dr Ludovic Dumée co-chaired a symposium on nano-spectroscopy in September with Dr Raul Freitas, a beamline scientist from the LNLS in Campinas, Brazil.

Eight members of the group attended and presented at the International Membrane Science and Technology Conference 2016 in Adelaide.

PUBLICATION HIGHLIGHTS

Balme, S., Lepoitevin, M., Dumée, L.F., Bechelany, M., Janot, J-M. (2017). Diffusion dynamics of latex nanoparticles coated with ssDNA across a single nanopore. *Soft Matter* **13**, 496–502.

NEW APPOINTMENTS

- Prof Lingxue Kong was appointed as Deakin's new ANFF-Vic Technology Fellow Ambassador at the Melbourne Centre for Nanofabrication (MCN).
- Dr Ikramul Kabir joined the group to work on an industry project with GT Recycling on using carpet waste for production of concrete.
- Dr Jane Zhang has been appointed to work on the project with Gale Pacific.

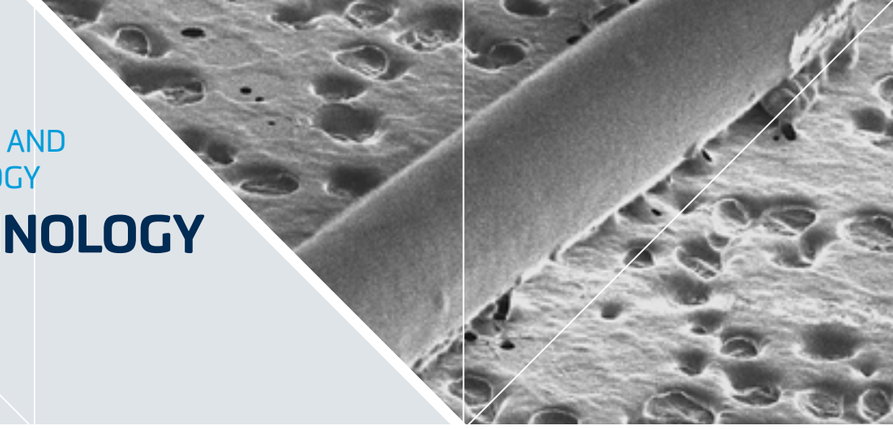
STUDENT COMPLETIONS

- Weiwei Cong – Alignment and characterisation of hexagonal lyotropic liquid crystalline nanostructure for membrane synthesis.
- Yongzhen Li – Fabrication of Core-Shell Structured Natural Rubber Based Microfibres for Artificial Blood Vessel Tissue Engineering Scaffolds.
- Lijue Chen – Delivery of Fluorouracil and siRNA by Mesoporous Silica Nanoparticles to Drug Resistant Colorectal Cancer.
- Chunfang Feng – Stretchable Graphene-based Materials of High Conductivity.

Top: Dr Ludovic Dumée received a Vice-Chancellor's Award for Research Excellence.

NANOTECHNOLOGY AND PLASMA TECHNOLOGY

NANOTECHNOLOGY



Nanotechnology research at IFM is focused on developing novel nanomaterials and using nanotechnology to solve some of today's problems in energy storage, environmental protection, and health and medical issues.

The nanotechnology team has produced a number of world-class research outputs in boron-nitride nanosheets, boron-nitride nanotubes, boron nitride nanotube-titanium composites, lithium-ion batteries and energy conversion, including five high-impact journal articles (impact factor >10). Our researchers have been awarded a number of prizes and research grants, and have been invited to give keynote presentations. Examples of these achievements can be seen in the following highlights.

GRANTS AND AWARDS

- Dr Luhua Li received a Vice-Chancellor's Early Career Research Award for Research Excellence.
- Dr Weiwei Lei was selected to attend the Global Young Scientists Summit@one-north 2016 (GYSS 2016) based on a project on Novel 3D porous boron nitride foam for water cleaning.
- Dr Weiwei Lei joined the editorial board of the journal *Current Graphene Science*.
- Dr Dan Liu was invited to join the editorial board of *Scientific Reports* (Nature Publishing Group).
- Prof Ying Chen is a CI on an Australia-India Strategic Research Fund grant ($999K), 'New materials for large-scale, high stability, high energy density batteries: from material design to prototype development' (see page 23).
- ARC Linkage Infrastructure, Equipment and Facilities award, (A$750K) 'High temperature atomic structure and physical property analysis facility'.
- Dr Lifeng Wang was awarded an Alfred Deakin Post-doctoral Fellowship.
- Dr Dan Liu and Dr Tianyu Yang were awarded grants in the Central Research Grants Scheme 2017.

Top: Boron nitride nanotubes grown on the surface of a steel wire. **Below:** Prof Ying Chen (front row, right) and the nanotechnology group.

PUBLICATION HIGHLIGHTS

- Li, L., Chen, Y. Atomically thin boron nitride: unique properties and applications (2016) *Advanced Functional Materials* **26**, 2594–2608.

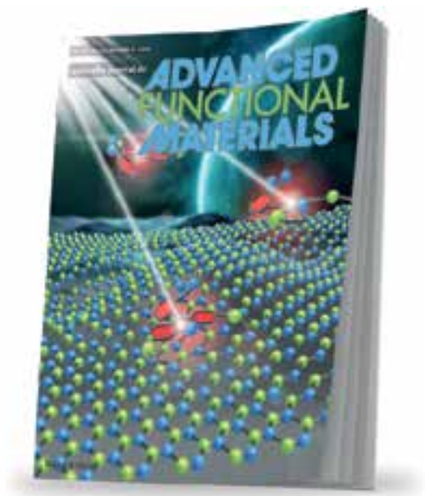
  This invited feature article presents our recent research advancement in atomic thin boron nitride nanosheets from synthesis to new properties and applications.

- Cai, Q., Mateti, S., Yang, W., Jones, R., Watanabe, K., Taniguchi, T., Huang, S., Chen, Y. Li, L.H. (2016) Boron Nitride Nanosheets Improve Sensitivity and Reusability of Surface-Enhanced Raman Spectroscopy. *Angewandte Chemie* **55** 8405.

  The paper describes the group's success in using boron nitride nanosheets to improve the sensitivity, reproducibility and reusability of substrates for sensing with surface-enhanced Raman spectroscopy at low concentrations.

- Rahman, M., Sultana, I., Yang, T., Chen, Z., Sharma, N., Glushenkov, A., Chen, Y. (2016). Lithium Germanate (Li2GeO3): A high-performance anode material for Lithium-ion batteries. *Angewandte Chemie* **55**, 16059–16063.

The paper describes the discovery of a new type of lithium-ion battery anode based on lithium germanium oxide (Li2GeO3). The material can be used directly, without a carbon coating or carbon matrix, which are required for many non-graphitic electrode materials.



- Cai, Q., Du, A., Gao, G., Mateti, S., Cowie, B.C., Qian, D., Zhang, S., Lu, Y., Fu, L., Taniguchi, T., Huang, S., Chen, Y., Ruoff, R.S., Li, L.H. (2016). Molecule-induced conformational change in boron nitride nanosheets with enhanced surface adsorption. *Advanced Functional Materials* **26**, 8202–8210.

  This study reports the enhanced surface adsorption capability of boron nitride (BN) with reduced thickness down to a monolayer. This study not only reveals a new special surface reaction mechanism responsible for the superior adsorption capability of BN nanosheets and other 2D nanomaterials, but also opens up possibilities for many novel applications, such as sensing, water purification, and chromatography.

- Tan Xing, Srikanth Mateti, Lu Hua Li, Fengxian Ma, Aijun Du, Yury Gogotsi and Ying Chen (2016) Gas protection of two-dimensional nanomaterials from high-energy impacts. *Scientific Reports* **6**, 35532 DOI: 10.1038/srep35532.

  This paper reports a novel mass-production technique for 2D nanomaterials using gas-assisted mechanical exfoliation process and realised via a controlled ball milling process. This method can produce graphene, BN nanosheets, MoS_2 and other nanosheets with high-quality structure.

  The new exfoliation role of certain gases has been discovered and the production technique is patented.

- Two new patents lodged: Provisional patent 2016903398, 'Colloidal solutions and aerogels,' Weiwei Lei and Ying Chen; new Australian Provisional Patent Application 'Nanomaterials;' Ying Chen and Luhua Li.

Award

Dr Luhua Li received a Vice-Chancellor's Early Career Researcher Award for Research Excellence

STUDENT COMPLETIONS

- Mahedi Hasan Bhuiyan – Boron nitride nanotube reinforced titanium matrix composite.
- Qiran Cai - Special adsorption behaviour of boron nitride nanosheets.

Above: IFM student Yuchen Liu explains details of his poster at the IFM conference. **Left:** A paper by group members was highlighted on the cover of *Advanced Functional Materials*.

NANOTECHNOLOGY AND PLASMA TECHNOLOGY

PLASMA TECHNOLOGY

Plasma research at IFM provides a platform technology for collaborative research and solutions for industry.

RESEARCH HIGHLIGHTS

GEM 2016 COMES TO GEELONG

The 19th Gaseous Electronics Meeting (GEM 2016) was held at the Geelong Waterfront Campus in February. This international conference, chaired by Dr Jane Dai, was the largest of the series held so far, with every plasma group in Australia represented.

Delegates from 15 countries included a fantastic array of invited international speakers, and the largest representation of women researchers.

The conference highlighted the diversity of plasma research, from applications in medicine and agriculture, to space propulsion and the behaviour of neutron stars.

It also strongly encouraged collaboration within the plasma community and with other research communities, particularly the Australasian Society of Biomaterials and Tissue Engineering, as well as astronomy.

SMART PLASMA COATINGS FOR THE DELAMINATION OF LAMINATED GLASS

An industrial trial of novel plasma coatings with expandable microspheres for glass delamination was successful. It confirms that this novel plasma coating we have developed can be applied for industrial scale production.

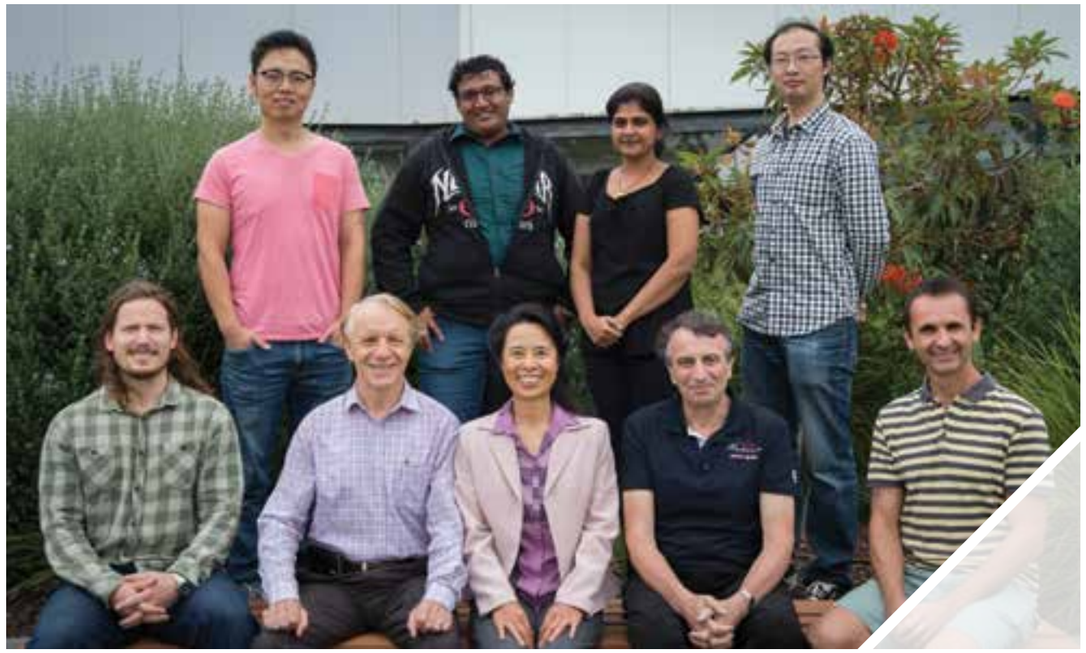
ASIA PACIFIC CONFERENCE ADDRESS

Dr Jane Dai was an invited speaker at the joint 13th Asia Pacific Physics Conference and 22nd Australian Institute of Physics Congress in Brisbane in December 2016. Her talk on *Gas Plasma in Liquid – Exciting Opportunities* was very well received.

VISITORS

We were again successful in an application for a Deakin University Thinker in Residence. Prof Yakov Krasik, Professor of Physics at Technion, Israel joined the plasma group for three months.

Top: Plasma plus thermal system.
Below: Delegates from 15 countries gathered in Geelong for GEM 2016.



Prof Krasik's work has had a large impact on the field of plasma application for a variety of scientific and industrial purposes. During his visit he delivered a series of 10 lectures on plasma physics. He also built and set up an industrial prototype of gas bubble-in-liquid plasma system (with 30 needles), and helped staff set up a corona discharge system, plasma jet, and prototype atmospheric pressure plasma system.

He conducted plasma optical diagnostics on the prototype liquid plasma system and trained staff and PhD students in the measurement. We discussed a number of project ideas and potential areas of collaboration and jointly wrote a paper on plasma optical diagnostics in liquid plasma.

Dr Anton Nikiforov from Gent University, Belgium visited IFM in November. Dr Nikiforov is an internationally recognized expert on both gas and liquid plasma. He has been very successful in gaining industrial funding for plasma-industry applications. After giving a seminar at IFM, Dr Nikiforov had several meetings and discussions about possible collaborative projects.

INDUSTRY ENGAGEMENT

We gained a new industrial project with Zhik ($100K) to develop a plasma treatment process for high performance garments. This is the second phase of the project after a successful pilot trial.

GRANTS AND AWARDS

PhD student Xiao Chen received an IFM student travel award to work at the University of Bari, Italy developing his plasma processing skills and investigating the route for aerosol assisted plasma synthesis.

Rob Pow received a Vice-Chancellor's Professional Development award to attend an X-Ray diffraction training course at the International Centre of Diffraction Data, Philadelphia USA.

STUDENT COMPLETIONS

- David Rubin de Celis Leal – Doped nanostructured semiconductors produced by cold plasma combined with heat.

The group farewelled its leader, Dr Jane Dai, who retired in December. Dr Dai established the plasma facility at IFM and built a strong plasma research group. During her time at IFM she developed several original plasma technologies and built strong collaborations with other groups in Australia and overseas. She supervised more than 10 PhD students whose projects were all focused on solving a specific industrial challenge. Dr Dai initiated several ongoing industry projects and the plasma facility now provides a platform technology for the use of researchers at IFM and in other parts of the University.

Top: The plasma group with Prof Yakov Krasik (second from right in the front row). **Above right:** IFM Director, Prof Xungai Wang presents Dr Jane Dai with a gift on her retirement.

ADVANCED CHARACTERISATION FACILITY

- > Electron Microscopy
- > Nuclear Magnetic Resonance
- > X-Ray

ADVANCED CHARACTERISATION FACILITY

In 2016, IFM's advanced characterisation instruments were grouped together under the Advanced Characterisation Facility (ACF), which is led by Dr Ross Marceau and administered by a steering committee consisting of a cross-section of academic, technical and administrative staff.

The ACF committee provides direction for the effective operation and growth of the Electron Microscopy (EM), Nuclear Magnetic Resonance (NMR) and X-ray facilities. Located within IFM, the ACF is an open access facility that houses one of Australia's premier collections of advanced characterisation instruments for materials research.

ELECTRON MICROSCOPY

MEMBERSHIP ACCESS MODEL

A user-access model was introduced in 2016, which was based on a membership system and was designed to better manage the gap between existing central funding and the true cost to operate the facility. The success of the new system was encouraging, prompting the IFM Executive Committee to approve its continuation into 2017.

Deakin's EM facility has a strong focus on service and, as such, the throughput of researchers through our various training programs is of high importance. Users through the facility in 2016 numbered 150 staff and students (with 38 supervisors) in the following research areas:

IFM	134
Life and Environmental Science	8
School of Engineering	4
School of Medicine	3
Centre for Intelligent Systems Research (now ISRII)	1

In 2016, the following numbers of new users were trained in their respective areas of interest:

Scanning electron microscopy	37
Transmission electron microscopy	20
Focused ion beam microscopy	8
Atom probe tomography	4
Confocal microscopy	6

OUTREACH

The EM facility hosted instrument demonstrations for school students; one group from Bellarine Secondary College and two groups from Northern Bay College. The visits are part of the ASPIRE program, co-ordinated by Anna Darcey (Faculty of Arts and Education), which is a partnership between Deakin University and local Geelong schools aimed at increasing the aspirations of high achieving year 6 to 10 students.

PUBLICATION HIGHLIGHTS

- Xing, T., Mateti, S., Li, L.H., Ma, F., Du, A., Gogotsi, Y., Chen, Y. (2016) Gas Protection of Two-Dimensional Nanomaterials from High-Energy Impacts. *Scientific Reports* **6**, 35532.
- Adineh, V.R., Marceau, R.K.W., Velkov, T., Li, J. Fu, J. Near-Atomic Three-Dimensional Mapping for Site-Specific Chemistry of 'Superbugs' (2016) *Nano Letters* **16**, 7113–7120.

Left: Electron Microscopy manager, Rosey Squire.

NUCLEAR MAGNETIC RESONANCE

RESEARCH AND RESEARCH TRAINING

A large number of students from IFM, as well as the School of Life and Environmental Sciences (LES), have been inducted and trained for solution-state or solid-state NMR. There are currently around 80 trained users spread across the five NMR spectrometers, who are using NMR to investigate a diverse array of samples, including ionic liquids, polymers, carbon fibres, metabolites and natural products in fruit, as well as numerous compounds from organic syntheses.

The number of external users and collaborators continues to grow, and we have provided service work for three commercial/industry clients in the past year. We have hosted visitors from Macquarie University to trial the new JEOL console/interface, MRI expert Prof Melanie Britton (University of Birmingham, UK) who delivered a seminar titled "Magnetic Resonance Imaging of Electrochemical Devices" and Prof Robert Schurko (University of Windsor, Canada) who presented a seminar on "What can Solid-State NMR of Quadrupolar Nuclides tell us about Materials?".

NEW 400 MHZ CONSOLE

The 400 MHz JEOL console underwent a much-needed upgrade in March 2016 thanks to generous support from both IFM and LES. The package included a new broadband probe for solution-state and a new 8mm MAS probe for solid-state experiments and so increased the capabilities of this spectrometer. Twenty-six users have been trained to use the new instrument since its installation.

DYNAMIC NUCLEAR POLARISATION – A NEW NMR CAPABILITY

Following an ARC LIEF award of $800K, Australia's first dynamic nuclear polarisation (DNP) NMR spectrometer has been installed at University of Melbourne's Bio21 facility.

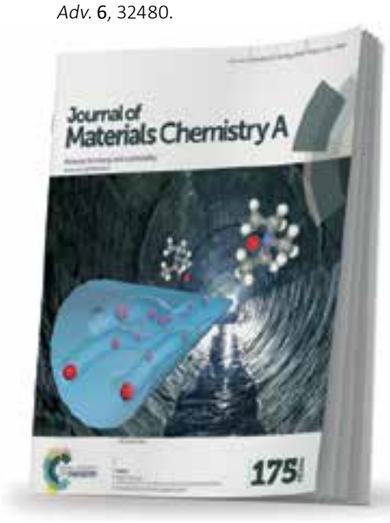
IFM researchers Dr Luke O'Dell and Prof Maria Forsyth played a key role in the grant application and Deakin is expected to be one of the major users of the instrument. DNP is a cutting edge technology that can provide huge sensitivity enhancements and opens the door to NMR characterisation of a much wider variety of samples. This capability will accelerate many of the IFM's NMR-based research projects.

PUBLICATION HIGHLIGHTS

Two recent NMR-based projects have been published as cover articles in the high-impact *Journal of Materials Chemistry A* and *ChemPhysChem.* The former work, led by Dr Haijin Zhu, used solid-state NMR to study the proton transport mechanism along nanochannels in a solid polymer electrolyte, while the latter paper by PhD student Cameron Pope used solution-state NMR and diffusion measurements to characterise ion interactions and dynamics in a sodium-containing ionic liquid designed for sodium battery technologies.

Elsewhere, PhD student Kathleen Beggs published her work on surface-functionalised carbon fibres in the journal *RSC Advances,* including results she obtained in the NMR lab. She showed that the use of microwave irradiation and an ionic liquid solvent can lead to improved functionalisation, resulting in stronger interfacial adhesion in the final composite material.

- Shah, A.H., Li, J., Yang, H., Rana, U.A., Ranganathan, V., Siddigi, H.M., MacFarlane, D.R., Forsyth, M. and Zhu, H. (2016) Enhancement of 'dry' proton conductivity by self-assembled nanochannels in all-solid polyelectrolytes. *J. Mater. Chem. A* **4**, 7615.
- Pope, C.R., Kar, M., MacFarlane, D.R., Armand, M., Forsyth, M. and O'Dell, L.A. (2016) Ion dynamics in a mixed-cation alkoxy-ammonium ionic liquid electrolyte for sodium device applications. *Chem. Phys. Chem.* **17**, 3187.
- Beggs, K.M., Perus, M.D., Servinis, L., O'Dell, L.A., Fox, B.L., Gengenbach, T.R., and Henderson, L.C. (2016) Rapid surface functionalization of carbon fibres using microwave irradiation in an ionic liquid. *RSC Adv.* **6**, 32480.



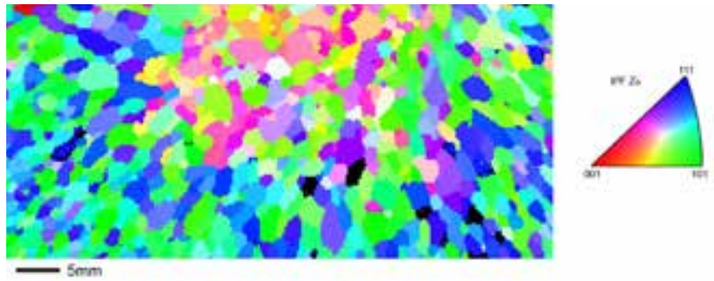
Top and right: Two recent NMR-based projects have been published as cover articles.

X-RAY

RESEARCH AND RESEARCH TRAINING

The X-ray characterisation facility within IFM continues to serve a large number of students and research staff from the School of Engineering, CSIRO and IFM. About 40 trained users are spread across the two X-ray diffraction (XRD) instruments. The primary goal of the X-ray suite is to support the main research areas across IFM: innovative manufacturing technologies and energy efficiency; resource and infrastructure sustainability. Consequently, the XRDs are used to better understand a diverse range of samples and sample formats. Throughout the year, X-ray diffraction has been routinely used for mineralogical phase identification, texture, residual strain and apparent crystallite size determination.

Growth has also continued across IFM in the application of synchrotron XRD and scattering methods. Peer reviewed beamtime proposals are aided by preliminary laboratory based measurements on the samples of interest.



In this context, data acquired from both lab XRDs have helped research staff and students across IFM to gain access to the Australian Synchrotron facility across four beamlines.

To meet the growing demands of research projects within IFM, new X-ray characterisation capabilities are being developed. Progress of the work to-date and relevant examples in each area are reviewed below.

2D X-RAY STUDIES

In 2016, a new 2D X-ray detector was purchased to extend the lifespan of the ageing PanAnalytical (PA) MRD XRD system. This new detector also offers interim support for projects requiring SAXS/WAXS characterisation capabilities. For future SAXS based measurements, the necessary hardware and engineering design is being finalised according to available project support and funding.

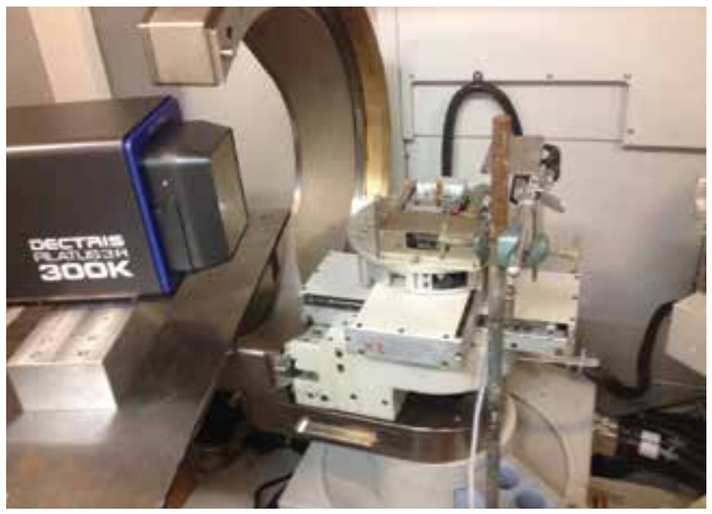
HIGH-ENERGY X-RAY SYSTEM

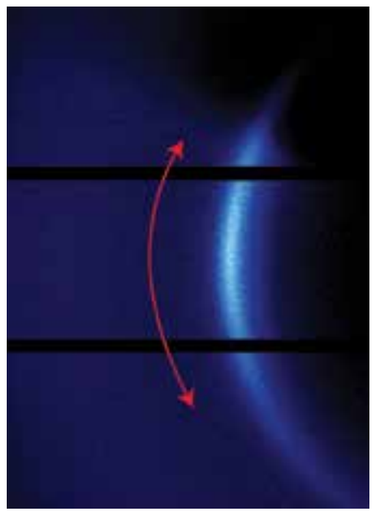
In October 2016 a laboratory based high-energy X-ray system was transported from CSIRO Clayton to Deakin (Waurn Ponds). The system is a joint CSIRO/Deakin facility and will support the growing need for X-ray characterisation beyond the current X-ray diffraction capabilities already available within IFM.

In the first instance, the system will be used to support the additive manufacturing, ARC Training Centre in Alloy Innovation for Mining Efficiency, and fibre/composite based projects. The newly arrived X-ray system can be configured in both a scattering and imaging modality.

A second application of the high energy X-ray system is for rapid microstructure characterisation in 3D additive manufactured samples. By application of the high energy, polychromatic X-ray source, grain-by-grain characterisation of the microstructure can be rapidly revealed.

Top: Large scale X-ray grain orientation map for a titanium billet. **Below (left):** Initial commissioning of the 2D X-ray detector; **(right)** WAXS fibre results showing the simultaneous acquisition of both equatorial and meridional X-ray data.





COLLABORATIVE CENTRES

- Australian Centre for Infrastructure Durability (ACID)
- ARC Future Fibres Hub
- Energy Pipelines CRC
- Excellerate Australia

AUSTRALIAN CENTRE FOR INFRASTRUCTURE DURABILITY (ACID)

Promoting a national platform for industry to access research in the area of infrastructure durability.

ACID has been established to connect industry with Australia's leading researchers and facilities for infrastructure durability to develop new solutions, technology and educational programs.

The prime objectives of ACID are therefore to provide expertise on a broad range of construction materials to ensure durability:

(i) Smarter maintenance through structural health monitoring and prediction.

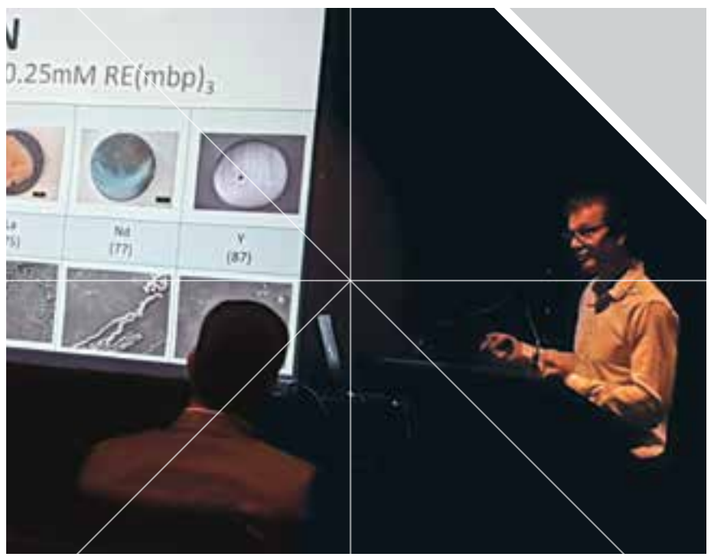
(ii) Novel mitigation strategies to manage degradation of infrastructure.

(iii) Advanced materials solutions to maximise life of new structures.

In 2016 we welcomed Monash University as a new ACID research partner and Prof Malek Bouazza as a research leader. Collaborations are underway on durability of landfill liners.

ACID research partners met for a planning meeting in Melbourne in May. Eleven research organisations, including Swinburne, RMIT, Monash, Queensland University of Technology, Curtin University, ANSTO, University of Sydney, University of South Australia and University of NSW plus a number of companies were represented. The number of partners has increased significantly over the past 12 months. This was the first time all the ACID partners had met together.

We have received Memorandums of Understanding from the following research partners: ANSTO (Lucas Heights and Synchrotron), Monash University, UNSW, Swinburne, UniSA, and RMIT.



PROJECTS

By the end of 2016, almost $500K in projects had been completed with $2.6 million in ongoing projects and $1.15 million in proposals submitted and under review. Current opportunities are being sought via Transurban, Metro Rail, ANSTO, and Defence Innovations.

SELF-FUNDING OF ACID

ACID's purpose is to provide a research resource on durability of engineering material. A recurring problem for industry is locating the source of durability research expertise across a range of materials, applications, and industries within Australian research organisations. Although Deakin has provided seed money to establish ACID, the vision is that much of the research generated will be undertaken either jointly (or entirely without Deakin) by other research organisations within ACID (depending on the type of research project and skill sets of the ACID members).

Following meetings in 2016 and feedback from research partners, we have put together a funding model which includes a number of levels of industry membership with different benefits and a small fee from research partners to cover administrative costs.

The ACID website has undergone major changes (www.acid.org.au). We have also created a video about ACID, which you can view on youtube (https://youtu.be/L3sISmP5_kM).

Top: Corrosion damage.
Left: Dr Anthony Somers talked about his research on corrosion inhibitors at the Australasian Corrosion Association conference in Auckland, New Zealand.

ARC FUTURE FIBRES HUB

The ARC funded Future Fibres Industrial Transformation Research Hub, an $8.7 million centre ($4.7m ARC, $3m industry, $1m Deakin), started operations on 31 May 2016, following the signing of the partner agreement.

The hub aims to accelerate the transformation of the Australian manufacturing industry by developing and enhancing fibre technologies. Five industry partners – HeiQ, Carbon Revolution, Quickstep Automotive, Draggin Jeans and Ear Science Institute Australia – help to realise this aim. Experts from CSIRO, Swinburne University of Technology and six international institutions also provide a valuable contribution to the hub's research program.

During the second half of 2016, the hub focused on establishing operational procedures, financial and reporting systems and building an online presence through a website and Twitter feed. The hub's advisory committee met for the first time, research projects were defined and staff have been appointed to undertake them.

RESEARCH

The hub contains three research streams, each with a range of research projects aligned with industry partners.

SHORT FIBRES AND NANOFIBRES

Three researchers joined the hub to work on developing the emerging short fibre and nanofibre industry in collaboration with HeiQ. Improving the fundamental understanding of how short polymer fibres are formed will enable the targeting of suitable new polymer systems and potential products. Furthermore, in-depth analysis of the properties of particular short fibre systems will open access to new applications and product markets.

CARBON FIBRE COMPOSITES

Two researchers are working with Carbon Revolution to investigate next generation materials for automotive wheels and another two are working with Quickstep Automotive to optimise the Quickstep manufacturing process, and the Resin Spray Transfer (RST) process.

HIGH VALUE-ADDED APPLICATIONS

An extension of previous research with Ear Science Institute Australia to develop a silk-based prosthetic device for damaged eardrum reconstruction is being undertaken in the hub. Additionally, the development of comfortable and abrasion resistant protective apparel is being carried out in collaboration with Draggin Jeans.

HIGHLIGHTS

Highlights of 2016 include:

- Hub Strategy day on 20 July where the Australia-based members met to discuss research projects and mutual interests.
- Official launch of the hub on 26 October by the Federal Member for Corangamite, Sarah Henderson MP, Deakin Vice-Chancellor Prof Jane den Hollander and ARC acting CEO Ms Leanne Harvey. The launch was held at Carbon Nexus and was well attended by hub members, IFM researchers, local industry and other guests.
- Introduction of the hub to the polymer and textile community through a range of presentations at conferences including: 36th Australasian Polymer Symposium, 1st Emerging Polymer Technologies Summit, 9th Textile Bioengineering and Informatics Symposium/6th Asian Protective Clothing Conference.

Top: The carbon fibre line at Carbon Nexus.
Left: Future Fibres Hub Launch (L-R): ARC acting CEO Ms Leanne Harvey; Hub Director, Prof Xungai Wang; HeiQ Australia CEO, Dr Murray Height; Federal Member for Corangamite, Ms Sarah Henderson MP; Carbon Revolution CEO, Jake Dingle; Draggin Jeans Operations Manager, Nathan Edwards; Quickstep CEO, David Marino; Deakin DVCR Prof Peter Hodgson; Deakin VC, Prof Jane den Hollander.

ENERGY PIPELINES CRC

The Energy Pipelines CRC (EPCRC) was established in 2010 to provide research and education to support and benefit Australia's energy pipeline industry.

Deakin University leads program 2 on coatings and corrosion, which is headed by Prof Mike Tan. Significant progress was made on existing major research projects in 2016, with major outcomes highlighted at the EPCRC Forum held in Adelaide in November 2016. Major ongoing research and industry projects include:

- Cathodic shielding and corrosion under disbonded coatings ($318K over three years).
- Pipeline condition monitoring sensors ($489K over three years).
- Methods for assessing coating integrity and cathodic protection efficiency under complex pipeline conditions ($308K over three years).
- Predicting pipeline failure through corrosion modelling ($114K over three years).
- Understanding stress corrosion cracking initiation on gas pipelines – phase II ($170K).
- Evaluating cathodic protection on shore-crossing pipelines ($60K over one year).
- A total 18 pipeline coating testing and assessment industry projects (ongoing, approximately $100K over the year).

Deakin pipeline research has so far influenced several Australian industry standards, including the revision of AS 4822 - External field joint coatings for steel; the revision of AS 2832.1, cathodic protection of metals, Part 1: Pipes and cables.

Deakin's corrosion sensor research has led to the practical installation of four localised corrosion sensor systems for the structural health monitoring of buried pipelines.

We received an Excellence in Innovation award from the Cooperative Research Centres Association (CRCA) in recognition of the development of the National Facility for Pipeline Coatings Assessment (NFPCA). At an awards dinner held on the 8 March 2016, CRCA CEO Prof Tony Peacock congratulated the Energy Pipelines CRC and the NFPCA team for their quality contribution to Australia's Innovative future.

The NFPCA brings together an independent facility for companies to test and evaluate pipeline coatings with a capability to support innovative research into coating performance. As the only independent commercial pipeline coating testing facility in Australia, it fills an important need for the Australian pipeline industry. The NFPCA is considered to be of great value to local industry as pipeline coatings are the primary method of protecting buried pipelines against corrosion and costly pipeline failure.

The ability to select, assess and independently verify pipeline coatings is key to their success in service. The NFPCA has so far supported a total of 10 EPCRC funded research projects with a total funding of approximately $3.5m, and will support future world class research in this important industry and engineering research area at Deakin. The coating facility is also being used by other members of the IFM metals group to perform salt spray testing for Bluescope Steel.

The NFPCA has received NATA accreditation, providing customers further confidence in the quality and accuracy of tests carried out within the facility. This helps the NFPCA continue to expand on its research and testing capacities as continuing to develop commercial relationships and providing a quality service to the Australian pipeline industry.

In November 2016 the NFPCA completed its internal audit by an approved NATA auditor.

Top: Corrosion is a major issue for Australia's 35,000km gas pipeline network. **Above:** PhD student Ying Huo gained some practical experience on an industry placement to detect corrosion in gas pipelines.

EXCELLERATE AUSTRALIA

Excellerate Australia (formerly the AutoCRC) has been funded until 2017 to implement the Auto 2020 roadmap for Australia. The aim is to transform the Australian automotive industry from being an innovation follower to a technology provider for the Asian region in strategic areas.

IFM is the lead institute for the lightweighting theme in Excellerate Australia's sustainable manufacturing research area.

DEVELOPMENT OF A LOW-COST COMPOSITE FRONT SEAT BACK

This project is an extension on the previous Auto-CRC composite seat structure development project with industry partner Futuris, which successfully delivered a carbon fibre composite seat back structure that achieved:

- A 69% reduced mass compared to the current steel seat frame
- An approximately 40% reduction in part count through increased part integration
- Passed current rearward pull test by about 25%.

In addition to the above achievements, the composite front seat back enables improved styling and design freedom that enhances aesthetic appeal and comfort. Finally, this project successfully established and built the composite design and manufacturing capability within Futuris, an important requirement for future company growth.

The continued development of the front seat back product will focus primarily on reducing costs through materials and component design that also enables higher production volumes.

These aims will be achieved through a two phase approach described below:

- Design optimisation of the front seat back
- Utilisation of lower cost materials and fabrication methods that maintain performance criteria.

This will be followed by a final demonstrator to complete the project.

BAMBOO COMPOSITES FOR AUTOMOTIVE COMPONENTS

Plastic and composite materials significantly improve the weight reduction of cars but at the end of the vehicle's life these components are buried in landfills where it takes thousands of years to degrade.

The aim of Erwan Castanet's research project is to use a bamboo reinforced polylactic acid (PLA) bio-composite to overcome this issue. The main problem with using bio-composites is the interfacial adhesion between the fibre and the matrix which has been addressed by coating the surface of bamboo fibre with an amphiphilic block copolymer of polyethylene glycol and PLA ([PEG-PLA]) resulting in a significant improvement of the overall mechanical properties of the final bio-composite.

Top: Bamboo fibres - being used in bio-composites for vehicle components. **Left:** PhD student Erwan Castanet is exploring the properties of bio-composites made from bamboo fibre and polylactide biopolymer.

LOW COST AUTOMOTIVE GRADE PAN BASED CARBON FIBRES

This collaborative project between Deakin University and the Ford Motor Company is developing a time/cost-optimised process for creating Polyacrylonitrile (PAN)-based carbon fibres for use in producing automotive components in large-scale production.

The use of lightweight materials, such as carbon fibre composites, in vehicle construction assists in reducing weight to achieve better fuel economy while reducing greenhouse gas emissions. However, the cost of carbon fibre needs to be significantly lowered to be widely accepted by the automotive industry.

A key factor in the cost of carbon fibre is the manufacturing process. Stabilisation or oxidation is considered one of the most complex carbon fibre manufacturing steps. Using the pilot-scale line at Carbon Nexus enables the analysis of various process parameters used in the oxidation ovens that make up the process of stabilisation. Since stabilisation is typically the most time consuming stage in the manufacture of carbon fibre, any improvement in process conditions will lead to a significant reduction in energy consumption in the carbon fibre process, which, in turn, results in development of low cost carbon fibre via reducing the manufacturing cost.

INDUSTRY PARTNERS

AUSTRALIA

Advanced Metallurgical Solutions Pty Ltd
AECOM
ALS Global Pty Ltd
AMOG Engineering
Anti Corrosion Technology
ArcActive Ltd
Atteris
AusComposites Manufacturing Facility
Austmine Ltd
Austral Services Group
Australia Defence Apparel
Australian Foundry Institute
Australian National Fabrication Facility
Australian Pipeline Industry Association
Australian Roll Forming Manufacturers (ARM)
Australian Wool Innovation Ltd
APA Group
Backwell IXL
BHP Billiton
Bluescope Steel Pty Ltd
Capral Ltd
Carbon Revolution Pty Ltd
Carpenter Technology Corporation
Cast Bonding Australia Pty Ltd
Charles Parsons Pty Ltd
CleanTeq Ltd
Cotton Research and Development Corporation
CPE Systems Pty Ltd
CSL Ltd
Cytomatrix Pty Ltd
Defence Materials Technology Centre
Defence Science Technology Group
Delaminating Resources Pty Ltd
Denso (Australia) Pty Ltd
Draggin Jeans Pty Ltd
Ear Science Institute Australia Incorporated
Eco2000 Pty Ltd
Eden Energy Ltd
ELG Carbon Fibre
Energy Pipelines CRC
EP Robinson Pty Ltd
Excellerate Australia (formerly Auto CRC)
Ford Motor Company
Futuris Pty Ltd
Gale Pacific Ltd
Galvanisers Association Australia
Geelong Abrasive Blaasting
Gekko Systems Pty Ltd
Geofabrics Australasia Pty Ltd
Godfrey Hirst Carpets
GT Recycling
HeiQ Australia
Honda R&D Co. Ltd
Horizon Fuel Cells Technologies
Hydrochem Pty Ltd
Hycast Metals Pty Ltd
IXL Metal Castings
Jemena
Keech Castings Australia Pty Ltd
Materials Solutions Pty Ltd
McConnell Dowell
METS Ignited Australia Ltd
MPC Group
Murphy Pipe & Civil Constructors (Aust) Pty Ltd
Nacap Australia
NanoCarbon Pty Ltd
Newcrest Mining Ltd
Nplex Pty Ltd
Planet Innovation
PPG Industries Australia Pty Ltd
Qenos Pty Ltd
QIC Protective Coatings
QuickStep Technologies Pty Ltd
ROC Oil (WA) Ltd
Rockingham Desalination Research Facility
Rural Industries R&D Corporation
Santos Geelong Pty Ltd
Seagas
Shell Refinery (Australia) Pty Ltd
Shinil Chemical Company
Stockbrands Co. Pty Ltd
Studco Building Systems
Sussex Materials Solutions
ThyssenKrupp Mannex Pty Ltd
Trelleborg Engineered Systems Australia Pty Ltd
United Surface Technologies Pty Ltd
Universal Corrosion Coatings
Weir Minerals Australia Pty Ltd
Zhik Pty Ltd

INTERNATIONAL

Baosteel (China)
Bharat Forge (India)
The Boeing Company (USA)
Carpenter Technology Ltd (USA)
Chinese Iron and Steel Research Institute
Cytec (Canada)
Data M Sheet Metal Solutions (Germany)
Donaldson Co. (USA)
Dongfang Turbine Co. (China)
DowAksa (Turkey, USA)
Esquel (China)
Ford USA
General Motors (USA)
HeiQ Materials AG (Switzerland)
Holding Company Composites (Russia)
Hydro-Quebec (Canada)
Hyundai Motor Company (South Korea)
Jiangsu Shisong New Material Technology Co. Ltd (China)
LG Chem Ltd (Korea)
Logistik Unicorp (Canada)
Multimatic (Canada)
Metallicum Inc (USA)
Office of Naval Research – Global (USA)
Polygauss Ltd (UK)
POSCO (South Korea)
SABIC Global Technologies (Saudi Arabia)
Safran Power Units (France)
Seeyao Electronics Company Ltd (China)
Shangdong Ruyi Woollen Textile Co. Ltd (China)
Sichuan ShangZhiDeng New Materials Co. (China)
Stora Enso Oyj (Finland)
Straumann Pty Ltd (Switzerland)
Tata Steel (India)
Tecnalia (Spain)
Terves Inc (USA)
Toyota Motor Engineering & Manufacturing (USA)
Universal Alloy Corporation (USA)
US Air Force Office of Scientific Research (USA)
US Asian Office of Aerospace Research and Development (USA)
US Army International Technology Center, Pacific (USA)
Wuhan Iron & Steel (Group) Corporation (China)
Yuntong Nanomaterials Technology Co. Ltd (China)

FINANCIAL REPORTS AND OTHER ITEMS

IFM FINANCIAL SUMMARY 2016

TOTAL RESEARCH INCOME BY CATEGORY - ACTUAL 2016 ($M)

FINANCIAL SUMMARY - FOR PERIOD ENDED 31 DECEMBER 2016	2016 Actual $
INCOME	
Research Income	13,719,344
Other Income	448,700
Research Allocation / University Contribution	15,047,631
Total Income	**29,215,675**
EMPLOYMENT COSTS	
Academic Salaries	13,524,112
General Salaries	5,631,967
Other Employment Costs	38,998
Contractors	45,058
Total Employment Costs	**19,240,135**
NON SALARY EXPENSES	
Buildings and Grounds Infrastructure Costs	411,260
Communication / Advertising, Marketing and Promotions	114,649
Consumables	1,207,685
Depreciation and Amortisation	1,912,065
Equipment - Repairs, Maintenance and Other Costs	1,695,998
Other Costs	1,493,930
Professional, Legal and Consultants	200,778
Staff Recruiting, Training and Other / Library Information Resource Expenses	339,639
Student Expenses	1,667,390
Travel, Catering and Entertainment	932,145
Total Non Salary Expenses	**9,975,540**
Surplus/(Deficit)	**0**

IFM PERFORMANCE (2014-2016)

HDR STUDENT LOAD (EQUIVALENT FULL TIME, 2014 - 2016)

2014	2015	2016
144.0	143.1	142.2

HDR STUDENT COMPLETIONS (EQUIVALENT FULL TIME, 2014 - 2016)

2014	2015	2016
23	30	36

PUBLICATIONS* (2014 - 2016)

2014	2015	2016
307	260	334

**Refers to number of journal articles.*

2016 GRANT APPLICATIONS

GRANTS	APPLIED	SUCCESSFUL	% SUCCESS	AMOUNT AWARDED
Reportable - Category 1	27	6	22%	$257,798
Reportable - Category 2 - 4	53	46	87%	$3,314,385
Non-reportable - Other	9	3	33%	$2,800

The amount awarded represents the amount awarded over the total life of the project as initially communicated by the funding agency.

***ACG (Australian Competitive Research Grants - Category 1)** is the term used to describe a group of some 70 research grant schemes to which all universities can apply and where awards are based on merit of the application and the research team. The ARC and NHMRC are two of the major funding bodies included in this list.*

***Other public (Other Public Sector Research funding - Category 2)** is government funding, Federal or State, from schemes not included in the ACG group and not necessarily determined through a competitive process; it includes contract research and research-related consultancies.*

***Industry (Industry and Other Funding - Category 3)** includes all research funding from industry, international sources, donations, bequests and foundations, and Higher Degree by Research fee income for domestic and international students.*

***CRC (Category 4)** is a university's research income from Cooperative Research Centres excluding their own contribution.*
Note: CRC income is based on financial year results.

GRANT HOLDERS AND THEIR PROJECTS

TEAM	PROJECT TITLE	YEARS	INDUSTRY PARTNER / FUNDING BODY	TOTAL AWARDED ($AU ,000)
AUSTRALIAN RESEARCH COUNCIL				
Australian Research Council Industrial Transformation Research Hub				
Prof Xinhua Wu, Prof Peter Hodgson, Prof Christopher Davies, Dr Wenyi Yan, Dr Mark Easton, Prof Yi-Bing Cheng, A/Prof Matthew Dargusch, A/Prof Bernard Rolfe, Prof Lyndon Edwards, Mr Damien Miller, Mr Gavin Becker, Dr Emilie Herny, Dr Robert Hobbs, Dr Roger Lumley, Mr Thomas Hawkes, Mr Kevin Lee	ARC Research Hub for Transforming Australia's Manufacturing Industry through High Value Additive Manufacturing led by Monash University	2013-2018		1,321
Prof Xungai Wang, Prof Bronwyn Fox, Prof Tong Lin, Prof Russell Varley, A/Prof Joselito Razal, A/Prof Jingliang Li, A/Prof Luke Henderson, Dr Nolene Byrne, Dr Rangam Rajkhowa, Dr Alessandra Sutti, Dr Minoo Naebe, Dr Christopher Hurren, Dr Mandy De Souza, Dr Murray Height, A/Prof Mark Kirkland, Mr Ashley Denmead, Mr Salwan Al-Assafi, A/Prof Rodney Dilley, Prof Marcus Atlas, Mr Grant Mackintosh, Dr Ian Blanchonette, Dr Linda Hillbrick, Dr Tony Pierlot, Prof Gregory Rutledge, A/Prof Friedrich Vollrath, Prof David Kaplan, Prof Uwe Pieles, Dr Rudolf Hufenus, A/Prof Jeffrey Wiggins	A World Class Future Fibre Industry Transformation Research Hub	2016-2021	HeiQ Pty Ltd, Carbon Revolution Pty Ltd, Quickstep Automotive Pty Ltd, Ear Science Institute Australia Inc, Draggin Jeans Pty Ltd, CSIRO	4,745
A/Prof Wenhui Duan, Prof Sritawat Kitipornchai, Prof Aibing Yu, Prof Priyan Mendis, Prof Vute Sirivivatnanon, Prof Sujeeva Setunge, Dr Chao Chen, Prof Qipeng Guo, Prof Bijan Samali, Prof Guowei Ma, Dr David Law, Prof Chun-Qing Li, Prof Zhong Tao, Dr Rackel San Nicolas, Dr Wengui Li, Dr Kwesi Sagoe-Crentsil, Dr Warren South, Prof Tongbo Sui, Dr Phillip Arena, Prof Jannie Van Deventer, Mr Thomas Hanly, Dr Richard Yeo, Mr Brian O'Donnell, Dr Ming Zhou, Mr Nelson Hiscock, Mr Bill Martin, Dr Steve Pascoe, Mr Roland Davies, Dr Yew-Chin Koay, Mr Joel Brown, Mr Fraser Tonner, Prof Surendra Shah, Prof Chien Ming Wang, Dr Redmond Lloyd, Dr Louise Keyte, Mr William Thompson, A/Prof Claire White, Mr Stephen Darwell	ARC Research Hub for Nanoscience-based Construction Material Manufacturing, led by Monash University	2016-2021	Boral Construction Materials Ltd, CSR Building Products Ltd, Cement Concrete & Aggregates Australia, Sinoma International Engineering Co Ltd, Zeobond Research Pty Ltd, Advanced Material Group, Fortis Adhesives & Coatings Pty Ltd, ARRB Group Ltd, Centre For Pavement Excellence Asia Pacific Ltd, Jiangsu Rongchang Group, Markham Global, AGL Loy Yang Pty Ltd, Energy Australia Pty Ltd, Adbri Masonry Pty Ltd, Roads Corporation, Airey Taylor Pty Ltd, Argos FRP Pty Ltd	5,000
Australian Research Council Industrial Transformation Training Centre				
Prof Matthew Barnett, Prof Peter Hodgson, Dr Daniel Fabijanic, Prof Ming-Xing Zhang, Dr Jeffrey Gates, Prof Christopher Hutchinson, Dr Christopher Solnordal, Dr Balamurali Hebbar Majil, Mr Kuno Brautigam, Mr Tony Klein, Mr Alexander Lewis-Gray, Mr Kevin Dolman	ARC Training Centre in Alloy Innovation for Mining Efficiency	2017-2022	Keech Castings Aus, Gekko Systems, Weir Minerals, IXL Metal Castings, Cast Bonding Aus, Hycast Metals, Trelleborg Engineered Systems Aus, Newcrest Mining, CSIRO, Central Institute of Mining, Austmine Limited, METS Ignited Australia, Materials Solutions, Australian Foundry Institute	4,881
Prof Chun Wang, Prof Adrian Mouritz, Prof Stuart Bateman, Prof Mark Easton, Prof Milan Brandt, A/Prof Martin Leary, Prof Michael Cardew-Hall, A/Prof Paul Compston, Dr Matthew Doolan, Prof Matthew Barnett, A/Prof Bernard Rolfe, Dr Matthias Weiss, Dr Minoo Naebe, Dr Luke Henderson, Mr Richard Taube, Dr Bita Ghaffari, Dr Nia Harrison, Dr Adam Best, Dr Russell Varley, Dr Richard Evans, Mr Henry Wolfkamp, Mr Brian Hughes, Mr Carl De Koning, Mr Richard Axe, Mr Edward Albert, Mr Brian Oxley, Mr Albert Sedlmaier, Prof Anthony Kinloch, Prof Michael Wisnom, A/Prof Paul Sanders, Prof Dr Marion Merklein	ARC Training Centre in Lightweight Automotive Structures (ATLAS), led by RMIT University	2016-2021	Ford Motor Company of Australia, Australian Rollforming Manufacturers, Composite Materials Engineering, Quickstep Automotive, Capral Aluminium, MTM Pty Ltd, CSIRO, Data M Sheet Metal Solutions, Shape Corporation	3,024
Australian Research Council Linkage Infrastructure Equipment and Facilities (LIEF)				
Prof Justin Zobel, Prof Michael Parker, Prof Andrew Ooi, Prof Richard Sandberg, A/Prof Andrew Lonie, Prof Salvy Russo, Prof Toby Allen, Prof Irene Yarovsky, Prof Tiffany Walsh, Prof John Grundy, Prof Maria Forsyth, Prof Brian Smith	A high-performance cloud resource for computational modelling, led by University of Melbourne	2017		635
Prof Paul Richard Munroe, Prof Chennupati Jagadish, Prof Paul Mulvaney, Prof Dougal McCulloch, Dr Scott Findlay, Dr Joanne Etheridge, Olga Shimoni, Dr Nagarajan Valanoor, Prof Yun Liu, A/Prof Jeffrey McCallum, A/Prof Sharath Sriram, Dr Jian-Feng Nie, Prof Leone Spiccia, Prof Michael Fuhrer, Prof Matthew Barnett	UltraTEM: To resolve the structure of matter in space, energy and time, led by Monash University	2017		1,800
Australian Research Council Linkage				
Prof Peter Hodgson, Prof Nick Birbilis, A/Prof Nicole Stanford, Dr Thomas Dorin, Dr Justin Lamb, Mr John Carr, Mr Victor Dangerfield	Development of novel high performance aluminium alloys containing scandium	2016-2018	Universal Alloy Corporation, Clean TeQ Ltd	400
Dr Daniel Wilkosz, Mr Richard Taube, Mr Henry Wolfkamp, A/Prof Bernard Rolfe, Prof Peter Hodgson, Dr Matthias Weiss	Micro-roll forming of metal bipolar plates for fuel cells	2015-2018	Australian Rollforming Manufacturers, Ford Motor Co Australia	212
A/Prof Rimma Lapovok, Prof Andrey Molotnikov, Dr Christopher Davies	Innovative aluminium extrusion: increased productivity through simulation	2015-2018	Capral Ltd	285

TEAM	PROJECT TITLE	YEARS	INDUSTRY PARTNER / FUNDING BODY	TOTAL AWARDED ($AU ,000)
Australian Research Council Linkage (continued)				
Mr Gregory H Solomon, Dr James McInnes Middleton, Dr Will Peter Gates, Prof Frank Collins	Concrete Enriched with Carbon Nanotubes for Advanced Future Construction	2015-2017	Eden Energy Ltd	372
Prof Malek Bouazza, Dr Will Gates	Waste containment lining systems for Antarctica: Ensuring their performance under extreme conditions	2015-2017	Geofabrics Australasia	125
Prof Xungai Wang, Dr Alessandra Sutti, Dr Rangam Rajkhowa, Dr Cynthia Wong, A/Prof Mark Kirkland	Short silk nanofibre based 3D scaffolds with enhanced biomimicry	2014-2017	Cytomatrix	696
Prof Peter Hodgson, Prof Stephen Gray, Prof Lingxue Kong, A/Prof Mikel Duke, Dr Ludovic Dumee, Mr Gilbert Erskine	Functional nano-porous metal membranes for novel separations in sustainable industrial processes	2014-2017	Advanced Metallurgical Solutions Pty Ltd	550
Prof Q Ma, Prof Y Chen, Mr G Erskine, Mr C Zhang	A transformational approach to enabling the low-cost fabrication of intricate titanium components	2014-2016	Advanced Metallurgical Solutions Pty Ltd, Chongqing Dien Scientific Technology Devpt Co Ltd	420
A/Prof Michael Ferry, A/Prof Nicole Stanford, Prof Peter Hodgson	Reducing the environmental impact of steel making through direct strip casting	2013-2016		90
Australian Research Council Discovery				
Prof Peter Hodgson, A/Prof Nicole Stanford, Dr Ross Marceau	Cluster hardening of metastable steel alloys produced by thin strip casting	2015-2018	ARC	333
Prof Michel Armand, Dr Alexey Glushenkov, A/Prof Patrick Howlett, Prof Maria Forsyth	Advanced Na battery technology; key to transforming society's energy use	2015-2018	ARC	621
Dr Laurence Aldridge, A/Prof Daniel Pickard, Dr Kapila Fernando, Prof Frank Collins, Dr Will Gates	Cementitious Gel: The Missing Link in Understanding the Ageing of Built Infrastructure	2015-2017	ARC	340
Dr Ilana Timokhina, Prof Peter Hodgson, Prof Michael Miller	A new approach to advanced steels via cluster and precipitate strengthening	2015-2017	ARC	325
Prof Ying Chen, A/Prof Chunyi Zhi	Porous nanosheets	2015-2017	ARC	325
A/Prof. P. Howlett, A/Prof. J. Pringle, Dr. G.W. Greene, Prof. M. Armand	Novel ionic composites with superior transport and mechanical properties for clean energy system	2014-2016	ARC	270

TEAM	PROJECT TITLE	YEARS	INDUSTRY PARTNER / FUNDING BODY	TOTAL AWARDED ($AU ,000)
Australian Research Council Discovery (continued)				
Prof Tong Lin, Dr J Fang, Prof Liming Dai	Segmental fibres having periodically-repeating multicomponent segments from T-junction microfluidic electrospinning	2014-2016	ARC	309
Dr Hongxia Wang, Dr Yan Zhao, Prof Gregory Rutledge	Water-phase Assembly of Durable, Superamphiphobic, Self-cleaning Surfaces	2015-2017	ARC	238
Dr Christopher Hutchinson, Prof Matthew Barnett, Prof Alexis Deschamps	A new paradigm for creating fatigue-resistant light metals- Monash University	2015-2018	ARC	120
A/Prof Jenny Pringle, Adj/Prof Anthony Hollenkamp, Prof Peter Bruce	Increasing solid electrolyte conductivity through defect design	2017-2019	ARC	322
A/Prof Joselito Razal, Dr Maryam Naebe, Prof Xungai Wang	Understanding the true potential and limitations of novel fibres	2017-2019	ARC	278
Australian Research Council Discovery Early Career Researcher Awards				
Dr Luhua Li	Superior Adsorption Capability of Nanosheets for Surface Enhanced Raman	2016-2018	ARC	379
Dr Dan Liu	Novel Three Dimensional Porous Boron Nitride Foam for Water Cleaning	2015-2017	ARC	340
Australian Research Council Australian Laureate Fellowship				
Prof Maria Forsyth	New materials for a sustainable energy future	2011-2016	ARC	2,260
Australian Research Council Future Fellowship				
Prof Tong Lin	Piezoelectric nanofibre membranes with built-in p-n junction: new self-rectifying piezoelectric power generators	2012-2016	ARC	747
A/Prof Joselito Razal	Spinning nanosheets for versatile applications	2014-2017	ARC	749
A/Prof Jingliang Li	Supramolecular assembly of chromophores: the effects of nucleation kinetics on their molecular packing, fibre structure and light harvesting efficiency	2014-2017	ARC	692

TEAM	PROJECT TITLE	YEARS	INDUSTRY PARTNER / FUNDING BODY	TOTAL AWARDED ($AU ,000)
Australian Research Council Centre of Excellence				
Prof G.G. Wallace, Prof G. Spinks, Prof S. Dodds, Prof M. Forsyth, Prof D. R. MacFarlane, Prof M. Cook, Prof D. Officer, Prof S. Moulton, Prof G. Alici, Prof M. in het Panhuis, A/Prof P. Innis, A/Prof J. M. Crook, Prof M. Coote, A/Prof M. Higgins, A/Prof A. Mozer, Prof R. Kapsa, Prof L. Hancock, Prof L. Spiccia, A/Prof J. Pringle, A/Prof P. Howlett, Prof X. Wang, Prof B. Paull, Prof R. Sparrow, Dr J. Zhang	ARC Centre of Excellence for Electromaterials Science, led by University of Wollongong	2014-2020	ARC	4,537
CSIRO				
Prof Lingxue Kong	CSIRO Postgraduate Scholarships - Manufacturing - Aref Daneshfar	2016-2019	CSIRO	51
Dr Minoo Naebe	Preparation of ceramic composites targets for ballistic testing	2016	CSIRO	8
Defence Science & Technology Organisation (DSTO)				
Prof Tong Lin, Dr Hua Zhou, Dr Hong Wang	Development of functional coatings for repelling low surface-energy, high permeability and solubility chemical fluids	2015-2016	DSTO	30
Prof Maria Forsyth, Dr Peipei Huang, Dr Timothy Khoo	Multifunctional inhibitors for migration of microbiologically influences corrosion	2015-2016	DSTO	100
Prof Maria Forsyth	Ionic liquid electrolytes	2014-2016	DSTO	60
A/Prof R Lapovok, Dr I Timokhina	New Energy-Saving Method of Swarf Upcycling into Titanium Alloys with Enhanced Properties'	2016-2017	DSTO	30
Dr Peter Lynch, Dr Sitarama Kada	Scoping study for optimal experimental setup and determining microstructural deformation from damaged Aluminium specimen using X-ray diffraction methods	2016-2017	DSTO	9
Dr Grant McAdam, Neil Wayne, Prof Maria Forsyth, Mr Anthony Somers	Development and understanding of multi-functional corrosion inhibitor systems for high strength steels in sea water	2016-2017	DSTO	95

TEAM	PROJECT TITLE	YEARS	INDUSTRY PARTNER / FUNDING BODY	TOTAL AWARDED ($AU ,000)
OTHER COMMONWEALTH FUNDING				
Prof Peter Hodgson	Manufacture of a small aero-engine entirely through additive manufacturing	2013-2017	Science and Industry Endowment Fund (SIEF)	600
Ms Seyedeh Azam Oroumei	Development of low-cost and high performance carbon fibre	2017	Dept Education and Training Endeavour Research Fellowship	18
Dr Haijin Zhu	Novel poly(ionic liquid)/ plastic crystal composites as an alternative approach for anhydrous proton conductors	2017	Dept Education and Training Endeavour Research Fellowship	24
Dr Daniel Fabijanic, Dr Minoo Naebe	Towards copper-free friction materials	2016-2017	Dept Industry Innovation and Science Global Innovation Linkages, FMP Group Australia Pty Ltd	99
Dr Mary She, Dr Ludovic Dumee, Prof Lingxue Kong	Development of robust and cost effective super hydrophobic surfaces for PP fabrics	2016-2017	Dept Industry Innovation and Science Global Innvoation Linkages, Gale Pacific Ltd	100
Prof Lingxue Kong, Dr Mary She, Prof Frank Collins	Transforming carpet waste into a commercial admixture for concrete	2016-2017	Dept Industry, Innovation and Science Global Innovation Linkages, GT Recycling	99
Prof Maria Forsyth, A/Prof Patrick Howlett, Prof Douglas MacFarlane, Prof Ying (Ian) Chen	New materials for large scale, high stability, high energy density batteries: from material design to prototype development	2016-2019	Australia India Strategic Research Foundation	1,000
A/Prof R. Lapovok, Dr I. Timokhina, Dr J. Wang	Enhanced properties of TWIP steels by asymmetric rolling	2016-2018	Universities Australia/ German Academic Exchange Service (DAAD)	24
Australian Institute of Nuclear Science and Engineering (AINSE)				
Dr Ludovic Dumee, Mr Francois-Marie Jacques Allioux, Prof Peter Hodgson	Revealing nanoscale interactions and electro-migration mechanisms during desalination by electro-dialysis in mixed solvents by SANS	2015-2017	AINSE grant - postgraduate research award	22
Mr Jamie Lee Gilbert, Dr Minoo Naebe, Prof Bronwyn Fox	Structure property relationships in thermoplastic nanocomposites	2015-2016	AINSE grant - postgraduate research award	8
Mr Guang Wang, Prof Lingxue Kong	Reorientation of mesochannels templated from hexagonal lyotropic liquid crystals under electric field and its structure reconstruction	2015-2016	AINSE grant - postgraduate research award	6
Dr Ludovic Dumee, Mr James Maina	Inorganic nanoparticles/ metal organic frameworks hybrid membrane reactors for simultaneous separation and conversion of CO_2	2016-2018	AINSE grant - postgraduate research award	22

TEAM	PROJECT TITLE	YEARS	INDUSTRY PARTNER / FUNDING BODY	TOTAL AWARDED ($AU ,000)
INDUSTRY AND OTHER FUNDING				
Prof Tiffany Walsh	Molecular Simulation of Interactions between von Willebrand Factor and Factor VIII	2015-2016	CSL Ltd	20
Dr Alessandra Sutti, Dr Paul Collins	HeiQ Australia Research Program 2014/15	2015-2019	HeiQ Australia Pty Ltd	1,833
Dr Jin Zhang, Dr Christopher Hurren, Prof Xungai Wang	Smart cotton/ carbon fabrics for electromagnetic interference shielding	2015-2018	Cotton Research and Development Corporation	358
Prof Xungai Wang	Novel spinning technologies for fine and high quality Australian cotton yarns	2014-2017	Cotton Research and Development Corporation	814
Prof Xungai Wang, Dr Rangam Rajkhowa	Improving length, strength and fitness of cotton fibre, PhD project	2013-2016	Cotton Research and Development Corporation	138
A/Prof Olga Troynikov, Dr Ron Denning, Prof Xungai Wang, Dr Maryam Naebe	Breathable cotton for compression athletic wear	2015-2017	Cotton Research and Development Corporation	332
Dr Xin Liu, Dr Yan Zhao	Novel anti-wetting and self-sterilising cotton fabrics	2014-2017	Cotton Research and Development Corporation	299
Dr Nolene Byrne	Identifying technical benefits in producing regenerated cellulose fibres from cotton for carbon fibre production	2016-2017	Cotton Research and Development Corporation	28
Dr Stuart Gordon, Dr Rangam Rajkhowa	An eco-friendly treatment to improve look and handle of cotton fabric	2016-2018	Cotton Research and Development Corporation	222
Dr Ludovic Dumee, Dr Mary She, Prof Lingxue Kong	Evaluation of the mechanical and chemical stability of recycled tarp products after cold-cryo treatments	2016	Gale Pacific Ltd	11
Dr Alessandra Sutti	Production of short fibres from melt and process modelling - Martina Di Venere	2016-2020	HeiQ Australia Pty Ltd	9
Prof Jeong Yoon	Thermo-mechanical deformation model for hot rolling process (Phase-I)	2016-2017	Hyundai	68

TEAM	PROJECT TITLE	YEARS	INDUSTRY PARTNER / FUNDING BODY	TOTAL AWARDED ($AU ,000)
INDUSTRY AND OTHER FUNDING (CONTINUED)				
Dr Hongxia Wang, Dr Hua Zhou, Prof Tong Lin	Functional Innovations for Merino wool II: Low-temperature curing of water-resistant coatings and screen-printing of directional water-transport wool	2015-2016	Australian Wool Innovation Ltd	90
Dr Jinfeng Wang, Dr Jing Wang	Body odour intensity of wool/polyester blends	2017	Australian Wool Innovation Ltd	100
Dr Dr Jane Dai, Dr Zhiqiang Chen, Dr Kevin Magniez	Development of plasma treatment process for Zhik high performance garments Stage 1	2016	Zhik Pty Ltd	19
Prof Matthew Barnett, Dr Daniel Fabijanic, Mr Gourab Saha	A method for developing steels for wear resistance in ground engaging applications	2013-2019	Keech Australia Pty Ltd student project	80
Dr Minoo Naebe, Dr Daniel Fabijanic	High Curvature Armour Systems	2016-2017	Defence Materials Technology Centre	289
Dr Minoo Naebe, Prof Bronwyn Fox	High Barrier and Strength Polyethylene Nanocomposites	2014-2018	Qenos	200
A/Prof Luke Henderson	Synthesis of Tethered Catalysts	2017	Cytec Engineered Materials Ltd	55
Dr Christopher Hurren	Planet Innovation DMTC MCM 10.41	2016-2017	Defence Materials Technology Centre	193
Dr Christopher Hurren	Shift gear clothing development project	2016-2017	Shift Gear Industries	22
Dr Minoo Naebe	Nano-enhanced polyethylene based carbon fibre - Jarret Grout	2015-2019	Imagine Intelligent Materials Pty Ltd	18
Dr Minoo Naebe	Nano-enhanced polyethylene based carbon fibre - Jarret Grout	2015-2019	Qenos	18
Dr Nolene Byrne	Utilization of textile waste towards new product development	2016-2018	Perkin Elmer	15
Mr Patrick Phillips, Dr Christopher Hurren	Planet Innovation Thread project	2016	Planet Innovation	6
Dr Christopher Hurren, Prof Tom Gibson, Dr Liz de Rome	Development of assessment and rating protocols for the motorcycle protective clothing program	2016	Transport for NSW	48
A/Prof Mark Kirkland, Dr Julie Sharp, Dr Cynthia Wong	Production of neurotrophic factors by umbilical cord blood cells - Scholarship Jasmine Cleminson	2015-2016	Cytomatrix	61

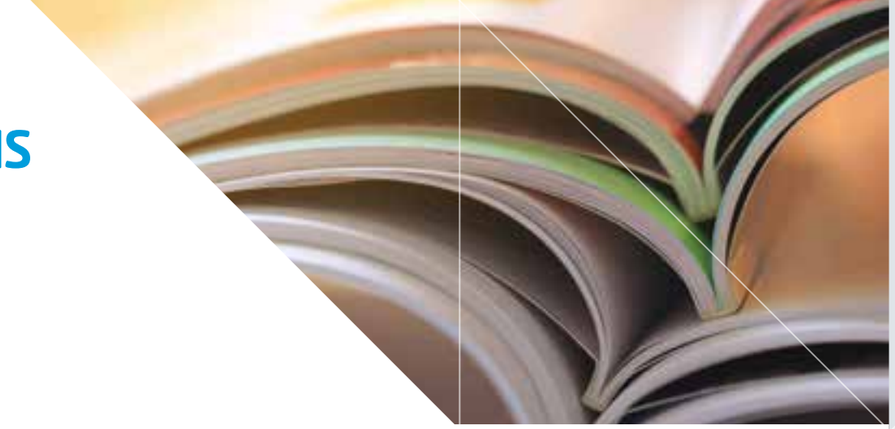
TEAM	PROJECT TITLE	YEARS	INDUSTRY PARTNER / FUNDING BODY	TOTAL AWARDED ($AU ,000)
INDUSTRY AND OTHER FUNDING (CONTINUED)				
A/Prof Mark Kirkland, Dr Julie Sharp, Dr Cynthia Wong	Development of bioreactor for cell expansion	2015-2016	Cytomatrix	1,040
Prof Qipeng Guo	Analysis of Energy pipeline Coating Materials	2015-2016	Santos Geelong Pty Ltd	14
Prof Mike Yongjun Tan, Mr Ivi Cicak	Pipeline coating testing and assessment	2015-2016	McConnell Dowell Constructors (Aust) Pty Ltd	10
Mr Ivi Cicak, Prof Mike Yongjun Tan	Pipeline coating testing and assessment	2016-2017	QIC Protective Coatings	5
Mr Ivi Cicak, Prof Mike Yongjun Tan	Pipeline coating testing and assessment	2015-2016	PPG Industries Australia Pty Ltd	9
Mr Ivi Cicak	Pipeline coating testing and assessment	2015-2016	Nacap Australia	14
Mr Ivi Cicak, Prof Mike Yongjun Tan	Pipeline coating testing and assessment	2016-2017	Atteris	9
Mr Ivi Cicak	Pipeline coating testing and assessment	2016	BAO Australia	6
Mr Ivi Cicak	Pipeline coating testing and assessment	2016	Murphy Pipe and Civil Pty Ltd	4
Dr Zhiqiang Chen, Dr Jane Dai	Delamination of laminated glass	2015-2016	Austral Services Group	62
Dr Thomas Dorin	Towards new industrial SC-containing alloy for aeronautic applications	2016	Clean TeQ	99
Prof Matthew Barnett, Dr Daniel Fabijanic	Towards the optimisation of a novel titanium surface modification process	2016-2017	Callidus Welding Solutions	38
Dr Matthias Weiss	Experimental analysis for Studco Building Systems	2016-2017	Studco Australia Pty Ltd	5
Dr Shayan Seyedin	Ian Potter Foundation Travel Grant to attend Nanotech France 2016 Conference and Exhibition - changed to 'Global Graphene Forum' in 23-25 August 2016	2016	Ian Potter Foundation Travel	3
Dr Jian Fang	High performance elastic fibres	2016-2017	Australian Academy of Technology and Engineering - Global Connections Fund Priming Grant	7
Dr Rangam Rajkhowa	Exploring new products combining Australian animal fibres and Eri silk	2016-2017	Australian Academy of Technology and Engineering - Global Connections Fund Priming Grant	7

TEAM	PROJECT TITLE	YEARS	INDUSTRY PARTNER / FUNDING BODY	TOTAL AWARDED ($AU ,000)
COOPERATIVE RESEARCH CENTRES				
Prof Mike Yongjun Tan	Predicting Pipeline Failure Through Corrosion Modelling	2015-2018	Energy Pipelines CRC	114
Prof Mike Yongjun Tan	Interaction between onshore and offshore pipeline cathodic protection systems at shoreline crossings	2016-2017	Energy Pipelines CRC	60
Prof Mike Yongjun Tan	Pipeline condition monitoring sensors	2015-2018	Energy Pipelines CRC	489
Prof Mike Yongjun Tan	Cathodic shielding and corrosion under disbonded coatings	2015-2018	Energy Pipelines CRC	318
Prof Mike Yongjun Tan	Methods for assessing coating integrity and CP efficiency under complex pipeline conditions	2015-2018	Energy Pipelines CRC	308
Prof Bronwyn Fox, Dr Minoo Naebe, Ms Claudia Creighton	Low Cost Automotive Grade PAN based Carbon Fibers	2014-2016	Ford USA/Auto CRC project	335
Dr Claudia Creighton, Dr Mandy De Souza, Prof Russell Varley	Improved design of a composite front seat back for higher production at lower cost	2016-2017	AutoCRC Ltd	279
INTERNATIONAL FUNDING				
Prof Peter Hodgson, Dr Matthias Weiss	Micro-Roll Forming of Fuel Cell Bipolar Plates	2014-2016	Ford USA	41
A/Prof Bernard Rolfe, Dr Matthias Weiss	Low volume production of longitudinal components by combining flexible roll forming and free forming	2016-2018	Ford USA	163
Dr Ilana Timokhina, Dr Hossein Beladi, Prof Peter Hodgson, Prof Lingxue Kong	Cluster strengthened steels	2016-2018	Wuhan Iron and Steel (Group) Corporation	280
Dr Matthias Weiss, A/Prof Bernard Rolfe, Prof Lingxue Kong, Prof Peter Hodgson	Flexible roll forming of WISCO high strength steels	2016-2018	Wuhan Iron and Steel (Group) Corporation	220
A/Prof Bernard Rolfe, Dr Michael Pereira, Prof Lingxue Kong	Hot stamping	2014-2016	Wuhan Iron and Steel (Group) Corporation	240
Prof Peter Hodgson, A/Prof Bernard Rolfe, Prof Lingxue Kong	Improving WISCO coatings	2014-2016	Wuhan Iron and Steel (Group) Corporation	230
Prof Tiffany Walsh	Bio-nanocombinatorics to achieve precisely-assembled multicomponent, functional hybrid nanomaterials	2012-2017	US Air Force Office of Scientific Research	532

TEAM	PROJECT TITLE	YEARS	INDUSTRY PARTNER / FUNDING BODY	TOTAL AWARDED ($AU ,000)
INTERNATIONAL FUNDING (CONTINUED)				
A/Prof Rimma Lapovok	Shear induced solid-state joining of dissimilar titanium alloys	2016-2018	US Air Force Office of Scientific Research	151
Prof Qipeng Guo	Nanotoughened Benzoxazine Resins and High Performance Composites	2015-2019	Sichuan SZD New Materials Co Ltd	250
A/Prof Luke Henderson	Treatment of Carbon Fibre Felts with Amine Capping Agents	2015-2016	ArcActive Ltd	2
A/Prof Luke Henderson	Examination of Carbon Fibre Surface Treatments	2015-2016	SABIC Global Technologies	77
A/Prof Luke Henderson	Small diameter PAN-based carbon fibre	2016-2017	US Air Force Office of Scientific Research	461
Prof Peter Hodgson	Effect of precipitation on austenite grain size in medium carbon microalloyed steel	2015-2016	POSCO	70
Dr Peter Lynch, Dr Claudia Creighton, Dr Minoo Naebe	Next generation fibre program-Carbon fibre structure property relationship	2015-2016	The Boeing Company	64
Dr Minoo Naebe, Dr Nishar Hameed, Prof Bronwyn Fox	Quickstep processing of thermoformable composite sheet for Stora Enzo	2015-2016	Stora Enso Oyj	49
Prof Tong Lin	Industrial scale nanofibre production system	2015-2020	Yuntong Nanomaterials Technology Co. Ltd	500
Dr Haitao Niu, Prof Tong Lin, Dr Hong Wang	Nanofibre Face Mask Production Line	2015-2017	Shandong Dongwo Carpet	1
Dr Aiden Beer	Extrusion Development of Terves Magnesium Alloys	2015-2016	Terves Inc	41
Prof Qipeng Guo	High Performance Epoxy Resins and Composites	2015-2020	Dongfang Turbine Co Ltd	500
Prof Matthew Barnett, Dr Erik Pavlina, Dr Tim De Souza	Improving the accuracy of BIW Benchmarking by using a reduced testing methodology	2015-2016	Ford USA Grant - Research	131
A/Prof Patrick Howlett	Research on phosphonium-based ionic liquids for lithium-air battery electrolytes	2015-2016	Toyota Motor Engineering & Manufacturing North America, Inc	50

TEAM	PROJECT TITLE	YEARS	INDUSTRY PARTNER / FUNDING BODY	TOTAL AWARDED ($AU ,000)
INTERNATIONAL FUNDING (CONTINUED)				
A/Prof Patrick Howlett, Dr Timothy Khoo	Development of a single ion conducting polymer electrolyte for low temperature	2015-2017	LG Chem Ltd	40
Mr Xi Lu, Dr Jinfeng Wang, Prof Xungai Wang, Dr Jing Wang	Modifying photocatalyst on porous support for odour treatment application	2016-2019	Jiangsu BOHN Environmental Protection Science and Tech Company	45
Prof Xungai Wang, Mr Jing Wang, Dr Jinfeng Wang	Development of graphene/TiO_2 modified metal foam for industrial odour control	2016-2017	Jiangsu BOHN Environmental Protection Science and Tech Company	105
A/Prof Joselito Razal, Dr Christopher Hurren, Dr Rangam Rajkhowa, Prof Xungai Wang	Fibre deconstruction polymer addition material reassembly and applications	2016-2018	Lincoln Agritech Ltd	642
Dr Rangam Rajkhowa, Prof Xungai Wang, Prof Colin Barrow	Functional wool powder with Indian Sandal wood oil and ultrafine sandalwood powder for skin care applications	2016-2017	TFS Corporation	135
Dr Peter Lynch, Dr Claudia Creighton, Dr Minoo Naebe	Next generation fibres program: X-ray scattering characterisation	2016-2018	The Boeing Company	65
Prof Jeong Yoon	Generic Project with LG Electronics in the ICIM	2016-2019	LG Electronics	66
Prof Jeong Yoon	Membership fee for GM participation in the ICM	2015-2018	General Motors Holdings LLC	185
Prof Jeong Yoon	Generic project in the ICIM	2015-2018	POSCO	150
Prof Jeong Yoon	Generic Project with SungWoo HiTech (Tier-2) in the ICIM	2015-2018	Sungwoo Hitech	66
Prof Jeong Yoon	Advanced Fracture Modeling for Crashworthiness of Aluminum Wheel (Phase-1)	2015-2016	Hyundai	48

PUBLICATIONS



BOOKS

1. T Lin, J Fang, *Fundamentals of Electrospinning and Electrospun Nanofibers*, DEStech Publications, ISBN (978-1-60595-160-7), 2016.
2. Q Guo, *Polymer Morphology: principles, characterization and processing*. Wiley, 2016

BOOK SECTIONS

1. Daliri, J. Zhang, and C. H. Wang, (2016), "Hybrid polymer composites for high strain rate applications," in *Lightweight composite structures in transport: design, manufacturing, analysis and performance*, J. Njuguna, Ed. Amsterdam, The Netherlands: Elsevier, pp. 121-163.
2. L. H. Li and Y. Chen, (2016), "Boron nitride nanotube films: preparation, properties, and implications for biology applications," in *Boron nitride nanotubes in nanomedicine : a volume in micro and nano technologies*, G. Ciofani and V. Mattoli, Eds. Amsterdam, The Netherlands: Elsevier, pp. 165-181.
3. Palanisamy and Q. Guo (2016), "Self-Assembly and Morphology in Block Copolymer Systems with Specific Interactions," in *"Polymer Morphology: principles, characterization and processing"*, Guo, Q, Ed, Wiley, 2016. Chapter 14, pp. 259-282.
4. Palanisamy, N. Valiyaveettil Salim, P. Jyotishkumar, and N. Hameed, (2016), "Water sorption and solvent sorption of epoxy/block copolymer blends," in *Handbook of Epoxy Blends*, P. Jyotishkumar, N. Hameed, P. Pionteck, and E. M. Woo, Eds.: Springer, pp. 1-16.
5. M. Parvinzadeh Gashti, E. Pakdel, and F. Alimohammadi, (2016), "Nanotechnology-based coating techniques for smart textiles," in *Active coatings for smart textiles*, J. Hu, Ed. (Woodhead Publishing series in textiles, Duxford, Eng.: Woodhead Publishing, pp. 243-268.
6. E. Pereloma, A. Gazder, and I. Timokhina, (2016), "Retained Austenite: Transformation-Induced Plasticity," in *Encyclopedia of Iron, Steel and Its Alloys (Metals and Alloys Encyclopedia Collection*, New York: Taylor and Francis), pp. 3088-3103.
7. E. Pereloma and I. Timokhina, (2016), "Bake hardening of automotive steels," in *Automotive steels: design, metallurgy, processing and applications*, R. Rana and S. B. Singh, Eds. (Woodhead publishing series in metals and surface engineering), Amsterdam, The Netherlands: Elsevier, pp. 259-288.
8. J. A. Sharp, V. Modepalli, A. Enjapoori, H. Abud, C. Lefevre, and K. R. Nicholas, (2016), "Milk: milk of monotremes and marsupials," in *Reference module in food sciences*, Amsterdam, The Netherlands: Elsevier, pp. 1-10.
9. A. Vahidgolpayegani, C. Wen, P. Hodgson, and Y. Li, (2016), "Production methods and characterization of porous Mg and Mg alloys for biomedical applications," in *Metallic Foam Bone: Processing, Modification and Characterization and Properties*, pp. 25-82.
10. N. Valiyaveettil Salim and N. Hameed, (2016), "Mechanical Properties of composite systems," in *3rd Ed AIAA Book Composite Materials in Aircraft Structures*, A. Baker, S. Dutton, D. Kelly, and M. L. Scott, Eds.: AIAA Education Series.
11. N. Valiyaveettil Salim, P. Jyotishkumar, and N. Hameed, (2016), "Thermal properties of epoxy/block copolymer blends," in *Handbook of Epoxy Blends*, P. Jyotishkumar, N. Hameed, J. Pionteck, and E. M. Woo, Eds.: Springer, pp. 1-25.
12. E. Zdraveva, J. Fang, B. Mijovic, T. Lin (2016), "Electrospun nanofibers," in *Structure and Properties of High-Performance Fibers*, (edited by Gajanan Bhat), Chapter 11.
13. Y. Zhao, Z. Xu, and T. Lin, (2016), "Barrier textiles for protection against microbes," in *Antimicrobial textiles*, G. Sun, Ed. Cambridge, Eng.: Woodhead Publishing, pp. 225-245.

JOURNAL ARTICLES

1. B. Abeyrathna, B. Rolfe, P. Hodgson, and M. Weiss, (2016), "An extension of the flower pattern diagram for roll forming," *International Journal of Advanced Manufacturing Technology*, 10.1007/s00170-015-7667-0 vol. 83, no. 9, pp. 1683-1695.
2. B. Abeyrathna, B. Rolfe, P. Hodgson, and M. Weiss, (2016), "Local deformation in roll forming," *International Journal of Advanced Manufacturing Technology*, 10.1007/s00170-016-8962-0 pp. 1-11.
3. M. M. Abolhasani, H. Fashandi, and M. Naebe, (2016), "Crystalline polymorph transition in poly(vinylidene fluoride) (PVDF)/acrylic rubber(ACM)/clay partially miscible hybrid," *Polymer Bulletin*, 10.1007/s00289-015-1472-7 vol. 73, no. 1, pp. 65-73.
4. R. Abraham, C. Wong, and M. Puri, (2016), "Enrichment of cellulosic waste hemp *(Cannabis sativa)* hurd into non-toxic microfibres," *Materials*, 10.3390/ma9070562 vol. 9, no. 7, pp. 1-13.
5. A. Abvabi, J. Mendiguren, A. Kupke, B. Rolfe, and M. Weiss, (2016), "Evolution of elastic modulus in roll forming," I*nternational Journal of Material Forming*, 10.1007/s12289-016-1295-6 pp. 1-9.
6. A. Abvabi, B. Rolfe, P. D. Hodgson, and M. Weiss, (2016), "An inverse routine to predict residual stress in sheet material," *Materials Science and Engineering A*, 10.1016/j.msea.2015.11.077 vol. 652, pp. 99-104.
7. V. R. Adineh, R. K. W. Marceau, T. Velkov, J. Li, and J. Fu, (2016), "Near-Atomic Three-Dimensional Mapping for Site-Specific Chemistry of 'Superbugs'," *Nano Lett*, 10.1021/acs.nanolett.6b03409 vol. 16, no. 11, pp. 7113-7120.
8. S. L. Agius, M. Joosten, B. Trippit, C. H. Wang, and T. Hilditch, (2016), "Rapidly cured epoxy/anhydride composites: effect of residual stress on laminate shear strength," *Composites part A: applied science and manufacturing,* 10.1016/j.compositesa.2016.06.013 vol. 90, pp. 125-136.
9. M. Ahmadi, O. Zabihi, M. Masoomi, and M. Naebe, (2016), "Synergistic effect of MWCNTs functionalization on interfacial and mechanical properties of multi-scale UHMWPE fibre reinforced epoxy composites," *Composites Science and Technology*, 10.1016/j.compscitech.2016.07.026 vol. 134, pp. 1-11.
10. D. Aili, J. Zhang, M. T. Dalsgaard Jakobsen, H. Zhu, T. Yang, J. Liu, M. Forsyth, C. Pan, J. O. Jensen, L. N. Cleemann, S. P. Jiang, and Q. Li, (2016), "Exceptional durability enhancement of PA/PBI based polymer electrolyte membrane fuel cells for high temperature operation at 200°C," *Journal of Materials Chemistry A*, 10.1039/c6ta01562j vol. 4, no. 11, pp. 4019-4024.
11. M. A. Ali, A. Bouazza, R. M. Singh, W. P. Gates, and R. K. Rowe, (2016), "Thermal conductivity of geosynthetic clay liners," *Canadian Geotechnical Journal,* 10.1139/cgj-2015-0585 vol. 53, no. 9, pp. 1510-1521.
12. U. Ali, H. Niu, A. Abbas, H. Shao, and T. Lin, (2016), "Online stretching of directly electrospun nanofiber yarns," *RSC Advances*, 10.1039/c6ra01856d vol. 6, no. 36, pp. 30564-30569.
13. B.J. Allardyce, R. Rajkhowa, R. J. Dilley, M. D. Atlas, J. Kaur, and X. Wang, (2016), "The impact of degumming conditions on the properties of silk films for biomedical applications," *Textile Research Journal*, 10.1177/0040517515586166 vol. 86, no. 3, pp. 275-287.
14. B.J. Allardyce, R. Rajkhowa, R. J. Dilley, Z. Xie, L. Campbell, A. Keating, M. D. Atlas, M. von Unge, and X. Wang, (2016), "Comparative acoustic performance and mechanical properties of silk membranes for the repair of chronic tympanic membrane perforations," *Journal of the Mechanical Behavior of Biomedical Materials*, 10.1016/j.jmbbm.2016.07.017 vol. 64, pp. 65-74.
15. L. Andrighetto, N. Burns, P. G. Stevenson, J. Pearson, L. Henderson, C. Bowen, and X. Conlan, (2016), "In-silico optimisation of two-dimensional high performance liquid chromatography for the determination of Australian methamphetamine seizure samples," *Forensic Science International*, 10.1016/j.forsciint.2016.07.016 vol. 266, pp. 511-516.
16. L. M. Andrighetto, L. C. Henderson, J. R. Pearson, P. G. Stevenson, and X. A. Conlan, (2016), "Influence of base on nitro-aldol (Henry) reaction products for alternative clandestine pathways," *Australian Journal of Forensic Sciences*, 10.1080/00450618.2015.1112429 vol. 48, no. 6, pp. 684-693.
17. K. Badii, J. S. Church, G. Golkarnarenji, M. Naebe, and H. Khayyam, (2016), "Chemical structure based prediction of PAN and oxidized PAN fiber density through a non-linear mathematical model," *Polymer Degradation and Stability*, 10.1016/j.polymdegradstab.2016.06.019 vol. 131, pp. 53-61.
18. O. M. Badr, F. Barlat, B. Rolfe, M. G. Lee, P. Hodgson, and M. Weiss, (2016), "Constitutive modelling of high strength titanium alloy Ti-6Al-4 V for sheet forming applications at room temperature," *International journal of solids and structures*, 10.1016/j.ijsolstr.2015.08.025 vol. 80, pp. 334-347.
19. A. Basile, A. I. Bhatt, and A. P. O'Mullane, (2016), "Anion effect on lithium electrodeposition from N-propyl-N-methylpyrrolidinium bis(fluorosulfonyl)imide ionic liquid electrolytes," *Electrochimica Acta*, 10.1016/j.electacta.2016.08.075 vol. 215, pp. 19-28.
20. A. Basile, A. I. Bhatt, and A. P. O'Mullane, (2016), "Stabilizing lithium metal using ionic liquids for long-lived batteries," *Nature Communications*, 10.1038/ncomms11794 vol. 7.

21. A. Basile, H. Yoon, D. R. MacFarlane, M. Forsyth, and P. C. Howlett, (2016), "Investigating non-fluorinated anions for sodium battery electrolytes based on ionic liquids," *Electrochemistry communications*, 10.1016/j.elecom.2016.07.014 vol. 71, pp. 48-51.

22. N. M. Bedford, Z. E. Hughes, Z. Tang, Y. Li, B. D. Briggs, Y. Ren, M. T. Swihart, V. G. Petkov, R. R. Naik, M. R. Knecht, and T. R. Walsh, (2016), "Sequence-Dependent Structure/Function Relationships of Catalytic Peptide-Enabled Gold Nanoparticles Generated under Ambient Synthetic Conditions," *Journal of the American Chemical Society,* 10.1021/jacs.5b09529 vol. 138, no. 2, pp. 540-548.

23. N. M. Bedford, A. R. Showalter, T. J. Woehl, Z. E. Hughes, S. Lee, B. Reinhart, S. P. Ertem, E. B. Coughlin, Y. Ren, T. R. Walsh, and B. A. Bunker, (2016), "Peptide-Directed PdAu Nanoscale Surface Segregation: Toward Controlled Bimetallic Architecture for Catalytic Materials," *ACS Nano*, 10.1021/acsnano.6b03963 vol. 10, no. 9, pp. 8645-8659.

24. K. M. Beggs, M. Perus, L. Servinis, L. A. O'Dell, B. L. Fox, T. R. Gengenbach, and L. C. Henderson, (2016), "Rapid surface functionalization of carbon fibres using microwave irradiation in an ionic liquid," *RSC Advances*, 10.1039/c6ra04260k vol. 6, pp. 32480-32483.

25. S. Begić, H. Li, R. Atkin, A. F. Hollenkamp, and P. C. Howlett, (2016), "A comparative AFM study of the interfacial nanostructure in imidazolium or pyrrolidinium ionic liquid electrolytes for zinc electrochemical systems," *Phys Chem Chem Phys*, 10.1039/c6cp04299f vol. 18, no. 42, pp. 29337-29347.

26. H. Beladi and G. S. Rohrer, (2016), "The role of thermomechanical routes on the distribution of grain boundary and interface plane orientations in transformed microstructures," *Metallurgical and Materials Transactions A: Physical Metallurgy and Materials Science*, 10.1007/s11661-016-3630-4 pp. 1-10.

27. S. R. Bobe, A. Gupta, A. Rananaware, A. Bilic, W. Xiang, J. Li, S. V. Bhosale, R. A. Evans (2016), "Insertion of a naphthalenediimide unit in a metal-free donor–acceptor organic sensitizer for efficiency enhancement of a dye-sensitized solar cell," *Dyes and Pigments*, 134, 83-90.

28. D. Briggs, J. P. Palafox-Hernandez, Y. Li, C. K. Lim, T. J. Woehl, N. M. Bedford, S. Seifert, M. T. Swihart, P. N. Prasad, T. R. Walsh, and M. R. Knecht, (2016), "Toward a modular multi-material nanoparticle synthesis and assembly strategy via bionanocombinatorics: bifunctional peptides for linking Au and Ag nanomaterials," *Phys Chem Chem Phys*, 10.1039/c6cp06135d vol. 18, no. 44, pp. 30845-30856.

29. A. Brinkmann and L. A. O'Dell, (2016), "Optimisation of excitation schemes for (14)N overtone MAS NMR using numerically exact simulations," *Solid State Nucl Magn Reson*, 10.1016/j.ssnmr.2016.12.006.

30. A.H. Brown and T. R. Walsh, (2016), "Elucidating the influence of polymorph-dependent interfacial solvent structuring at chitin surfaces," *Carbohydrate polymers*, 10.1016/j.carbpol.2016.05.116 vol. 151, pp. 916-925.

31. A. Byeon, A. M. Glushenkov, B. Anasori, P. Urbankowski, J. Li, B. W. Byles, B. Blake, K. L. Van Aken, S. Kota, E. Pomerantseva, J. W. Lee, Y. Chen, and Y. Gogotsi, (2016), "Lithium-ion capacitors with 2D Nb2CTx (MXene) - carbon nanotube electrodes," *Journal of Power Sources*, 10.1016/j.jpowsour.2016.03.066 vol. 326, pp. 686-694.

32. N. Byrne, M. Setty, S. Blight, R. Tadros, Y. Ma, H. Sixta, and M. Hummel, (2016), "Cellulose-derived carbon fibers produced via a continuous carbonization process: investigating precursor choice and carbonization conditions," *Macromolecular chemistry and physics*, 10.1002/macp.201600236 vol. 217, no. 22, pp. 2517-2524.

33. M. Cabral, P. C. Howlett, and D. R. MacFarlane, (2016), "Electrochemistry of the tris(2,2'-bipyridine) complex of iron(II) in ionic liquids and aprotic molecular solvents," *Electrochimica Acta*, 10.1016/j.electacta.2016.10.126 vol. 220, pp. 347-353.

34. J. Cai, H. Niu, H. Wang, H. Shao, J. Fang, J. He, H. Xiong, C. Ma, and T. Lin, (2016), "High-performance supercapacitor electrode from cellulose-derived, inter-bonded carbon nanofibers," *Journal of Power Sources*, 10.1016/j.jpowsour.2016.05.070 vol. 324, pp. 302-308.

35. M. H. Cai, W. J. Zhu, N. Stanford, L. B. Pan, Q. Chao, and P. D. Hodgson, (2016), "Dependence of deformation behavior on grain size and strain rate in an ultrahigh strength-ductile Mn-based TRIP alloy," *Materials science and engineering A*, 10.1016/j.msea.2015.11.103 vol. 653, pp. 35-42.

36. Q. Cai, A. Du, G. Gao, S. Mateti, B. C. C. Cowie, D. Qian, S. Zhang, Y. Lu, L. Fu, T. Taniguchi, S. Huang, Y. Chen, R. S. Ruoff, and L. H. Li, (2016), "Molecule-induced conformational change in boron nitride nanosheets with enhanced surface adsorption," *Advanced functional materials*, 10.1002/adfm.201603160 vol. 26, no. 45, pp. 8202-8210.

37. Q. Cai, S. Mateti, K. Watanabe, T. Taniguchi, S. Huang, Y. Chen, and L. H. Li, (2016), "Boron nitride nanosheet-veiled gold nanoparticles for surface-enhanced raman scattering," *ACS Applied materials and interfaces*, 10.1021/acsami.6b04320 vol. 8, no. 24, pp. 15630-15636.

38. Q. Cai, S. Mateti, W. Yang, R. Jones, K. Watanabe, T. Taniguchi, S. Huang, Y. Chen, and L. H. Li, (2016), "Boron nitride nanosheets improve sensitivity and reusability of surface-enhanced raman spectroscopy," *Angewandte chemie international edition*, 10.1002/anie.201600517 vol. 55, no. 29, pp. 8405-8409.

39. Q. Cai, S. Mateti, W. Yang, R. Jones, K. Watanabe, T. Taniguchi, S. Huang, Y. Chen, and L. H. Li, (2016), "Inside Back Cover: Boron Nitride Nanosheets Improve Sensitivity and Reusability of Surface-Enhanced Raman Spectroscopy (Angew. Chem. Int. Ed. 29/2016)," *Angewandte Chemie - International Edition*, 10.1002/anie.201604295 vol. 55, no. 29, p. 8457.

40. R. Chandrasekharan Nair Remadevi, X. Wang, and R. Rajkhowa, (2016), "Investigation of the swelling of cotton fibers using aqueous glycine solutions," *Textile Research Journal*, 10.1177/0040517516665267.

41. Q. Chao, P. Cizek, J. Wang, P. D. Hodgson, and H. Beladi, (2016), "Enhanced mechanical response of an ultrafine grained Ti-6Al-4V alloy produced through warm symmetric and asymmetric rolling," *Materials science and engineering A*, 10.1016/j.msea.2015.10.061 vol. 650, pp. 404-413.

42. Q. Chao, P. D. Hodgson, and H. Beladi, (2016), "Microstructure and texture evolution during symmetric and asymmetric rolling of a martensitic Ti-6Al-4V alloy," *Metallurgical and materials transactions A : physical metallurgy and materials science*, 10.1007/s11661-015-3211-y vol. 47, no. 1, pp. 531-545.

43. S. Z. Chavoshi, S. C. Gallo, H. Dong, and X. Luo, (2016), "High temperature nanoscratching of single crystal silicon under reduced oxygen condition," *Materials Science and Engineering: A*, 10.1016/j.msea.2016.11.097 pp. 385-393.

44. F. Chen and M. Forsyth, (2016), "Elucidation of transport mechanism and enhanced alkali ion transference numbers in mixed alkali metal-organic ionic molten salts," *Physical chemistry chemical physics*, 10.1039/c6cp01411a vol. 18, no. 28, pp. 19336-19344.

45. J. Chen, B. Yuan, Z. Li, B. Tang, A. Gupta, S. V. Bhosale, and J. L. Li, (2016), "Synergistic coassembly of two structurally different molecular gelators," *Langmuir,* 10.1021/acs.langmuir.6b03527 vol. 32, no. 46, pp. 12175-12183.

46. J. Y. Chen, B. Yuan, Z. Y. Li, B. Tang, E. Ankers, X. G. Wang, and J. L. Li, (2016), "Controlling the supramolecular architecture of molecular gels with surfactants," *Langmuir,* 10.1021/acs.langmuir.5b04384 vol. 32, no. 4, pp. 1171-1177.

47. S. J. Chen, W. Wang, K. Sagoe-Crentsil, F. Collins, X. L. Zhao, M. Majumder, and W. H. Duan, (2016), "Distribution of carbon nanotubes in fresh ordinary Portland cement pastes: understanding from a two-phase perspective," *RSC Advances*, 10.1039/c5ra13511g vol. 6, no. 7, pp. 5745-5753.

48. X. Chen, F. Chen, E. Jónsson, and M. Forsyth, (2016), "Molecular dynamics study of a dual-cation ionomer electrolyte," *Chemphyschem,* 10.1002/cphc.201600821 pp. 1-8.

49. X. Chen, F. Chen, M. S. Liu, and M. Forsyth, (2016), "Polymer architecture effect on sodium ion transport in PSTFSI-based ionomers: a molecular dynamics study," *Solid state ionics*, 10.1016/j.ssi.2015.12.004 vol. 288, pp. 271-276.

50. X. Chen, N. Xiao, M. Cai, D. Li, G. Li, G. Sun, and B. F. Rolfe, (2016), "A modified approach to modeling of diffusive transformation kinetics from nonisothermal data and experimental verification," *Metallurgical and Materials Transactions A: Physical Metallurgy and Materials Science,* 10.1007/s11661-016-3608-2 vol. 47, no. 9, pp. 4732-4740.

51. J. Cheng, G. Gu, Q. Guan, J. M. Razal, Z. Wang, X. Li, and B. Wang, (2016), "Synthesis of a porous sheet-like V_2O_5-CNT nanocomposite using an ice-templating 'bricks-and-mortar' assembly approach as a high-capacity, long cyclelife cathode material for lithium-ion batteries," *Journal of Materials Chemistry A*, 10.1039/c5ta10414a vol. 4, no. 7, pp. 2729-2737.

52. L. Chong, J. I. Mardel, D. R. MacFarlane, M. Forsyth, and A. E. Somers, (2016), "Synergistic corrosion inhibition of mild steel in aqueous chloride solutions by an imidazolinium carboxylate salt," *ACS sustainable chemistry and engineering*, 10.1021/acssuschemeng.5b01725 vol. 4, no. 3, pp. 1746-1755.

53. S. Chuah, W. H. Duan, Z. Pan, E. Hunter, A. H. Korayem, X. L. Zhao, F. Collins, and J. G. Sanjayan, (2016), "The properties of fly ash based geopolymer mortars made with dune sand," *Materials and Design*, 10.1016/j.matdes.2015.12.070 vol. 92, pp. 571-578.

54. P. Cizek, (2016), "The microstructure evolution and softening processes during high-temperature deformation of a 21Cr-10Ni-3Mo duplex stainless steel," *Acta materialia*, 10.1016/j.actamat.2016.01.012 vol. 106, pp. 129-143.

55. P. Cizek, A. Sankaran, E. F. Rauch, and M. R. Barnett, (2016), "Microstructure and Texture of Electrodeposited Nanocrystalline Nickel in the As-Deposited State and After In-Situ and Ex-Situ Annealing," *Metallurgical and Materials Transactions A: Physical Metallurgy and Materials Science*, 10.1007/s11661-016-3810-2 vol. 47, no. 12, pp. 6655-6670.

56. S. Corujeira Gallo and H. Dong, (2016), "Effect of microstructure on the plasma surface treatment of carbon fibres," *Journal of Composite Materials*, 10.1177/0021998316684935.

57. S. Da Sun, D. Fabijanic, A. Ghaderi, M. Leary, J. Toton, S. Sun, M. Brandt, and M. Easton, (2016), "Microstructure and hardness characterisation of laser coatings produced with a mixture of AISI 420 stainless steel and Fe-C-Cr-Nb-B-Mo steel alloy powders," *Surface and coatings technology*, 10.1016/j.surfcoat.2016.03.061 vol. 296, pp. 76-87.

58. X. J. Dai, C. S. Corr, S. B. Ponraj, M. Maniruzzaman, A. T. Ambujakshan, Z. Chen, L. Kviz, R. Lovett, G. D. Rajmohan, D. R. de Celis, M. L. Wright, P. R. Lamb, Y. E. Krasik, D. B. Graves, W. G. Graham, R. D'Agostino, and X. Wang, (2016), "Efficient and selectable production of reactive species using a nanosecond pulsed discharge in gas bubbles in liquid," *Plasma processes and polymers*, 10.1002/ppap.201500156 vol. 13, no. 3, pp. 306-310.

59. J. C. Debnath, S. K. Nair, Strydom, A. M., Ramesh kumar K., J. L. Wang, (2016) "Magnetocaloric properties of metamagnetic ErRhSi compound". *Journal of Applied Physics*, 10.1063/1.4971959 vol. 120, pp. 233902-6.

60. J. C. Debnath & J. L. Wang, (2016) "Magnetocaloric effect in $HoMn_2Si_2$ compound with multiple magnetic phase transitions". *Intermetallics*, 10.1016/j.intermet.2016.09.002 vol. 78, pp. 50-54.

61. L. de Rome, M. Fitzharris, M. Baldock, R. Fernandes, A. Ma, and J. Brown, (2016), "The prevalence of crash risk factors in a population-based study of motorcycle riders," *Injury*, 10.1016/j.injury.2016.03.033 vol. 47, no. 9, pp. 2025-2033.

62. L. de Rome, E. A. Taylor, R. J. Croft, J. Brown, M. Fitzharris, and N. A. S. Taylor, (2016), "Thermal and cardiovascular strain imposed by motorcycle protective clothing under Australian summer conditions," *Ergonomics*, 10.1080/00140139.2015.1082632 vol. 59, no. 4, pp. 504-513.

63. R. De Silva, K. Vongsanga, X. Wang, and N. Byrne, (2016), "Understanding key wet spinning parameters in an ionic liquid spun regenerated cellulosic fibre," *Cellulose*, 10.1007/s10570-016-0989-8 vol. 23, no. 4, pp. 2741-2751.

64. R. De Silva, X. Wang, and N. Byrne, (2016), "Development of a novel cellulose/duck feather composite fibre regenerated in ionic liquid," *Carbohydrate polymers*, 10.1016/j.carbpol.2016.07.090 vol. 153, pp. 115-123.

65. B. Demir and T. R. Walsh, (2016), "A robust and reproducible procedure for cross-linking thermoset polymers using molecular simulation," *Soft Matter*, 10.1039/c5sm02788h vol. 12, no. 8, pp. 2453-2464.

66. Y. Ding, Y. Li, and C. Wen, (2016), "Effects of Mg17Sr2 Phase on the bio-corrosion behavior of Mg-Zr-Sr alloys," *Advanced engineering materials*, 10.1002/adem.201500222 vol. 18, no. 2, pp. 259-268.

67. Y. Ding, J. Lin, C. Wen, D. Zhang, and Y. Li, (2016), "Mechanical properties, in vitro corrosion and biocompatibility of newly developed biodegradable Mg-Zr-Sr-Ho alloys for biomedical applications," *Scientific reports*, 10.1038/srep31990 vol. 6, no. 31990, pp. 1-10.

68. G. K. Dolan, G. E. Yakubov, G. W. Greene, N. Amiralian, P. K. Annamalai, D. J. Martin, and J. R. Stokes, (2016), "Dip-and-Drag Lateral Force Spectroscopy for Measuring Adhesive Forces between Nanofibers," *Langmuir*, 10.1021/acs.langmuir.6b03467 vol. 32, no. 50, pp. 13340-13348.

69. T. Dorin, A. Taylor, K. Wood, J. Wang, P. D. Hodgson, and N. Stanford, (2016), "Complex precipitation phenomena in strip cast steels with high sulfur and copper contents," *Journal of Applied Crystallography*, 10.1107/S1600576716013054 vol. 49, no. 5, pp. 1777-1785.

70. T. Dorin, K. Wood, A. Taylor, P. Hodgson, and N. Stanford, (2016), "Effect of coiling treatment on microstructural development and precipitate strengthening of a strip cast steel," *Acta materialia*, 10.1016/j.actamat.2016.05.043 vol. 115, pp. 167-177.

71. T. Dorin, K. Wood, A. Taylor, P. Hodgson, and N. Stanford, (2016), "Quantitative examination of carbide and sulphide precipitates in chemically complex steels processed by direct strip casting," *Materials characterization*, 10.1016/j.matchar.2015.12.028 vol. 112, pp. 259-268.

72. S. Du, J. Zhang, W. T. Zhou, Q. X. Li, G. W. Greene, H. J. Zhu, J. L. Li, and X. G. Wang, (2016), "Interactions between fibroin and sericin proteins from antheraea pernyi and bombyx mori silk fibers," *Journal of colloid and interface science,* 10.1016/j.jcis.2016.06.030 vol. 478, pp. 316-323.

73. Y. Du, K. Cai, S. Z. Shen, W. Yang, J. Xu, and T. Lin, (2016), "ZnO flower/PEDOT:PSS thermoelectric composite films," *Journal of Materials Science: Materials in Electronics*, 10.1007/s10854-016-5111-3 vol. 27, no. 10, pp. 10289-10293.

74. Y. Du, J. Xu, Y. Wang, and T. Lin, (2016), "Thermoelectric properties of graphite-PEDOT:PSS coated flexible polyester fabrics," *Journal of Materials Science: Materials in Electronics*, 10.1007/s10854-016-6250-2 pp. 1-6.

75. L. F. Dumee, H. Alglave, T. Chaffraix, B. Lin, K. Magniez, and J. Schütz, (2016), "Morphology-properties relationship of gas plasma treated hydrophobic meso-porous membranes and their improved performance for desalination by membrane distillation," *Applied surface science*, 10.1016/j.apsusc.2015.12.034 vol. 363, pp. 273-285.

76. L. F. Dumée, L. He, P. Hodgson, and L. Kong, (2016), "Insights into Surface Interactions between Metal Organic Frameworks and Gases during Transient Adsorption and Diffusion by In-Situ Small Angle X-ray Scattering," *Membranes (Basel)*, 10.3390/membranes6030041 vol. 6, no. 3.

77. D. Dutta, N. Nagapradeep, H. Zhu, M. Forsyth, S. Verma, and A. J. Bhattacharyya, (2016), "N7-(carboxymethyl) guanine-lithium crystalline complex: a bioinspired solid electrolyte," *Scientific reports*, 10.1038/srep24499 vol. 6, pp. 1-9.

78. C. Elbadawi, T. T. Tran, M. Kolíbal, T. Šikola, J. Scott, Q. Cai, L. H. Li, T. Taniguchi, K. Watanabe, M. Toth, I. Aharonovich, and C. Lobo, (2016), "Electron beam directed etching of hexagonal boron nitride," *Nanoscale*, 10.1039/c6nr04959a vol. 8, no. 36, pp. 16182-16186.

79. D. Esrafilzadeh, R. Jalili, X. Liu, K. J. Gilmore, J. M. Razal, S. E. Moulton, and G. G. Wallace, (2016), "A novel and facile approach to fabricate a conductive and biomimetic fibrous platform with sub-micron and micron features," *Journal of Materials Chemistry B*, 10.1039/c5tb02237a vol. 4, no. 6, pp. 1056-1063.

80. D. Esrafilzadeh, R. Jalili, E. M. Stewart, S. H. Aboutalebi, J. M. Razal, S. E. Moulton, and G. G. Wallace, (2016), "High-performance multifunctional graphene-PLGA fibers: toward biomimetic and conducting 3D scaffolds," *Advanced functional materials*, 10.1002/adfm.201505304 vol. 26, no. 18, pp. 3105-3117.

81. D. J. Eyckens, H. L. Brozinski, J. P. Delaney, L. Servinis, S. Naghashian, and L. C. Henderson, (2016), "Ion-tagged prolinamide organocatalysts for the direct aldol reaction on-water," *Catalysis letters*, 10.1007/s10562-015-1630-4 vol. 146, no. 1, pp. 212-219.

82. D. J. Eyckens, M. E. Champion, B. L. Fox, P. Yoganantharajah, Y. Gibert, T. Welton, and L. C. Henderson, (2016), "Solvate ionic liquids as reaction media for electrocyclic transformations," *European journal of organic chemistry*, 10.1002/ejoc.201501614 vol. 2016, no. 5, pp. 913-917.

83. D. J. Eyckens, B. Demir, T. R. Walsh, T. Welton, and L. C. Henderson, (2016), "Correction: Determination of Kamlet-Taft parameters for selected solvate ionic liquids," *Phys Chem Chem Phys*, 10.1039/c6cp90177h vol. 18, no. 29, p. 19975.

84. D. J. Eyckens, B. Demir, T. R. Walsh, T. Welton, and L. C. Henderson, (2016), "Determination of Kamlet–Taft parameters for selected solvate ionic liquids," *Physical chemistry chemical physics*, 10.1039/c6cp01216g pp. 1-5.

85. H. Fashandi, M. M. Abolhasani, P. Sandoghdar, N. Zohdi, Q. Li, and M. Naebe, (2016), "Morphological changes towards enhancing piezoelectric properties of PVDF electrical generators using cellulose nanocrystals," *Cellulose*, 10.1007/s10570-016-1070-3 vol. 23, no. 6, pp. 3625-3637.

86. A. Fehervari, W. P. Gates, A. F. Patti, T. W. Turney, A. Bouazza, and R. K. Rowe, (2016), "Potential hydraulic barrier performance of cyclic organic carbonate modified bentonite complexes against hyper salinity," *Geotextiles and geomembranes*, 10.1016/j.geotexmem.2016.06.002 vol. 44, no. 5, pp. 748-760.

87. A. Fehervari, W. P. Gates, T. W. Turney, A. F. Patti, and A. Bouazza, (2016), "Cyclic organic carbonate modification of sodium bentonite for enhanced containment of hyper saline leachates," *Applied Clay Science*, 10.1016/j.clay.2016.09.007 vol. 134, pp. 2-12.

88. A. Feng, F. An, J. Rookes, G. Xie, D. Cahill, X. Cai, Z. Zou, and L. Kong, (2016), "Ethephon increases rubber tree latex yield by regulating aquaporins and alleviating the tapping-induced local increase in latex total solid content," *Journal of plant growth regulation*, 10.1007/s00344-016-9573-6 vol. 35, no. 3, pp. 701-709.

89. A. Feng, C. Feng, Z. Yi, F. She, W. Gao, Z. Peng, C. J. Garvey, L. F. Dumee, and L. Kong, (2016), "Superhydrophobic and superoleophilic micro-wrinkled reduced graphene oxide as a highly portable and recyclable oil sorbent," *ACS Applied materials and interfaces*, 10.1021/acsami.6b01648 vol. 8, no. 15, pp. 9977-9985.

90. M. Forsyth, F. Chen, L. A. O'Dell, and K. Romanenko, (2016), "New insights into ordering and dynamics in organic ionic plastic crystal electrolytes," *Solid state ionics*, 10.1016/j.ssi.2015.11.025 vol. 288, pp. 160-166.

91. M. Forsyth, G. M. A. Girard, A. Basile, M. Hilder, D. R. MacFarlane, F. Chen, and P. C. Howlett, (2016), "Inorganic-Organic Ionic Liquid Electrolytes Enabling High Energy-Density Metal Electrodes for Energy Storage," *Electrochimica Acta*, 10.1016/j.electacta.2016.10.134 vol. 220, pp. 609-617.

92. M. Forsyth, H. Yoon, F. Chen, H. Zhu, D. R. MacFarlane, M. Armand, and P. C. Howlett, (2016), "Novel Na+ Ion diffusion mechanism in mixed organic-inorganic ionic liquid electrolyte leading to high Na+ transference number and stable, high rate electrochemical cycling of sodium cells," *Journal of physical chemistry C,* 10.1021/acs.jpcc.5b11746 vol. 120, no. 8, pp. 4276-4286.

93. W. Gao, F. She, J. Zhang, L. F. Dumee, K. L. Tung, P. D. Hodgson, and L. Kong, (2016), "Molecular dynamics approach to the structural characterization and transport properties of poly(acrylonitrile)/N,N-dimethylformamide solutions," *Journal of Molecular Liquids*, 10.1016/j.molliq.2016.03.017 vol. 219, pp. 45-53.

94. W. P. Gates, U. Shaheen, T. W. Turney, and A. F. Patti, (2016), "Cyclic carbonate–sodium smectite intercalates," *Applied Clay Science*, 10.1016/j.clay.2016.02.005 vol. 124-125, pp. 94-101.

95. A. Ghaderi, P. D. Hodgson, and M. R. Barnett, (2016), "β-Ti grain refinement via α-Precipitation," Metallurgical and *Materials Transactions A: Physical Metallurgy and Materials Science*, 10.1007/s11661-015-3299-0 vol. 47, no. 3, pp. 1322-1330.

96. E. Ghanbari, A. Zarei-Hanzaki, E. Farghadany, H. R. Abedi, and S. Khoddam, (2016), "High-Temperature Deformation Characteristics of a β-Type Ti-29Nb-13Ta-4.6Zr Alloy," *Journal of Materials Engineering and Performance*, 10.1007/s11665-016-1953-3 vol. 25, no. 4, pp. 1554-1561.

97. E. Ghasali, A. H. Pakseresht, M. Alizadeh, K. Shirvanimoghaddam, and T. Ebadzadeh, (2016), "Vanadium carbide reinforced aluminum matrix composite prepared by conventional, microwave and spark plasma sintering," *Journal of Alloys and Compounds*, 10.1016/j.jallcom.2016.07.063 vol. 688, no. PA, pp. 527-533.

98. S. M. Ghoreishian, K. Badii, M. Norouzi, and K. Malek, (2016), "Effect of cold plasma pre-treatment on photocatalytic activity of 3D fabric loaded with nano-photocatalysts: response surface methodology," *Applied surface science*, 10.1016/j.apsusc.2015.12.155 vol. 365, pp. 252-262.

99. M. Gias Uddin, (2016), "Effect of Biopolishing on Dye ability of Cotton Fabric - A Review," *Trends in Green Chemistry*, 10.21767/2471-9889.100011 vol. 2, no. 1.

100. S. Gou, Q. Zhang, C. Yang, Q. Li, S. Xu, Y. Wu, and Q. Guo, (2016), "A novel α-aminophosphonic acid-modified acrylamide-based hydrophobic associating copolymer with superb water solubility for enhanced oil recovery," *RSC Advances*, 10.1039/c6ra11952b vol. 6, no. 80, pp. 76696-76706.

101. W. Greene, E. Duffy, A. Shallan, A. Wuethrich, and B. Paull, (2016), "Electrokinetic Properties of Lubricin Antiadhesive Coatings in Microfluidic Systems," *Langmuir*, 10.1021/acs.langmuir.5b03535 vol. 32, no. 7, pp. 1899-1908.

102. T. Guo, F. Siska, and M. R. Barnett, (2016), "Distinguishing between slip and twinning events during nanoindentation of magnesium alloy AZ31," *Scripta materialia*, 10.1016/j.scriptamat.2015.07.034 vol. 110, pp. 10-13.

103. R. K. Gupta, M. Y. J. Tan, J. Esquivel, and M. Forsyth, (2016), "Occurrence of anodic current and corrosion of steel in aqueous media under fluctuating cathodic protection potentials," *Corrosion: the journal of sicence and engineering*, 10.5006/1637 vol. 72, no. 10, pp. 1243-1251.

104. C. Haase, O. Kremer, W. Hu, T. Ingendahl, R. Lapovok, and D. A. Molodov, (2016), "Equal-channel angular pressing and annealing of a twinning-induced plasticity steel : microstructure, texture, and mechanical properties," *Acta materialia*, 10.1016/j.actamat.2016.01.056 vol. 107, pp. 239-253.

105. N. Haghdadi, D. Martin, and P. Hodgson, (2016), "Physically-based constitutive modelling of hot deformation behavior in a LDX 2101 duplex stainless steel," *Materials and Design*, 10.1016/j.matdes.2016.05.118 vol. 106, pp. 420-427.

106. N. H. Hameed, J. S. Sharp, S. N. Nunna, K. M. Magniez, J. P. Jyotishkumar, S. Valiyaveettil, and B. F. Fox, (2016), "Structural Transformation of Polyacrylonitrile Fibers during Stabilization and Low Temperature Carbonization," *Polymer Degradation and Stability*, 10.1016/j.polymdegradstab.2016.02.029.

107. Q. Han, X. Wang, and N. Byrne, (2016), "Understanding the influence of key ionic liquid properties on the hydrolytic activity of thermomyces lanuginosus lipase," *Chemcatchem*, 10.1002/cctc.201600014 vol. 8, no. 8, pp. 1551-1556.

108. S. W. Hasan, S. M. Said, M. F. M. Sabri, A. S. A. Bakar, N. A. Hashim, M. M. I. M. Hasnan, J. M. Pringle, and D. R. MacFarlane, (2016), "High thermal gradient in thermo-electrochemical cells by insertion of a poly(vinylidene fluoride) membrane," *Scientific reports*, 10.1038/srep29328 vol. 6, pp. 1-11.

109. J. He, D. Al-Masri, D. R. MacFarlane, and J. M. Pringle, (2016), "Temperature dependence of the electrode potential of a cobalt-based redox couple in ionic liquid electrolytes for thermal energy harvesting," *Faraday discussions*, 10.1039/c5fd00238a vol. 190, pp. 205-218.

110. M. Hilder, G. M. A. Girard, K. Whitbread, S. Zavorine, M. Moser, D. Nucciarone, M. Forsyth, D. R. MacFarlane, and P. C. Howlett, (2016), "Physicochemical characterization of a new family of small alkyl phosphonium imide ionic liquids," *Electrochimica Acta*, 10.1016/j.electacta.2016.03.130 vol. 202, pp. 100-109.

111. S. C. Hockey, G. J. Barbante, P. S. Francis, J. M. Altimari, P. Yoganantharajah, Y. Gibert, and L. C. Henderson, (2016), "A comparison of novel organoiridium(III) complexes and their ligands as a potential treatment for prostate cancer," *European journal of medicinal chemistry*, 10.1016/j.ejmech.2015.12.035 vol. 109, pp. 305-313.

112. S. Hosseini, A. Heidarpour, F. Collins, and C. R. Hutchinson, (2016), "Strain ageing effect on the temperature dependent mechanical properties of partially damaged structural mild-steel induced by high strain rate loading," *Construction and Building Materials*, 10.1016/j.conbuildmat.2016.07.001 vol. 123, pp. 454-463.

113. T. Hou, L. L. Martin, R. G. Horn, and G. W. Greene, (2016), "Use of optical interferometry to measure gold nanoparticle adsorption on silica," *Colloids and surfaces a: physicochemical and engineering aspects*, 10.1016/j.colsurfa.2016.07.022 vol. 506, pp. 383-392.

114. K. Hu, H. Gu, J. Zhuang, X. Zeng, L. Yan, Y. Jiang, Q. Guo, and J. Ding, (2016), "Synthesis and anti-corrosion performance of Adenine-L-Alanine ramification," *Journal of adhesion science and technology*, 10.1080/01694243.2015.1127089 vol. 30, no. 8, pp. 851-865.

115. G. Huang, P. Song, L. Liu, D. Han, C. Ge, R. Li, and Q. Guo, (2016), "Fabrication of multifunctional graphene decorated with bromine and nano-Sb_2O_3 towards high-performance polymer nanocomposites," *Carbon*, 10.1016/j.carbon.2015.11.063 vol. 98, pp. 689-701.

116. P. Huang, A. Somers, P. C. Howlett, and M. Forsyth, (2016), "Film formation in trihexyl(tetradecyl) phosphonium diphenylphosphate ([P6,6,6,14][dpp]) ionic liquid on AA5083 aluminium alloy," *Surface and coatings technology*, 10.1016/j.surfcoat.2015.12.060 vol. 303, Part B, pp. 385-395.

117. Z. E. Hughes and T. R. Walsh, (2016), "Elucidating the mechanisms of nanodiamond-promoted structural disruption of crystallised lipid," *Soft Matter*, 10.1039/c6sm01155a vol. 12, no. 40, pp. 8338-8347.

118. Z. E. Hughes and T. R. Walsh, (2016), "Non-covalent adsorption of amino acid analogues on noble-metal nanoparticles: influence of edges and vertices," *Physical chemistry chemical physics*, 10.1039/c6cp02323a vol. 18, no. 26, pp. 17525-17533.

119. Y. Huo, M. Y. Tan, and M. Forsyth, (2016), "Visualising dynamic passivation and localised corrosion processes occurring on buried steel surfaces under the effect of anodic transients," *Electrochemistry Communications*, 10.1016/j.elecom.2016.02.015 vol. 66, pp. 21-24.

120. Y. Huo, M. Y. J. Tan, and M. Forsyth, (2016), "Investigating effects of potential excursions and pH variations on cathodic protection using new electrochemical testing cells," *Corrosion Engineering, Science and Technology*, 10.1179/1743278215Y.0000000044 vol. 51, no. 3, pp. 171-178.

121. R. Q. Ivers, C. Sakashita, T. Senserrick, J. Elkington, S. Lo, S. Boufous, and L. de Rome, (2016), "Does an on-road motorcycle coaching program reduce crashes in novice riders? A randomised control trial," *Accid Anal Prev*, 10.1016/j.aap.2015.10.015 vol. 86, pp. 40-46.

122. H. Jafari, S. Afshar, O. Zabihi, and M. Naebe, (2016), "Enhanced photocatalytic activities of nanohybrids immobilized on cement-based materials for dye degradation," *Research on Chemical Intermediates*, 10.1007/s11164-015-2190-3 vol. 42, no. 4, pp. 2963-2978.

123. J. Jiao, B. Rolfe, J. Mendiguren, and M. Weiss, (2016), "An analytical model for web-warping in variable width flexible roll forming," *International journal of advanced manufacturing technology*, 10.1007/s00170-015-8191-y vol. 86, no. 5, pp. 1541-1555.

124. L. Jin, G. W. Greene, D. R. MacFarlane, and J. M. Pringle, (2016), "Redox-Active Quasi-Solid-State Electrolytes for Thermal Energy Harvesting," *ACS ENERGY LETTERS*, 10.1021/acsenergylett.6b00305 vol. 1, no. 4, pp. 654-658.

125. X. Jin, W. Wang, C. Xiao, T. Lin, L. Bian, and P. Hauser, (2016), "Improvement of coating durability, interfacial adhesion and compressive strength of UHMWPE fiber/epoxy composites through plasma pre-treatment and polypyrrole coating," *Composites Science and Technology*, 10.1016/j.compscitech.2016.03.026 vol. 128, pp. 169-175.

126. X. Jin, J. Zhang, W. Gao, S. Du, J. L. Li, and X. Wang, (2016), "Directional moisture transfer through a wild silkworm cocoon wall," *Biointerphases: an open access journal for the biomaterials interface community*, 10.1116/1.4952451 vol. 11, no. 2, pp. 1-13.

127. X. Jin, J. Zhang, C. Hurren, J. Li, R. Rajkhowa, and X. Wang, (2016), "The effect of fibrous structural difference on thermal insulation properties of biological composites: silkworm cocoons," *Textile Research Journal*, 10.1177/0040517515617427 vol. 86, no. 18, pp. 1935-1946.

128. M. W. Joosten, M. Dingle, A. Mouritz, A. A. Khatibi, S. Agius, and C. H. Wang, (2016), "A hybrid embedded cohesive element method for predicting matrix cracking in composites," *Composite Structures*, 10.1016/j.compstruct.2015.10.030 vol. 136, pp. 554-565.

129. M. I. Kabir, B. Samali, and R. Shrestha, (2016), "Fracture Properties of CFRP–Concrete Bond Subjected to Three Environmental Conditions," *Journal of Composites for Construction*, 10.1061/(ASCE)CC.1943-5614.0000665 vol. 20, no. 4, pp. 04016010-04016010.

130. M. I. Kabir, R. Shrestha, and B. Samali, (2016), "Effects of applied environmental conditions on the pull-out strengths of CFRP-concrete bond," *Construction and Building Materials*, 10.1016/j.conbuildmat.2016.03.195 vol. 114, no. C, pp. 817-830.

131. S. R. Kada, P. A. Lynch, J. A. Kimpton, and M. R. Barnett, (2016), "In-situ X-ray diffraction studies of slip and twinning in the presence of precipitates in AZ91 alloy," *Acta materialia*, 10.1016/j.actamat.2016.08.022 vol. 119, pp. 145-156.

132. W. Kang, N. Deng, J. Ju, Q. Li, D. Wu, X. Ma, L. Li, M. Naebe, and B. Cheng, (2016), "A review of recent developments in rechargeable lithium-sulfur batteries," *Nanoscale*, 10.1039/c6nr04923k vol. 8, no. 37, pp. 16541-16588.

133. M. Kar, Z. Ma, L. M. Azofra, K. Chen, M. Forsyth, and D. R. MacFarlane, (2016), "Ionic liquid electrolytes for reversible magnesium electrochemistry," *Chemical communications*, 10.1039/c5cc09324d vol. 52, no. 21, pp. 4033-4036.

134. M. Kar, B. Winther-Jensen, M. Armand, T. J. Simons, O. Winther-Jensen, M. Forsyth, and D. R. MacFarlane, (2016), "Stable zinc cycling in novel alkoxy-ammonium based ionic liquid electrolytes," *Electrochimica Acta*, 10.1016/j.electacta.2015.12.050 vol. 188, pp. 461-471.

135. C. Karlsson, J. Nicholas, D. Evans, M. Forsyth, M. Strømme, M. Sjödin, P. C. Howlett, and C. Pozo-Gonzalo, (2016), "Stable deep doping of vapor-phase polymerized poly(3,4-ethylenedioxythiophene)/ionic liquid supercapacitors," *ChemSusChem*, 10.1002/cssc.201600333 vol. 9, no. 16, pp. 2112-2121.

136. O. Kazum, H. Beladi, I. B. Timokhina, Y. He, and M. Bobby Kannan, (2016), "Hydrogen permeation in nanostructured bainitic steel," *Metallurgical and materials transactions A*, 10.1007/s11661-016-3677-2 vol. 47A, no. 10, pp. 4896-4903.

137. M. J. Khan, J. Zhang, and Q. Guo, (2016), "Covalent/crystallite cross-linked co-network hydrogels : an efficient and simple strategy for mechanically strong and tough hydrogels," *Chemical engineering journal*, 10.1016/j.cej.2016.04.025 vol. 301, pp. 92-102.

138. S. Khoddam, P. D. Hodgson, A. Zarei-Hanzaki, and L. Yan Foon, (2016), "A simple model for material's strengthening under high pressure torsion," *Materials & design*, 10.1016/j.matdes.2016.03.085 vol. 99, pp. 335-340.

139. S. Khoddam, T. Sapanathan, S. Zahiri, P. D. Hodgson, A. Zarei-Hanzaki, and R. Ibrahim, (2016), "Inner architecture of bonded splats under combined high pressure and shear," *Advanced Engineering Materials*, 10.1002/adem.201500418 vol. 18, no. 4, pp. 501-505.

140. A. A. K. King, B. R. Davies, N. Noorbehesht, P. Newman, T. L. Church, A. T. Harris, J. M. Razal, and A. I. Minett, (2016), "A new raman metric for the characterisation of graphene oxide and its derivatives," *Scientific reports*, 10.1038/srep19491 vol. 6, no. 19491, pp. 1-6.

141. O. Kuzmina, J. M. Slattery, M. Hu, Q. Song, S. Jiao, G. M. Haarberg, Q. Xu, D. Wang, P. Madden, D. Cooper, K. McGregor, T. Sudmeier, B. Tang, H. Zhu, A. Kamali, L. Yu, G. Z. Chen, J. Irvine, Y. Liu, J. Ge, J. Pringle, and X. Yue, (2016), "Improvements of energy conversion and storage: general discussion," *Faraday Discuss*, 10.1039/c6fd90029a vol. 190, pp. 291-306.

142. R. B. Ladani, S. Wu, A. J. Kinloch, K. Ghorbani, J. Zhang, A. P. Mouritz, and C. H. Wang, (2016), "Multifunctional properties of epoxy nanocomposites reinforced by aligned nanoscale carbon," *Materials and Design*, 10.1016/j.matdes.2016.01.052 vol. 94, pp. 554-564.

143. C. Lang, J. Fang, H. Shao, X. Ding, and T. Lin, (2016), "High-sensitivity acoustic sensors from nanofibre webs," *Nature Communications*, 10.1038/ncomms11108 vol. 7, no. 11108, pp. 1-7.

144. R. Lapovok, V. Mendoza, V. N. Anumalasetty, and P. D. Hodgson, (2016), "Prediction of ductile failure in CP-Titanium as criterion of SPD process design," *Journal of Materials Processing Technology*, 10.1016/j.jmatprotec.2015.10.017 vol. 229, pp. 678-686.

145. R. Lapovok, E. Zolotoyabko, A. Berner, Y. Kauffmann, E. Lakin, N. Larianovsky, and D. Shechtman, (2016), "Structure and mechanical property variations in Mg-Gd-Y-Zn-Zr alloy depending on its composition and processing conditions," *Philosophical Magazine*, 10.1080/14786435.2016.1154204 vol. 96, no. 11, pp. 1022-1046.

146. M. A. Lazar, D. Al-Masri, D. R. Macfarlane, and J. M. Pringle, (2016), "Enhanced thermal energy harvesting performance of a cobalt redox couple in ionic liquid-solvent mixtures," *Physical chemistry chemical physics*, 10.1039/c5cp04305k vol. 18, no. 3, pp. 1404-1410.

147. C. Li, H. Zhu, N. V. Salim, B. L. Fox, and N. Hameed, (2016), "Preparation of microporous carbon materials via in-depth sulfonation and stabilization of polyethylene," *Polymer Degradation and Stability*, 10.1016/j.polymdegradstab.2016.10.019 vol. 134, pp. 272-283.

148. C. Li, H. Zhu, X. She, T. Wang, F. She, and L. Kong, (2016), "Selective removal of anionic dyes using poly (N, N -dimethyl amino ethylmethacrylate) functionalized graphene oxide," *RSC Advances*, 10.1039/c6ra09049d vol. 6, no. 71, pp. 67242-67251.

149. H. Li, L. Gao, D. Zhang, and T. Lin, (2016), "Preparation of niobium pentoxide loaded on porous carbon and its application in supercapacitors," *Huagong Xuebao/CIESC Journal,* 10.11949/j.issn.0438-1157.20151500 vol. 67, no. 7, pp. 3071-3077.

150. H. Li, A. E. Somers, P. C. Howlett, M. W. Rutland, M. Forsyth, and R. Atkin, (2016), "Addition of low concentrations of an ionic liquid to a base oil reduces friction over multiple length scales: a combined nano- and macrotribology investigation," *Physical chemistry chemical physics*, 10.1039/c5cp07061a vol. 18, no. 9, pp. 6541-6547.

151. H. Li, A. E. Somers, M. W. Rutland, P. C. Howlett, and R. Atkin, (2016), "Combined nano- and macrotribology studies of titania lubrication using the oil-ionic liquid mixtures," *ACS sustainable chemistry and engineering*, 10.1021/acssuschemeng.6b01383 vol. 4, no. 9, pp. 5005-5012.

152. J. Li, Y. Zhao, M. Ge, S. Fu, and T. Lin, (2016), "Superhydrophobic and luminescent cotton fabrics prepared by dip-coating of APTMS modified particles in the presence of SU8 and fluorinated alkyl silane," *Journal of rare earths*, 10.1016/S1002-0721(16)60075-3 vol. 34, no. 7, pp. 653-660.

153. L. H. Li and Y. Chen, (2016), "Atomically thin boron nitride: unique properties and applications," *Advanced functional materials*, 10.1002/adfm.201504606 vol. 26, no. 16, pp. 2594-2608.

154. P. Li, Z. Yang, J. Shen, H. Nie, Q. Cai, L. Li, M. Ge, C. Gu, X. Chen, K. Yang, L. Zhang, Y. Chen, and S. Huang, (2016), "Subnanometer molybdenum sulfide on carbon nanotubes as a highly active and stable electrocatalyst for hydrogen evolution reaction," *ACS Applied materials and interfaces*, 10.1021/acsami.5b08816 vol. 8, no. 5, pp. 3543-3550.

155. P. W. Li, G. Wang, Z. M. Yang, W. Duan, Z. Peng, L. X. Kong, and Q. H. Wang, (2016), "Development of drug-loaded chitosan-vanillin nanoparticles and its cytotoxicity against HT-29 cells," *Drug delivery*, 10.3109/10717544.2014.900590 vol. 23, no. 1, pp. 30-35.

156. Q. Li, P. R. Brady, C. J. Hurren, and X. G. Wang, (2016), "Colour effect on fibre diameter measurement with OFDA 2000," *Indian Journal of Fibre and Textile Research*, vol. 41, no. 1, pp. 102-106.

157. Q. Li, J. S. Church, M. Naebe, and B. L. Fox, (2016), "Interfacial characterization and reinforcing mechanism of novel carbon nanotube – carbon fibre hybrid composites," *Carbon*, 10.1016/j.carbon.2016.07.058 vol. 109, pp. 74-86.

158. Q. Li, J. S. Church, M. Naebe, and B. L. Fox, (2016), "A systematic investigation into a novel method for preparing carbon fibre – carbon nanotube hybrid structures," *Composites part A: applied science and manufacturing*, 10.1016/j.compositesa.2016.05.004 vol. 90, pp. 174-185.

159. Q. Li, J. J. Wang, and C. J. Hurren, (2016), "A study on wicking in natural staple yarns," *Journal of natural fibers*, 10.1080/15440478.2016.1212763 pp. 1-10.

160. W. Li and X. Wang, (2016), "Innovations on Management of Sustainable Construction in a Large Earthwork Project: An Australian Case Research," *Procedia Engineering*, 10.1016/j.proeng.2016.04.067 vol. 145, pp. 677-684.

161. C. K. Lim, X. Li, Y. Li, K. L. M. Drew, J. P. Palafox-Hernandez, Z. Tang, A. Baev, A. N. Kuzmin, M. R. Knecht, T. R. Walsh, M. T. Swihart, H. Ågren, and P. N. Prasad, (2016), "Plasmon-enhanced two-photon-induced isomerization for highly-localized light-based actuation of inorganic/organic interfaces," *Nanoscale*, 10.1039/c5nr07973j vol. 8, no. 7, pp. 4194-4202.

162. D. Liu, W. Lei, S. Qin, K. D. Klika, and Y. Chen, (2016), "Superior adsorption of pharmaceutical molecules by highly porous BN," *Physical chemistry chemical physics*, 10.1039/c5cp06399j vol. 18, no. 1, pp. 84-88.

163. D. Liu, M. W. Zhang, W. J. Xie, L. Sun, Y. Chen, and W. W. Lei, (2016), "Efficient photocatalytic reduction of aqueous Cr(VI) over porous BNNSs/TiO_2 nanocomposites under visible light irradiation," *Catalysis Science & Technology*, 10.1039/c6cy01770c vol. 6, no. 23, pp. 8309-8313.

164. J. Liu, M. Bao, J. Li, Y. Weng, Y. Dou, B. Yuan, K. Yang, and Y. Ma, (2016), "Modulated deformation of lipid membrane to vesicles and tubes due to reduction of graphene oxide substrate under laser irradiation," *Carbon*, 10.1016/j.carbon.2015.11.003 vol. 98, pp. 300-306.

165. J. Liu, H. Ma, H. Zhu, Z. Liu, D. Jiang, J. Zhang, and W. Yang, (2016), "Quantifying the Tunable Conjugated Area of Graphene Oxide by Using Pyrene as a Fluorescent Probe," *Chemistry*, 10.1002/chem.201604201 vol. 22, no. 52, pp. 18881-18886.

166. J. Liu, D. Wang, D. Zhang, L. Gao, and T. Lin, (2016), "Synergistic effects of carboxymethyl cellulose and ZnO as alkaline electrolyte additives for aluminium anodes with a view towards Al-air batteries," *Journal of Power Sources*, 10.1016/j.jpowsour.2016.09.060 vol. 335, pp. 1-11.

167. J. Liu, X. Wang, T. Guo, J. Zou, and X. Yang, (2016), "Microstructural evolution and properties of aged Cu-3Ti-3Ni alloy," *Xiyou Jinshu Cailiao Yu Gongcheng/Rare Metal Materials and Engineering*, vol. 45, no. 5, pp. 1162-1167.

168. J. Liu, J. Zhou, B. Tang, T. Zeng, Y. Li, J. Li, Y. Ye, and X. Wang, (2016), "Surface enhanced Raman scattering (SERS) fabrics for trace analysis," *Applied surface science*, 10.1016/j.apsusc.2016.05.150 vol. 386, pp. 296-302.

169. X. Liu, J. Fang, Y. Liu, and T. Lin, (2016), "Progress in nanostructured photoanodes for dye-sensitized solar cells," *Frontiers of materials science*, 10.1007/s11706-016-0341-0 vol. 10, no. 3, pp. 225-237.

170. L. Lunevich, P. Sanciolo, L. F. Dumee, and S. R. Gray, (2016), "Silica fouling in high salinity waters in reverse osmosis desalination (sodium-silica system)," *Environmental science : water research & technology*, 10.1039/c6ew00065g vol. 2, no. 3, pp. 539-548.

171. G. Luo, H. Li, L. Gao, D. Zhang, and T. Lin, (2016), "Porous structured niobium pentoxide/carbon complex for lithium-ion intercalation pseudocapacitors," *Materials Science and Engineering B: Solid-State Materials for Advanced Technology*, 10.1016/j.mseb.2016.09.004 vol. 214, pp. 74-80.

172. Y. Lv, P. Hodgson, L. Kong, and W. Gao, (2016), "Formation of nanoscale titanium carbides in ferrite: an atomic study," *Applied physics A: materials science and processing*, 10.1007/s00339-016-9779-2 vol. 122, no. 3, pp. 1-5.

173. F. Ma, Y. Jiao, Y. Gu, A. Bilic, Y. Chen, Z. Chen, and A. Du, (2016), "Anomalous Enhancement of Mechanical Properties in the Ammonia Adsorbed Defective Graphene," *Sci Rep*, 10.1038/srep33810 vol. 6, pp. 33810-33810.

174. M. Maghe, C. Creighton, L. C. Henderson, M. G. Huson, S. Nunna, S. Atkiss, N. Byrne, and B. L. Fox, (2016), "Using ionic liquids to reduce energy consumption for carbon fibre production," *Journal of Materials Chemistry A*, 10.1039/c6ta06842a vol. 4, no. 42, pp. 16619-16626.

175. A. Mahawish, A. Bouazza, and W. P. Gates, (2016), "Biogrouting coarse materials using soil-lift treatment strategy," *Canadian Geotechnical Journal*, 10.1139/cgj-2016-0167 vol. 53, no. 12, pp. 2080-2085.

176. F. Mahdavi, M. Y. Tan, and M. Forsyth, (2016), "Communication - an approach to measuring local electrochemical impedance for monitoring cathodic disbondment of coatings," *Journal of the electrochemical society*, 10.1149/2.1101605jes vol. 163, no. 5, pp. C228-C231.

177. R. K. W. Marceau, (2016), "Atomic scale analysis of light alloys using atom probe tomography," *Materials science and technology*, 10.1179/1743284715Y.0000000088 vol. 32, no. 3, pp. 209-219.

178. S. Mateti, M. M. Rahman, L. H. Li, Q. Cai, and Y. Chen, (2016), "In situ prepared V2O5/graphene hybrid as a superior cathode material for lithium-ion batteries," *RSC Advances*, 10.1039/c6ra04871d vol. 6, no. 42, pp. 35287-35294.

179. O. Maulik, D. Kumar, S. Kumar, D. M. Fabijanic, and V. Kumar, (2016), "Structural evolution of spark plasma sintered AlFeCuCrMgx (x = 0, 0.5, 1, 1.7) high entropy alloys," *Intermetallics*, 10.1016/j.intermet.2016.07.001 vol. 77, pp. 46-56.

180. K. Maximova, X. Wang, A. Balčytis, L. Fan, J. Li, and S. Juodkazis, (2016), "Silk patterns made by direct femtosecond laser writing," *Biomicrofluidics*, 10.1063/1.4962294 vol. 10, no. 5, p. 054101.

181. J. L. McDonald, D. R. MacFarlane, M. Forsyth, and J. M. Pringle, (2016), "A novel class of gas separation membrane based on organic ionic plastic crystals," *Chemical communications*, 10.1039/c6cc06086b vol. 52, no. 88, pp. 12940-12943.

182. D. R. MacFarlane, M. Forsyth, P. C. Howlett, M. Kar, S. Passerini, J. M. Pringle, H. Ohno, M. Watanabe, F. Yan, W. Zheng, S. Zhang, J. Zhang, (2016), "Ionic liquids and their solid-state analogues as materials for energy generation and storage," *Nature Reviews Materials*, Article No.15005.

183. B. A. McGregor, (2016), "Allometric relationships determined for skin area and fleece production of Angora goats," *Small Ruminant Research*, 10.1016/j.smallrumres.2016.10.018 vol. 145, pp. 28-32.

184. B. A. McGregor, (2016), "The effects of nutrition and parity on the development and productivity of Angora goats: 1. Manipulation of mid pregnancy nutrition on energy intake and maintenance requirement, kid birth weight, kid survival, doe live weight and mohair production," *Small Ruminant Research*, 10.1016/j.smallrumres.2016.10.027 vol. 145, pp. 65-75.

185. B. A. McGregor, (2016), "Weathering, fibre strength and colour properties of processed white cashmere," *Journal of the Textile Institute*, 10.1080/00405000.2015.1099355 vol. 107, no. 9, pp. 1193-1202.

186. B. A. McGregor and K. L. Butler, (2016), "Coarser wool is not a necessary consequence of sheep aging: allometric relationship between fibre diameter and fleece-free liveweight of Saxon Merino sheep," *Animal*, 10.1017/S1751731116001038 no. In Press, pp. 1-10.

187. B. A. McGregor, S. P. de Graaf, and S. Hatcher, (2016), "On-farm factors affecting physical quality of Merino wool. 1. Nutrition, reproduction, health and management," *Small Ruminant Research*, 10.1016/j.smallrumres.2016.03.019 vol. 137, pp. 138-150.

188. B. A. McGregor and M. Naebe, (2016), "Fabric handle properties of superfine wool fabrics with different fibre curvature, cashmere content and knitting tightness," *Journal of the Textile Institute*, 10.1080/00405000.2015.1046310 vol. 107, no. 5, pp. 562-577.

189. R. S. McWatters, R. K. Rowe, D. Wilkins, T. Spedding, D. Jones, L. Wise, J. Mets, D. Terry, G. Hince, W. P. Gates, V. Di Battista, M. Shoaib, A. Bouazza, and I. Snape, (2016), "Geosynthetics in Antarctica: Performance of a composite barrier system to contain hydrocarbon-contaminated soil after three years in the field," *Geotextiles and geomembranes*, 10.1016/j.geotexmem.2016.06.001 vol. 44, no. 5, pp. 673-685.

190. A. E. Medvedev, R. Lapovok, Y. Estrin, T. C. Lowe, and V. N. Anumalasetty, (2016), "Bending fatigue testing of commercial purity titanium for dental implants," *Advanced Engineering Materials*, 10.1002/adem.201600002 vol. 18, no. 7, pp. 1166-1173.

191. A. E. Medvedev, A. Molotnikov, R. Lapovok, R. Zeller, S. Berner, P. Habersetzer, and F. Dalla Torre, (2016), "Microstructure and mechanical properties of Ti-15Zr alloy used as dental implant material," *Journal of the Mechanical Behavior of Biomedical Materials*, 10.1016/j.jmbbm.2016.05.008 vol. 62, pp. 384-398.

192. A. E. Medvedev, H. P. Ng, R. Lapovok, Y. Estrin, T. C. Lowe, and V. N. Anumalasetty, (2016), "Effect of bulk microstructure of commercially pure titanium on surface characteristics and fatigue properties after surface modification by sand blasting and acid-etching," *Journal of the mechanical behavior of biomedical materials*, 10.1016/j.jmbbm.2015.11.035 vol. 57, pp. 55-68.

193. T. C. Mendes, C. Xiao, F. Zhou, H. Li, G. P. Knowles, M. Hilder, A. Somers, P. C. Howlett, and D. R. MacFarlane, (2016), "In-Situ-Activated N-Doped Mesoporous Carbon from a Protic Salt and Its Performance in Supercapacitors," *ACS Appl Mater Interfaces*, 10.1021/acsami.6b11716 vol. 8, no. 51, pp. 35243-35252.

194. A. Merenda, E. D. Ligneris, K. Sears, T. Chaffraix, K. Magniez, D. Cornu, J. A. Schütz, and L. F. Dumée, (2016), "Assessing the temporal stability of surface functional groups introduced by plasma treatments on the outer shells of carbon nanotubes," *Sci Rep*, 10.1038/srep31565 vol. 6, p. 31565.

195. A. K. Minhas, P. Hodgson, C. J. Barrow, and A. Adholeya, (2016), "A review on the assessment of stress conditions for simultaneous production of microalgal lipids and carotenoids," *Frontiers in Microbiology*, 10.3389/fmicb.2016.00546 vol. 7, no. 546, pp. 1-19.

196. A. K. Minhas, P. Hodgson, C. J. Barrow, B. Sashidhar, and A. Adholeya, (2016), "The isolation and identification of new microalgal strains producing oil and carotenoid simultaneously with biofuel potential," *Bioresource technology*, 10.1016/j.biortech.2016.03.121 vol. 211, pp. 556-565.

197. V. Modepalli, L. A. Hinds, J. A. Sharp, C. Lefevre, and K. R. Nicholas, (2016), "Marsupial tammar wallaby delivers milk bioactives to altricial pouch young to support lung development," *Mech Dev*, 10.1016/j.mod.2016.08.004 vol. 142, pp. 22-29.

198. S. M. Moghaddas Tafreshi, H. Ranjbarzadeh, M. Jafari, and H. Khayyam, (2016), "A probabilistic unit commitment model for optimal operation of plug-in electric vehicles in microgrid," R*enewable and Sustainable Energy Reviews*, 10.1016/j.rser.2016.08.013 vol. 66, pp. 934-947.

199. J. Morikawa, M. Ryu, K. Maximova, A. Balčytis, G. Seniutinas, L. Fan, V. Mizeikis, J. Li, X. Wang, M. Zamengo, X. Wang, and S. Juodkazis, (2016), "Silk fibroin as a water-soluble bio-resist and its thermal properties," *RSC Advances*, 10.1039/c5ra20201a vol. 6, no. 14, pp. 11863-11869.

200. C. J. Munro, Z. E. Hughes, T. R. Walsh, and M. R. Knecht, (2016), "Peptide sequence effects control the single pot reduction, nucleation, and growth of Au nanoparticles," *Journal of physical chemistry C*, 10.1021/acs.jpcc.6b06046 vol. 120, no. 33, pp. 18917-18924.

201. M. Naebe, M. M. Abolhasani, H. Khayyam, A. Amini, and B. Fox, (2016), "Crack damage in polymers and composites: a review," *Polymer reviews*, 10.1080/15583724.2015.1078352 vol. 56, no. 1, pp. 31-69.

202. M. Naebe, Q. Li, A. Onur, and R. Denning, (2016), "Investigation of chitosan adsorption onto cotton fabric with atmospheric helium/oxygen plasma pre-treatment," *Cellulose,* 10.1007/s10570-016-0915-0 vol. 23, no. 3, pp. 2129-2142.

203. M. Naebe and K. Shirvanimoghaddam, (2016), "Functionally graded materials: A review of fabrication and properties," *Applied Materials Today*, 10.1016/j.apmt.2016.10.001 vol. 5, pp. 223-245.

204. B. Narayanaswamy, P. Hodgson, and H. Beladi, (2016), "Comparisons of the two-body abrasive wear behaviour of four different ferrous microstructures with similar hardness levels," *Wear*, 10.1016/j.wear.2016.01.013 vol. 350-351, pp. 155-165.

205. B. Narayanaswamy, P. Hodgson, and H. Beladi, (2016), "Effect of particle characteristics on the two-body abrasive wear behaviour of a pearlitic steel," *Wear*, 10.1016/j.wear.2016.03.001 vol. 354-355, pp. 41-52.

206. B. Narayanaswamy, P. Hodgson, I. Timokhina, and H. Beladi, (2016), "The impact of retained austenite characteristics on the two-body abrasive wear behavior of ultrahigh strength bainitic steels," *Metallurgical and Materials Transactions A: Physical Metallurgy and Materials Science*, 10.1007/s11661-016-3690-5 vol. 47, no. 10, pp. 4883-4895.

207. P. Newman, J. L. Galenano-Niño, P. Graney, J. M. Razal, A. I. Minett, J. Ribas, R. Ovalle-Robles, M. Biro, and H. Zreiqat, (2016), "Relationship between nanotopographical alignment and stem cell fate with live imaging and shape analysis," *Sci Rep*, 10.1038/srep37909 vol. 6, p. 37909.

208. T. N. G. Nguyen, P. H. L. Tran, T. Van Vo, W. Duan, and T. T. D. Tran, (2016), "Development of a sustained release solid dispersion using swellable polymer by melting method," *Pharmaceutical research*, 10.1007/s11095-015-1767-2 vol. 33, no. 1, pp. 102-109.

209. H. Niu, H. Zhou, H. Wang, and T. Lin, (2016), "Polypyrrole-coated PDMS fibrous membrane: flexible strain sensor with distinctive resistance responses at different strain ranges," *Macromolecular materials and engineering*, 10.1002/mame.201500447 vol. 301, no. 6, pp. 707-713.

210. B. Nuhiji, D. Attard, A. Deveth, J. Bungur, and B. Fox, (2016), "The influence of processing techniques on the matrix distribution and filtration of clay in a fibre reinforced nanocomposite," *Composites part b: engineering*, 10.1016/j.compositesb.2015.08.067 vol. 84, pp. 1-8.

211. S. Nunna, M. Naebe, N. Hameed, C. Creighton, S. Naghashian, M. J. Jennings, S. Atkiss, M. Setty, and B. L. Fox, (2016), "Investigation of progress of reactions and evolution of radial heterogeneity in the initial stage of thermal stabilization of PAN precursor fibres," *Polymer Degradation and Stability*, 10.1016/j.polymdegradstab.2016.01.008 vol. 125, pp. 105-114.

212. T. H. Okabe, H. Wang, J. Ge, Y. Liu, J. Pringle, W. Xiao, B. Khalaghi, A. Doherty, Q. Xu, D. Wang, P. Madden, B. Hu, C. Wei, K. McGregor, J. M. Slattery, A. Mount, Y. Kong, A. Kamali, L. Yu, X. Jin, Y. Liu, B. Tang, G. Z. Chen, B. Dong, I. Farnan, J. Irvine, H. Zhu, Y. Liu, D. Gunasekera, and J. Yang, (2016), "Advancement in knowledge of phenomena and processes: general discussion," *Faraday Discuss*, 10.1039/C6FD90032A vol. 190, pp. 525-549.

213. E. Onal, R. Lapovok, H. Kishimoto, A. Kato, C. H. J. Davies, and K. Suzuki, (2016), "Effect of processing parameters on the magnetic properties and macrotexture of a Nd13.5Fe73.8Co6.7B5.6Ga0.4 alloy processed by equal channel angular pressing with back pressure," *IEEE Transactions on Magnetics*, 10.1109/TMAG.2016.2529602 vol. 52, no. 7, pp. 1-4.

214. E. E. Oseland, Z. J. Ayres, A. Basile, D. M. Haddleton, P. Wilson, and P. R. Unwin, (2016), "Surface patterning of polyacrylamide gel using scanning electrochemical cell microscopy (SECCM)," *Chem Commun (Camb)*, 10.1039/c6cc05153g vol. 52, no. 64, pp. 9929-9932.

215. Y. V. Oza, D. R. MacFarlane, M. Forsyth, and L. A. O'Dell, (2016), "Unexpected effect of tetraglyme plasticizer on lithium ion dynamics in PAMPS based ionomers," *Physical Chemistry Chemical Physics*, 10.1039/c6cp03689a vol. 18, no. 28, pp. 19011-19019.

216. E. Pakdel, J. Wang, B. J. Allardyce, R. Rajkhowa, and X. Wang, (2016), "Functionality of nano and 3D-microhierarchical TiO_2 particles as coagulants for sericin extraction from the silk degumming wastewater," *Separation and Purification Technology*, 10.1016/j.seppur.2016.06.025 vol. 170, pp. 92-101.

217. J. P. Palafox-Hernandez, C. K. Lim, Z. Tang, K. L. M. Drew, Z. E. Hughes, Y. Li, M. T. Swihart, P. N. Prasad, M. R. Knecht, and T. R. Walsh, (2016), "Optical actuation of inorganic/organic interfaces: comparing peptide-azobenzene ligand reconfiguration on gold and silver nanoparticles," *ACS Applied Materials and Interfaces*, 10.1021/acsami.5b11989 vol. 8, no. 1, pp. 1050-1060.

218. M. Paramasivam, A. Gupta, N. J. Babu, K. Bhanuprakash, S. V. Bhosale, and V. J. Rao, (2016), "Funnel shaped molecules containing benzo/pyrido[1,2,5]thiadiazole functionalities as peripheral acceptors for organic photovoltaic applications," *RSC Advances*, 10.1039/c6ra06616j vol. 6, no. 71, pp. 66978-66989.

219. J. Parameswaranpillai, V. K. Dubey, K. S. Sisanth, S. Jose, A. K. Zachariah, S. Siengchin, N. V. Salim, and N. Hameed, (2016), "Tailoring of interface of polypropylene/polystyrene/carbon nanofibre composites by polystyrene-block-poly(ethylene-ran-butylene)-block-polystyrene," *Polymer Testing*, 10.1016/j.polymertesting.2016.03.009 vol. 51, pp. 131-141.

220. J. Parameswaranpillai, G. Joseph, S. K. Sidhardhan, S. Jose, and N. Hameed, (2016), "Miscibility, UV resistance, thermal degradation, and mechanical properties of PMMA/SAN blends and their composites with MWCNTs," *Journal of applied polymer science*, 10.1002/app.43628 vol. 133, no. 30, pp. 1-11.

221. K. Pingkarawat, C. Dell'Olio, R. J. Varley, and A. P. Mouritz, (2016), "Poly(ethylene-co-methacrylic acid) (EMAA) as an efficient healing agent for high performance epoxy networks using diglycidyl ether of bisphenol A (DGEBA)," *Polymer (United Kingdom)*, 10.1016/j.polymer.2016.03.054 vol. 92, pp. 153-163.

222. D. Poddar, P. Cizek, H. Beladi, and P. D. Hodgson, (2016), "Microstructure characteristics of the (111) oriented grains in a Fe-30Ni-Nb model austenitic steel deformed in hot uniaxial compression," *Materials Characterization*, 10.1016/j.matchar.2016.06.015 vol. 118, pp. 382-396.

223. I. Poon, R. K. W. Marceau, J. Xia, X. Z. Liao, and S. P. Ringer, (2016), "Precipitation processes in Al-Cu-Mg-Sn and Al-Cu-Mg-Sn-Ag," *Materials and Design*, 10.1016/j.matdes.2016.02.048 vol. 96, pp. 385-391.

224. C. R. Pope, M. Kar, D. R. MacFarlane, M. Armand, M. Forsyth, and L. A. O'Dell, (2016), "Ion dynamics in a mixed-cation alkoxy-ammonium ionic liquid electrolyte for sodium device applications," *Chemphyschem*, 10.1002/cphc.201600692 vol. 17, no. 20, pp. 3187-3195.

225. C. Pozo-Gonzalo, M. Kar, E. Jónsson, P. C. Howlett, D. R. MacFarlane, and M. Forsyth, (2016), "Reduction of oxygen in a trialkoxy ammonium-based ionic liquid and the role of water," *Electrochimica Acta*, 10.1016/j.electacta.2016.02.208 vol. 196, pp. 727-734.

226. J. W. V. Preston, S. Hatcher, and B. A. McGregor, (2016), "Fabric and greasy wool handle, their importance to the Australian wool industry: a review," *Animal Production Science*, 10.1071/AN14777 vol. 56, no. 1, pp. 1-17.

227. E. L. Prime, D. H. Solomon, I. J. Dagley, and G. G. Qiao, (2016), "Duolayers at the air/water interface: improved lifetime through ionic interactions," *Journal of Physical Chemistry B*, 10.1021/acs.jpcb.6b04273 vol. 120, no. 30, pp. 7401-7407.

228. Y. Qi, K. Contreras, H-D. Jung, H-E. Kim, R. Lapovok, Y. Estrin, (2016), "Ultrafine-grained porous titanium and porous titanium/magnesium composites fabricated by space holder-enabled severe plastic deformation," *Materials Science and Engineering C*, 59:1, 754-765.

229. Y. Qi, R. Lapovok, and Y. Estrin, (2016), "Microstructure and electrical conductivity of aluminium/steel bimetallic rods processed by severe plastic deformation," *Journal of Materials Science*, 10.1007/s10853-016-9973-9 vol. 51, no. 14, pp. 6860-6875.

230. H. Qiao, M. R. Barnett, and P. D. Wu, (2016), "Modeling of twin formation, propagation and growth in a Mg single crystal based on crystal plasticity finite element method," *International Journal of Plasticity*, 10.1016/j.ijplas.2016.08.002 vol. 86, pp. 70-92.

231. Y. Qiao, H. Wang, X. Zhang, P. Jia, T. Shen, X. Hao, Y. Tang, X. Wang, W. Gao, and L. Kong, (2016), "Ultrahigh volumetric capacitance biomorphic porous carbon material derived from mold," *Materials Letters*, 10.1016/j.matlet.2016.08.081 vol. 184, pp. 252-256.

232. S. Qin, W. Lei, D. Liu, and Y. Chen, (2016), "Advanced N-doped mesoporous molybdenum disulfide nanosheets and the enhanced lithium-ion storage performance," *Journal of Materials Chemistry A*, 10.1039/c5ta10224c vol. 4, no. 4, pp. 1440-1445.

233. M. M. Rahman, I. Sultana, T. Yang, Z. Chen, N. Sharma, A. M. Glushenkov, and Y. Chen, (2016), "Lithium Germanate (Li2 GeO3): A High-Performance Anode Material for Lithium-Ion Batteries," *Angew Chem Int Ed Engl*, 10.1002/anie.201609343 vol. 55, no. 52, pp. 16059-16063.

234. T. Ramireddy, N. Sharma, T. Xing, Y. Chen, J. Leforestier, and A. M. Glushenkov, (2016), "Size and Composition Effects in Sb-Carbon Nanocomposites for Sodium-Ion Batteries," *ACS Appl Mater Interfaces*, 10.1021/acsami.6b09619 vol. 8, no. 44, pp. 30152-30164.

235. S. Ranade, M. Forsyth, and M. Y. J. Tan, (2016), "In situ measurement of pipeline coating integrity and corrosion resistance losses under simulated mechanical strains and cathodic protection," *Progress in Organic Coatings*, 10.1016/j.porgcoat.2016.08.007 vol. 101, pp. 111-121.

236. A. Rananaware, A. Gupta, J. Li, A. Bilic, L. Jones, S. Bhargava, and S. V. Bhosale, (2016), "A four-directional non-fullerene acceptor based on tetraphenylethylene and diketopyrrolopyrrole functionalities for efficient photovoltaic devices with a high open-circuit voltage of 1.18 V," *Chemical communications*, 10.1039/c6cc03730e vol. 52, no. 55, pp. 8522-8525.

237. J. Rao, R. Vijayaraghavan, F. Chen, H. Zhu, P. C. Howlett, D. R. MacFarlane, and M. Forsyth, (2016), "Protic organic ionic plastic crystals based on a difunctional cation and the triflate anion: a new solid-state proton conductor," *Chem Commun (Camb)*, 10.1039/c6cc07154f vol. 52, no. 98, pp. 14097-14100.

238. H. Ravishankar, J. Wang, L. Shu, and V. Jegatheesan, (2016), "Removal of Pb (II) ions using polymer based graphene oxide magnetic nano-sorbent," *Process safety and environmental protection*, 10.1016/j.psep.2016.04.002 vol. 104, no. Part B, pp. 472-480.

239. A. M. Raynor, A. Gupta, H. Patil, D. Ma, A. Bilic, T. J. Rook, and S. V. Bhosale, (2016), "A non-fullerene electron acceptor based on central carbazole and terminal diketopyrrolopyrrole functionalities for efficient, reproducible and solution-processable bulk-heterojunction devices," *RSC Advances*, 10.1039/c6ra01558a vol. 6, no. 33, pp. 28103-28109.

240. R. Reis, L. F. Dumee, B. L. Tardy, R. Dagastine, J. D. Orbell, J. A. Schutz, and M. C. Duke, (2016), "Towards enhanced performance thin-film composite membranes via surface plasma modification," *Scientific reports*, 10.1038/srep29206 vol. 6, pp. 1-13.

241. K. Romanenko, L. Jin, P. Howlett, and M. Forsyth, (2016), "In situ MRI of operating solid-state Lithium metal cells based on ionic plastic crystal electrolytes," *Chemistry of materials*, 10.1021/acs.chemmater.6b00797 vol. 28, no. 8, pp. 2844-2851.

242. N. D. Rosedhi, N. H. Idris, M. M. Rahman, M. F. M. Din, and J. Wang, (2016), "Disordered spinel LiNi0.5Mn1.5O4 cathode with improved rate performance for lithium-ion batteries," *Electrochimica Acta*, 10.1016/j.electacta.2016.04.152 vol. 206, pp. 374-380.

243. M. A. Rouf, A. Bouazza, R. M. Singh, W. P. Gates, and R. K. Rowe, (2016), "Gas flow unified measurement system for sequential measurement of gas diffusion and gas permeability of partially hydrated geosynthetic clay liners," *Canadian Geotechnical Journal*, 10.1139/cgj-2015-0123 vol. 53, no. 6, pp. 1000-1012.

244. M. A. Rouf, A. Bouazza, R. M. Singh, W. P. Gates, and R. K. Rowe, (2016), "Water vapour adsorption and desorption in GCLs," *Geosynthetics International*, 10.1680/jgein.15.00034 vol. 23, no. 2, pp. 86-99.

245. M. A. Rouf, R. M. Singh, A. Bouazza, R. K. Rowe, and W. P. Gates, (2016), "Gas permeability of partially hydrated geosynthetic clay liner under two stress conditions," *Environmental geotechnics*, 10.1680/envgeo.14.00009 vol. 3, no. 5, pp. 325-333.

246. K. Roy, Y. S. Patel, R. K. Kanwar, R. Rajkhowa, X. Wang, and J. R. Kanwar, (2016), "Biodegradable Eri silk nanoparticles as a delivery vehicle for bovine lactoferrin against MDA-MB-231 and MCF-7 breast cancer cells," *International journal of nanomedicine*, 10.2147/IJN.S91810 vol. 11, pp. 25-44.

247. S.S. Najar, X. Wang, and M. Naebe, (2016), "The effect of plasma treatment and tightness factor on the low-stress mechanical properties of single jersey knitted wool fabrics," *Textile Research Journal*.

248. M. S. F. Samsudin, M. Dell'Olio, K. H. Leong, Z. Ahamid, and R. J. Varley, (2016), "Adhesives performance of 3-layer PE pipe coatings: Effects of MAH loading, PE particles size, coating interval time and service temperature," *Progress in Organic Coatings*, 10.1016/j.porgcoat.2016.05.013 vol. 99, pp. 157-165.

249. T. Sapanathan, S. Khoddam, S. H. Zahiri, A. Zarei-Hanzaki, and R. Ibrahim, (2016), "Hybrid metallic composite materials fabricated by sheathed powder compaction," *Journal of Materials Science*, 10.1007/s10853-015-9621-9 vol. 51, no. 6, pp. 3118-3124.

250. S. Sen, R. B. Jayappa, H. Zhu, M. Forsyth, and A. J. Bhattacharyya, (2016), "A single cation or anion dendrimer-based liquid electrolyte," *Chemical science*, 10.1039/c5sc04584c vol. 7, no. 5, pp. 3390-3398.

251. S. Seyedin, J. M. Razal, P. C. Innis, R. Jalili, and G. G. Wallace, (2016), "Compositional effects of large graphene oxide sheets on the spinnability and properties of polyurethane composite fibers," *Advanced Materials Interfaces*, 10.1002/admi.201500672 vol. 3, no. 5, pp. 1-10.

252. S. Seyedin, J. M. Razal, P. C. Innis, and G. G. Wallace, (2016), "A facile approach to spinning multifunctional conductive elastomer fibres with nanocarbon fillers," *Smart materials and structures*, 10.1088/0964-1726/25/3/035015 vol. 25, no. 3, pp. 035015-035024.

253. A. H. Shah, J. Li, H. Yang, U. A. Rana, V. Ranganathan, H. M. Siddigi, D. R. MacFarlane, M. Forsyth, and H. Zhu, (2016), "Enhancement of 'dry' proton conductivity by self-assembled nanochannels in all-solid polyelectrolytes," *Journal of material chemistry A*, 10.1039/C6TA00368K vol. 4, no. 20, pp. 7615-7623.

254. U. Shaheen, T. W. Turney, K. Saito, W. P. Gates, and A. F. Patti, (2016), "Pendant cyclic carbonate-polymer/Na-smectite nanocomposites via in situ intercalative polymerization and solution intercalation," *Journal of Polymer Science, Part A: Polymer Chemistry*, 10.1002/pola.28117 vol. 54, no. 15, pp. 2421-2429.

255. H. Shao, J. Fang, H. Wang, L. Dai, and T. Lin, (2016), "Polymer-metal schottky contact with direct-current outputs," *Advanced Materials*, 10.1002/adma.201504778 vol. 28, no. 7, pp. 1461-1466.

256. J. A. Sharp, C. Lefèvre, A. Watt, and K. R. Nicholas, (2016), "Analysis of human breast milk cells: gene expression profiles during pregnancy, lactation, involution, and mastitic infection," *Functional and integrative genomics*, 10.1007/s10142-016-0485-0 vol. 16, no. 3, pp. 297-321.

257. X. She, L. Chen, Z. Yi, C. Li, C. He, C. Feng, T. Wang, S. Shigdar, W. Duan, and L. Kong, (2016), "Tailored mesoporous silica nanoparticles for controlled drug delivery: platform fabrication, targeted delivery, and computational design and analysis," *Mini-reviews in medicinal chemistry*, 10.2174/1389557516666160505114814 vol. 16, no. Mini-reviews issue, pp. 1-40.

258. J. Shen, Z. Yang, M. Ge, P. Li, H. Nie, Q. Cai, C. Gu, K. Yang, and S. Huang, (2016), "Neuron-Inspired Interpenetrative Network Composed of Cobalt-Phosphorus-Derived Nanoparticles Embedded within Porous Carbon Nanotubes for Efficient Hydrogen Production," *ACS Appl Mater Interfaces*, 10.1021/acsami.6b04718 vol. 8, no. 27, pp. 17284-17291.

259. K. Shirvanimoghaddam, H. Khayyam, H. Abdizadeh, M. Karbalaei Akbari, A. H. Pakseresht, F. Abdi, A. Abbasi, and M. Naebe, (2016), "Effect of B4C, TiB2 and ZrSiO4 ceramic particles on mechanical properties of aluminium matrix composites: Experimental investigation and predictive modelling," *Ceramics international*, 10.1016/j.ceramint.2015.12.181 vol. 42, no. 5, pp. 6206-6220.

260. K. Shirvanimoghaddam, H. Khayyam, H. Abdizadeh, M. Karbalaei Akbari, A. H. Pakseresht, E. Ghasali, and M. Naebe, (2016), "Boron carbide reinforced aluminium matrix composite : physical, mechanical characterization and mathematical modelling," *Materials science and engineering A*, 10.1016/j.msea.2016.01.114 vol. 658, pp. 135-149.

261. V. Shterner, I. B. Timokhina, and H. Beladi, (2016), "On the work-hardening behaviour of a high manganese TWIP steel at different deformation temperatures," *Materials science & engineering A*, 10.1016/j.msea.2016.05.104 vol. 669, pp. 437-446.

262. M. N. Shuakat and T. Lin, (2016), "Direct electrospinning of nanofibre yarns using a rotating ring collector," *Journal of the Textile Institute*, 10.1080/00405000.2015.1061785 vol. 107, no. 6, pp. 791-799.

263. N. Shubha, H. Zhu, M. Forsyth, and M. Srinivasan, (2016), "Study of lithium conducting single ion conductor based on polystyrene sulfonate for lithium battery application," *Polymer*, 10.1016/j.polymer.2016.07.090 vol. 99, pp. 748-755.

264. C. Singh and X. Wang, (2016), "A biomechanically optimized knitted stent using a bio-inspired design approach," *Textile Research Journal*, 10.1177/0040517515590413 vol. 86, no. 4, pp. 380-392.

265. A. E. Somers, G. B. Deacon, B. R. W. Hinton, D. R. MacFarlane, P. C. Junk, M. Y. J. Tan, and M. Forsyth, (2016), "Recent developments in environment-friendly corrosion inhibitors for mild steel", *Journal of the Indian Institute of Science*, vol. 96, no. 4, pp. 285-292.

266. A. E. Somers, R. Yunis, M. B. Armand, J. M. Pringle, D. R. MacFarlane, M. Forsyth, (2016), "Towards phosphorus free ionic liquid anti-wear lubricant additives," *Lubricants*, 4(2) 22-34.

267. D. Srivani, A. Gupta, A. M. Raynor, A. Bilic, J. Li, S. V. Bhosale, and S. V. Bhosale, (2016), "Naphthalene diimide-based non-fullerene acceptors for simple, efficient, and solution-processable bulk-heterojunction devices," *RSC Advances*, 10.1039/c6ra05538a vol. 6, no. 45, pp. 38703-38708.

268. G. D. Stynes, G. K. Kiroff, W. A. Morrison, G. A. Edwards, R. S. Page, and M. A. Kirkland, (2016), "Rigid removable cover for dorsal wound protection and tube fixation in pigs," *Australian Veterinary Journal*, 10.1111/avj.12424 vol. 94, no. 4, pp. 111-116.

269. G. D. Stynes, G. K. Kiroff, W. A. Morrison, R. S. Page, and M. A. Kirkland, (2016), "Toward a skin-material interface with vacuum-integrated capped macroporous scaffolds," *Journal of Biomedical Materials Research*, 10.1002/jbm.b.33649 pp. 1-12.

270. A. M. Sultan, Z. C. Westcott, Z. E. Hughes, J. P. Palafox-Hernandez, T. Giesa, V. Puddu, M. J. Buehler, C. C. Perry, and T. R. Walsh, (2016), "Aqueous peptide-TiO_2 interfaces: isoenergetic binding via either entropically or enthalpically driven mechanisms," *ACS applied materials & interfaces*, 10.1021/acsami.6b05200 vol. 8, no. 28, pp. 18620-18630.

271. I. Sultana, T. Ramireddy, M. M. Rahman, Y. Chen, and A. M. Glushenkov, (2016), "Tin-based composite anodes for potassium-ion batteries," *Chemical communications*, 10.1039/c6cc03649j vol. 52, no. 59, pp. 9279-9282.

272. D. Sun, H. I. Hussain, Z. Yi, J. E. Rookes, L. Kong, and D. M. Cahill, (2016), "Mesoporous silica nanoparticles enhance seedling growth and photosynthesis in wheat and lupin," *Chemosphere*, 10.1016/j.chemosphere.2016.02.096 vol. 152, pp. 81-91.

273. S. Sure, A. A. J. Torriero, A. Gaur, L. H. Li, Y. Chen, C. Tripathi, A. Adholeya, M. L. Ackland, and M. Kochar, (2016), "Identification and topographical characterisation of microbial nanowires in Nostoc punctiforme," *Antonie Van Leeuwenhoek*, 10.1007/s10482-015-0644-7 vol. 109, no. 3, pp. 475-480.

274. A. Sutti, T. Chaffraix, A. Voda, A. Taylor, and K. Magniez, (2016), "Nano-capsules of amphiphilic poly (ethylene glycol)-block-poly (bisphenol A carbonate) copolymers via thermodynamic entrapment," *RSC Advances*, 10.1039/C5RA23555C vol. 6, no. 8, pp. 6065-6071.

275. M.Y.J. Tan, D. Abreu, T. Hallifax Ballinger, and B. Grey, (2016), "An enhanced method for determining the maximum strain a pipeline coating could tolerate," Progress in Organic Coatings, 10.1016/j.porgcoat.2015.11.002 vol. 90, pp. 339-349.

276. M.Y.J. Tan, F. Varela, Y. Huo, R. Gupta, D. Abreu, F. Mahdavi, B. Hinton, and M. Forsyth, (2016), "An overview of new progresses in understanding pipeline corrosion," *Corrosion Science and Technology*, vol. 15, pp. 271-280.

277. I. Timokhina, M. K. Miller, J. Wang, H. Beladi, P. Cizek, and P. D. Hodgson, (2016), "On the Ti-Mo-Fe-C atomic clustering during interphase precipitation in the Ti-Mo steel studied by advanced microscopic techniques," *Materials and Design*, 10.1016/j.matdes.2016.08.086 vol. 111, pp. 222-229.

278. I. B. Timokhina, K. D. Liss, D. Raabe, K. Rakha, H. Beladi, X. Y. Xiong, and P. D. Hodgson, (2016), "Growth of bainitic ferrite and carbon partitioning during the early stages of bainite transformation in a 2 mass% silicon steel studied by in situ neutron diffraction, TEM and APT," *Journal of Applied Crystallography*, 10.1107/S1600576716000418 vol. 49, pp. 399-414.

279. I. B. Timokhina, M. K. Miller, H. Beladi, and P. D. Hodgson, (2016), “The influence of fine ferrite formation on the γ/α interface, fine bainite and retained austenite in a thermomechanically-processed transformation induced plasticity steel,” *Journal of materials research*, 10.1557/jmr.2016.73 vol. 31, no. 6, pp. 806-818.

280. A. Tiwari, C. S. Wong, L. P. Nekkanti, J. A. Deane, C. McDonald, G. Jenkin, and M. A. Kirkland, (2016), “Impact of oxygen levels on human hematopoietic stem and progenitor cell expansion,” *Stem cells and development*, 10.1089/scd.2016.0153 vol. 25, no. 20, pp. 1604-1613.

281. H. Tran, P. Tran, T. Vo and T. Tran, *Current Drug Delivery*, 2016, Design of Fucoidan Functionalized - Iron Oxide Nanoparticles for Biomedical Applications 13, 774-783.

282. T. T. Tran, C. Zachreson, A. M. Berhane, K. Bray, R. G. Sandstrom, L. H. Li, T. Taniguchi, K. Watanabe, I. Aharonovich, and M. Toth, (2016), “Quantum emission from defects in single-crystalline hexagonal boron nitride,” *Physical Review Applied*, 10.1103/PhysRevApplied.5.034005 vol. 5, no. 3, pp. 034005-1-034005-5.

283. T. T. D. Tran, P. H. L. Tran, Y. Wang, P. Li, and L. Kong, (2016), “Nanoparticulate drug delivery to colorectal cancer : formulation strategies and surface engineering,” *Current pharmaceutical design*, 10.2174/1381612822666160217140932 vol. 22, no. 19, pp. 2904-2912.

284. N. Valiyaveettil Salim, A. Palanisamy, N. Hameed, P. Jyotishkumar, T. Pradeep, and B. Box, (2016), “A facile method to fabricate carbon nanostructures via the self-assembly of polyacrylonitrile/poly (methyl methacrylate-b-polyacrylonitrile) AB/B’ type block copolymer/homopolymer blends,” *RSC Advances*, 10.1039/C6RA09823A vol. 6, pp. 55792-55799.

285. R. J. Varley and K. H. Leong, (2016), “Polymer coatings for oilfield pipelines,” *Springer Series in Materials Science*, 10.1007/978-94-017-7540-3_14 vol. 233, pp. 385-428.

286. S. L. Veinberg, Z. W. Friedl, A. W. Lindquist, B. Kispal, K. J. Harris, L. A. O’Dell, and R. W. Schurko, (2016), “(14) N Solid-State NMR Spectroscopy of Amino Acids,” *Chemphyschem*, 10.1002/cphc.201600873 vol. 17, no. 23, pp. 4011-4027.

287. A. S. Voda, K. Magniez, N. V. Salim, C. Wong, and Q. Guo, (2016), “Synthesis and self-assembly behaviour of poly(Nα-Boc-l-tryptophan)-block-poly(ethylene glycol)-block-poly(Nα-Boc-l-tryptophan),” *RSC Advances*, 10.1039/c6ra03718f vol. 6, no. 29, pp. 24142-24153.

288. D. Wang, L. Gao, D. Zhang, D. Yang, H. Wang, and T. Lin, (2016), “Experimental and theoretical investigation on corrosion inhibition of AA5052 aluminium alloy by l-cysteine in alkaline solution,” *Materials Chemistry and Physics*, 10.1016/j.matchemphys.2015.11.041 vol. 169, pp. 142-151.

289. J. Wang, M. She, (2016), “Probabilistic latent semantic analysis for multichannel biomedical signal clustering,” *IEEE Signal Processing Letters*, vol. 23 (12), pp. 1821-1824.

290. J. Wang, C. Yang, and P. D. Hodgson, (2016), “Strain gradients in Cu-Fe thin films and multilayers during micropillar compression,” *Materials Science and Engineering: A*, 10.1016/j.msea.2015.10.105 vol. 651, pp. 146-154.

291. L. Wang, Z. Yang, H. Nie, C. Gu, W. Hua, X. Xu, X. Chen, Y. Chen, and S. Huang, (2016), “A lightweight multifunctional interlayer of sulfur-nitrogen dual-doped graphene for ultrafast, long-life lithium-sulfur batteries,” *Journal of Materials Chemistry A*, 10.1039/c6ta07027b vol. 4, no. 40, pp. 15343-15352.

292. L. Wang, Y. Zhuang, J. Li, J. Pang, and X. Liu, (2016), “The textural properties and microstructure of konjac glucomannan - tungsten gels induced by DC electric fields,” *Food Chemistry*, 10.1016/j.foodchem.2016.05.162 vol. 212, pp. 256-263.

293. W. Wang, X. Jin, Y. Zhu, C. Zhu, J. Yang, H. Wang, and T. Lin, (2016), “Effect of vapor-phase glutaraldehyde crosslinking on electrospun starch fibers,” Carbohydrate Polymers, 10.1016/j.carbpol.2015.12.061 vol. 140, pp. 356-361.

294. X. Wang, H. Zhu, G. W. Greene, J. Li, N. Iranipour, C. Garnier, J. Fang, M. Armand, M. Forsyth, J. M. Pringle, and P. C. Howlett, (2016), “Enhancement of ion dynamics in organic ionic plastic crystal/PVDF composite electrolytes prepared by co-electrospinning,” *Journal of Materials Chemistry A*, 10.1039/c6ta02817a vol. 4, no. 25, pp. 9873-9880.

295. Y. Wang, Y. Chen, J. Gao, H. G. Yoon, L. Jin, M. Forsyth, T. J. Dingemans, and L. A. Madsen, (2016), “Highly conductive and thermally stable ion gels with tunable anisotropy and modulus,” A*dvance Materials*, 10.1002/adma.201505183 vol. 28, no. 13, pp. 2571-2578.

296. Y. Wang, P. Li, T. T. D. Tran, J. Zhang, and L. Kong, (2016), “Manufacturing techniques and surface engineering of polymer based nanoparticles for targeted drug delivery to cancer,” *Nanomaterials*, 10.3390/nano6020026 vol. 6, no. 2, pp. 1-18.

297. S. Wasnik, S. Kantipudi, M. A. Kirkland, and G. Pande, (2016), “Enhanced Ex Vivo expansion of human hematopoietic progenitors on native and spin coated acellular matrices prepared from bone marrow stromal cells,” *Stem cells international*, 10.1155/2016/7231567 vol. 2016, no. 7231567.

298. B. Weng, A. Ding, Y. Liu, J. Diao, J. Razal, K. T. Lau, R. Shepherd, C. Li, and J. Chen, (2016), “Hierarchical Nafion enhanced carbon aerogels for sensing applications,” *Nanoscale*, 10.1039/c5nr08631k vol. 8, no. 6, pp. 3416-3424.

299. S. Wu, R. B. Ladani, J. Zhang, K. Ghorbani, X. Zhang, A. Mouritz, A. Kinloch, and C. H. Wang, (2016), “Strain sensors with adjustable sensitivity by tailoring the microstructure of graphene aerogel/PDMS nanocomposites,” *ACS Applied materials and interfaces*, 10.1021/acsami.6b06012 vol. 8, pp. 24853-24861.

300. S. Wu, J. Zhang, R. B. Ladani, K. Ghorbani, A. P. Mouritz, A. J. Kinloch, and C. H. Wang, (2016), “A novel route for tethering graphene with iron oxide and its magnetic field alignment in polymer nanocomposites,” *Polymer*, 10.1016/j.polymer.2016.05.024 pp. 1-34.

301. T. Xing, S. Mateti, L. H. Li, F. Ma, A. Du, Y. Gogotsi, and Y. Chen, (2016), “Gas Protection of Two-Dimensional Nanomaterials from High-Energy Impacts,” *Sci Rep*, 10.1038/srep35532 vol. 6, p. 35532.

302. Z. Xu, Y. Zhao, H. Wang, H. Zhou, C. Qin, X. Wang, and T. Lin, (2016), “Fluorine-free superhydrophobic coatings with pH-induced wettability transition for controllable oil-water separation,” *ACS Applied Materials and Interfaces*, 10.1021/acsami.5b11720 vol. 8, no. 8, pp. 5661-5667.

303. R. Yadav, M. Naebe, X. Wang, and B. Kandasubramanian, (2016), “Body armour materials: from steel to contemporary biomimetic systems,” *RSC Advances*, 10.1039/c6ra24016j vol. 6, no. 116, pp. 115145-115174.

304. R. Yadav, M. Naebe, X. Wang, and B. Kandasubramanian, (2016), “Temperature Assisted in-Situ Small Angle X-ray Scattering Analysis of Ph-POSS/PC Polymer Nanocomposite,” *Sci Rep*, 10.1038/srep29917 vol. 6, p. 29917.

305. K. Yan, K. D. Liss, I. B. Timokhina, and E. V. Pereloma, (2016), “In situ synchrotron X-ray diffraction studies of the effect of microstructure on tensile behavior and retained austenite stability of thermo-mechanically processed transformation induced plasticity steel,” *Materials Science and Engineering A*, 10.1016/j.msea.2016.03.048 vol. 662, pp. 185-197.

306. L. Yan, B. Zhao, X. Liu, X. Li, C. Zeng, H. Shi, X. Xu, T. Lin, L. Dai, and Y. Liu, (2016), “Aligned nanofibers from polypyrrole/graphene as electrodes for regeneration of optic nerve via electrical stimulation,” *ACS Applied Materials and Interfaces*, vol. 8, no. 11, pp. 6834-6840.

307. J. Yang, H. Zhu, C. Zhang, Q. Jiang, Y. Zhao, P. Chen, and D. Wang, (2016), “Transesterification induced mechanical properties enhancement of PLLA/PHBV bio-alloy,” *Polymer*, 10.1016/j.polymer.2015.12.025 vol. 83, pp. 230-238.

308. T. Yang, Y. Zhong, J. Liang, M. M. Rahman, W. Lei, Y. Chen, M. J. Monteiro, Z. Shao, and J. Liu, (2016), “Hierarchical Porous Yolk-Shell Carbon Nanosphere for High-Performance Lithium-Sulfur Batteries,” *Particle and Particle Systems Characterization*, 10.1002/ppsc.201600281.

309. M. J. Yao, P. Dey, J. B. Seol, P. Choi, M. Herbig, R. K. W. Marceau, T. Hickel, J. Neugebauer, and D. Raabe, (2016), “Combined atom probe tomography and density functional theory investigation of the Al off-stoichiometry of κ-carbides in an austenitic Fe-Mn-Al-C low density steel,” *Acta Materialia*, 10.1016/j.actamat.2016.01.007 vol. 106, pp. 229-238.

310. Y. Yao, B. Tang, W. Chen, L. Sun, and X. Wang, (2016), “Sunlight-induced coloration of silk,” *Nanoscale Research Letters*, 10.1186/s11671-016-1506-6 vol. 11, no. 1, pp. 1-9.

311. P. Yoganantharajah, D. J. Eyckens, J. L. Pedrina, L. C. Henderson, and Y. Gibert, (2016), “A study on acute toxicity and solvent capacity of solvate ionic liquids: in vivo using a zebrafish model (Danio rerio),” *New Journal of Chemistry*, 10.1039/c6nj00291a vol. 40, no. 8, pp. 6599-6603.

312. C. Yu, C. Wang, X. Liu, X. Jia, S. Naficy, K. Shu, M. Forsyth, and G. G. Wallace, (2016), “A Cytocompatible Robust Hybrid Conducting Polymer Hydrogel for Use in a Magnesium Battery,” *Adv Mater*, 10.1002/adma.201601755 vol. 28, no. 42, pp. 9349-9355.

313. Y. Yu, C. Hurren, K. R. Millington, L. Sun, and X. Wang, (2016), “Understanding the influence of fibre, yarn and fabric parameters on UV protection of wool-knitted fabrics,” *Journal of the Textile Institute*, 10.1080/00405000.2016.1269980 vol. In Press, pp. 1-9.

314. O. Zabihi, M. Ahmadi, H. Khayyam, and M. Naebe, (2016), “Fish DNA-modified clays: Towards highly flame retardant polymer nanocomposite with improved interfacial and mechanical performance,” *Sci Rep*, 10.1038/srep38194 vol. 6, p. 38194.

315. O. Zabihi, M. Ahmadi, S. Shafei, S. M. Seraji, A. Oroumei, and M. Naebe, (2016), "One-step amino-functionalization of milled carbon fibre for enhancement of thermo-physical properties of epoxy composites," *Composites part A: applied science and manufacturing*, 10.1016/j.compositesa.2016.06.005 vol. 88, pp. 243-252.

316. C. Zeng, H. Wang, H. Zhou, and T. Lin, (2016), "Directional water transport fabrics with durable ultra-high one-way transport capacity," *Advanced Materials Interfaces*, 10.1002/admi.201600036 vol. 3, no. 14, pp. 1-7.

317. W. Zeng, H. Wang, and Z. Li, (2016), "Nanomaterials for sensing applications," *Journal of nanotechnology*, 10.1155/2016/2083948 vol. 2016, no. 2083948, pp. 1-2.

318. H. Zhang, F. Liu, Z. Mou, X. Liu, J. Sun, and W. Lei, (2016), "A facile one-step synthesis of ZnO quantum dots modified poly(triazine imide) nanosheets for enhanced hydrogen evolution under visible light," *Chem Commun (Camb)*, 10.1039/c6cc06970c vol. 52, no. 88, pp. 13020-13023.

319. J. Zhang, S. Lu, H. Zhu, K. Chen, Y. Xiang, J. Liu, M. Forsyth, and S. P. Jiang, (2016), "Amino-functionalized mesoporous silica based polyethersulfone-polyvinylpyrrolidone composite membranes for elevated temperature proton exchange membrane fuel cells," *RSC Advances*, 10.1039/c6ra15093d vol. 6, no. 89, pp. 86575-86585.

320. J. Zhang, S. F. Lu, H. J. Zhu, K. F. Chen, J. Liu, Y. Xiang, M. Forsyth, and S. P. Jianga, (2016), "Amino-functionalized mesoporous silica based polyethersulfone-polyvinylpyrrolidone composite membrane for elevated temperature fuel cells," *ECS Transactions*, 10.1149/07514.0581ecst vol. 75, no. 14, pp. 581-588.

321. M. Zhang, B. Tang, L. Sun, and X. Wang, (2016), "Protection of silica-coated ZnO nanoparticles on pre-dyed polyester fabrics against photofading," *Journal of the Textile Institute*, 10.1080/00405000.2016.1153912 pp. 1-8.

322. M. Zhang, W. Xie, B. Tang, L. Sun, and X. Wang, (2016), "Synthesis of TiO_2&SiO_2 nanoparticles as efficient UV absorbers and their application on wool," *Textile Research Journal*, 10.1177/0040517516659375 pp. 1-9.

323. T. Zhang and Q. Guo, (2016), "Isorefractive high internal phase emulsion organogels for light induced reactions," *Chemical communications,* 10.1039/c6cc00391e vol. 52, no. 24, pp. 4561-4564.

324. T. Zhang, Z. Xu, and Q. Guo, (2016), "Closed-cell and open-cell porous polymers from ionomer-stabilized high internal phase emulsions," *Polymer Chemistry*, 10.1039/c6py01725h vol. 7, no. 48, pp. 7469-7476.

325. T. Zhang, Z. Xu, Y. Wu, and Q. Guo, (2016), "Assembled block copolymer stabilized high internal phase emulsion hydrogels for enhancing oil safety," *Industrial and engineering chemistry research*, 10.1021/acs.iecr.6b00039 vol. 55, no. 16, pp. 4499-4505.

326. Y. Zhang, X. Liu, S. S. Jamal, B. R. W. Hinton, S. E. Moulton, G. G. Wallace, and M. Forsyth, (2016), "The effect of treatment time on the ionic liquid surface film formation: promising surface coating for Mg alloy AZ31," *Surface and coatings technology*, 10.1016/j.surfcoat.2016.04.038 vol. 296, pp. 192-202.

327. Z. Zhang, X. Yang, Z. Xiao, J. Wang, D. Zhang, C. Liu, and T. Sakai, (2016), "Dynamic recrystallization behaviors of a Mg-4Y-2Nd-0.2Zn-0.5Zr alloy and the resultant mechanical properties after hot compression," *Materials and Design*, 10.1016/j.matdes.2016.02.072 vol. 97, pp. 25-32.

328. Y. Zheng, Y. Jiao, Y. Zhu, L. H. Li, Y. Han, Y. Chen, M. Jaroniec, and S. Z. Qiao, (2016), "High Electrocatalytic Hydrogen Evolution Activity of an Anomalous Ruthenium Catalyst," *J Am Chem Soc*, 10.1021/jacs.6b11291 vol. 138, no. 49, pp. 16174-16181.

329. H. Zhou, H. Wang, H. Niu, C. Zeng, Y. Zhao, Z. Xu, S. Fu, and T. Lin, (2016), "One-way water-transport cotton fabrics with enhanced cooling effect," *Advanced Materials Interfaces*, 10.1002/admi.201600283 vol. 3, no. 17, pp. 1-6.

330. H. Zhou, Y. Zhao, H. Wang, and T. Lin, (2016), "Recent Development in Durable Super-Liquid-Repellent Fabrics," *Advanced Materials Interfaces*, 10.1002/admi.201600402 vol. 3, no. 23.

331. W. Zhou, H. Huang, S. Du, Q. Wang, J. He, and S. Cui, (2016), "Facile fabrication of polyester filament fabric with highly and durable hydrophilic surface by microwave-assisted glycolysis," *Journal of Applied Polymer Science*, 10.1002/app.44069 vol. 133, no. 40, pp. 1-9.

332. Y. Zhou, D. S. Fox, P. Maguire, R. O'Connell, R. Masters, C. Rodenburg, H. Wu, M. Dapor, Y. Chen, and H. Zhang, (2016), "Quantitative secondary electron imaging for work function extraction at atomic level and layer identification of graphene," *Scientific Reports*, 10.1038/srep21045 vol. 6, no. 21045, pp. 1-8.

333. Y. Zhou, Y. Zhao, J. Fang, and T. Lin, (2016), "Electrochromic/supercapacitive dual functional fibres," *RSC Advances*, 10.1039/c6ra20729d vol. 6, no. 111, pp. 110164-110170.

334. L. Zhu, M. Naebe, I. Blanchonette, and X. Wang, (2016), "Moisture transfer properties of bifacial fabrics," *Textile Research Journal*, 10.1177/0040517516648510 pp. 1-11.

CONFERENCE PAPERS:

1. B. Abeyrathna, A. Abvabi, B. Rolfe, R. Taube, and M. Weiss, (2016), "Flexible Roll Forming of Automotive Components from Ultra High Strength Steel," in *International Deep Drawing Research Group (IDDRG) 2016*, Linz, Austria: Austrian Society for Metallurgy and Materials (ASMET).

2. B. Abeyrathna, A. Abvabi, B. Rolfe, R. Taube, and M. Weiss, (2016), "Numerical analysis of the flexible roll forming of an automotive component from high strength steel," in *IOP Conference Series: Materials Science and Engineering*, vol. 159.

3. B. Albanese, L. Meredith, T. Whyte, T. Gibson, E. de Rome, M. Fitzharris, M. Baldock, and J. Brown, (2016), "Protective Clothing and Impact Protection for Motorcyclists," in *Australasian Road Safety Conference, Canberra, ACT: Australasian College of Road Safety.*

4. E. de Rome, B. Albanese, L. Meredith, T. Whyte, T. Gibson, M. Fitzharris, M. Baldock, and J. Brown, (2016), "Energy Attenuation Performance of Impact Protection for Motorcyclists," in *IRCOBI Conference 2016*, Malaga, Spain: International Research Council on the Biomechanics of Injury.

5. E. de Rome and J. Brown, (2016), "Motorcycle protective clothing: the cognitive and psychophysical concomitants of thermal strain," in *Australasian Road Safety Conference*, CanberraCanberra, ACT: Australasian College of Road Safety.

6. A. Ghaderi, P. D. Hodgson, and M. R. Barnett, (2016), "Hot deformation and recrystallization of a metastable beta titanium ingot," in *13th Titanium World Conference* (2015 : San Diego, California). London, Eng., pp. 765-769: Wiley.

7. P. D. Hodgson, I. B. Timokhina, H. Beladi, T. Dorin, N. Stanford, and M. Cai, (2016), "Engineering steels at the nanoscale for improved performance," in *AISTech - Iron and Steel Technology Conference Proceedings*, vol. 1, pp. 1-10.

8. B. Hurren, E. de Rome, A. Nathula, and X. Wang, (2016), "Development of Ranking Equations for a Protection Level Star Rating System for Motorcycle Clothing," in *Australian Road Safety, Canberra* Canberra, ACT: Australasian College of Road Safety.

9. M. Latino, F. Varela, M.Y.J. Tan, M. Forsyth (2016), An overview on cathodic shielding produced by disbanded coatings," in *Proc. Corrosion and Prevention 2016,* Auckland New Zealand. Australasian Corrosion Association.

10. F. Mahdavi, M.Y.J. Tan, M. Forsyth, (2016), "Capabilities and limitations of direct current and electrochemical impedance mapping in measuring cathodic disbondment of coatings using multi-electrode array," in *Proc. Corrosion and Prevention 2016,* Auckland New Zealand. Australasian Corrosion Association.

11. K. Maximova, X. Wang, A. Balcytis, J. Li, and S. Juodkazis, (2016), "Writing of bio-compatible silk patterns: 3D laser nano-printing," in *Conference on Lasers and Electro-Optics*.

12. A.E. Medvedev, R. Lapovok, Y. Estrin, T. C Lowe, Non-conventional fatigue testing of titanium for medical implants, In *Proceedings of the 13th World Conference on Titanium* (Eds: V. Venkatesh, A.L. Pilchak, J.E. Allison et al), TMS series, 837-840.

13. L. Meredith, E. Clarke, C. Hurren, M. Fitzharris, M. Baldock, J. Olivier, J. Brown, and E. de Rome, (2016), "Abrasion resistance performance of clothing worn by Australian motorcyclists," in *IRCOBI Conference Proceedings - International Research Council on the Biomechanics of Injury*, Malaga, Spain, pp. 505-506: International Research Council on the Biomechanics of Injury.

14. A. Mostaani, M. Pereira, and B. Rolfe, (2016), "Comparison of ductile damage models during scratch tests - a numerical study," in 8th BALTTRIB International Scientific Conference (2015 : Kaunas, Lithuania), pp. 126-133: Aleksandras Stulginskis University.

15. E. B. Motlagh, A. Ghaderi, S. R. Kada, P. A. Lynch, and M. R. Barnett, (2016), "The effect of ageing on the compressive deformation of Mg-Sn-Zn-Na alloy," in *Magnesium Technology Symposium* (2016 : Nashville, Tennessee) Hoboken, N.J., pp. 93-96: John Wiley & Sons.

16. C. Quiniou, H. Wang, M. Naebe, and D. Crowe, (2016), "Report on the second Wool ComfortMeter round trial," in *85th International Wool Textile Organisation Congress* (2016: Sydney, N.S.W.) Brussels, Belgium: IWTO.

17. B. F. Rolfe, A. Abdollahpoor, M. P. Pereira, H. Kong, E. Pavlina, M. Cai, D. Fabijanic, K. Hu, R. Han, L. Pan, Y. Bi, Z. Wang, and Y. Zhang, (2016), "Advances in tailored hot stamping – innovations in material and local patchwork topology," in *Advanced high strength steel and press hardening: proceedings of the 2nd international conference (ICHSU2015)*, Y. Zhang and M. Ma, Eds. Changsha, China. London: World Scientific Publishing, pp. 413-418.

18. M.Y. Tan, F. Varela, Y. Huo, F. Mahdavi, M. Forsyth, and B. Hinton, (2016), "Visualizing dynamic corrosion and coating disbondment processes on simulated pipeline conditions," in *Proc. Corrosion and Prevention 2016*, Auckland New Zealand. Australasian Corrosion Association.

19. F. Varela, M.Y.J. Tan, M. Forsyth, (2016), "An overview of finite element models used for CP applications," in *Proc. Corrosion and Prevention 2016*, Auckland New Zealand. Australasian Corrosion Association.

20. H. Wang, C. Quiniou, M. Naebe, and D. Crowe, (2016), "Predicting fabric prickle propensity by testing yarns on the Wool ComfortMeter," in *85th International Wool Textile Organisation Congress* (2016: Sydney, NSW). Brussels, Belgium: IWTO.

PATENT:

1. A. Sutti, M. Kirkland, P. K. Collins, and R. George, (2016). "An apparatus for producing nano-bodies," Australian Government - IP Australia Patent 2013900814.

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