Centre for Advanced Materials and Industrial Chemistry

Annual Report

2022

RMIT UNIVERSITY


RMIT
RMIT
Building
80
CYCLISTS
STOP

About RMIT

RMIT is a multi-sector university of technology, design and enterprise, with 96,277 students and close to 10,000 staff globally. The University's mission is to help shape the world through research, innovation and engagement, and to create transformative experiences for students to prepare them for life and work. Postgraduate, undergraduate, vocational education, foundation studies and online programs offer students a variety of work-relevant pathways.

RMIT is a global university of technology, design and enterprise

#1 in Australia
In 2022, RMIT won the Award for Most Popular Careers Service in Australia

12,456 industry placements
for students in 2022

#3 globally
for our efforts to reduce inequality

Contents

RESEARCH EMBEDDED IN MENTORING AND ENGAGEMENT

About CAMIC

CENTRE FOR ADVANCED MATERIALS AND INDUSTRIAL CHEMISTRY

Inaugurated in 2010, The Centre for Advanced Materials and Industrial Chemistry (CAMIC) is a multidisciplinary research centre known for performing cutting-edge research in eight disciplines. The Centre is known for its state-of-the-art laboratories, particularly in the field of industrial chemistry, with unique facilities for researching critical minerals, advanced materials, nano-biotechnology, and chemical sensors, to name a few.

CAMIC's funding sources are quite diverse, including government programs like the National Competitive Grants Program (NCGP), as well as collaborative partnerships with industries and international organizations. This indicates a strong commitment to collaboration and a wide range of research activities.

The research philosophy of CAMIC is notable for its emphasis on collaboration with industries and government bodies. This approach, combined with the diverse scientific expertise of its members, allows CAMIC to take a multidisciplinary and holistic approach to problem-solving. From identifying challenges to conceptualizing solutions and even commercializing innovations, CAMIC seems to be involved in the complete research lifecycle.

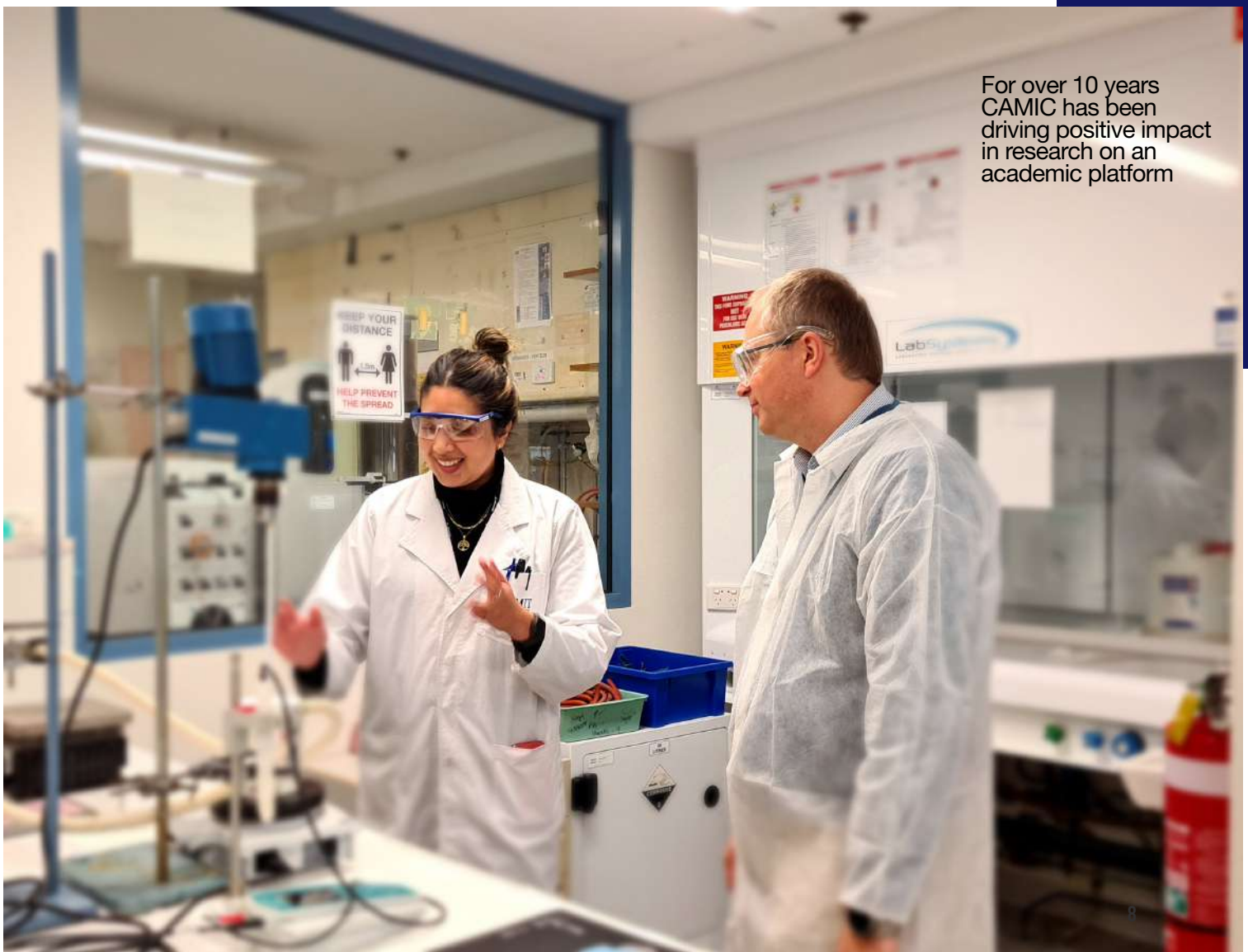
Overall, CAMIC's focus on cutting-edge research, its impressive array of partnerships and funding sources, and its commitment to collaborative problem-solving make it an important player in the field of advanced materials and industrial chemistry research.

We translate knowledge into action

History

- 2010 - CAMIC WAS ESTABLISHED
- 2012 - FIRST GENERATION OF HDR STUDENTS GRADUATE FROM CAMIC
- 2014 - MULTI-MILLION $ INDUSTRY COLLABORATIONS CONTINUE
- 2016 - GLOBAL RESEARCH IMPACT: PUBLICATIONS, AWARDS, AND GRANTS
- 2018 - RAPID EXPANSION AS AN ACADEMIC PLATFORM FOR TRANSLATIONAL RESEARCH
- 2020 - ADAPTING AND GROWING DURING THE COVID-19 PANDEMIC
- 2022 - THRIVING AND MOVING FORWARD TO THE NEW NORMAL

CAMIC Year in numbers



For over 10 years CAMIC has been driving positive impact in research on an academic platform

CONNECTING RESEARCH EXCELLENCE WITH RELEVANCE

2022

27 HDR

Student Completions

There were 27 Higher Degree by Research completions in 2022, compared to the five-year average for 2018-2022 of 14.6 as our research group continues to grow.

+197

Research Outputs

With 176 peer-reviewed articles featured in highly esteemed journals, a significant increase of 28% in articles peer-reviewed from 2021 to 2022.

+$5.1M

Research Funding

Over $5 million of research funding income. The total number of active contracts increased from 59 in 2021 to 64 in 2022.

Director's Statement

Distinguished Professor Suresh Bhargava AM

Our members' efforts to strengthen and champion CAMIC are internationally recognised. This is shown in our 2022 outcomes.

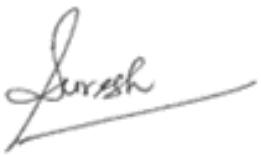
Even in the face of the formidable challenges posed by the Covid-19 pandemic, our journey towards progress remained unwavering; our resilience stood as a testament to our determination. CAMIC's commitment to fostering an inclusive and innovative environment for both students and staff is deserving of the highest commendation.

The strides we've taken in nurturing scientific and innovative thinking, coupled with our ability to achieve disruptive innovation, are emblematic of CAMIC's forward-looking ethos. The capacity to not only adapt but flourish in the face of adversity underscores the strength and determination of our community.

Our achievements over the past year, characterized by a significant number of high-impact publications and substantial external funding, reaffirm our dedication to the pursuit of excellence and advancement in research. The recognition accorded to core members and leaders, Lathe Jones and Samuel Ippolito, who have ascended to the rank of Associate Professors, serves as a compelling testament to the leadership and expertise that reside within CAMIC.

It is irrefutable that the collaborative synergy among CAMIC members, in tandem with the support from visitors, partners, and collaborators, has been the very cornerstone of our enduring growth and triumph. The dedication and achievements of every individual involved are not only a source of pride but a cause for celebration.

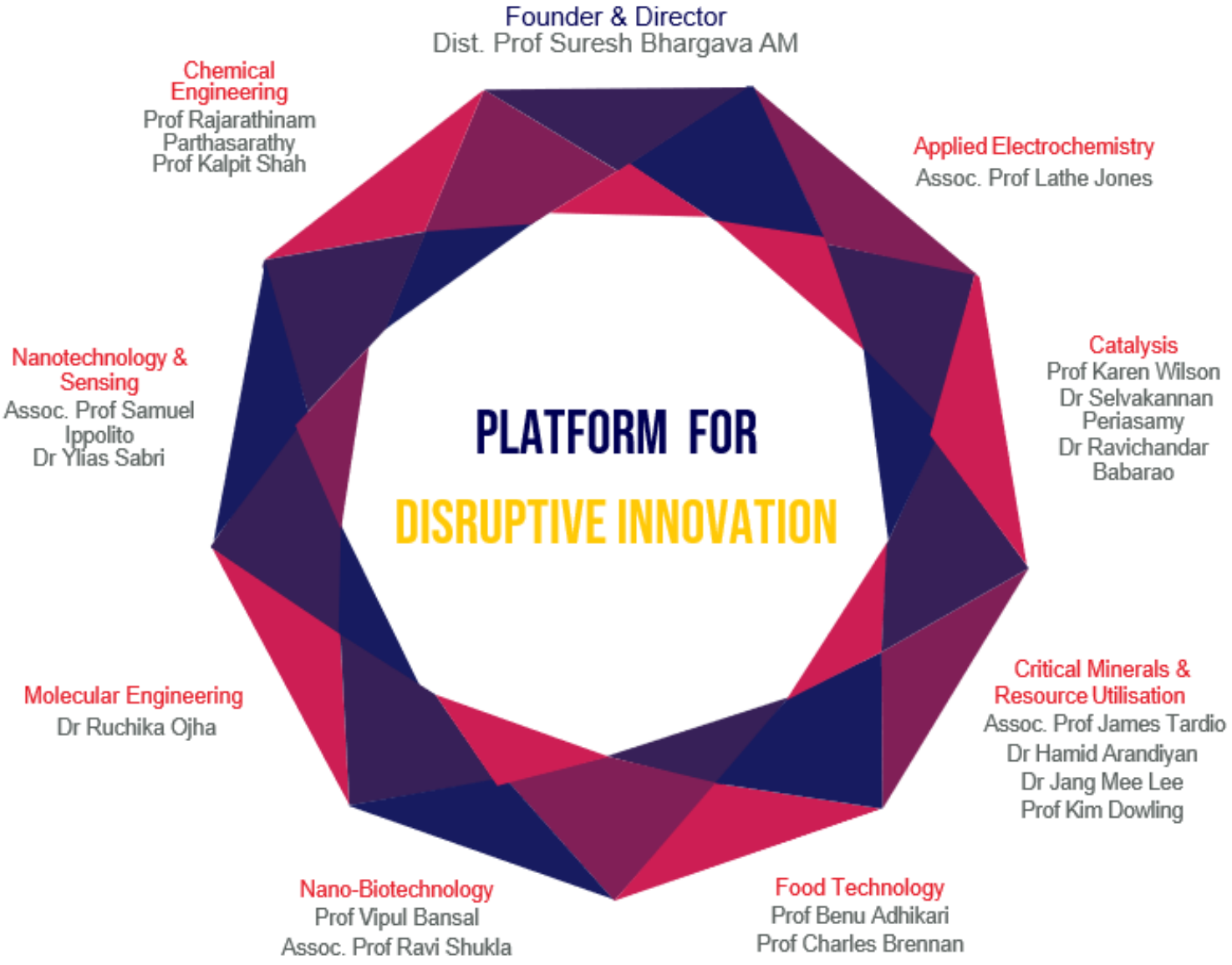
CAMIC has evolved into an ideal crucible for engineering solutions that resonate with impact. I am steadfast in my belief that the indomitable spirit of collective intelligence will continue to steer our trajectory of success. Together, we stand as a living testament to the transformative potential of a united community, harmoniously working towards a shared vision that promises to create a meaningful difference.



Distinguished Professor Suresh Bhargava, AM
Director for Centre for Advanced Materials and Industrial Chemistry
FTSE, FNAE, FAAAS, FRSC, FRACI, FNASI, FTWAS-UNESCO
KIA Laureate and QPM Chair
Dean, Research & Innovation
Research partnerships (India)
STEM College
RMIT University

Professor Suresh Bhargava AM, Dean of Research & Innovation (India) STEM College recognised as one of 2022's Queen's Birthday Honours recipients for his work in tertiary education and continuous efforts in connecting Australia and India.

CAMIC Structure 2022



We provide solution engineering

CAMIC

Bridging Academia & Industry

CAMIC leaders and members are highly recognised researchers driven to create positive impact

CAMIC is rapidly growing both nationally and internationally, with companies worldwide approaching the Centre to engage in partnerships and collaborations. The Centre actively contributes to RMIT's international reputation and global ranking. Our research philosophy revolves around working in collaboration with both industry and government bodies to achieve the most impact. Together, with the diverse scientific backgrounds of our members, we take a multidisciplinary and holistic solution-focussed approach. Despite the challenges of the last few years, CAMIC has continued to be an active, world-class research centre.

Our diverse composition provides an inclusive and engaging environment across eight disciplines, promoting innovative problem solving, entrepreneurial thinking, and cross-disciplinary, global collaboration. Since 2022, due to demand and the rapid growth of the Centre, we have included a new discipline: Food technology, introducing new members and approaches to the Centre. We are looking forward to expanding our horizons and exploring new pathways.

Our Vision
Your Future

CAMIC
Redefining Innovation

The Centre's goal is to translate research excellence in sustainable industrial technologies into innovations that solve real-world problems. The Centre has a multidisciplinary approach to research, uniting researchers from chemistry, physics, biology, and engineering on one platform. It has strong ties with academic and industrial partners worldwide.

CAMIC is an international research Centre. Our students, associates, and collaborators come from over 25 countries globally. Diversity and inclusivity is a key pillar of our success, creating an environment that is dynamic, challenging, and innovative.

Despite the global challenges over the last few years, CAMIC has demonstrated its ability to adapt and thrive in the face of hardship.

Distinguished Professor Suresh Bhargava AM mentors the teams across the eight disciplines as the Founding Director of CAMIC. Each discipline has its own laboratory platform, led by its own group leader(s).

Disciplines

Catalysis

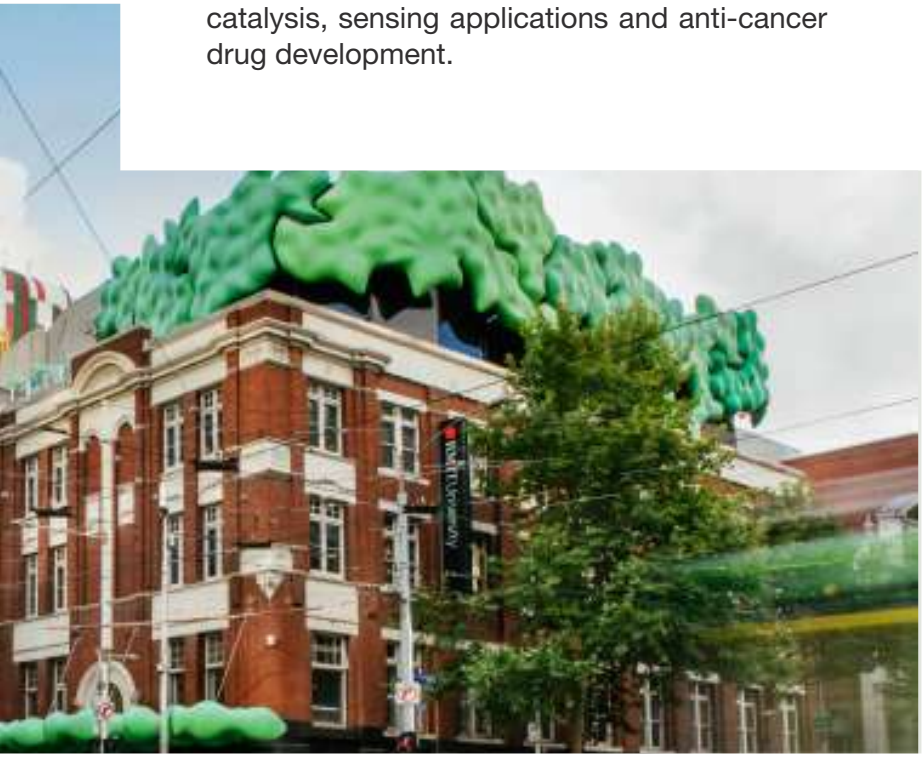
Heterogeneous catalysis with industrial applications and computational materials design.

Applied Electrochemistry

New materials by electrochemical methods, fundamental and applied electrochemistry of metal surfaces, electrodeposition, inorganic materials and the surface chemistry of minerals.

Molecular Engineering

Complexes of gold, palladium and platinum for catalysis, sensing applications and anti-cancer drug development.



COMMITMENT

We are committed to striving for high impact research outcomes through active collaboration between our researchers, global network, students and industry.

MISSION

We aim to provide an inclusive and engaging environment which promotes scientific and innovative thinking, producing research excellence with relevance, and enterprise-ready research graduates.

VISION

With an emphasis on strong industrial engagement and networks, CAMIC strives to produce excellent research and a new generation of globally trained graduates equipped with the tools to create disruptive innovations.

Disciplines

CAMIC fosters a dynamic environment where each research group functions in its field of expertise and collaborates with other disciplines to form multi-disciplinary approaches to innovation, research and enterprise.

In addition to the eight disciplines, CAMIC maintains close ties with other departments within the School of Science and the STEM College at RMIT University, as well as external collaborators in other universities, industry and government, nationally and worldwide.

Nano-Biotechnology

Innovative biomaterials and medical technologies based upon nanotechnology, including the design and development of targeted theranostics, molecular biosensors, and tissue-engineered materials for debilitating diseases such as cancer and diabetes.

Critical Minerals & Resource Utilisation

Chemical technologies related to mining, including environmental concerns, uranium, copper and ore leaching/processing and remediation

Nanotechnology & Sensing

Industrial sensors for analytes of global environmental and health significance, such as mercury and hydrogen sensors.

Chemical Engineering

Process intensification, industrial catalysis, polymer composites and hybrids, dense gas/ hydrothermal processing, and surface functionalisation and immobilisation.

Food Technology

Novel food ingredients, biodegradable food packaging, alternative proteins, food for infants and elderly. Foods for dysphagia and diabetic sufferers.

>10 YEARS

RESULTS

For over 10 years CAMIC has been driving positive impact in research on an academic platform.

- Several awards have been received by our members in recognition of outstanding achievements.
- The external funding secured is a reflection of the recognition and prestige that CAMIC has been building over the last decade.
- CAMIC's members have managed to land and secure new projects in all 8 disciplines due to the high demand for partnerships and collaborations.
- Without a doubt, CAMIC has demonstrated its efficiency and ability to create unprecedented global solutions which has attracted media attention over the years.

INNOVATION

In the last decade, our researchers have developed several patents across a wide variety of disciplines. In partnership with various international collaborators and the industry sector like CSIRO in Australia, we have patented different methodologies and systems for monitoring, such as a pyrolysis reaction system and method for pyrolysing organic feed. At the same time, we are at the forefront of next gen 3D printed catalysts to propel hypersonic flight.

Advisory Board

Dr Karl Föger
FRACI

Board Chair

Ceramic Fuel Cells, Australia

Dr Karl Föger is the Chair of the Centre for Advanced Materials & Industrial Chemistry (CAMIC) and an Adjunct Professor at RMIT University. As one of the initiators of SOFC technology in Australia, he has an international reputation in research and development in the energy and environmental fields and has published a number of papers on SOFC technology.

Professor Lakshmi Kantam
FNA, FNASC, FRSC

Committee Member

Institute of Chemical Technology (ICT), India

Prof Kantam is the Dr B.P. Godrej Distinguished Professor of Green Chemistry and Sustainability Engineering at the Institute of Chemical Technology, Mumbai. She is the former Director of CSIR-IICT, Hyderabad. She is also a recipient of the RMIT International Visiting Foundation.

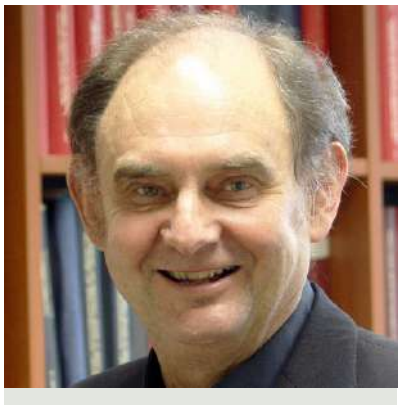
Dr Stephen Grocott
FRACI, AUSIMM

Committee Member

MD & CEO, Queensland Pacific Metals, Australia

Dr Stephen Grocott has 40 years of experience in minerals processing, process development and industrial chemistry. Before joining QPM, he was the Chief Technical Development Officer with Clean TeQ. He is an Adjunct Professor in Applied Sciences at RMIT University. He has worked extensively with and continues to work with CSIRO, CRCs, and international universities.

The Board provides independent strategic advice to CAMIC about its goals and focus. Its members include eminent scientists and industry leaders



Professor Alan Bond
FAA, FRSC
Committee Member
Monash University, Australia

Emeritus Professor Alan Bond was the R. L. Martin Distinguished Professor of Chemistry at Monash University. His research has provided the basis for developments in the theory, instrumentation and applications of cyclic alternating-current voltammetry; He held a Federation Fellowships and was the Deputy Director of the ARC Special Centre for Green Chemistry, in which he is still active.

Associate Professor Lathe Jones
Deputy Director
RMIT University

Dr Lathe Jones is a Senior Lecturer and Deputy Director of CAMIC. His research interests are electrodeposition, inorganic materials and the surface chemistry of minerals. He is currently working on electrocatalysis, inorganic chemistry of gold and porphyrins, and several aspects of ore leaching/characterisation with some applied projects in the minerals sector.

Professor Rajarathinam Parthasarathy
Deputy Director
RMIT University

Professor Rajarathinam Parthasarathy is a Professor of Chemical Engineering in the School of Engineering at RMIT. He obtained his PhD in Chemical Engineering from the University of Newcastle and has over 25 years of academic experience in overseas and Australian universities and over four years of experience in the oil and gas industry.

Distinguished Professor Suresh Bhargava AM
FTSE, FNAE, FAAAS, FRSC, FRACI, FNASI, FTWAS-UNESCO, KIA LAUREATE
Founder and Director

Distinguished Professor Suresh Bhargava is a world-renowned interdisciplinary scientist. He is among the top 1% scientists in the resources sector and has supervised over 60 PhD students at RMIT. He has passionately strived over the years to create solid and sustainable global research partnerships to improve and advance Science and Technology.

Group Leaders

Professor Vipul Bansal

NANO-BIOTECHNOLOGY GROUP LEADER

Professor Vipul Bansal is the Director of the Sir Ian Potter NanoBioSensing Facility, and the Group Leader of the RMIT Nano-Biotechnology Research Laboratory (NBRL). He leads a trans-disciplinary research team that collaborates across the intersection of chemistry, biology, physics, engineering and design to provide nanotechnology solutions for heath, environment and energy issues that have industrial importance and high social impact. Professor Bansal is leading the development of a nano-diagnostic hub which will play a critical role in the early diagnosis of a variety of diseases, food and environmental problems. This includes a product, currently in clinical trials, that will aid cancer diagnoses and development of next-generation cellular immunotherapies. His work has received over 14,613 citations with an h-index of 66, along with a host of awards and media coverage for advances made by his team.

Professor Karen Wilson

CATALYSIS GROUP LEADER

Professor Wilson was appointed Professor of Catalysis at RMIT University in 2018 and was previously Chair of Catalysis and Research Director of the European Bioenergy Research Institute at Aston University, UK (2013-17). She has published >280 peer-reviewed articles (h-index 75, 20983 citations. Professor Wilson's research focuses on the development of tuneable porous heterogeneous catalysts for use in green and sustainable chemistry and the utilisation of renewable resources in chemical processes. Recent projects have spanned the conversion of biomass from agriculture or forestry waste to fuels and chemicals, to the transformation of bakery waste to additives for application in coatings and polymers. Currently a Distinguished Visiting Professor at Zhengzhou University in China and Associate Editor of the Wiley journal Energy and Environmental Materials, and the RSC journal Sustainable Energy and Fuels.

Professor Adam Lee

CATALYSIS GROUP

Professor Adam Lee is the current Professor of Sustainable Chemistry at RMIT University since 2018. He has a BA(Hons) and a PhD in surface science and catalysis from the University of Cambridge. He held academic positions at Hull and York Universities before holding chair positions at Cardiff, Warwick, Monash, and Aston Universities. His research focuses on functional materials for sustainable chemical processes and in-situ/operando methods to understand surface reactions. He has received several awards including the CR Burch Prize, Fonda-Fasella Prize, McBain Medal, and Beilby Medal. He has authored over 270 peer-reviewed articles, with an h-index of 72 and 19,098 citations. supervised over 30 PhD and MSc students, and is a Fellow of the Royal Society of Chemistry and Royal Australian Chemical Institute, as well as an Associate Fellow of the IChemE. Professor Lee is also the Editor-in-Chief of Materials Today Chemistry.

Professor Charles Brennan

FOOD TECHNOLOGY GROUP LEADER

Professor Charles Brennan is the Dean of the School of Science and a food science professor at RMIT University. He has a PhD in food science and nutrition from King's College London and has previously worked at several universities. Brennan's research focuses on how bio-active ingredients and processing affect the nutritional quality of foods, particularly the role of plant dietary fibre in manipulating the glycaemic response. He has over 400 publication, 14,400 citations and h-index of 65.He is the editor-in-chief for the International Journal of Molecular Sciences and the International Journal of Food Science & Technology, and also serves on the editorial board of the Journal of Bioactive Carbohydrates and Dietary Fibre.

Professor Kim Dowling

RESOURCE UTILISATION GROUP LEADER

Kim Dowling is a Professor at RMIT University, who investigates the impact of metals on human and ecosystem health. She completed her undergraduate studies in geology at UNSW and a PhD at James Cook University focusing on exploration techniques for gold mineralization. She then worked in academic roles in Papua New Guinea, the University of Melbourne, and the University of Adelaide, where she developed an interest in environmental matters and completed further studies on Environmental Management at Deakin University. Her research interests include the link between geosciences and the UN's Sustainable Development Goals, particularly in relation to arsenic and mining landscapes. She is also interested in Public Health and the dissemination of environmental information. Kim is one of the founding members of the International Medical Geology Association and frequently reports on environmental matters in the media.

Professor Benu Adhikari

FOOD TECHNOLOGY GROUP LEADER

Professor Adhikari, a research-teaching professor at RMIT University, has a strong educational and professional background in food material science. He obtained his bachelor's and master's degrees in food engineering from Jiangnan University, China, and AIT, Thailand, respectively, and his PhD in Chemical Engineering, focusing on Food Engineering at UQ, Australia. He was awarded prestigious fellowships by the Australian Research Council. His research focuses on material science, engineering, and processing aspects of food, covering proteins, phytochemicals, packaging, powders, and new ingredients. He has authored 373 refereed journal papers and 15 book chapters, with over 19,000 citations and an H-index of 78. He serves on Editorial Boards of several journals in the Food Science/Engineering discipline and has an impressive record of supervising and mentoring PhD scholars and postdoctoral fellows.

Group Leaders

Professor Kalpit Shah

CHEMICAL ENGINEERING GROUP LEADER

Professor Kalpit Shah is currently Acting Assistant Associate Dean and Professor of Chemical and Environmental Engineering at RMIT University. He has received >$25M research funding, published more than 100 Q1 journal articles and holds ten patents, four of which are on the verge of commercialisation. He is one of the few researchers in Australia who has developed fluidised bed technologies/processes from a conceptual level to an industrial scale and has over 20 years of research and industrial consultancy experience. Professor Shah is also currently a Deputy Director (Academic) for the Australian Research Council Funded Traning Centre on Transforming Biosolids. His current research projects include fundamental and applied research in the areas of advanced thermo-chemical conversion systems and waste to value-addition.

Assoc. Professor James Tardio

RESOURCE UTILISATION GROUP LEADER

Associate Professor James Tardio is a Group Leader of the Resource Utilisation Group. He is a Higher Degrees Manager for Chemistry and Environmental Science in the School of Science at RMIT. He obtained a BSc (1st class Honours) in Chemistry from the University of Melbourne in 1996 and a PhD in Industrial Chemistry from RMIT University in 2002. His research interests include minerals processing chemistry, catalysis and water treatment. James has authored over 130 journal articles (h-index 25), graduated over 15 PhD students and received over $2M from multiple research funding from government and private sources.

Assoc. Professor Ravi Shukla

NANO-BIOTECHNOLOGY GROUP LEADER

Dr Ravi Shukla is an Associate Professor of Bioscience & Food Technology at RMIT University, leading the Targeted Theranostics and NanoBiotechnology research program and coordinating the Biotechnology teaching program. With a PhD in Cell Biology and experience as a post-doctoral researcher at NIH's Cancer Nanotechnology Platform, his research focus on understanding materials-biomolecular interactions and designing targeted theragnostic, molecular biosensors, non-viral nucleic acid delivery, and tissue-engineered materials for diseases. Dr Shukla is a co-editor in chief of Current Research in Nutrition & Food Science and an Associate Editor for Frontiers in Bioscience & Bioengineering. He has supervised 15 PhD, 5 Masters, and over 50 undergraduate researchers, with over 8000 citations and an h-index of 40.

Assoc. Professor Samuel Ippolito

NANOTECHNOLOGY & SENSING GROUP LEADER

Dr Samuel Ippolito is an Associate Professor at RMIT University in the School of Engineering, responsible for teaching courses in embedded C++ programming, advanced software engineering design, and real-time operating systems. His research interests include machine learning for chemical classification, development of chemical sensors for industrial sensing applications, and mercury removal technologies for coal-fired power generation and alumina refinery effluent control. He has been involved in several large joint industrial research projects and has helped commercialize chemical sensing technology. He has over 120 publications and has supervised 17 PhD students and 1 MSc graduate, currently supervising 6 PhD and 1 Master's students.

Dr Ylias Sabri

NANOTECHNOLOGY & SENSING GROUP LEADER

Dr Ylias Sabri is a Senior Lecturer in the School of Engineering at RMIT University. He is also a Group Co-Leader for Nanotechnology and Sensing within CAMIC, where he leads research in waste management and pollution control. Dr Sabri has published one book chapter, over 90 journal articles and four major patents, and has worked on several industrial research projects over the past 12 years with companies such as Cement Australia, Agilent Technologies, Rio Tinto, ExxonMobil, Alcoa World Alumina, and BHP Billiton Worsley Alumina. He has received several awards, including the Megan Clark award at the RACI Centenary Congress in 2017, the RMIT Invention Disclosure award, AINSE travel awards, and Surface Science awards. He is constantly seeking to develop long-term collaborations in chemical sensor technology developments for pollution control and waste upcycling to value-added products.

Dr Ruchika Ojha

MOLECULAR ENGINEERING GROUP LEADER

Dr Ruchika Ojha is a synthetic chemist and electrochemist with research interests in cancer and energy storage solutions. She completed her PhD in 2017 at Monash University and worked as a Research Fellow on an ARC-funded collaborative project between Monash and RMIT Universities from 2017 to 2019. She was awarded a Research Fellowship funded by the Australian Renewable Energy Agency (ARENA) at RMIT University in 2020. Dr Ojha's work involves synthesising novel bimetallic gold-platinum anticancer drugs and undertaking electrochemical studies to increase their overall anticancer activity. In addition to her research, she is a Group Leader at CAMIC, a Committee Member of the Women in Chemistry Group in Victoria, and a Membership Officer of the Electrochemistry Network at RMIT. She is also a proud mother of two children.

Group Leaders

Dr Selvakannan Periasamy

CATALYSIS GROUP LEADER

Dr Periasamy has been a Group Leader for the Catalysis Group at RMIT University since 2010. He is keenly interested in heterogeneous catalysis, CO2 utilisation, methane activation, endothermic fuels for high-speed flight vehicles, nanostructured catalysts, surface-enhanced Raman scattering, and additive manufacturing practices in catalysis. He has published 81 papers in international peer-reviewed journals, edited a book, and authored three book chapters. His h-index is 37, and his publications have been cited 5400 times. Before joining RMIT, he worked as a Research Fellow at the University of Paris-Sud, France, from 2007 to 2009 and as a Research Scientist at the Innovation Centre, Tata Chemicals Ltd, India, from 2005 to 2007. He earned his PhD from the National Chemical Laboratory in India in 2005. Also holds a master's and bachelor's degree in chemistry from the American College, India.

Dr Ravichandar Babarao

CATALYSIS GROUP

Dr Ravichandar Babarao is a Senior Lecturer and the leader of the Computational Porous Materials Team at RMIT University. He obtained his PhD from the National University of Singapore before working as a postdoctoral research associate at Oak Ridge National Laboratory and later at CSIRO, where he was promoted to Research Scientist. Dr Babarao has received numerous awards for his work in energy and environmental sustainability, including the 2015 Prosper.net Scopus Young Scientist Award, the Alexander von Humboldt Fellowship, and the 2016 RACI Rennie Memorial Medal. His current research focuses on using advanced computational techniques to discover new porous materials for sustainable energy and environmental applications. He was also named one of the fifteen researchers in the 2020 Class of Influential Researchers from Industrial Engineering and Chemistry Research.

Assoc. Professor James Chapman

CATALYSIS GROUP

Dr James Chapman is an Associate Professor of Chemistry with expertise in analytical chemistry, spectroscopy, and chemometrics. He has a proven record in research, teaching, and leadership within higher education. Dr Chapman's research is focused on developing tools for diagnosing and detecting biochemicals in complex systems. Spectroscopic and spectrometric methods and microscopic methods underpin this work. The main objective of this research is to create rapid sensors that can immediately detect specific events or systems, such as disease or pollution, based on identifying biochemical changes. He also uses artificial intelligence systems to analyse single molecules, cells, or contamination in any complex system to achieve this.

Dr Hamid Arandiyan

CRITICAL MINERALS & RESOURCE UTILISATION

Dr Hamid Arandiyan is a Senior Research Fellow within the School of Science. Prior to moving to RMIT, he was awarded a University of Sydney Senior Research Fellowship in the School of Chemistry in 2018, and Vice-Chancellor's Research Fellowship in the School of Chemical Engineering from UNSW in 2015. Dr Arandiyan research spans heterogeneous catalysis, green chemistry, surface science, and chemical science. His focus is on the rational design of functional nanomaterials for sustainable chemical processes and energy production and the development and application of in-situ spectroscopies for probing metal and oxide interfaces and nanostructures. Interests: Catalysts and process for hydrogen production, environmental catalysis; selective hydrogenation and reaction mechanisms; CO2 hydrogenation.

Dr Jang Mee Lee

CRITICAL MINERALS & RESOURCE UTILISATION

Dr Jang Mee Lee has been working on the synthesis and characterisation of low-dimensional nanomaterial based nanohybrids for diverse energy applications such as photocatalysis, Li/Na/K-ion batteries, supercapacitor and electrocatalysis. In addition, for a mechanism understanding, she is passionate about in-situ characterizations of high-performing nanomaterials when they are at catalytic function, such as in-situ x-ray absorption spectroscopy (XAS) with EXAFS fitting to gain the critical insight in terms of local structural alteration or physicochemical properties. After moving to RMIT University, she is expanding her research area to critical metal extraction through a collaboration with Queensland Pacific Metals (QPM) industry partner.

Mid & Early-Career

Dr Paramita Koley

RESEARCH FELLOW

Dr Paramita Koley received her PhD in Applied Chemistry in 2020 from CAMIC, where she focused on developing catalysts for converting biomass-derived molecules into valuable chemicals. She is now a Post-Doctoral Research Fellow in CAMIC. She has expertise in synthesizing various materials, including metal-organic frameworks and metal oxides, for catalytic purposes and in handling instrumental techniques. Her research interests include converting biomass-derived chemicals into fuel/fuel additives, glycerol conversion into value-added chemicals, photocatalytic water splitting, and CO2 reduction. She has published her research in reputed journals and continues on carbon dioxide conversion into advantageous chemicals such as acetic acid, formic acid, methanol, and ethers. She aims to achieve a carbon-neutral environment and reduce the adverse effects of global warming.

Dr Ranjithkumar Jakku

RESEARCH FELLOW

Dr Ranjithkumar Jakku received his Ph.D. in Applied Chemistry from RMIT University, Australia, and completed a Master of Science degree in Chemistry at Osmania University, India. Currently, he is working as a Postdoctoral Researcher under the supervision of Prof. Suresh K Bhargava at the Centre for Advanced Materials and Industrial Chemistry (CAMIC), RMIT. His research interests are developing organic fluorophores for the ultra-sensitive detection of toxic metal ions. He has also explored his research on the preparation and characterisation of organometallic complexes, focusing on their reactivity and medicinal applications. Dr Jakku has multiple publications in international peer-reviewed journals with 1,221 reads.

Dr Roxanne Hubesch

RESEARCH FELLOW

Dr Roxanne Hubesch completed her Bachelor's and Master's degrees in Chemistry from Université Libre de Bruxelles, Belgium. She worked in Chemical Engineering at Universiteit Gent, Belgium, where she researched kinetic modelling of biomass-derived products for fluid catalytic cracking. Her research focused on the interaction between binders and zeolites under supercritical conditions during catalytic cracking. Currently, Roxanne's research concentrates on using additive-manufactured materials as catalyst supports, their testing in catalysis, and the fundamental understanding of the interaction between additive-manufactured support and catalyst. Her research on the functionalisation of additive-manufactured supports with zeolites has generated interest from the research community for heat management of high-speed flight vehicles.

Researchers

Dr Stephen Kennedy
RESEARCH FELLOW

Dr Stephen Kennedy is a post-doctoral fellow with research experience in academia and industry both domestically and internationally. He has published research in a variety of scientific journals and his research interests include heterogeneous catalysis, reaction engineering, and sustainable chemical processing. Dr Kennedy completed his PhD in Chemical Engineering at RMIT University and has been working with CAMIC since 2021. He's currently testing materials for carbon capture and storage in close partnership with CSIRO.

Dr Tayebeh Hosseinnejad
RESEARCH FELLOW

Dr Tayebeh Hosseinnejad completed her PhD in the field of Physical Chemistry from University of Tehran. She is a passionate physical chemist equipped with the skillsets required to work with various professional computational chemistry packages. She has consistently focused on conducting fundamental research, in computational and experimental aspects of the design, synthesis, and characterisation of functional materials and their catalysis applications. She has been working as an academic in the Department of Chemistry at Alzahra University, Iran. She is currently working in Molecular Engineering Group at CAMIC-RMIT to computationally investigate the structure and properties of gold-based compounds and their anti-cancer bioactivities.

Dr Jampaiah Deshetti
RESEARCH FELLOW

Dr Jampaiah Deshetti completed his master's degree in Chemistry from the Indian Institute of Technology - Madras, India, in 2010. He obtained his PhD in Applied Chemistry in 2016 from RMIT University. He was awarded the Dr Megan Clark Excellence Award in 2014 for his outstanding research during his PhD. He worked as a post-doctoral researcher at CAMIC from 2016 to 2018 and as a visiting researcher at the University of Antwerp, Belgium. Dr Deshetti is currently a Research Assistant at CAMIC. He has published 61 articles in international peer-reviewed journals with an h-index of 25. His research interests include synthesising nanomaterials and their application in various energy and environmental domains such as elemental mercury oxidation, photo- and thermo-catalytic CO2 reduction, biomass valorisation, water-gas shift catalysis, and water-splitting.

CAMIC

Committed to high impact research outcomes through active collaboration

Higher Degree Research Students 2022

CAMIC's impactful mentorship and HDR supervision fosters growth in our students by providing a high-quality learning environment and encourages opportunities for lifelong learning

New link between students and first-class researchers.

Over the past 10 years, CAMIC has provided mentorship and supervision to over **150** HDR students, and we take pride in the significant impact we have made to RMIT University and the country as a whole. We acknowledge the responsibility that comes with mentoring our students and strive to make them resilient in the face of upcoming challenges. Our aim is to ensure that their research and minds continue to flourish.

As mentors, we understand the importance of providing a safe and supportive environment for our students, particularly when they are new to the field or working in unfamiliar settings. We aim to provide a sense of community and trust that allows our students to thrive and focus on their research goals without fear of failure or judgement.

We recognise that research can be a demanding and often stressful undertaking, and we are committed to supporting our students through the ups and downs of their academic journeys. Our goal is to create a positive and inclusive environment that encourages creativity, innovation, and collaboration, while also ensuring that our students have the skills and resilience they need to succeed.

Highlights

Students' Achievements

CAMIC has mentored more than **150** HDR students, placing emphasis on diversity and gender. Of these, **96** have successfully graduated. As of the end of 2022, we had **27** HDR graduate students who were equipped with a diverse range of professional skills, making them employable in both industry and academia.

We would like to extend our warmest congratulations to the HDR students Roxanne Hubesch, Piumie Rajapaksha Pathirannahalage, Oshadie de Silva, Piyumi Liyanage, Samuel Cheeseman, and Sunil Mehla who met all academic requirements for the Doctor of Philosophy Degree. In 2022, Sam Cheeseman won the 'Beautiful Science Award' and Gayatri Bagree submitted her thesis and has two papers under review. Uzma Malik recently published in the Elsevier Journal Applied Surface Science. Samayla Siddik Urmee won the third prize for her poster presentation held Victorian Cleantech Expo. Sunil Luhar and Samira Almalki attended conferences in India. We wish them all the best on their future research trajectory.

Testimonies

Uzma Malik

The opportunity to pursue PhD at RMIT itself is fantastic for me as an International student from Pakistan. I feel very privileged to have been part of the CAMIC team at RMIT. This program has provided me with the necessary resources to work on my research and I am thankful for all the experiences it has provided me with. I had a chance to develop my skills by working with the best researchers in the field. I learned from the best minds in the field. I am now able to confidently present my research and collaborate with other experts in the field. Additionally, I have gained invaluable insight into the research process and am better equipped to tackle research challenges. I am truly thankful for the RMIT program and the impact it has had on my career.

Mehran Ghasemlou

Mehran earned his PhD from RMIT in 2022, researching bioplastics with multiscale surface patterns for self-cleaning and liquid repellence. His work produced 16 Q1 journal articles, and he received the Vice-Chancellor's Research Impact Award and Publication. His research gained media attention from various outlets and he was interviewed by Australia Radio Science & Technology. Translation of this PhD research into tangible commercial products was one of his specific goals. For this reason, he started to work at Cardia Bioplastics (Secos group) immediately after his PhD. He has achieved multiple commercial successes in developing compostable and sustainable food packaging, largely from renewable natural resources.

Jamila Nisar

I am Jamila Nisar, a PhD research student at RMIT University working on a collaborative project with CSIRO in the green energy sector. With practical experience gained at CSIRO under distinguished supervisors, I consider myself privileged to be pursuing my research studies at RMIT. Being a third-generation research student, I have always been determined to continue my scientific research. Despite the challenges of being a full-time researcher and mother of two young children, I have persevered with the support of my supervisors, especially Distinguished Professor Suresh Bhargava. During the pandemic, his Co-vidya Club provided support and guidance to help us learn and endure the stress of the situation. I am grateful to him for believing in me and providing this amazing opportunity.

CAMIC's constant dedication to provide HDR students a transformative experience to develop skills, opportunities and innovation outcomes

Nipon Sarmah

At RMIT, I had an amazing learning experience with world-class research facilities and excellent experimental techniques. I am grateful to Distinguished Professor Suresh Bhargava and his team, my supervisors Professor Rajarathinam Parthasarathy and Dr Sumana Chenna for their support. RMIT's workshops and events, including the Chemeca 2022 conference, provided me with an international platform for my research work. The RMIT Indian Club made me feel at home. Melbourne is Australia's most liveable city, and I love exploring it, from the graffitied laneways to the diverse cuisines. I thank everyone involved in the RMIT-AcSIR Joint Research Program for this opportunity.

Gayatri Bagree

Selected for the RMIT-AcSIR joint research program, I am grateful to Distinguished Professor Suresh Bhargava, Professor Callum Drummond, and Professor Rajender Sangwan for providing me with this opportunity. Thanks to my AcSIR and RMIT supervisors, I combined my fundamental and applied research for my multidisciplinary PhD proposal. At RMIT, I interacted with people from various backgrounds and presented my work at online conferences, boosting my confidence. Despite COVID-19, the School of Science staff were immensely supportive. In Australia, I balanced my academic and social life, exploring Melbourne and Tasmania and learning different dance forms. Thanks to everyone who made this experience enriching.

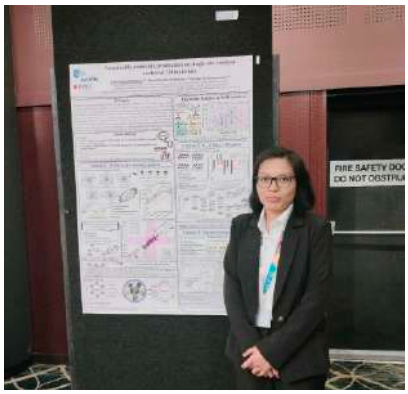
Shiva Prasad Nandala

I am grateful for the RMIT-AcSIR joint research program, which allowed me to pursue a PhD at two renowned universities and experience different cultures and work environments. Accessing RMIT's state-of-the-art facilities, especially the RMMF, enabled me to learn new physiochemical characterisation techniques and improve my research skills. I am thankful to my supervisory team for their guidance and support. Special thanks to Distinguished Professor Suresh Bhargava and Dr S Sridhar for this opportunity. As a successful graduate of this program, I obtained the CSIRO Early Research Career Postdoctoral and Engineering Fellowships, and I am currently working at CSIRO as a Postdoctoral Research Fellow.

Testimonies

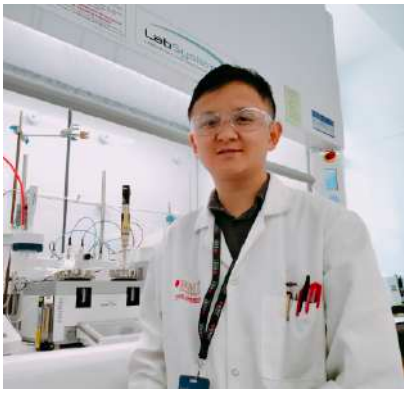
Digambar Chavan

My experience at RMIT has been great for advancing my research career; was welcoming, innovative, and inspirational. State-of-the-art research facilities and laboratories were available for higher degree by research students. Melbourne City provided various benefits for international students. I would like to express my sincere gratitude to my supervisors Dr Sunil Kumar, Dr P Lakshmikanthan, Assoc Prof James Tardio (RMIT, Melbourne), and Prof Nicky Eshtiaghi for their timely support and guidance in effectively improving the quality of my research work. I express my gratitude to my supervisors and committee members from AcSIR and RMIT for their support and guidance. Distinguished Prof Suresh Bhargava's inspiring words kept me motivated to work with passion and enthusiasm.



Ashakiran Maibam

Moving from Imphal, a small town in India, to Melbourne was daunting, but the RMIT-AcSIR Joint Research Program was a blessing. The kindness and generosity of people at RMIT, including Distinguished Professor Suresh Bhargava, Mr Tae Kim, and my supervisor, Dr Ravichandar, have been invaluable. I enjoy a great work-life balance in Melbourne and have explored museums and art galleries as a history buff. My research on computational exploration of next-gen electrocatalysts has a small audience, but Dr Ravichandar taught me the importance of networking and reaching out. Thankfully, RMIT has provided me with various platforms, such as symposiums, expos, and 3-Minute presentations, to reach a larger audience. I am grateful for this wonderful opportunity to grow as a researcher.



Ashis Chhetri

I'm Ashis from Darjeeling, India, known as "The Queen of The Hills" for its natural beauty. My passion for research began during my M.Sc and led me to pursue a PhD at CSIR-in Gujarat. COVID-19 halted my journey, but the RMIT-AcSIR Joint Research Program brought new hope, and I joined RMIT University. I explored local places and experienced different cultural events and am grateful to Distinguished Professor Suresh Bhargava and others who made it possible. I sincerely thank my RMIT supervisors, Professor Karen Wilson, Professor Adam Lee, Dr Subashani Maniam, and fellow SMAC group members for their valuable guidance and support. This program has been a wonderful experience both professionally and personally.

Job-ready graduates

HDR Students 2022 Graduation

Alumni Testimonies

Dr Sameena Begum

Dr Begum, a Chemical Engineering PhD graduate from the RMIT University – IICT Joint Research Program, has been awarded the 2021 Young Engineer of the Year Award by the Government of Telangana and the Institution of Engineers in India. She currently works as a research fellow at the CSIR-Indian Institute of Chemical Technology. Dr Begum credits the mentorship and supervision of many RMIT professors during her studies for the development of her career as a researcher. I'm grateful to Distinguished Prof Suresh Bhargava, Prof Shah all the professors associated with the RMIT-IICT Joint Research Program, and her supervisors for their continuous encouragement and support. Her thesis has been evaluated as an "Outstanding work" and passed without amendments, and her research ethics and outputs have had a positive impact on the research group.

Dr Hailey Daly

Hailey earned her PhD from RMIT in 2013, focusing on the preparation and dissolution studies of synthetic coffinite, a uranium mineral. Her research played a crucial role in BHP's Uranium Minerals research. She was also honored with the Dr Megan Clark Award during her Honours degree. Since then, Hailey has transitioned into the role of Lead Systems Integrator specializing in KNX and Business Development Manager at Wired By MJD. The company is widely respected in the Integration and Electrical fields and has received notable recognition, including the distinction of being the only CEDIA Member of Excellence in Australia since 2021.Hailey cherishes her time at RMIT and CAMIC, appreciating the exceptional supervisors who have contributed to her personal and professional growth. She particularly values her friendship with Suresh, who serves as both a friend and mentor.

Dr Sangita Kumari

I had an excellent research experience at AcSIR, which provided me with a productive work environment and the facilities to conduct my research. Joining RMIT improved my expertise in various areas and broadened my thinking as a researcher. Working at AcSIR and RMIT as a PhD student allowed me to encounter different work cultures and systems that boosted my passion and willingness to adapt to new situations. Additionally, the program provided me with the opportunity to pursue a dual doctoral degree in two different disciplines, enhancing my career perspectives with employment opportunities and postdoctoral experiences. I extend my heartfelt thanks to my RMIT and AcSIR supervisors for their support throughout my PhD journey, enabling me to become an Assistant Professor at the Department of Chemistry, Faculty of Science, University of Allahabad, Prayagraj, India.

Research & Innovation

Adjunct Professors, Associates and Visitors

Delivering excellence in their respective fields

Adjunct professors

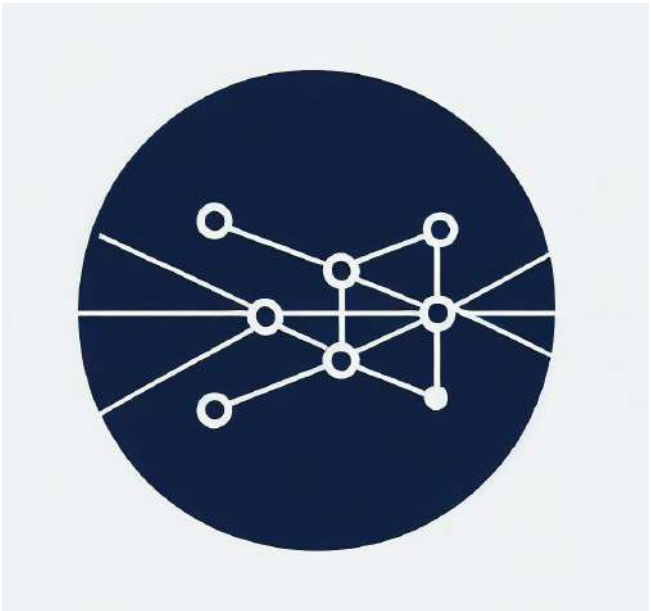
- **Emer. Prof. Neil Furlong (FTSE), RMIT University and the University of Melbourne**
- **Prof. Martin Bennett (FRS, FRSC, FRACI, FAA), The Australian National University**
- **Prof. Alan Bond (FAA, FRACI), Monash University**
- **Prof. Jochen Petersen, University of Cape Town, South Africa**
- **Prof. Richard Kaner, University of California, USA**
- **Prof. Alexander Blake, The University of Nottingham, United Kingdom**
- **Prof. Kazunari Domen, The University of Tokyo, Japan**
- **Prof. Paul Weiss, University of California, USA**
- **Prof. Karl Föger (FRACI), Ceramic Fuel Cells**
- **Prof. Lakshmi Kantam (FNA), Institute of Chemical Technology, Mumbai, India**
- **Prof. Kattesh Katti (FRSC, FNAI), University of Missouri, USA**
- **Prof. Murali Sastry, IITB-Monash Academy**
- **Dr Stephen Grocott, Queensland Pacific Metals**
- **Dr Andrew Hind, Agilent Technologies**
- **Dr Raksh Vir Jasra, Reliance Industries**
- **Dr Mark Pownceby, CSIRO**
- **Dr Mohan Rao Chintalagiri (FTWAS, FNA, FASc, FNASc, FAPSc, FTASc), Centre for Cellular & Molecular Biology, Hyderabad, India**
- **Dr Patrick Hartley, CSIRO**

Associate members

- Distinguished Professor Andrew Ball, School of Science

Distinguished visitors

- Professor Raghunath A. Mashelkar, FRS, FREng, FAA Academy of Science and Innova¬tive Research, India.
- Professor Robin Batterham, AO, FAA, FTSE, The University of Melbourne, Australia
- Dr Alan Simon Finkel AC FAA FTSE, Australia



High impact research outcomes through active collaboration between our members and global network

Creating Global Intellectual Infrastructure for Tomorrow

Innovation is always taking place with a state-of the art and holistic approach

CAMIC is an organisation of recognised leaders and members who are committed to making a positive impact. With a diverse composition spanning eight different disciplines, we have created an inclusive and engaging environment that fosters innovative problem-solving, entrepreneurial thinking, and cross-disciplinary and global collaborations.

Our long history of collaboration with experts worldwide has allowed us to expand our knowledge base and technical capabilities. Through our network of 100 researchers across 25 countries, including Australia, Austria, Bangladesh, Belgium, Canada, China, France, Germany, India, Italy, Japan, Malaysia, Nepal, Saudi Arabia, South Africa, Spain, Switzerland, the United Kingdom, and the United States of America, we have developed a global reach.

This diversity of expertise and research projects has made CAMIC a highly sought-after partner for industrial and academic collaborations. We are committed to continuing to work with our partners to create new knowledge, develop innovative solutions, and drive positive change in the world.

AT THE FOREFRONT OF RESEARCH AND COLLABORATIVE PARTNERSHIPS

Driving positive impact in research on a multidisciplinary academic platform

Despite the challenges that the world has faced during the last couple of years, CAMIC demonstrated its ability to adapt and grow in the face of hardship by strengthening our collaboration ties

America
- University of Missouri
- George Washington University
- Fritz-Haber
- University of California
- University of Saskatchewan
- University of Windsor

Europe
- University of Technology
- Katholieke Universiteit Leuven
- Universidad de Granada
- University of Geneva
- University of Geneva
- University of Berne
- Cardiff Catalysis Institute
- University of Nottingham
- University of Manchester
- University of Bordeaux
- University of Cologne
- TU Bergakademie Freiberg
- Jacobs University
- University of Wurzburg
- Istituto Italiano Di Tecnologia

Africa
- SOUTH AFRICA, University of Cape Town

India
- Institute of Chemical Technology (ICT)
- Indian Institute of Technology Bombay (IITB)
- Council of Scientific and Industrial Research (CSIR)
- Amity University
- Central University of Gujarat
- Indian Institute of Petroleum (IIP)

Asia
- University of Hong Kong
- Jahangirnagar University
- University of Tokyo
- Osaka University
- University of Tsukuba
- Kyushu University
- University of Malaya
- Bangladesh Council of Scientific and Industrial Research
- NRLBB
- King Saud University

Australia
- Queensland Pacific Metals
- Rio Tinto
- Monash University
- Flinders University
- Clean TeQ Limited
- University of Melbourne
- Australian National University
- University of Sydney
- CSIRO
- Bioelektra
- Regain Materials, Australia
- University of New South Wales
- University of Queensland

Our worldwide presence and ability to translate knowledge-to-action provides the ability to deliver consistent quality and on-trend solutions

Platform for scholarly engagement with business and global community networks.

ACROSS BORDERS AND BEYOND EXPECTATIONS

ACROSS 25+ COUNTRIES

We are continuously innovating with our partners to leverage our global reach

2022 Achievements

Honours Awarded

Congratulations to Professor Suresh Bhargava AM, who was recognized as a recipient of the 2022 Queen's Birthday Honours for his contributions to tertiary education and his continuous efforts to strengthen connections between Australia and India.

Innovative Sunscreen Testing

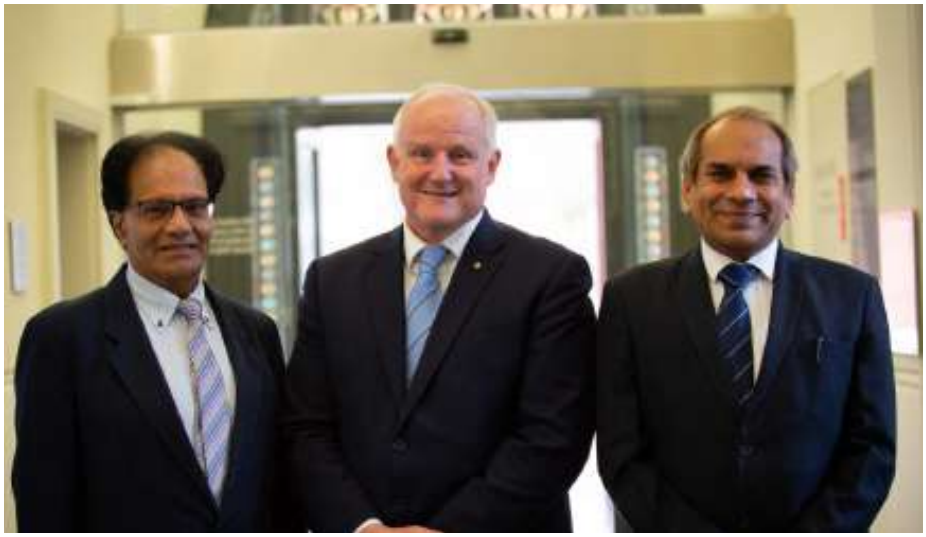
Congratulations to the Nanobiotechnology group: Professor Bansal, Dr Zou, Assoc Prof Urban and Assoc Prof Rajesh Ramanathan who are collaborating across RMIT, ARPANSA, and Cancer Council Victoria to develop human-free sunscreen testing methods and protocols within this decade.

CAMIC Representation

Congratulations to Dr Sabri for receiving a commendation letter for the Research Excellence Award as part of the STEM College Staff Awards 2022. He also attended the All-Energy and Waste Australia Exhibition & Conference 2022 where the spin-off company from RMIT's CRC-P solar grant (Elecsome) launched its first concrete product.

Partnership Extension

RMIT University and AcSIR extended their partnership to 2027 to expand their PhD program, offering global research training to candidates and access to labs in both countries. Over 250 Indian PhD students are expected to participate in the program, which will create future research leaders who can work across international borders.



AcSIR/RMIT Graduation

Congratulations to recent graduates of RMIT University and AcSIR joint research program. They celebrated their achievements with Distinguished Professor Suresh Bhargava, at CSIR-NPL in New Delhi, India.

Visit of Agnico Eagle to CAMIC

A delegation of top executives, headed by the Vice President of Agnico Eagle Ltd, the third-largest gold producer globally, paid a visit to CAMIC from Canada. During their visit, they presented a substantial grant proposal in the range of AUD$2million, equivalent to approximately 25 kilograms of gold. The grant aims to support the exploration of pioneering gold chemistry, with the goal of crafting metallodrugs for advancing cancer treatment methodologies.

New Partnerships and Funds

Congratulations to Professor Parthasarathy, for securing a new $40K collaboration with Sydney Water and Griffith University; a PhD stipend of $134K funded by CSIRO. He also published five journal papers and co-authored six papers presented at Chemeca 2022.

Profound Impact

Congratulations to Dr Arandiyan on the successful ARC-LIEF23 bid, which installs the first in-house suite of X-ray Absorption Spectroscopy in Australia. He submitted a Horizon Europe Grant as a Lead CI with >$8M budget. He was elected as a Fellow of FRSC in Cambridge and attended RACI 2022 National Congress in Brisbane, Australia, and visited CSIR-IMMT in Bhubaneswar and IICT in Hyderabad, India

Collaborations

Congratulations to Dr Ojha and her team for securing a collaborative access project, they have also secured $196,704 worth of funding for Syncrotron access. For establishing a partnership with MaxHealth hospital group in India. She visited CSIR–CCMB facilities to establish future collaborations.

Team engagement

The nano biotechnology group had reason to rejoice as several thesis submission and articles were published, showcasing their cutting-edge research and advancements in the field. The team's collective accomplishments further strengthened their commitment to pushing the boundaries of knowledge.

Promotions & Growth

Congratulations to our Deputy Director, Dr Jones, for being promoted to Associate Professor (Level D). He organised the RACI VCE Teachers Development Day at RMIT. He also had five journal papers published and presented a talk at the RACI 2022 National Congress in Brisbane on July.

Engagement and projects

Congratulations to Dr Periasamy on his achievements in publications and media. He authored a book on additive manufacturing, 7 research articles, and 5 book chapters. Additionally, 3 of his PhD students have graduated. He established new partnerships, grants, and funds, including one with CleanAway for toxic waste handling.

Highlights

Congratulations to the Nanotechnology and Sensor Group for the following achievements: The group leaders have been appointed to a 3-year CSIRO Visiting Scientist position within the Advanced Materials and Processing Program at the CSIRO. The group leaders have been awarded a successful CRC-P with BioPlant Limited for 2022, with a total funding of $6.8m, $670k of which will go to RMIT. They have also received the Circular Economy Catalyst Funding for Water Sector 2022. They have filed an international patent application (WO2022/087683 A1).

Forefront of research in eight disciplines

Congratulations to Professor Karen Wilson and her team on their achievements in 2022, including securing new partnerships, grants, and funds such as the ARC Discovery Project on advanced chemical recycling and the ARC Centre of Excellence on green electrochemical transformation. Professor Wilson also received awards and appointments, including serving as Editorial Board Member for the RSC's 'Energy & Environmental Science' and being appointed Victorian representative for RACI Green and Sustainable Chemistry. In addition, she gave ten keynote/plenary webinars in 2022 and presented at various conferences including the Gordon Research Conference on Catalysis, and World Congress on Oxidation Catalysis.

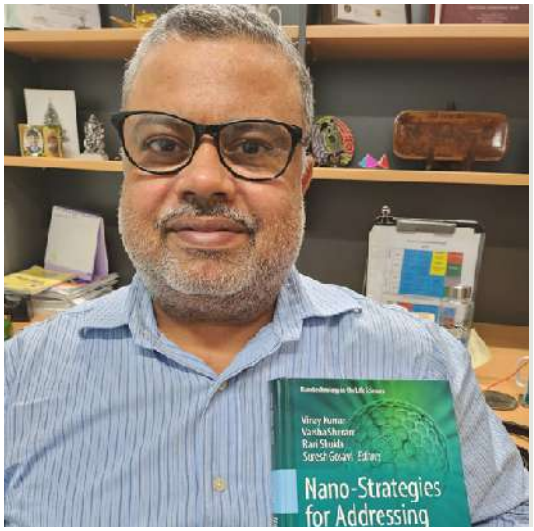
Congratulations to the Nanobiotechnology group for their recent achievements: The BIP project proposal on plant viral sensors was successful with funding of approximately $220K over the next year. The group's staff presented at the 4th ICEAN 2022. They also published a review on "Aptamer-based NanoBioSensors for seafood safety" in Biosensors and Bioelectronics. The group's members, along with colleagues at the Indian Council of Agriculture Research and the Centre for Development of Advanced Computing, published an article on "Aptamer-based NanoBioSensors for seafood safety" in Biosensors and Bioelectronics. Several members of the group were recognised as STEM Top Performers.

CAMIC - a Platform for Disruptive Innovation

Highlights

Distinguished Professor Bhargava and a delegation from RMIT made a successful visit to Bangladesh and several research centers in India to expand, strengthen, and explore new collaborations and partnerships.

Our diversity of expertise and research projects has made CAMIC a highly desirable partner in industrial and academic collaborations

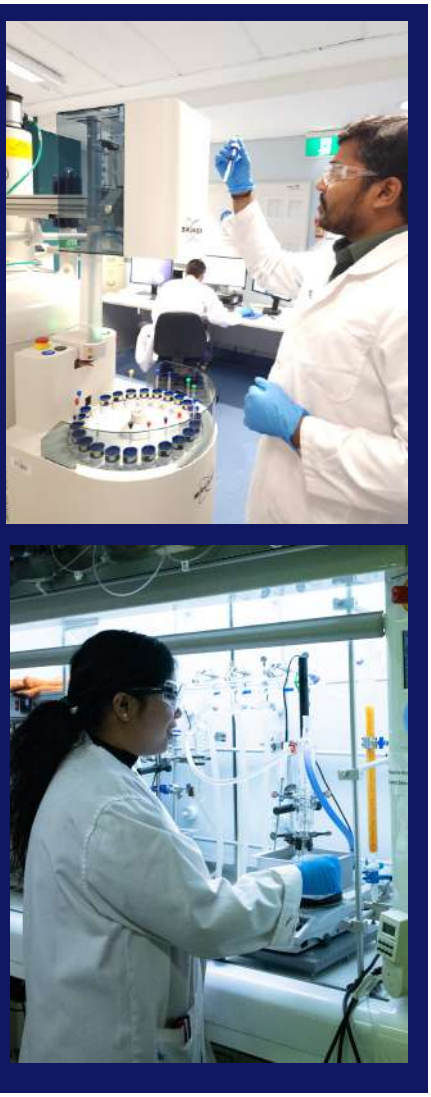


Congratulations to Dr Ravi Shukla and his team for editing a timely book on “Nano-strategies for addressing antimicrobial resistance”. The book showcase how nanotechnology can combat antimicrobial resistance, one of society’s biggest health challenges.

Congratulations to Assoc Prof James Tardio, Angus McFarlane, Naoko Zwingmann, and Stuart Pritchard on their new collaboration with Rio Tinto in 2022. Additionally, we would like to extend our gratitude Dr Tardio for his excellent work in teaching CHEM1040 this semester.

Congratulations to Prof Kalpit Shah for his achievements in energy-efficient biochar providing a sustainable approach for biosolids disposal. It is inspiring to see the emphasis on collaboration and great partnerships in the development of this technology.

Congratulations to Prof Benu Adhikari for receiving the School of Science Dean’s Award for Research Excellence. He continues to collaborate with industry partners such as Bega Cheese, Burra Foods, Spraying Systems, and more.



Research Excellence

As showcased in this report, our researchers continue to perform at the global level, delivering real-world impact in many key resource areas.

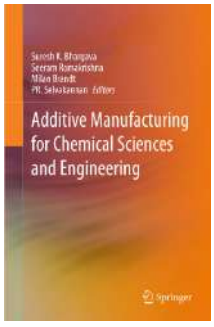
As RMIT's largest centre, CAMIC is renowned for performing cutting-edge research in nanotechnology and sensing, nano-biotechnology, catalysis, applied electrochemistry, molecular engineering, and chemical engineering. Our multidisciplinary approach enables academics with diverse expertise to work together on research and industry challenges, providing real-world solutions and applications.

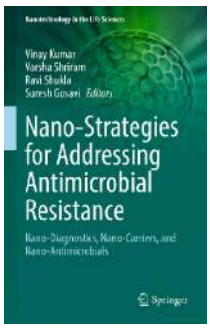
Despite the challenges posed by 2020 and 2021, CAMIC has managed to thrive in its mission of providing an academic platform for research excellence. This success is largely attributed to the centre's remarkable research output, which includes 197 publications.

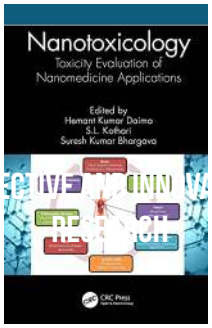
Our research has garnered international recognition, with 176 peer-reviewed articles being featured in highly esteemed journals in 2022 alone. Additionally, over 89% of our research outputs were published in Q1 journals, further solidifying our position as a leading research institution.

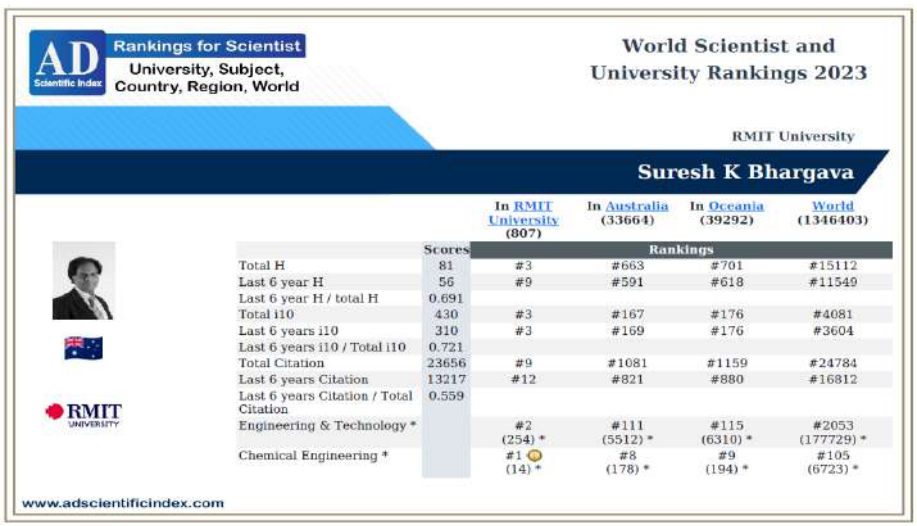
During 2022, we registered three new US patents, including a method and system for pyrolysis, anti-cancer gold compounds, and a method of purifying metal oxide particles and their uses. We have also completed 11 books and book chapters, with some of them being featured on the cover page of leading journals. Our members and students have actively participated in several international and national conferences, leading to conference and article publications.

We are proud to note a significant increase of 28% in peer-reviewed articles from 2021 to 2022, with a difference of 39. However, while we acknowledge that there are areas for improvement, we remain committed to building on these successes and enhancing our research capabilities in the years to come.

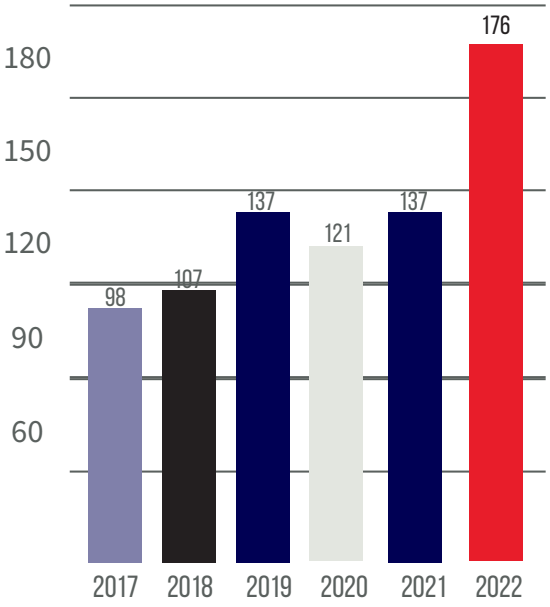








CAMIC 2022 Publications Snapshot Performance



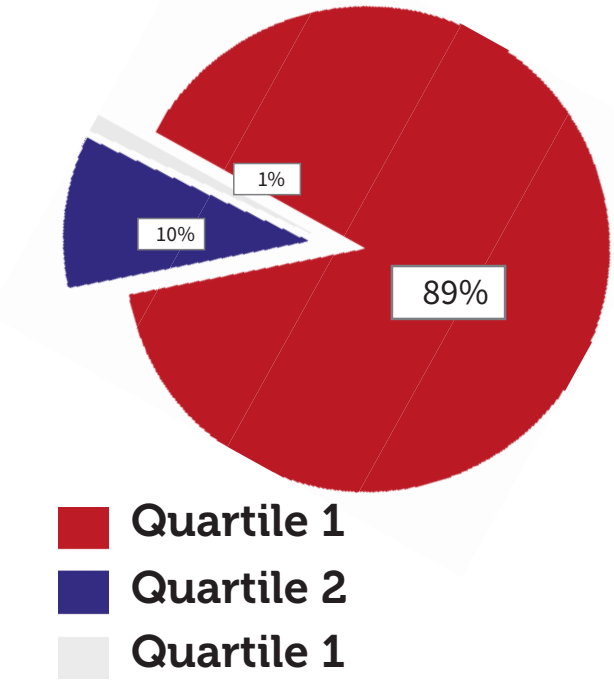
Astounding teamwork and performance

In the past few years, we have had to adapt to the new ways of working and conducting research, which have become the new normal. Nevertheless, our members and students have excelled in advancing our research goals to unprecedented levels, and we take immense pride in their accomplishments.

+176 Journal Article Publications

Over 89% of our research articles were published in Quartile 1 journals.

+89% within Q1 Journals



Best Chemistry Scientists in Australia

It is worth noting that CAMIC members dominated the rankings, with six out of the top seven RMIT chemists and two out of the top eight Materials Scientists being CAMIC members. Distinguished Professor Bhargava, the CAMIC Director, was awarded the Chemistry Leader Award by Research.com. In 2022, he was RMIT University's top-ranked researcher in Chemistry and Materials Science.

CAMIC Publications 2022

Journal Articles

Alenezy, E. , Esmaiel Zadeh Kandjani, A. , Pramoda, K. , Al Kobaisi, M. , Ippolito, S. , Sabri, Y. & Bhargava, S. 2022, 'Heterostructure colloidal crystal for light activated hydrogen sensing at low temperature', Colloids and Surfaces A: Physicochemical and Engineering Aspects, vol. 652, pp. 1 - 13.

Almalki, A. , Downing, D. , Lozanovski, B. , Tino, R. , Du Plessis, A. , Ma, M. , Brandt, M. & Leary, M. 2022, 'A Digital-Twin Methodology for the Non-destructive Certification of Lattice Structures', JOM, vol. 74, no.4, pp. 1 - 14.

Andrews, J., Niya, S.R. and Ojha, R., 2022. Electrochemical hydrogen storage in porous carbons with acidic electrolytes: uncovering the potential. Current Opinion in Electrochemistry, 31, p.100850.

Andrews, J., Ojha, R., Niya, S.M.R. and Seibt, S., 2022. Electrochemical storage reactions of hydrogen in activated carbon from phenolic resin. Catalysis Today, 397, pp.155-164.

Anyaoku, C. , Bhattacharya, S. & Parthasarathy, R. 2022, 'A novel methodology for measuring batch settling velocities of particles using Electrical Resistance Tomography', Chemical Engineering Science, vol. 250, pp. 1 - 15.

Bansal, V. 2022, 'Label-Free Electrochemiluminescence Nano-aptasensor for the Ultrasensitive Detection of ApoA1 in Human Serum', ACS Omega, vol. 7, no.43, pp. 38709 - 38716.

Barr, C. , Pateras, A. , Molotnikov, A. , Clarke, D. & Brandt, M. 2022, 'Effect of composition on the tensile and corrosion performance of nickel aluminium bronze produced via laser powder bed fusion', Additive Manufacturing, vol. 54, pp. 1 - 15.

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Funding Highlights

This diverse range of funding sources is a reflection of CAMIC's multidisciplinary approach and ongoing efforts to expand its collaborations and partnership initiatives.

Astounding collaborations and teamwork demonstrated in 2022

CAMIC's ability to secure competitive research contracts and funding has been instrumental in advancing its research goals and innovations. The institute's focus on international, national, industrial, and government research partnerships has been highly successful, with $5,164,585 in research income received from 64 active projects in 2022. This result is even more impressive considering the emphasis on Higher Degrees by Research (HDR) students and supervisions, which can often lead to lower research income.

Although income declined from the previous year's $6.3 million, 2021 was an outlier as it included VHESIF funding of $1.4 million. CAMIC's ability to secure such funding and increase its research income is a testament to the institute's commitment to collaboration and innovation. Moreover, the increase in the number of active contracts from 59 in 2021 to 64 in 2022 highlights CAMIC's ability to continue attracting high-quality projects and research partners.

We can see how some categories go up from the previous two years and other go down. For instance, in the Public sector funding, we increased by 64.12% from 2021. However, we saw a decrease of 57% in the Industry funding. We aim to set new targets with actions plan, aiming to achieve a positive increase in our funding for 2023.

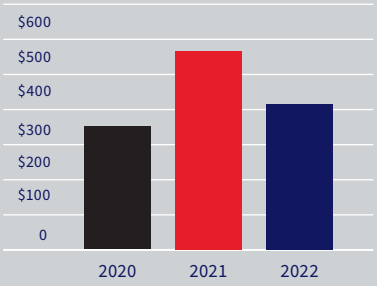
CAMIC's success in securing research contracts and funding has not only allowed it to pursue its research goals but has also helped upskill its highly trained workforce. The funding has enabled us to develop its workforce's skills and knowledge, enhancing its ability to deliver cutting-edge research and innovative solutions. We continue to expand its research partnerships and contracts. CAMIC is well-positioned to continue delivering exceptional research outcomes.

This section illustrates the breakdown of funding received by CAMIC from 2020 to 2022

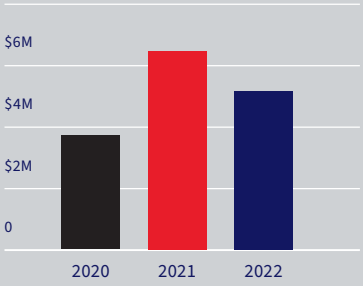
Category	2020	2021	2022
Australian Competitive Grants	$1,441,050.00	$1,400,000.00	**$727,907.00**
Other Public Sector R&D Income	$1,015,090.00	$1,100,000.00	**$1,805,372.00**
Industry and Other R&D Income	$489,365.00	$3,000,000.00	**$1,278,436.00**
Cooperative Research Centre (CRC) R&D Income	$1,036,140.00	$1,000,000.00	**$1,248,825.00**
Non-HERDC	-	-	**$104,045.00**
Total	$3,981,645.00	$6,500,000.00	**$5,164,585.00**

Funding Report for the year ending 31 December 2022

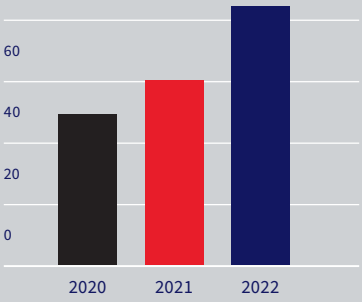
International Income
($ thousands)



Research funding all categories
($ millions)



Funded Projects



CAMIC International Funding (2022-2022)

■ CAMIC remains committed, to pursue new collaborations and explore new funding opportunities.

CAMIC's international funding income in 2022 exhibited a 14% growth from 2020, followed by a fall of 34% from 2022. This trend highlights the need for continued efforts in expanding and diversifying international research partnerships to sustain research income.

Last three-year funding (2020-2022)

■ Life returns to new normal, we observe a new approach to our numbers.

Due to the global changes caused by the COVID-19 pandemic in 2020, there were delays and pushbacks on funding applications, resulting in outstanding outcomes during 2021.

There was a 36% increase from 2020 to 2022, compared to a 19% decrease from 2021 to 2022.

Number of funded projects (2020-2022)

■ Above and beyond outcomes

In the last decade, we have increased the number of funded projects significantly, as demonstrated in the graph. In 2022, we continued to increase our numbers by 25% from 2020 and 8% from 2021. The increase in the number of active contracts from 59 in 2021 to 64 in 2022 underscores CAMIC's capacity to attract exceptional projects and research partners.

Research funding represents the value of funded projects attributed to years within funding period following the current method in the Research Centre Report in powerbi.

CAMIC

A Benchmark for Redefining Innovation

Industry Partners

Our members host visits by industry partners to CAMIC and visit industry partner facilities

We were joined by Biolektra Australia's Managing Director, Fred Itaoui, during his visit to our catalysis lab hosted by Dr Periasamy and Distinguished Professor Bhargava AM to review and monitor the progress of our joint waste-management project.

Bioelektra AUSTRALIA
YOUR WASTE IS A RESOURCE

CLEANAWAY

AGNICO EAGLE

Our PhD students receive regular mentoring from our industry partner, Queensland Pacific Metals, through fortnightly virtual meetings and bi-monthly visits to CAMIC facilities.

Taking our PhD students experiences above and beyond in collaboration with Queensland Pacific Metals. We allow them to live first-class industry experiences with short and extended visit to their multiple facilities.

Over the years, we have had successful collaborations with CSIRO. We were delighted to host Dr Pownceby at our CAMIC day event, where he shared his insights on the latest developments in the field.

CAMIC is an active research innovator in mining our strong bond with Rio Tinto over the years is a prove of that. Dr McFarlane visited the facilities to track and follow project status.

QUEENSLAND PACIFIC METALS

CSIRO

RioTinto

Fostering Diversity through Multicultural Engagement

We believe that embracing diversity enriches our community and enhances the educational experience for everyone involved

CAMIC holds traditions and values close to its heart. We understand the challenges faced by students who leave their home countries to pursue better opportunities and experiences abroad. That is why we strive to provide our students with a welcoming environment and a sense of home on campus. We organise and participate in cultural events that showcase the diversity of our community, including celebrations of various cultures, religions, and countries.

Through these events, our students have the opportunity to connect with each other and the wider community. They can share their experiences, learn from each other, and appreciate the different backgrounds and perspectives that they bring to the table. Our goal is to foster an inclusive environment that celebrates diversity and promotes cross-cultural understanding.

We believe that embracing diversity enriches our community and enhances the educational experience for everyone involved. Our commitment to supporting our students extends beyond the classroom and academic pursuits. We want our students to thrive and succeed both academically and personally, and we are dedicated to providing them with the support and resources they need to achieve their goals.

Open Day, 75th India Independence Day, Lunch to welcome new students.

Diwali celebration

Eid celebration

Diwali celebration

HDR Graduation

CAMIC Day 2022

Interdisciplinary platform for borderless minds to create innovation

We were thrilled to host our annual CAMIC day event in person on November 22, 2022, at the Council Chambers of RMIT University. Our esteemed discipline leaders, students, and special guests joined us for a day full of insights, joy, and camaraderie.

The day began with a heartfelt welcome and acknowledgment of country, followed by an introduction by Dr. Karl Foger, the Chair of the CAMIC Board. Our CAMIC group leaders then showcased their latest research and projects, followed by presentations from our CAMIC research fellows and students.

Distinguished Visitors

We were thrilled and honoured to have multiple distinguished guests and industry partners attend our event.

Some notable attendees included Professor Robin Batterham, Professor Raghunath Mashelkar, Dr Alan Finkel, Dr Karl Forger, and many others.

We then took a break to enjoy lunch in the foyer, where attendees had the opportunity to network and connect with one another. After lunch, we were privileged to hear from our guest speaker, Professor Robin Batterham, who shared his valuable insights and experiences with the group.

Book Launch: Additive Manufacturing for Chemical Sciences and Engineering*

The day continued with the launch of the CAMIC report by Distinguished Professor Suresh Bhargava AM and the unveiling of a special edition of Dalton. We then heard from industry and research partners, who shared their latest findings and innovations in the field.

*This book is dedicated to those students who were severely impacted by COVID but through resilience and perserverance, kept pushing through on their educational pathway. All royalties will go to help them.

Our research makes a difference worldwide

The day concluded with a group picture and an afternoon session, leaving everyone inspired and energised to continue their work in this exciting field. We look forward to hosting another successful CAMIC day event in the future.

We are globally active but

locally responsible

CAMIC delegation in India

CPIMC Workshop

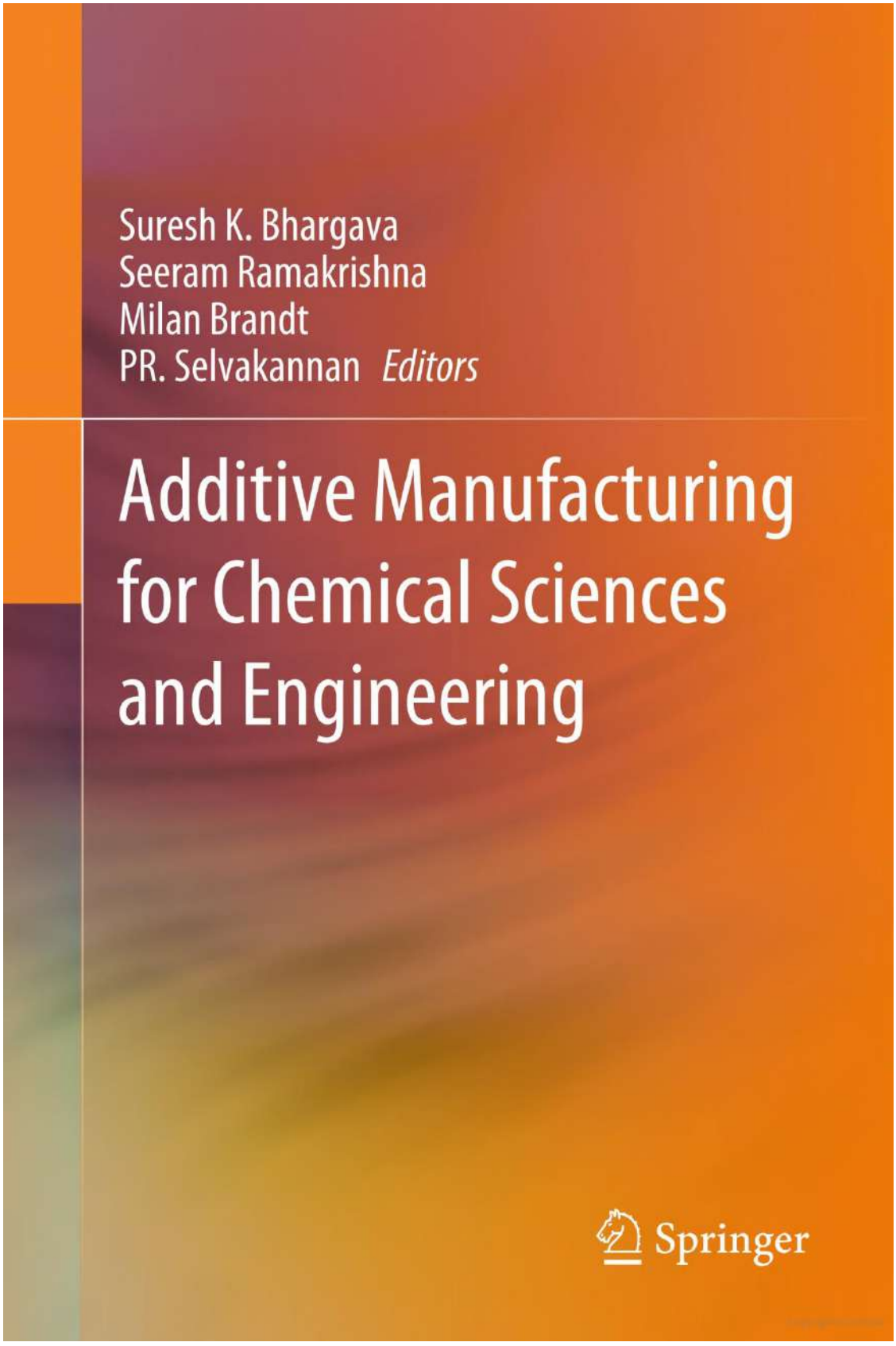
International industry connections are of paramount importance to us, and our partnership with RMIT X Council of Scientific and Industrial Research-Indian Institute of Chemical Technology (CSIR-IICT) is a prime example. At the end of last year, a two-day international workshop was held at the CSIR-IICT in Hyderabad, India, in which delegates from RMIT, including Calum Drummond AO, Suresh Bhargava AM, Charles Brennan and discipline members of CAMIC participated. The workshop, titled “Creating Profound Impact through Multidisciplinary Collaborations (CPIMC 2022),” focused on exploring potential new research collaborations between RMIT and India, with a shared industry focus.

During the workshop, Professor Bhargava expressed the intention to extend the successful collaboration to include Japan and the United States. Dr D. Srinivasa Reddy, Director of CSIR-IICT and Programme Convener, praised the benefits of the partnership, citing that as part of the program, 33 Indian research scholars have been awarded PhDs, with more students enrolling in the sandwich program. Additionally, the partnership has led to the publication of 150 research papers in international journals, 50 articles in various conference proceedings, and a few patents filed too.

"Always believe and trust in yourself, as you are capable of achieving even more than what someone else has done. At CAMIC, we strive to provide you with the necessary resources, both technical and intellectual, to match your efforts and take your skills to the next level"

Distinguished Professor Suresh Bhargava AM

2022



AM+

"We keep moving forward in the additive manufacturing and 3D printing field"

RMIT UNIVERSITY

Centre for Advanced Materials and Industrial Chemistry (CAMIC)

Annual Report 2022

Contact

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Connect with RMIT