

Research capability
delivering value



Advanced Materials

Enabling Capability Platform

Contact us to partner for a better future

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[www.rmit.edu.au/research/research-expertise/
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Creating materials for the world of tomorrow

Advanced materials such as carbon fibre composites, ceramics and nanomaterials are dramatically changing how we interact with and adapt to the world around us. They are in our cars, our clothing, our devices and our homes.

The industries of tomorrow need materials that have high-performance characteristics: materials that are stronger yet lighter; flexible and transparent, yet water and airtight. They need materials that are longer lasting and capable of increasing energy efficiency and decreasing environmental impact, while still being cost-effective to produce.

RMIT's **Advanced Materials Enabling Capability Platform** (ECP) brings together a dynamic, interdisciplinary research community to focus on creating advanced materials to meet the future needs of industry and the wider community.

Our researchers specialise in fields ranging from science and engineering to biomedicine, design, textiles and social studies. They are passionate about working with RMIT's partners in the environmental, sustainability, health and manufacturing sectors to create, prototype and commercialise materials destined to revolutionise how humans engage with the physical world.

Research shaped by industry needs

RMIT has a long history of aligning our research and educational programs with the practical needs of Australian industry. Our eight Enabling Capability Platforms, including the Advanced Materials ECP, mark a new era of partnership and co-creation between our research community and our external partners.

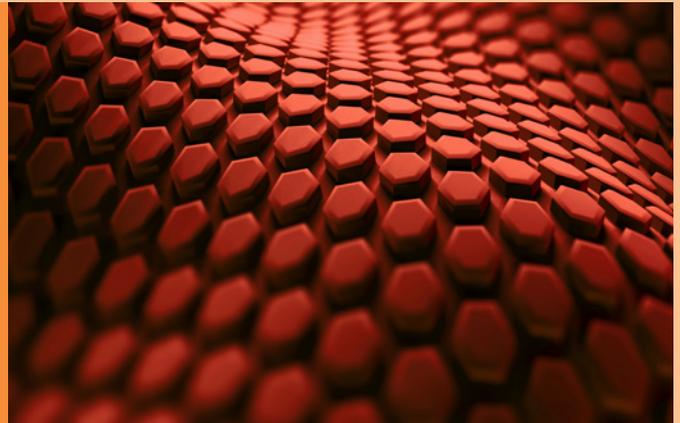
This capability platform serves as a streamlined, single point of contact within the University for research projects and partnerships that focus on the design, creation and modification of advanced materials. It works closely with our other ECPs, particularly those focusing on Advanced Manufacturing and Fabrication, Biomedical and Health Innovation, and Urban Futures.

A Sector Expert Research Advisory Group of industry leaders and stakeholders will help to shape our research direction, expertise and technical facilities for advanced materials development. We will identify industry's priority needs for smart materials and make those priorities our own.

What are advanced materials?

The term 'advanced materials' refers to the modification of existing materials or the creation of new ones to achieve superior performance.

The materials can be structural and functional, inorganic, organic or inorganic-organic hybrids. They can be classified as soft matter or hard matter depending on their characteristics.



Our vision

Rachel Caruso, Director, RMIT Advanced Materials ECP



We will work with our external partners to discover, develop and deploy the advanced materials needed by the industries of tomorrow.

The materials we create will benefit industry, society and the environment. They will lead to more sustainable ways of living; better ways of adapting to extreme conditions; smarter and more effective health care; and responsive, high-performance consumer products. They will help to solve global problems.



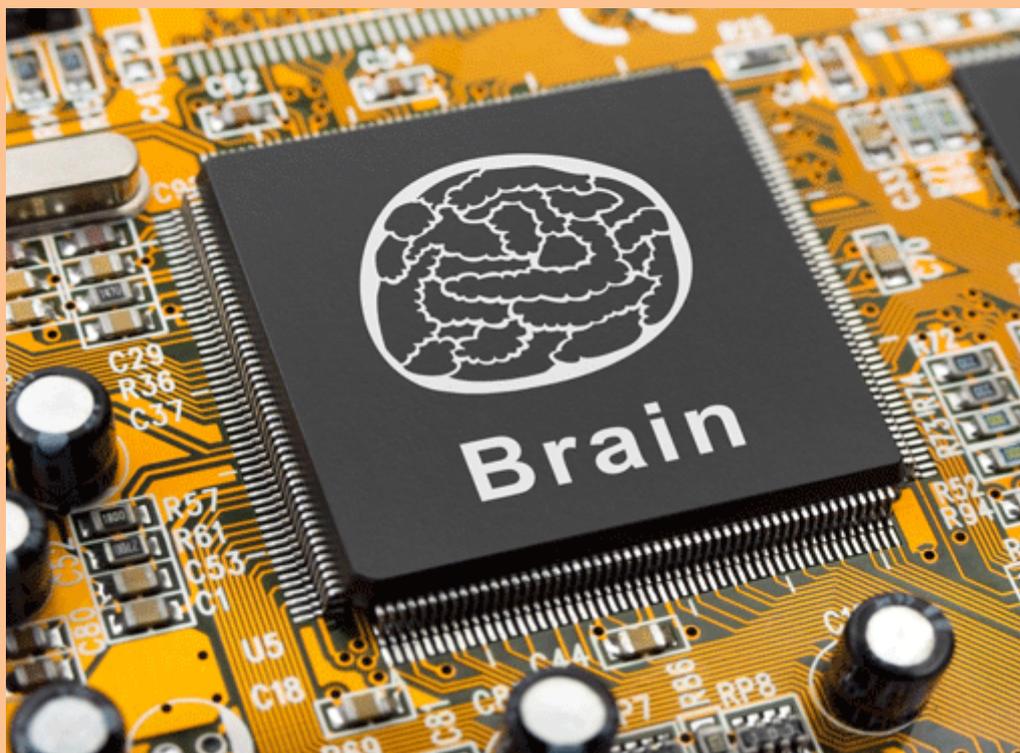
Examples of Advanced Materials ECP collaborative research projects

Nanoscale memory technologies that mimic processes in the human brain will revolutionise computing and machine learning.

The 'RMIT Brain Alliance' has been established to provide national leadership in bionic computing technology. The alliance:

- > brings together a diverse and complementary group of RMIT researchers working in the fields of memory, intelligence and brain science
- > is building a network of national and international research leaders in the field
- > is defining the potential of these emerging technologies and the advanced materials involved, and
- > investigating collaborative funding and research opportunities.

The alliance was funded by RMIT's ECP Capability Development Fund.



RMIT is partnering with a leading pharmaceutical company in developing new vaccine technologies, to streamline the design of novel lipid nanoparticles for delivering large therapeutic bioactive compounds.

This project involves deep collaboration with industry, modelling and experimentation at all product development stages. It aims to develop new drug delivery technologies based on biocompatible lipid nanomaterials to overcome the problem of how to effectively deliver poorly soluble drugs.

This is a significant issue for the pharmaceutical industry, as more than 90 per cent of new drug candidates and up to 40 per cent of the drugs on the World Health Organisation Essential Drug List are lipophilic (poorly soluble).

This research is funded by RMIT's ECP Capability Development Fund.

Key capabilities

Hundreds of expert research affiliates in disciplines ranging from engineering and science to biomedicine, design, fashion and textiles, construction and urban studies.

Internationally recognised areas of research excellence in:

- > nanotechnology
- > physical chemistry, macromolecular and materials chemistry
- > aerospace, biomedical, electrical and electronic, and materials engineering

Additional research strengths in:

- > materials characterisation and processing
- > wearable technologies, high-performance and protective clothing
- > computational simulations and modelling
- > industrial and creative design

Research facilities and centres, including:

- > NanoMicro Research Facility
- > Advanced Manufacturing Precinct
- > RMIT Microscopy and Microanalysis Facility
- > Food Research and Innovation Centre
- > Centre for Advanced Materials and Industrial Chemistry
- > Centre for Materials Innovation and Future Fashion
- > Sir Lawrence Wackett Aerospace Centre
- > Centre for Molecular and Nanoscale Physics
- > Centre for Innovative Structures and Materials
- > Centre for Advanced Electronics and Sensors

Close relationships with:

- > federal and state governments
- > Industry Growth Centres and peak industry bodies
- > Victoria's Priority Industry Sectors
- > major industries and research institutions and networks in Australia, Asia and Europe

Research and innovation priorities

Our research will support industry through:

- > materials processing and characterisation, and
- > computer simulations and modelling of materials

with a focus on the following four priority areas.

Materials on the nanoscale

Ranging from biomaterials to multifunction textiles, these materials will have applications in areas including catalysis, photonics and energy conversion.

Materials for devices

Materials for developing:

- > sensors
- > point-of-care diagnostics
- > optoelectronics
- > plasmonics
- > integrated photonics
- > memory technologies and simulated neural networks

Materials for extreme conditions

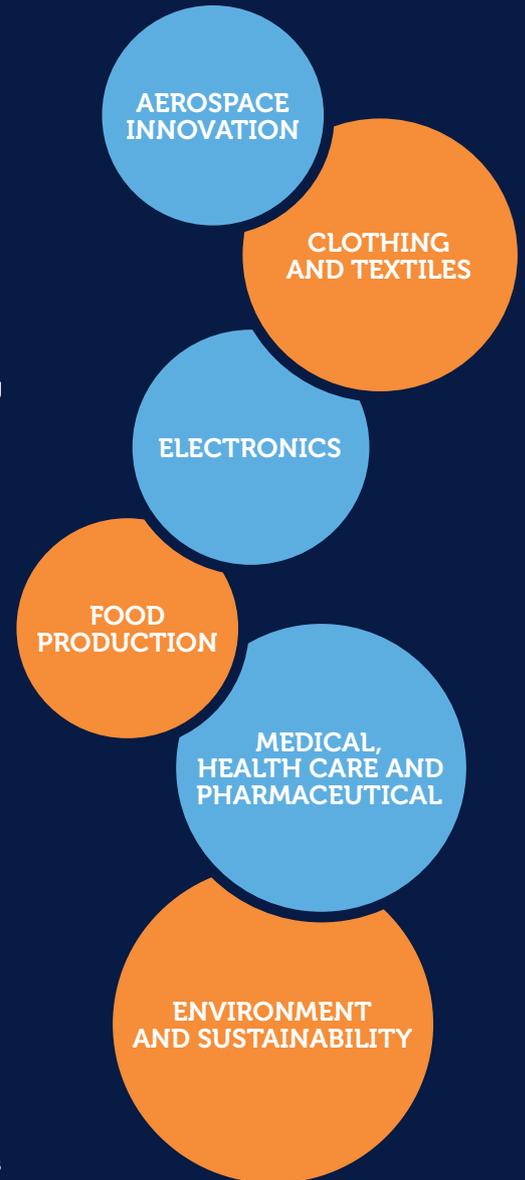
Developing protective and/or high-tolerance materials capable of withstanding extreme temperatures, pressures and other challenging conditions.

Also developing materials that help to improve health, wellbeing and sports performance.

Materials for sustainable living

Materials and processes using materials that will improve the use, recovery, remediation and recycling of resources, including biomass, energy, food, minerals, waste and water.

Key application areas



RMIT'S ENABLING CAPABILITY PLATFORMS (ECPs)

- > **Advanced Materials**
- > Biomedical and Health Innovation
- > Advanced Manufacturing and Fabrication
- > Design and Creative Practice
- > Global Business Innovation
- > Information and Systems (Engineering)
- > Social Change
- > Urban Futures