

ADVANCED MATERIALS TECHNOLOGIES FOR ENERGY, ENVIRONMENT AND SENSING



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

Our research is focussed on the development of advanced nanoporous carbon and carbon nitride materials for the applications of energy (including battery, solar cell and fuel cells), filter for the removal of PFAS, heavy metals and other pollutants, selective capture of CO₂ or other toxic gases as well as bioapplications such as drug delivery, hyperthermia, and magnetic resonance images. In addition, our Centre is actively working on the development of advanced magnetic materials for magnetic sensors and microwave Radar absorption of magnetic materials.

COMPETITIVE ADVANTAGE

- Pioneering research in developing carbon and carbon nitride porous materials for a variety of applications including energy, selective capture of toxic materials and CO₂
- Expertise and experience in association with defence research and technologies
- Outstanding research team including world-leading scientist, Future Fellow, DECRA fellows and postdoctoral fellows
- Expertise in developing magnetic field sensors for submarine detection
- Expertise in developing microwave absorption based on magnetic materials

SUCCESSFUL APPLICATIONS OF RESEARCH

- CO₂ capture and conversion
- Semiconducting gas sensors for combustion gases
- Filter for removing pollutants including PFAS
- Magnetic fluxgate sensors
- Portable light and high efficiency batteries

PARTNERS

- Green Camel
- Minotaur Exploration Limited
- Andromeda Metals Limited
- DEBEL Lab in India

IMPACT

- By CO₂ capture and conversion using very light materials, improving environment in submarines
- Obtaining clean water in the field with portable filters
- Effective detecting submarines using high sensitive magnetic sensor, and reduce radar absorption using high magnetization materials
- With CO₂ capture and conversion, photo/electro-catalyst to produce hydrogen, energy storage and conversion technologies (battery, supercapacitors, solar cell and fuel cell), our research can provide power for cars without any fuel, enhancing the survival of soldiers in battle and in the field

CAPABILITIES AND FACILITIES

- World class facilities for advanced nanomaterial synthesis, characterization and device fabrication, such as customized synthesis facilities, state-of-art SEM and XRD system, TEM, SQUID and PPMS system, shielding room, and a variety of mass spectroscopy systems with in-situ measurement capabilities
- World wide collaboration for advanced facilities including synchrotron, muons and neutron facilities
- World first customised water splitting measurement system
- Customized facilities for photocatalist, battery, solar cell and fuel cell measurement