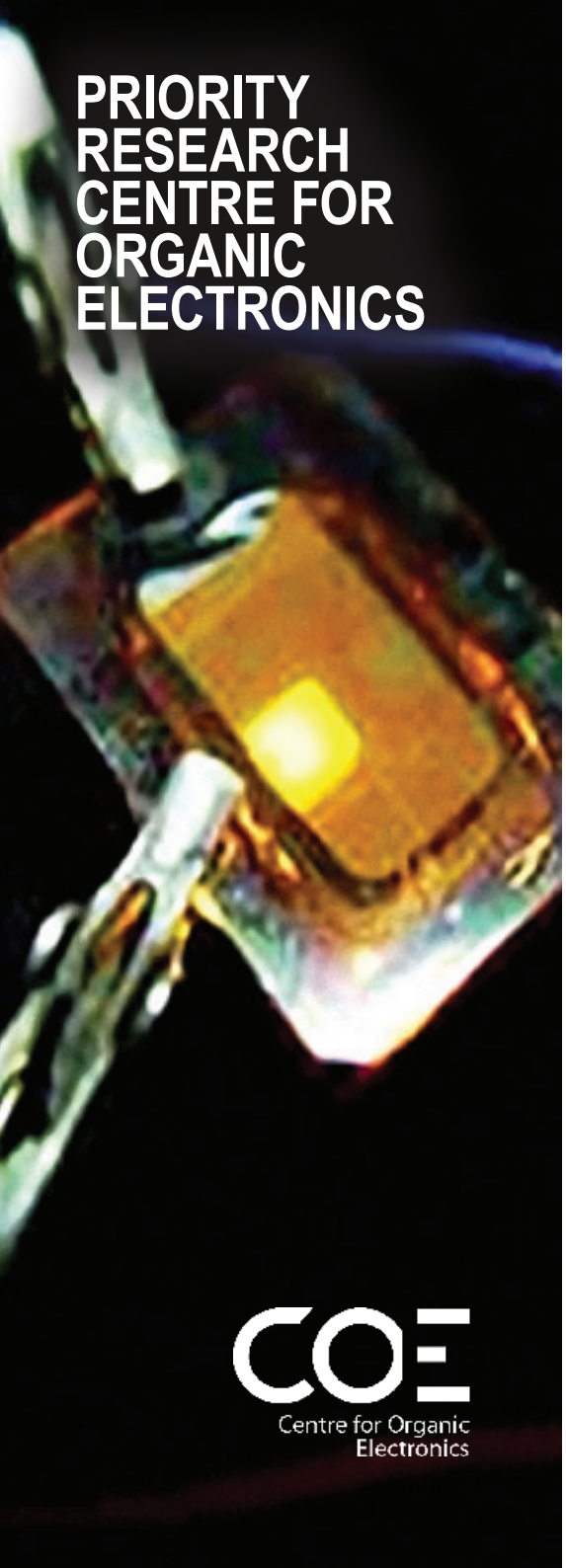
PRIORITY RESEARCH CENTRE FOR ORGANIC ELECTRONICS



COE
Centre for Organic Electronics

FACULTY OF SCIENCE AND INFORMATION TECHNOLOGY

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

OVERVIEW

The Centre for Organic Electronics (COE) brings together researchers from Physics, Chemistry and Medicine to work on projects associated with semiconducting polymers and devices. Professor Paul Dastoor and his team have an international reputation in the area of organic electronics and devices.

The COE's primary focus is on the development of new electronic devices at the intersection between semiconductors and plastics. The Centre focuses on the scientific challenges in the development of organic photovoltaics, with massive potential for the next generation of environmentally friendly energy sources, photonics and biosensors.

The COE offers unique organic electronic device fabrication and characterisation facilities and expertise that are currently not accessible elsewhere in Australia or internationally. The COE has world-class facilities for building organic electronic devices (such as light emitting diodes (LEDs), field effect transistors (FETs) and organic photovoltaics (OPVs) based on organic materials (such as polymers). These devices have potential application in a wide range of industry sectors such as:
(a) Electricity generation (large area polymer solar cells);
(b) Instrument manufacture (organic transistors);
(c) Optoelectronics (organic LEDs),
(d) Telecommunications (organic photonics),
(e) Biotechnology (biosensors and detectors).

OBJECTIVES

The COE brings together leading Newcastle researchers across Physics, Chemistry and Medicine to create a multidisciplinary body of researchers working together on the development of organic electronic devices.

The COE aims to capitalise upon the advances that these researchers have made separately in developing new concepts, methods and technologies in the area of organic electronic systems. This COE is exploiting these synergies to tackle three crucial areas in organic electronic device development:
1. Renewable energy (Organic Photovoltaics and Solar Paint)
2. Biotechnology (biosensors and Integrated Detection Systems)
3. Information technology (Telecommunications and Organic Photonics)

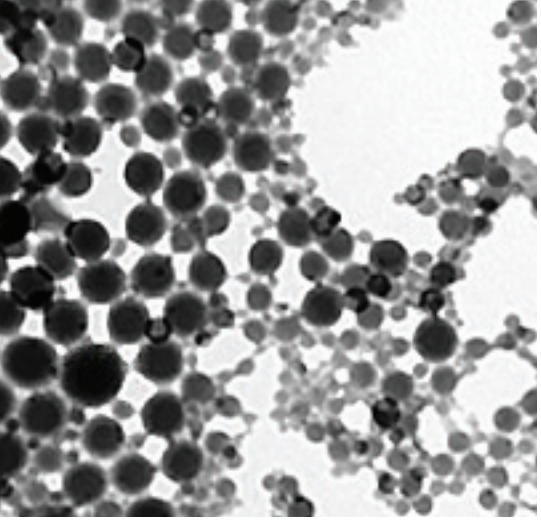
RESEARCH FACILITIES

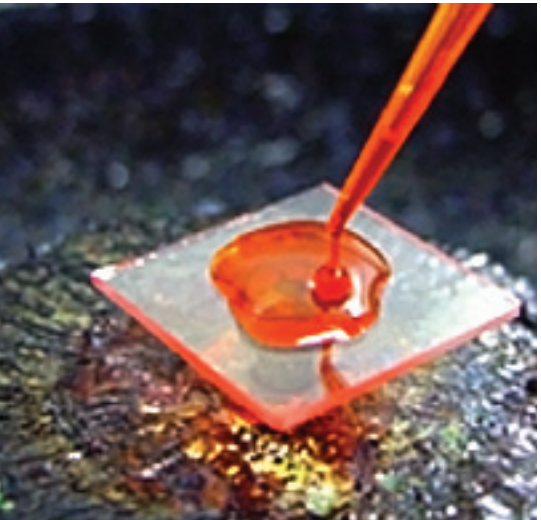
The COE has world-class research facilities, which include:

- thin film deposition (spin-coating, vacuum evaporation) and measurement (profilometry)
- class 1000 clean room containing inert atmosphere gloveboxes for sensitive device manufacture
- advanced characterisation facilities (UV-vis spectroscopy, AMN1.5 solar simulator, spectral response equipment, transistor testing equipment
- NDF (nanostructure deposition facility): a unique chemical vapour deposition system for fabricating nanostructured surfaces.
- IntLab: a unique X-ray photoelectron spectroscopy (XPS) and ultra-violet photoelectron (UPS) that is directly integrated with a complete inert atmosphere glovebox for organic electronic device fabrication
- NSPM (Near-field scanning photocurrent microscopy): a unique nanoscaled photocurrent mapping facility developed in the COE.
- IMF (interfacial mapping facility): a unique scanning probe microscopy facility
- Large area printing and laminating facilities
- Regular access to unique synchrotron based soft X-ray facilities in Australia and overseas.

EXTERNAL COLLABORATORS

- CSIRO Energy Technology
- University of Wollongong
- University of Sydney
- Cambridge University, UK
- Imperial College, London, UK
- Cornell University, US
- Georgia Tech, US
- IMRE, Singapore
- University of Texas
- Otago University, US
- North Dakota State University, US





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EXAMPLES OF CURRENT PROJECTS

Organic Solar Cells
Solar energy is widely considered to be the alternative energy source of choice and it is clear that solar cells (photovoltaics), will be required to provide a significant fraction of Australia's carbon-free electricity in the coming decades.

Recent developments in solar cell research worldwide have led to the emergence of a new distinct and complementary photovoltaic technology based on organic materials such as polymers with the aim of a fundamental step down in the cost to the end user.

Organic Sensors
This major research effort is focused on the development of novel chemo- and bio-sensors based on a completely organic platform. This work exploits the synergy between molecularly imprinted polymers (MIPs) with novel biosensors based on organic field effect transistors.

The goal is to develop integrated sensor platforms that could be readily interfaced to give an electronic signal.

Organic Photonics
The development of the next generation of telecommunications will involve optical fibre based networks rolled out to the home. The COE is focused on the development of low cost organic electronic based photonic detectors and components for integrated optical networks. The development of low cost printable detectors will significantly reduce the cost of optical network monitoring equipment and play a role in the roll-out of the National Broadband Network.

RESEARCH OUTCOMES

The COE has an extensive track record in all aspects of organic electronic research and development and its key researchers have an impressive array of publications in high quality international journals.

The COE was the major contributor to the recent ERA outcomes of the University across two of the 17 areas that scored 4 or 5. Moreover, this project is a key part of the development strategy towards the next ERA assessment and will deliver high impact research outcomes and high profile research outputs. As such, this project is directly aligned with a major research strength and the strategic direction of the University of Newcastle.

In addition the COE was invited to participate in the ABC New Inventors program to highlight their Solar Paint invention. The Solar Paint invention was selected for the ABC Grand Final. The COE was one of only five contenders who topped 120 inventions featured on the TV show in 2010. Overall, the work of the COE was featured on ABC National Television three times with total viewing figures of two million viewers across Australia (www.throng.com.au).

In 2010, the COE received Australian National Fabrication Facility funding for large scale thin film fabrication equipment. In addition, the COE is one of the key members of the Newcastle Institute for Energy and Resources (NIER) and will be moving into a new purpose-built facility funded by a large grant secured by the University of Newcastle in 2010.

GROUP MEMBERS

Prof Paul Dastoor
A/Prof Erica Wanless
Prof Alison Jones
A/Prof Scott Donne
Dr John Holdsworth
Dr Michael Bowyer
Dr Clovia Holdsworth
Dr Warwick Belcher
Dr Xiaojing Zhou
Dr Glen Bryant
Dr Ben Vaughan
Dr Chhinder Bilen
Dr Lars Thomsen

CONTACT

Director
Prof Paul Dastoor
Discipline of Physics
School of Mathematical and Physical Sciences
University of Newcastle
Callaghan NSW 2308 Australia

Phone: +61 2 4921 5426
Email: Paul.Dastoor@newcastle.edu.au

www.newcastle.edu.au/faculty/science-it/research/