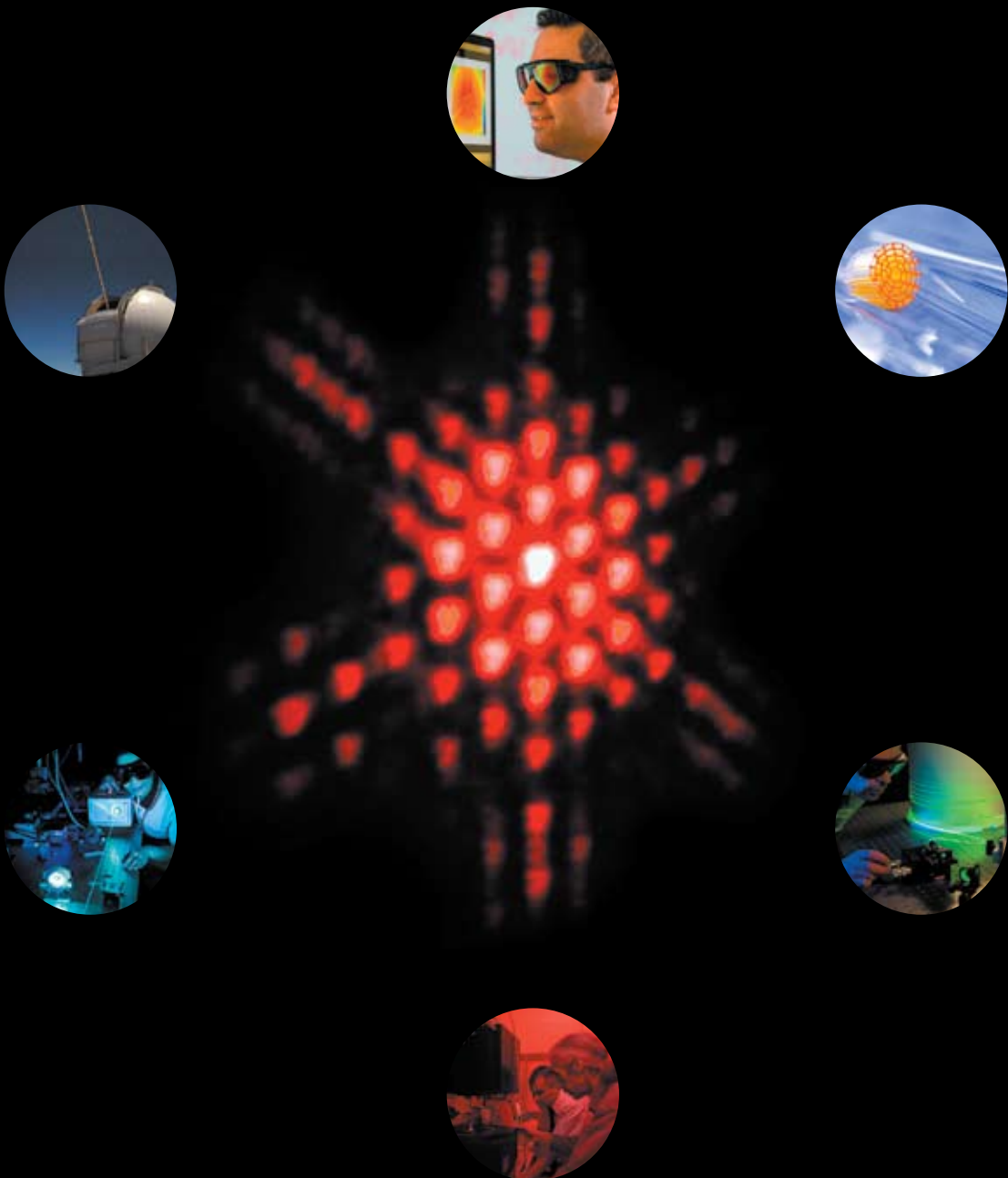


# Institute for Photonics & Advanced Sensing

[www.ipas.edu.au](http://www.ipas.edu.au)



# WELCOME

The Institute for Photonics & Advanced Sensing – IPAS, has been founded on the success of the Centre of Excellence in Photonics, a joint centre of the University of Adelaide and DSTO and the recognition of the importance that new forms of Advanced Sensing will play in the world.

We are developing new ways to help wine producers measure the maturation of wine, new sensor systems for our military, virus detectors that should one day be in every airport in the world and will help prevent global flu pandemics and new ways of monitoring the minute changes in the environment that will help us understand the effects of global warming.

IPAS will perform cutting edge research, pushing the boundaries of understanding in photonics and other measurement sciences. Working in partnership with government and industry we will work to translate discoveries into practical solutions.

The Federal Government, State Government, DSTO, Defence SA and the University of Adelaide have committed over \$38 million to IPAS. This funding will be used to construct cutting edge advanced sensing laboratories, fibre optic production facilities and offices to house IPAS.

Our team of world leading scientists is pledged to creating a culture of research excellence and making IPAS a place where collaboration will create significant breakthroughs and the development of new technologies.

IPAS research is focused on developing solutions in four key markets:

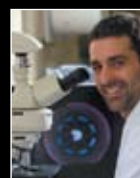
- Defence and national security
- Environmental monitoring
- Food and wine
- Preventative health



## IPAS MISSION

To bring together researchers from different disciplines focused on developing new platform technologies with those who traditionally use commercial measurement tools.

To build sustainable critical mass in research capacity and capability in photonics and sensing to deliver outcomes and provide support and a rich experience for researchers, postgraduates and undergraduates.



## IPAS VISION

To move beyond multidisciplinary to create integrated scientific knowledge and theory which is transdisciplinary and which will answer 'big, real-world questions' at the boundaries of physics, chemistry and biology.

To create disruptive new technologies for applications in Defence & National Security, Environmental Monitoring, Preventative Health and Food & Wine.

## What is Transdisciplinary?

A transdisciplinary approach brings discipline specialists from different areas together to work side by side with the common purpose of evolving new research methodologies and frameworks that span the discipline boundaries. This goes beyond simply contributing different disciplinary techniques or viewpoints to a problem at hand, as is done in multidisciplinary research, or bringing the tools of one discipline to bear on another a problem in another discipline, as is done in interdisciplinary research. A transdisciplinary approach aims to provide solutions to challenging real world problems that cannot be tackled with the tools of any one discipline alone.

# RESEARCH

## IPAS Research Strengths

### Production of Novel Optical Materials

- Formulating glass materials with novel optical properties
- Design and fabrication of micro and nanostructured optical fibres
- Advanced fibre drawing capabilities
- Mid-infrared and THz fibres

### Surface Science

- The production of specialised biological and chemical coatings to enable the realisation of sensors for specific chemicals and biomolecules

### Theory & Computational Modelling

- Development of new theoretical frameworks for understanding waveguides and fibres with extreme properties and nanoscale features
- The design and modelling of the properties of advanced fibre structures including nonlinear effects, dispersive effects and photonic bandgaps

### Fibre Lasers

- The production and testing of novel fibre lasers allowing high power applications and new wavelengths

### Fibre Sensors

- A new class of fibre sensors capable of measuring chemicals and biomolecules in concentrations as low as  $<0.2\text{nM}$  from picoliter volume samples
- Novel label-free fibre-based biosensors
- Novel exposed core fibres for distributed sensing

### Nonlinear Fibres and Devices

- Fibres with extreme nonlinearity Supercontinuum sources, optical data processing, including electro-optic devices

### Atmospheric Sensing

- Development of new lasers and optical systems for LIDAR and environmental monitoring

### Luminescence

- New forensic Luminescence techniques for applications in defence, mining, geology and paleontology

## Research Collaborations, Industrial Interactions and Optofab

IPAS collaborates with universities across the world. Transdisciplinary teamwork is a core component of the Institute Vision and is critical to solving many of the research challenges. We welcome interactions from potential collaborators in all scientific fields of endeavour.

To transform research into practical solutions IPAS collaborates with many commercial and development organisations including DSTO, BAE Systems Australia, Micromet, Asahi and Wine 2030. IPAS is part of the Optofab node of ANFF under NCRIS. Academic groups and companies can access our specialised equipment and services and via this scheme. For a full listing of the equipment and services we offer please see our website at [www.ipas.edu.au](http://www.ipas.edu.au)

## IPAS PEOPLE



The Institute for Photonics & Advanced Sensing is led by Professor Tanya Monro, with the guidance of the IPAS Board and the support of both Scientific and Executive management committees.

### Professor Tanya Monro IPAS Institute Director

Professor Tanya Monro is a Federation Fellow in the School of Chemistry & Physics at the University of Adelaide.

Professor Monro is a member of the South Australian Premier's Science & Research Council, a Bragg member of the RiAus, and provides advice to the Prime Minister on science via a thematic foresighting group supporting PMSEIC.

In 2008, she received the Australian Prime Minister's Malcolm McIntosh Prize for Physical Scientist of the Year, and in 2009 was named the "Emerging Leader" in Science by the Weekend Australian Magazine. She obtained her PhD in physics in 1998 from the University of Sydney, for which she was awarded the Bragg Gold Medal for the best physics PhD in Australia in that year. Tanya Monro has published over 300 papers.

### IPAS Board Members

**Mr Joe Flynn - Chairman**  
CEO, Water Industry Alliance

**Professor Mike Brooks**  
Deputy Vice-Chancellor and Vice-President (Research), The University of Adelaide

**Professor Bob Hill**  
Executive Dean, Faculty of Sciences, The University of Adelaide

**Professor Andrew Holmes**  
University Laureate Fellow and CSIRO Fellow, The University of Melbourne

**Dr Warren Harch**  
Deputy Chief Defence Scientist (Information and Weapon Systems), DSTO

**Dr Jurgen Michaelis**  
CEO, BioInnovation SA



### Contact IPAS

Professor Tanya Monro  
Federation Fellow  
Director, The Institute for Photonics  
& Advanced Sensing (IPAS)  
University of Adelaide  
Adelaide SA 5005 Australia

**T:** +61 08 8303 3955

**M:** +61 0400 649369

**E:** [tanya.monro@adelaide.edu.au](mailto:tanya.monro@adelaide.edu.au)

**W:** [www.ipas.edu.au](http://www.ipas.edu.au)