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The recent explosion in new fluorescence applications is accelerating the pace of research and development in basic and applied life sciences, including genomics, proteomics, bioengineering, medical diagnosis and industrial microbiology. Fluorescence-based techniques are rapidly becoming widely used to address fundamental and applied questions in the biological and biomedical sciences. Coordinated development and application of new techniques will be critical to Australia's ability to grow and capitalise on such developments.

Examples of current use of fluorescence-based technology include assays for biomolecules, metabolic enzymes, DNA sequencing, research into biomolecule dynamics cell signalling and adaptation, and fluorescence in situ hybridisation (FISH) to identify specific DNA and/or RNA sequences in tissues. Recently, molecular methods have been applied to fuse the gene for Green Fluorescent Protein (GFP) to other genes leading to its expression in living cells. This allows sophisticated analysis of gene expression and cellular location of important structural proteins and enzymes. Extreme selectivity of fluorescent labels that can target specific organisms open new avenues to resolve industrially and medically relevant problems in areas such as public health, safety of foods and environmental monitoring. Innovative fluorophores, new techniques including spectrally and temporally resolved fluorescence and purpose-engineered instrumentation create niche commercial opportunities and lead towards tangible industrial outcomes.

The Network brings together key teams with world-class expertise in biological and biomedical sciences, chemistry, physics and optoelectronics. These teams will benefit significantly from synergistic cooperation. The aim of the network is to consolidate these groups making it possible to translate scientific advances, from devising new fluorescent labels to system development, into market-driven products informed by knowledge of what the needs and emerging applications are. The internationally-competitive Network acts as a repository of high level research expertise in all aspects of relevant technologies and generates appropriately qualified graduates. It forms an important part of the development of Australia's internationally-competitive technology base and the associated industries.

All the details about this Network as contained in this website can also be downloaded in pdf format from here.

News Flash

Annual FABLS Workshop!
Visit the 'Conferences' link in News section...

Funding forms, guidelines and other Documents
Visit 'Members Announcements' link in News section...(Login required)

Scholarship Opportunities
Visit "General Annoucements" in News Section....

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Research Priorities

Identification of key challenges and needs through a roadmap of possible approaches provides a solid foundations for tangible research outcomes.

Please click on the links below for specific details:

- Development of high resolution probes for cellular imaging
- Detection and imaging of small molecules
- Fluorescence Detection in X-Ray Absorption Spectroscopy as applied to Frontier Bioinorganic Systems

This initial version of research priorities will be further developed as a result of discussion at our Network Workshop of 18 February.

DEVELOPMENT OF HIGH RESOLUTION PROBES FOR CELLULAR IMAGING

The development of new technologies to enable higher sensitivity biological imaging in living cells has been identified as one of the key scientific challenges. This would require creation of fundamentally new probes with enhanced spectral characteristics with the goal of improving detection schemes by a factor of 10 to 100. Parallel improvements in probe targeting, cellular delivery, and signal detection will be needed. The ultimate goal will be to develop probes that can be used to routinely achieve single molecule sensitivity for imaging dynamic processes in living cells. The research programs of relevance to these aims may emphasise pre-clinical development of imaging agents for the detection, and diagnosis, or measurement of treatment efficacy for different disease processes.

Recent scientific advances have greatly increased our knowledge of biological structures. Despite that little is known about molecular movement, intracellular molecular dynamics, and the formation of transient assemblies inside the cell. Temporal or spatial relationships among individual molecules as they move within the cell cannot be captured by examining isolated static structures in vitro or by analyzing indirect biochemical or genetic data. Imaging organelle structure in frozen or fixed cells gives information about cellular context but is limited by its static 'snapshot' view. Dynamic imaging of molecules *in vivo* is required to track structural changes over time and to obtain direct information about native structures within the cell. Despite the increasing demand to image cellular processes, however, the tools and reagents are not well developed.

The lack of sufficiently sensitive molecular probes and detection schemes for imaging individual molecules in vivo is a significant barrier to obtaining real-time information on dynamic cellular processes. A variety of probes are currently used for in vivo studies, but their chemical and photophysical properties limit their use and resolution within the 3-D context of the living cell. Detection in eukaryotic cells using currently available probes typically requires signals from tens to thousands of molecules. Problems with spectral intensity, photobleaching, isomerization, and large size limit their utility. Additional difficulties with probe targeting, cell delivery and detection instrumentation contribute

to a detection sensitivity level that is estimated to be too low by a factor of 100-1000. The development of improved technology to increase the sensitivity of the probe signal 10-100 fold from what is currently possible would be a significant step forward.

Examples of research that are relevant for these objectives include:

1. Addressing the need for higher sensitivity and greater flexibility in probes for in vivo imaging
2. Addressing current bottlenecks related to spectral intensity, blinking, photobleaching, isomerization, signal-to-noise, and large size of labels
3. Developing new approaches to create genetically encoded probes with high quantum yield for routine detection of single molecules in vivo in eukaryotic cells; to develop probes that emit the maximum number of photons before bleaching
4. Identifying genetically encoded fluorescent proteins in nature that are superior to those currently used
5. Developing new strategies to create genetically encoded domains that 'capture' optically active, membrane permeable, diffusible probes
6. Exploiting in vitro evolution strategies to maximize the spectral characteristics of genetically encoded probes
7. Exploiting strategies in combinatorial chemistry or coordination chemistry to find new ways to intensify the probe signal
8. Creating multifunctional probes that generate a signal in more than one imaging modality (e.g., optical microscopy/electron microscopy, or x-ray/optical microscopy)
9. Developing new approaches to deliver and adapt inorganic materials (metallic colloids, magnetic nanoparticles, quantum dots, nanocrystals, or other) to the cellular environment; to address problems related to membrane permeability
10. Developing strategies for 'multiplexing' probe signals by combining or linking optically active molecules
11. Developing novel strategies for delivering probes into cells and for targeting specific molecules without disrupting cell physiology
12. Developing detection strategies and hardware to maximize signal amplification

The technologies that fall under examples 3, 5, and 6 above are especially significant, with emphasis on those that have a reasonable future potential to provide information
regarding the dynamic presence, location, association, and/or activity of proteins.

A complete research and development pathway leading to single molecular event detection should be proposed. The strategy should address all the steps needed to assemble the components of a complete system including delivery into cells, targeting, reporting, and detection.

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DETECTION AND IMAGING OF SMALL MOLECULES

A class of organic chemicals, commonly referred to as "small molecules," has proven to be extremely important to functions of the cell at the molecular level. Such molecules have also been valuable for treating everything from headaches to cancer. In fact, most medicines, from aspirin to antihistamines, are small molecule compounds.

Small molecules are significant as they lend themselves to molecular imaging - the imaging of molecules or molecular events in biologic systems that span the scale from single cells to whole organisms. Ultimately, it is hoped that this effort will enable doctors to obtain personalized profiles of cell and tissue function for each patient, leading to more individualized approaches to diagnosis and treatment. Obstacles to routine clinical use of this promising technology include the need for more sensitive probes for use in imaging systems, the need for a single database of probes and the need for centralized probe production.

An important research program concerns development of high-specificity/high-sensitivity probes with the goal of improving detection sensitivity 10- to 100-fold within five years. This program will enhance research efforts towards specificities, activities and applications of imaging probes for a wide range of diseases and biological .

It is also important to provide a mechanism for producing significant quantities of probes for which there is no good commercial supplier, as well as to generate novel imaging probes for biomedical research and clinical applications. The development of these probes will be aided by discoveries that emerge from the screening of small molecules for their affinity for targets of interest. Once developed, these probes will in turn aid the development of effective therapeutic agents by monitoring their biological behaviour.

Molecular imaging holds great promise for early detection and treatment of numerous diseases, for providing researchers with detailed information about cellular physiology and function, and for facilitating the goal of personalized medicine. Molecular imaging will become a powerful tool for biomedical research and will be a synergistic component of the overall research in molecular medicine that promises landmark improvements in clinical care.

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Fluorescence Detection in X-Ray Absorption Spectroscopy as Applied to Frontier Bioinorganic Systems

Recent frontier applications of XAS using fluorescence detection to bioinorganic systems are discussed. These include EXAFS determination of the local structure of metalloproteins, fingerprint identification of biochemical species, and information on electronic structure from XANES (including microprobe), and both elementally and chemically specific imaging of biological samples using micro-focused x-ray beams.

Of the two main detection methods used in X-ray absorption spectroscopy, i.e. fluorescence and transmission, only the former has wide applicability to biological and bioinorganic systems due to its suitability to the measurement of low concentration samples which are prevalent in the field. Transmission is unsuitable for low concentration samples as they are dominated by a background signal which decreases rapidly with energy. Fluorescence detection is normally limited to lower concentration samples (from ~ 50mM depending on detector to as low as nM) as at higher concentrations the linearity of the most commonly used Ge detectors becomes a problem and self absorption (reabsorption) of fluorescent photons leads to badly distorted spectra. A wealth of information is available on the internet regarding X-ray absorption spectroscopy techniques and analysis – much of this can be accessed through Matt Newville's website at the University of Chicago.

Full Report available here.

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Scope

The objective of this Network is to initiate, encourage and enable collaborative projects in areas represented by Members

A specific example of a significant program will be to develop new probes for molecular and cellular spectroscopy. The overall goals are to create complete toolsets for detection of single molecule events in living cells, and to generate new strategies for dramatically increasing the resolution for imaging dynamic cellular processes. Although the probes will be initially used for the study of basic molecular and cellular processes, the technology developed may ultimately be adapted for clinical or industrial uses.

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Roles

The roles of the Network are to

- Capitalise on basic research concerned with much-needed deeper understanding of biological systems.
- Enhance research & development outcomes in a coordinated manner
- Assemble and link our critical mass of scientific expertise and technologies.
- Through the research infrastructure access program, improve the efficiency of infrastructure utilisation and minimise unnecessary duplication of resources.
- Facilitate interactions with international research & development groups to ensure a global perspective and facilitate collaborations within international programs.
- Apply the findings of the basic research and improved understanding of biological systems to generate products of value to the Australian economy.
- Seek improved feedback from technology end users to stimulate, develop and transfer internationally competitive fluorescence-based diagnostic and analytical technologies.
- Through applications of these technologies within Australia, foster benefits such as improved public health diagnostics, improved processing and quality of foods and beverages, and development of new technology-based companies.
- Improve the quality of the Australian postgraduate learning environment by adding a distributed, cross-disciplinary focus and an industrial perspective to applications.
- Provide a quality environment for professional training to meet the needs of academia and industry.

Intellectual property generated within the Network is conducive to facilitating establishment of new Australian companies with international markets.

Significance

Scientific viewpoint

The recent explosion in new fluorescence applications is accelerating the pace of research and development in basic and applied life sciences, including genomics, proteomics, biotechnology, bioengineering, medical diagnosis and industrial microbiology. The extreme selectivity of fluorescent labels that can target specific organisms, organelles or even single molecules opens new avenues for research and development. Better understanding of basic biological processes will inform targeted research and development of novel tools for bioindustries.

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Industrial viewpoint

Innovative fluorochromes and new techniques (for example spectrally and temporally resolved fluorescence and purpose-engineered instrumentation) create niche commercial opportunities. The global market for fluorescence-based products is estimated in billions of dollars p.a. This high technology area with its comparatively low entry costs is particularly well suited to enable Australia to capitalise on research results originating from the academic sector. This Network represents a major academic research grouping in enabling areas of research, with the focus and scale of the type that exists overseas. Approaches such as highly selective fluorescent labelling of targets using appropriate immunological and molecular techniques and purpose-engineered fluorochromes accompanied by the development of specialised instrumentation will and lead towards tangible industrial outcomes.

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Interdisciplinary viewpoint

The Network capitalises on the multi-disciplinary research strengths of its Members. As science has advanced it has become increasingly apparent that in the dynamic research process, the traditional divisions within sciences may in some instances impede the pace of scientific discovery. This Network lowers artificial organizational barriers in order to advance science, and implements strategies to facilitate conduct of interdisciplinary research. Importantly it creates a forward-looking forum to foster collaboration among the life and physical sciences, important areas of research that historically have had limited interaction.

Interdisciplinary research integrates the analytical strengths of two or more, often disparate, scientific disciplines to solve a given scientific or industrial problem. By engaging seemingly unrelated disciplines, traditional gaps in terminology, approach and methodology also are gradually eliminated. With roadblocks to potential collaboration removed, a true meeting of minds can take place that broadens the scope of investigation, yields fresh and possibly unexpected insights, and may give birth to new hybrid disciplines that are more analytically sophisticated.

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Partnership viewpoint

The far-reaching progress anticipated for scientific research in the 21st century will require research collaboration among several sectors. Public-private partnerships have become a model for advancing science and communicating results of research advances to improve the quality of life for all people. As researchers tackle ever more complex problems, strategic partnerships between University researchers, private industry and non-profit organizations are becoming more important. They have already extended and accelerated research, research training and the dissemination of information in diverse and creative ways.

This Network puts in place mechanisms to encourage partnerships among researchers in academia, government and the private sector. Each partner brings unique resources and strengths, leading to results that are better than any could accomplish alone.

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Application viewpoint

Scientific discoveries must be translated into practical applications so the community can derive concrete benefits. These discoveries typically begin at "the bench" with basic research - where scientists may study the phenomena at a molecular or cellular level – and then progress to more realistic settings.

Scientists have become increasingly aware that this approach is really a two-way street. Basic scientists deliver to practicians new tools, but practicians make novel observations that can stimulate basic investigations. Their research interactions have proven to be a powerful process that primes the entire research engine. Awareness of this junction lies at the centre of our focus on development of novel applications of fluorescence.

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Mission

- To inspire and coordinate multi-disciplinary research into applications of fluorescence which require a high degree of interaction of expertise in biology, physics, chemistry, bioengineering and medicine.

- To facilitate transfer of scientific approaches, technologies and applications to resolve industrially and medically relevant problems in areas such as public health, food processing and safety, and environmental monitoring.

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Programs

- Facilitation of research interactions across diverse disciplines.
  - Foundation for understanding between the disciplines and between different types of organisations aimed at increased mutual awareness of issues.
  - Mechanism for identification of research priorities, and articulation of research programs
- Facilitation of dialogue with research end-users creating awareness and opportunities
  - Industrial seminar and professional training program
  - Infrastructure access program
- Ensuring of quality environment for postgraduate education

Foundation of understanding between the disciplines and between different types of organisations aimed at increased mutual awareness of issues

Details of this Network program will be described in the full application to the ARC.

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Mechanism for identification of research priorities, and articulation of research programs

The key reason for the activities of the Network is identification what are the important problems in the area of fluorescence applications in biotechnology and life sciences, who has the skills to contribute to solving of these problems and how do we identify approaches to solve these problems. It can be anticipated that the process of identification of research priorities and challenges will proceed independently of the Network stimulus, through individual insights and informal interactions between Network Members. However a structured means in form of a yearly Network workshop would add value to the process by bringing together a wider representation of scientists from more diverse disciplines. The workshops will be designed to identify several (three to four) project areas that would respond to international priorities and would suit the skill set represented by the Network members.

Such Workshops would concentrate around the following issues:

- recent research highlights of members,
- recent significant developments in their respective areas,
- emerging challenges in their areas generally,
- emerging challenges they are inclined to tackle,
- possible approaches that could be adopted to meet these challenges (to see if other Network

members could make a contribution).

The next step would involve identification of focus groups and emergence of the working parties that would further fine tune research strategies, find ways of their implementation and monitor progress once projects have started. The working parties would need to meet periodically, for instance quarterly.

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Industrial seminar and professional training program

Details of this Network program will be described in the full application to the ARC.

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Infrastructure access program

Details of this Network program will be described in the full application to the ARC.

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Network Members

Our members include research leaders and key teams with world-class expertise in biology, chemistry, physics and optoelectronics and who already benefit from synergistic cooperation and commercial focus. This Network consolidates these groups making it possible to translate scientific advances, from devising new fluorescent labels to system development, into market driven products informed by the knowledge of what the needs and emerging applications are. This enables generation of a high level of research expertise in all aspects of relevant technologies and appropriately qualified graduates.

Our vision of an internationally competitive network is an important part of the development of internationally competitive technology base and the associated industries.

Executive Management Committee (EMC):

A/Prof. Ewa Goldys Chair	(Department of Physics, Macquarie University)
A/Prof. Robert Learmonth	(Biological and Physical Sciences, University of Southern Queensland)
Dr. Mark Prescott	(Biochemistry and Molecular Biology, Monash University)
Dr. Stuart Rumble	(Spectroscopic & Analytical Instruments, Lastek Pty. Ltd.)
Dr. Anya Salih	(Electron Microscope Unit, The University of Sydney)
Dr. Trevor Smith	(School of Chemistry, The University of Melbourne)
Prof. Jim Piper Withdrawn	(Centre for Lasers & Applications, Macquarie University)
A/Prof. Paul Mulvaney Withdrawn, 8/12/2004	(School of Chemistry, The University of Melbourne)

Resource Management Committee (RMC):

Dr. Mark Prescott Chair	(Biochemistry and Molecular Biology, Monash University)
Dr. Stuart Rumble	(Spectroscopic & Analytical Instruments, Lastek Pty. Ltd.)
Dr. Anya Salih	(Electron Microscope Unit, The University of Sydney)
A/Prof. Robert Learmonth	(Biological and Physical Sciences, University of Southern Queensland)
Dr. Trevor Smith	(School of Chemistry, The University of Melbourne)
Dr. Liz Harry	(Biotechnology of Infectious Diseases, University of Technology, Sydney)
Prof. John Harvey	(Department of Physics, University of Auckland)
Dr. Don McNaughton	(Centre for Biospectroscopy, Monash University)
Dr. Pierre Moens	(Biological, Biomedical & Molecular Sciences,The University of New England)
Mrs. Gerri Springfield	(Physical sciences, Coherent Scientific Pty. Ltd)

Education and Training Committee (ETC):

A/Prof. Robert Learmonth Chair	(Biological and Physical Sciences, University of Southern Queensland)
Dr. Ron Clarke	(School of Chemsitry, The University of Sydney)
A/Prof. Ewa Goldys	(Department of Physics, Macquarie University)
Dr. Ian Harper	(Micro Imaging, Monash University)
Prof. David Jameson	(Department of Cell and Molecular Biology, University of Hawaii at Manoa)
Dr. Karl Poetter	(Genera Biosystems Pty Ltd)
Dr. Graham Vesey	(BTFbio Pty Ltd)

Present Members:

Following is the list of current Network members:

- Academics
- Companies

New Members:

For new members who would like to join the network, please click the Membership Registration link.

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Governance

The organisational structure of the Network and its funding components underpin its long-term success.

This structure and governance is currently under development and will be finalised at our planned Network Workshop of 18 February.

We are developing a collaborative and distributed governance model, centred on an Executive Management Committee, with several sub-committees. Thus all Network Members will be able to contribute to the management of the Network.

The Executive Management Committee will be advised by:

- An Advisory Committee, which will include the industry and overseas associates.
- Sub-committees, which will include:
  - Scientific Committees to define key scientific issues in two domains: be problem-centred (vertical) and discipline-centred (horizontal). Leaders for each domain will be nominated at the Workshop and will coordinate individual contributions and information gathering activities of Members.
  - A Resource Management Committee that will determine the optimal application of resources, for example infrastructure availability, a small pilot grant program, postdoctoral fellowships and exchange programs.
  - An Education & Training Committee that will administer a PhD scholarships program and develop mechanisms to improve the quality of environment for postgraduate education and professional training.

Collaborative management and coordination of research programs and activities will be achieved through regular interactions between Committees and all Members via workshops, as well as with virtual interactions via electronic means such as chat rooms, and bulletin boards.

The network governance will be described more in the full application to the ARC.

Please check this link for more updates later.

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Expertise

Academic Network Members

The Network Members and their research groups carry out multifaceted research programs that may be mutually supportive within the scope of the Network.

The researchers Karuso, Salih, Mulvaney, Dove and Bottle concentrate on the development of novel fluorophores with optimised properties through chemical synthesis, bio-processes, or identification of naturally occurring fluorescent compounds. Ghiggino, Smith, Kable and Clarke specialise in diagnostic use of fluorescence to elucidate molecular environments, especially in biological systems.

Trounson, Piper, Williams, Willcox, Clayton, Baker, Bergquist, Nevalainen, Learmonth and Harry utilise fluorophores in studies of molecular and cellular dynamics, biological/medical imaging, clinical applications, proteomics, genomics, and flow cytometry.

Requirements of these research groups for high throughput; high sensitivity, low background diagnostic assays allow the scientists in this area to identify special demands unmet by present fluorophores. Those particularly desirable for their applications such as multispectral labelling in genomics or time-resolved flow cytometry using long lifetime fluorophores frequently need new measurement techniques or instrumentation.

Development of techniques (such as confocal FRAP, surface enhanced and multiphoton and FTIR microscopy) for identification and localisation of trace chemicals with high temporal and spatial resolution is carried out by Ghiggino, Smith, Tilley, McNaughton, and Piper.

Piper, Rubinstein-Dunlop, Heckenberg and Goldys focus on development of industrially significant instrumentation for biotechnology, medical and bioengineering. This involves new applications in laser and microelectronics to produce instrumentation with lower cost, improved sensitivities and new functionalities.

Please note that this section is based upon the expertise of participants of the original seed funding proposal. Network membership is progressively growing, and this section will be regularly updated as new members join.

Company Network Members

This section is under construction, and will be updated as development progresses. In the meantime, company capabilities may be determined by viewing the web links on the Company Members page.

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Facilities

The following is the list of facilities currently available which are related to this network:

- Optical Microcharacterisation Facility (Macquarie University)
- Circular dichroism, fluorescence and stopped-flow analysis system (Macquarie University)
- Molecular Spectroscopy and Centre for Bio Spectroscopy (Monash University)
- Microstructural Analysis Unit (University of Technology Sydney)
- Confocal Microscope Facility with FRAP capability (Latrobe University)
- Fluorescence Microscopy System: Olympus BH-2 fluorescence microscope, Olympus FV300 scanning confocal system on IX71 frame, Olympus FV500 scanning confocal system on IX71 frame, LaVision picosecond ICCD camera system (Melbourne University)
- Spectrometers: Cary Bio50 UV-VIS Spectrometer, Cary Varian Eclipse Fluorescence Spectrometer, Hitachi 4010 Spectrofluorimeter (Melbourne University)
- Optical+Biomedical Engineering Laboratory (OBEL) (University of Western Australia)
- Centre for Biophotonics and Laser Science (University of Queensland)

Contact Details:

Please contact in the following address for any further information regarding Fluorescence Applications:

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fax: 61 (02) 9850 8115
email goldys@ics.mq.edu.au / fabls@ics.mq.edu.au

Industry

The following is an indicative list of companies that are involved or potentially involved with Flourescence Applications in Biotechnology and Life Sciences:

- Amersham Pharmacia Biotech Inc.
- Becker & Hickell GmbH
- Bio-Rad Laboratories
- Biocrystal Limited, USA
- BMG Lab Technologies
- BTFbio Pty Ltd
- Capital Biochip Corporation
- Chemunex – The Rapid Microbiology Company
- Chroma (Filters)
- Coherent Scientific (laser systems)
- Edinburgh Instruments (Ge infrared detectors)
- Evotech Technologies
- Fonterra Research Centre - The Science of Dairy
- Genera Biosystems Pty Ltd
- Genentech (nanoparticle applications)
- Hitachi (fluorescence spectrophotometers)
- Hamamatsu (photomultiplier tubes)
- Horiba Ltd. (fluorescence spectrophotometers, CCD's)
- IBH (fluorescence lifetime equipment)
- Invetech Instrument Design, Development and Manufacture
- ISPEX - International Scientific Products Exchange
- ISS Inc., Innovations in Fluorescence
- Jobin Yvon (monochromators)
- Kaiser Optical Systems
- Lastek (lasers and photonic products)
- Leica Microsystems Inc.
- Molecular Probes (chromophores and laser dyes)

- Nanogen (nanoparticle applications)
- Nanosphere (nanoparticle applications)
- NeoBio - Novel Biotechnology
- Nikon (microscopy equipment)
- Ocean Optics (microscopy equipment, suppliers of nanoparticles, spectrographs and micrometers)
- Olympus (microscopy equipment)
- Omega Optical (filters)
- Ortec (electronics)
- Oxford Instruments (cryostat)
- PerkinElmer (confocal microscopy equipment)
- Photon Technology International (general suppliers)
- Picoquant (fluorescence lifetime equipment)
- Princeton Instruments (CCD camera)
- Quantum Dot Corporation, California , USA (fluorescent nanocrystals to biological molecules, nanoparticle applications)
- Rofin Lamps (forensic science instruments)
- Shimadzu Corporation (fluorescence spectrophotometers)
- Spectra-Physics (laser systems)
- Starna (cuvettes, standards)
- Tektronix (oscilloscopes)
- Varian, Inc. (UV-vis spectrophotometer and fluorimeter)
- Vision BioSystems (clinical diagnostic and life sciences)

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Network Members: Academics

The following are the Network members from universities and research institutes. Please click on the names to vew more details.
A more detailed list (including foundation member status) will be available for download soon from here.

Sort By:

Name	Organisation	Department	Email	Website
Prof. Alan Trounson	Monash University	Institute of Reproduction and Development	email	www
Dr Andrei Zvyagin	University of Queensland	Physics	email	www
Dr. Andrew Clayton	Ludwig Institute for Cancer Research	Epithelial Biochemistry Laboratory	email	www
Dr. Anya Salih	The University of Sydney	Electron Microscope Unit	email	www
Dr. Brett Hambly	The University of Sydney	Department of Pathology	email	www
Prof. Brian Orr	Macquarie University	Department of Physics	email	www
Dr. Charles Cranfield	Swinburne University of Technology	Centre for Micro-Photonics	email	www
A/Prof. Claude Roux	University of Technology, Sydney	Forensic Science	email	www
Prof. Dan Nicolau	Swinburne University of Technology	Bioengineering	email	www
Prof. David Jameson	University of Hawaii at Manoa	Department of Cell and Molecular Biology	email	www
Prof. David Sampson	University of Western Australia	Optical & Biomedical Engineering Laboratory	email	www
Dr. David Williams	The University of Melbourne	Medicine, Dentistry & Health Sciences	email	www
Dr. David Millar	The Scripps Research Institute	Department of Molecular Biology	email	www
Dr. Donald McNaughton	Monash University	Centre for Biospectroscopy	email	www
A/Prof. Ewa Goldys	Macquarie University	Department of Physics	email	www
A/Professor Filip Braet	Australian Key Centre for Microscopy & Microanalysis	Nanostructural Analysis Network Organisation, Major National Research Facility (NANO-MNRF)	email	www

Dr. Grace Chojnowski	Queensland Institute of Medical Research	Flocytometry and Microscopy	email	www
Dr. Greg Monteith	The University of Queensland	School of Pharmacy	email	www
Prof. Guy Cox	The University of Sydney	Electron Microscope Unit	email	www
Prof. Halina Rubinsztein-Dunlop	The University of Queensland	Centre for Biophotonics and Laser Science	email	www
A/Prof. Helena Nevalainen	Macquarie University	Biological Sciences	email	www
Mr. Hemant Bhatta	Department of Physics	Macquarie University	email	www
Dr. Ian Harper	Monash University	Micro Imaging	email	www
A/Prof. James Camakaris	University of Melbourne	Department of Genetics	email	www
Prof. Jim Piper	Macquarie University	Centre for Lasers & Applications	email	www
Mr. Jin Dayong	Macquarie University	Centre for Lasers & Applications	email	www
Dr. Joerg Enderlein		Forschungszentrum Juelich	email	www
Prof. John Harvey	University of Auckland	Department of Physics	email	www
Dr. John Beardall	Monash University	School of Biological Sciences	email	www
Prof. Ken Ghiggino	The University of Melbourne	School of Chemistry	email	www
Ms. Kristi Hanson	Faculty of Engineering and Industrial Science	Swinburne University	email	www
Mrs. Krystyna Tomsia	Department of Physics	Macquarie University	email	www
A/Prof. Leann Tilley	La Trobe University	Biochemistry	email	www
Dr. Liz Harry	The University of Sydney	Molecular and Microbial biosciences	email	www
Prof. Mark Baker	Macquarie University	Australian Proteome Analysis Facility (APAF)	email	www
Prof. Mark Willcox	University of New South Wales	School of Optometry and Vision Science	email	www
Dr. Mark Prescott	Monash University	Biochemistry and Molecular Biology	email	www
A/Prof. Matthew Phillips	University of Technology, Sydney	Faculty of Science	email	www
A/Prof. Morry Silberstein	Monash University	Department of Medical Imaging_& Radiation Sciences	email	www
Dr. Nick Klonis	La Trobe University	Department of Biochemistry	email	www
A/Prof. Norman Heckenberg	The University of Queensland	School of Physical Sciences	email	www
Prof. Paras Prasad	University at Buffalo	Department of Chemistry	email	www
A/Prof. Paul Mulvaney	The University of Melbourne	School of Chemistry	email	www

Prof. Peter Bergquist	Macquarie University	Biotechnology Research Institute	email	www
A/Prof. Peter Karuso	Macquarie University	School of Chemistry	email	www
Prof. Peter Lay	The University of Sydney	School of Chemistry	email	www
Dr. Pierre Moens	The University of New England	Biological, Bio- medical & Molecular Sciences	email	www
A/Prof. Robert Learmonth	University of Southern Queensland	Biological and Physical Sciences	email	www
Dr. Ron Clarke	The University of Sydney	School of Chemsitry	email	www
Mrs. Sarah Ellis	Peter MacCallum Cancer Centre	Microscopy	email	www
A/Prof. Scott Kable	The University of Sydney	School of Chemistry	email	www
Dr. Scott Martin	CSIRO Industrial Physics	Industrial Physics	email	www
Dr. Seth Olsen	Centre for Computational Molecular Science (CCMS)	The University of Queensland	email	www
Dr. Sophie Dove	The University of Queensland	Centre for Marine Studies	email	www
Mr. Stephen Cody	Ludwig Institute For Cancer Research	Central Resource for Advanced Microscopy	email	www
Dr. Steven Bottle	Queensland University of Technology	School of Physical and Chemical Sciences	email	www
Dr. Trevor Smith	The University of Melbourne	School of Chemistry	email	www

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Research and Development Laboratories

Fluorescence Applications in Biotechnology and Life Sciences has undoubtedly created interest world wide. The following list links to personnel and organizations involved in this technology around the globe:

- David Millar, The Scripps Research Institute
- Guillermo Bazan, University of California
- Moungi G. Bawendi, Massachusetts Institute of Technology
- Andrew T. Taton, University of Minnesota
- Sandra Rosenthal, Vanderbilt University , Nashville , TN
- Sanford M Simon, Rockefeller University, New York
- Movies of Cell Imaging - Rockfeller University
- Victor E. Borisenko, A B Filonov, S. V. Gaponenko, V. S. Gurin (Book)
- Optical Sciences Division, U.S. Naval Research Laboratory, Washington
- University of Maryland, Center for Fluorescence Spectroscopy
- University of Maryland Biotechnology Institute
- Molecular Imaging Resources Centre, Berkeley
- National Institute of Biomedical Imaging and Bioengineering
- The Institute for Lasers Photonics and Biophotonics – University at Buffalo
- Bioprocessing Technology Institute, Singapore
- Stanford Microfluidics Laboratory
- Analytical Imaging Facility at AECOM
- Laboratory for Fluorescence Dynamics, University of Illinois at Urbana-Champaign
- Fluorescence Education Center

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Network Members: Companies

The contact details of the member companies which are involved in this new initiative are listed below. Please click on the names to vew more details.
More companies have been approached and will be listed on future updates. Details of some companies are listed at the end of the list.

Sort By:

Name	Organisation	Section	Email	Website
Dr. Alan Hibbs	BIOCON	Confocal Microscopy	email	www
Mr. Alex Stanco	Lastek Pty Ltd	Managing Director	email	www
Dr. Carola Thoni	Leica Microsystem	Product Manager Confocal Microscopy	email	www
Dr. Charlotte Morgan	BTFbio Pty Ltd	Development Scientist	email	www
Mr. Chris Johnson	PerkinElmer Life and Analytical Sciences	Live Cell Imaging	email	www
Mr. David Haines	Varian Australia Pty Ltd	Marketing - Fluorescence Products	email	www
Dr. Gavin Symonds	Carl Zeiss Australia Pty Ltd	Microscopy Business Group - Application Specialist	email	www
Mrs. Gerri Springfield	Coherent Scientific Pty. Ltd	Physical sciences	email	www
Dr. Graham Vesey	BTFbio Pty Ltd	Chief Technical Officer	email	www
Mr. James Balmer	BMG LABTECH Pty Ltd		email	www
Dr. Karl Poetter	Genera Biosystems Pty Ltd	Genera Biosystems	email	www
Dr. Maria Paje	Bio-rad Laboratories Pty Ltd	Confocal Applications	email	www
Mr. Philip Binns	Varian Australia Pty Ltd	Marketing and Field Operations	email	www
Dr. Stuart Rumble	Lastek Pty. Ltd.	Spectroscopic & Analytical Instruments	email	www
Dr. Tets Minamikawa	Olympus Australia Pty Ltd	Precision Instruments Business Unit	email	www

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Details of some companies:

- Bio-Rad Laboratories Pty Ltd

- BTFbio Pty Ltd
- Carl Zeiss Australia Pty Ltd
- Genera Biosystems Pty Ltd
- Lastek Pty Ltd
- Leica Microsystems Pty Ltd
- Olympus Australia Pty Ltd
- Varian Australia Pty Ltd

Bio-Rad Laboratories Pty Ltd.

Dr. Maria Luz F. Paje
Confocal Applications Specialist
Life Science (Research, Education, Process Separations, Food/Animal/Environment Testing)

Unit 1, Block Y
Regents Park Industrial Estate
391 Park Road
Regents Park,
New South Wales 2143

Tel.: 61 2 9914 2800
Fax.: 61 2 9914 2889
Mobile: 61 405 12 48 63

email: Maria_Paje@bio-rad.com
website: www.bio-rad.com

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BTFbio Pty Ltd

Mr. Graham Vesey
Founder
Chief Technical Officer

Unit 1, 35-41 Waterloo Rd
North Ryde NSW 2113
Australia

Postal Address:
PO Box 599
North Ryde BC NSW 1670
Australia

Tel.: 61 2 8877 9150
Fax: 61 2 8877 9101

email: graham.vesey@btfbio.com
website: www.btfbio.com

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Carl Zeiss Australia Pty Ltd

Dr. Gavin Symonds
Microscopy Business Group - Application Specialist

Unit 13, 2 Eden Park Drive
North Ryde, NSW 2113
Australia

Tel.: 61 2 9020 1363
Fax: 61 2 9020 1330

email:gsymonds@zeiss.com.au
website: www.zeiss.com.au

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Genera Biosystems Pty Ltd

Dr. Karl Poetter
CSO, Genera Biosystems

4 Research Avenue
La Trobe R&D Park
Bundoora Vic 3083
Australia

Tel.: 61 3 9345 2251
Fax: 61 3 9345 2242

email: poetter@wehi.EDU.AU
website: www.generabiosystems.com

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Lastek Pty Ltd

Mr. Alex Stanco
Managing Director

The University of Adelaide Commerce and Research Precinct
10 Reid Street

Thebarton SA 5031
Australia

Postal Address:
GPO Box 2212 ,
Adelaide , SA 5001,
Australia

Tel.: 61 8 8443 8668
Freecall: 1 800 88 2215
Fax: 61 8 8443 8427
NZ Freecall: 0800 441 005

email: alex@lastek.com.au
website: www.lastek.com.au

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Leica Microsystems Pty Ltd

Dr. Carola Thoni
Product Manager Asia-Pacific / Confocal Microscopy

482 Victoria Road
Gladesville NSW 2111
Australia

Toll-free: 1800625286
Tel.: 61 2 96551289
Fax: 61 2 92259122

email: Carola.Thoni@Leica-Microsystems.com
website: www.confocal-microscopy.com

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Olympus Australia Pty Ltd

Dr. Tets Minamikawa
Precision Instruments Business Unit

31 Gilby Road
Mount Waverley VIC 3149
Australia
Tel.: 61 2 9886 3920
Fax:

email: TetsMinamikawa@olympus.com.au
website: www.olympus.com.au

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Varian Australia Pty Ltd

Mr. David Haines
Marketing - Fluorescence Products

Melbourne, Victoria
Australia

Tel.: 61 3 9566 1125
Fax: 61 3 9566 1196

email: david.haines@varianinc.com
website: www.varianinc.com

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Other Resources

These are some of the resources related to the network:

1. Journals 2. Community Information 3. Other Useful Fluorescence Links

Journals

- Journal of Fluorescence
- Biophysical Journal

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Community Information

- Gregorio Weber International Prize in Biological Fluorescence
- 6th International Weber Symposium on Innovative Fluorescence Methodologies in Biochemistry & Medicine, Hawaii. July 2005
- Fluoro 2004: Workshop on use of optical spectroscopic techniques in biomedical research, Coffs Harbour, NSW, 19-23 September 2004
- Who's Who in Fluorescence 2004
- Fluorescence Interest Group
- Australian Society for Biophysics
- International Union for Pure & Applied Biophysics
- Australian Society for Biochemistry and Molecular Biology
- AusBiotech Inc – Australia's Biotechnology Organisation
- The AusBiotech Inc Database
- Australaian Biotechnology Directories
- Biotechnology Worldwide
- AusIndustry Biotechnology Innovation Fund (BIF) Recipients 2001 to 2003

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The AusBiotech Inc Database

Ausbioinfo provides the Australian biotechnology and biopharmaceutical industry with a database of Australian companies offering a vast array of services and products to the biotechnology industry. Ausbioinfo currently stores in excess of 700 companies across various categories listed in the table below.

Company Categories

Organisations(95)	HealthCare (26)
Agritechnologies (68)	Industry Associations and Interest Groups (15)
BioEngineering (16)	Instrumentation (26)
Bioinformatics (14)	Professional Service Provider (158)
Devices, Instrumentation and Equipment (23)	Research & Development Service Provider (73)
Diagnostic Products (27)	Retail and Wholesale Suppliers (38)
Diagnostic Services (human) (12)	Technical Service Provider and Products (22)
Environmental technologies (36)	Therapeutics (human) (133)
Finance & Investment (116)	Veterinary (10)
Food & beverage technologies (20)	

Detailed information was sought only for those categories of relevance (highlighted in red). To view a list of relevant industries please click here (5.6Mb). A compressed version of the same file is available here (576Kb).

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Australian Biotechnology Directories

The Australian Biotechnology Directory showcases biotechnology organisations throughout vaious States in Australia . It provides an overview of the range of activities undertaken in the life sciences disciplines, with a particular emphasis on activities that have significant commercial and economic benefit.

Australia has a small, but strongly growing life sciences industry, driven by a strong research base, particularly in medical research and agriculture. In 1998, there were an estimated 120 core biotech companies with an estimated turnover of AUD$965 million (US$600 million). In addition there are a significant number of large corporations, such as breweries, food producers and miners involved in the development of technologies based on the life sciences.

1. ***Queensland Biotechnology Directory (Download info)***

2. ***South Australia Biotechnology Directory (Download Info)***

3. ***Tasmania Biotechnology Directory (DownLoad Info)***

4. ***Victoria Biotechnology Directory (DownLoad Info)***

5. ***Western Australian BiotechnologyDirectory (DownLoad Info)***

6. ***NSW Government BioFirst Portal (DownLoad Info)***

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Biotechnology Worldwide

There are several countries that are making special efforts to both develop and capitalise on Biotechnology. Chief amongst them is America , though cutting edge work is also going on in the UK , Ireland , Germany , Korea , Singapore , China and Japan .

- America is the world leader in biotechnology, it has 1,379 biotechnology companies and employs 174,000 people. It spends £9 billion on research into biotechnology.
- The European market for goods and services dependent on biotechnology is currently estimated at £30 billion and is forecast to exceed £100 billion by the year 2005
- The UK leads Europe in biotechnology and employs 19,000 people
- The UK has 300 dedicated biotechnology companies and a further 250-300 involved in broader bioscience related activities
- The industrial sectors which stand to benefit from biotechnology are pharmaceutical, agriculture, food and drink, chemicals and environmental technologies
- Germany is the second strongest country in Europe , with 332 companies but fewer products in development than the UK .

The BioIndustry Association, the trade association for innovative enterprises in the UK 's bioscience sector, is the authoritative voice of UK biotechnology. A full list of its members is provided here. For contact and details on each member organisation please go to this link.

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AusIndustry Biotechnology Innovation Fund (BIF) Recipients 2001 to 2003

The BIF is a merit-based competitive grants program which aims to increase the rate of commercialisation of promising biotechnology developed in Australia . It provides financial assistance to companies to demonstrate proof-of-concept between the initial research stage of a biotechnology project and the early stage of its commercialisation. This program forms part of the $3 billion Innovation Statement, Backing Australia's Ability that underscores the Federal Government's commitment to innovation.

The program is implemented by AusIndustry and runs for three years from 2001-2004. Since its launch in 2001, the BIF has supported 162 projects (from more than 350 applicants) with grants worth in excess of $36.5 million.

A full list of the recipients to date is provided here.

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Other Useful Fluorescence Links

- Application of Microorganisms in Food Industry and Agriculture
- Biogenesis Laboratories
- Biotechnology Worldwide
- Cellular Biotechnology and Biochips
- Electron Microscopy Sample Preparation
- Electronic Spectroscopy
- Laser Induced Fluorescence Spectroscopy
- Molecular Expressions Microscopy Primer
- Molecular Libraries and Imaging, NIH Roadmap
- Nano-Biophotonics and Biomedical Applications
- Photonics West
- Single Molecule Fluorescence Imaging and Assays
- TBAK for Cultured Dairy Products
- Tempest Chem – Bio
- Time Resolved Fluorescent

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Biotechnology Worldwide

There are several countries that are making special efforts to both develop and capitalise on Biotechnology. Chief amongst them is America , though cutting edge work is also going on in the UK , Ireland , Germany , Korea , Singapore , China and Japan .

UK Bio industry association:

The BioIndustry Association, the trade association for innovative enterprises in the UK 's bioscience sector, is the authoritative voice of UK biotechnology. A full list of its members is provided here . For contact and details on each member organisation go to this link.

More UK based industries in biotech sector are provided here.

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Photonics west

Photonics West has become North America 's largest commercial exhibition on optics, lasers, **biomedical optics** , optoelectronic components, and **imaging technologies** . No other event covers the full range of applications and technologies.

Exhibitions:

To view a complete list of exhibitors please click here

Proceedings:

The latest technical discoveries and education opportunities presented at Photonics West 2004. Click here to view a list.

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New Members Registration

Please use one of the following options to register:

- Online Registration
- Download Membership Registration form (pdf) (rtf)
- Contact Us

Online Registration

To register into the network, please fill in the following details: (* Asterisk marks a required field.)

Personal Information

Title*: First Name*: Surname*:

Website:

Organisation*: Department:

Highest Qualification*: Date of award*:

GAMS ID:

Contact Information

Email*:

Phone Numbers:

Home:	Country Code:	Area Code:	Phone #:	Ext:
Work:	Country Code:	Area Code:	Phone #:	Ext:
Fax:	Country Code:	Area Code:	Phone #:	Ext:
Mobile:				

Postal Address:

Line 1:
Line 2:
City:
State/Province:
Zip/Postal Code:
Country: Not Selected

Reason to Join

It is important for us know how the Network can best serve your interest. Please kindly state your reasons for wishing to join the Network.

Submit

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Fluorescence Applications in Biotechnology and Life Sciences - New Members Registration Form

Personal Information

Title*: _____ First Name*: _____ Last Name*: _____

Website: _____

Organisation: _____

Department: _____

Highest Qualification*:_____ Year Awarded*:_____

GAMS ID: _____

Contact Information

Email*: _____

PHONE NUMBERS:

Home: Country Code: _____ Area Code: _____ Phone #: _____ Ext: _____

Work: Country Code: _____ Area Code: _____ Phone #: _____ Ext: _____

Fax : Country Code: _____ Area Code: _____ Phone #: _____ Ext: _____

Mobile: _____

POSTAL ADDRESS:

Street: _____

City: _____ State/ Province: _____

Zip/ Postal Code: _____ Country: _____

Reason to Join

It is important for us know how the Network can best serve your interest. Please kindly state your reasons for wishing to join the Network.

_____

_____

_____

Please send the completed form to:
A/Prof. Ewa M. Goldys
Director, Optical Microcharacterisation Facility,
Division of Information and Communication Sciences
Macquarie University, NSW 2109, Australia

Or email to: goldys@ics.mq.edu.au

General Announcements

- Environmental Biotechnology CRC PhD Scholarship (posted 16/11/2004; updated 9/2/2005)
- Gregorio Weber International Prize in Biological Fluorescence (posted 16/11/2004)

Environmental Biotechnology CRC PhD Scholarship

Macquarie University is the lead organisation in a project within the Environmental Biotechnology CRC focused on rapid detection of water-borne microbial pathogens. This is a large, three-year project with a PhD opportunity as outlined below.

Environmental Biotechnology CRC Project 1
Rapid pathogen detection strategies for the environment
Professor Peter Bergquist, Associate Professor Ewa Goldys and Dr Belinda Ferrari

We are developing rapid and cost effective technology for the identification and enumeration of pathogens including Cryptosporidium and E. coli. The research will be modeled on successful tests developed for Cryptosporidium.
New technologies will also be developed, ranging from simple to sophisticated (biosensors, quantum dots) techniques for real time detection of pathogens. Additionally proteomic analysis of diverse Cryptosporidium and/or E. coli isolates will be undertaken (as a separate project) to aid in target identification for the development of new antibodies and/or DNA probes.

The Ph. D. project will use molecular biological methods for the identification of microbial pathogens, biochemistry for the process of tagging the target and optical engineering methods for optical detection in complex water-borne environmental samples. The project would suit a person with a prior training in biology or organic chemistry, or physics, especially biophysics, who is prepared to work as part of a team in an interdisciplinary field. The research will examine the application of quantum dot technology to the rapid, real-time and multiplexed identification of water-borne pathogens.
A Post-doctoral fellow is also working on a different rapid identification technology and other Ph. D students and academic staff are utilising proteomics for the identification of novel targets for probe development and are developing current detection technologies further to enable the analysis of difficult environmental samples. The techniques employed include flow cytometry, multi-colour labelling with quantum dots, immunomagnetic separation, fluorescent in situ hybridisation and genotyping/PCR methods.

Project Industry Partner: Meat & Livestock Australia
Project Research Partner: Murdoch University, Perth, WA

One PhD scholarship valued at $25,000 pa is available in this project, tax-free for 3 and a half years (fees are also included but only for New Zealand and Australian citizens and permanent residents, otherwise international fees apply).
Allowances in addition to the scholarship include laboratory expenses, local and overseas conference travel and assistance with thesis costs.

Requirements:
Applicants should have a Bachelors Honours degree with a first or high 2.1 or a research Master's degree. A chemistry, microbiology or molecular biology background is essential and experimental physics courses in the applicant's undergraduate degree would provide an additional advantage".

For more information please contact:
Peter Bergquist on +61 2 9850 8614, email peter.bergquist@vc.mq.edu.au
or
Ewa Goldys on +61 2 9850 8902, email goldys@ics.mq.edu.au
or
Belinda Ferrari on +612 9850 9252, email bferrari@rna.bio.mq.edu.au

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Gregorio Weber International Prize in Biological Fluorescence

The Gregorio Weber International Prize in Biological Fluorescence (Weber Prize) is awarded for research related to a doctoral (or equivalent) dissertation. All fields of biological fluorescence (experimental, theoretical, or applied) are eligible. The award is international in scope. The award is conferred approximately every three years and presented at an international scientific meeting. Submitted dissertations will be evaluated by a scientific panel and three finalists will be identified. A second panel will select the winner from the three finalists.

The winner of the Weber Prize will receive a cash award of $2,500 and an invitation to present an acceptance lecture at the scientific meeting where the award is presented. The remaining two finalists will receive honorable mention awards of $1,000 each and invitations to present short talks at the same meeting.

Requirements for the 2005 award:

- For this year's submission, the dissertation must have been accepted and the doctorate conferred during the three years prior to December 4, 2004.
- English is the preferred language. Dissertations not in English must include a 10-15-page summary in English.
- A maximum of two published manuscripts, arising from the dissertation research, may also be submitted. Manuscripts not in English must have an English translation appended.
- Submitted materials must be conveyed by electronic or digital format (preferably in pdf format) to lfd@uiuc.edu, attention William Mantulin.
- Deadline for submission is December 4, 2004.

Selection Committee:

Panel I: Selects three finalists	***Panel II: Selects the final winner***
Enrico Gratton, U of Illinois, USA, Panel Moderator	David Jameson, U of Hawaii, USA, Panel Moderator
Luis Bagatolli, U of So. Denmark, Denmark	William Sawyer, U of Melbourne, Australia
Yves Engelborghs, U Leuven, Belgium	Antonie Visser, U of Wageningen, The Netherlands
Sergio Ferreira, Fed. U Rio de Janeiro, Brazil	
Jay Knutson, National Institutes of Health, USA	
Kazuhiro Oiwa, KARC, Japan	
Suzanne Scarlata, SUNY at Stony Brook, USA	
Sergey Tetin, Abbot Laboratories, USA	

For information about the inaugural Prize award, which was presented at the 2002 Weber Symposium, see lfd.uiuc.edu/weber/prizewinner.html

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