Dear Colleagues,

We have arrived at the end of yet another fantastic year for the FABLS Network! It has been a challenging year, yet the Network has grown and strengthened and now stands at 496 members! We are pleased to offer this final newsletter for 2008 and take the opportunity to wish you all a safe and wonderful festive season.

We have been proud to support a number of workshops and seminars over the year and have also been pleased to provide numerable scholarships to students and early career researchers (ECR) to attend and gain the benefit of furthering their knowledge and their networks. We are pleased to be able to support a number of initiatives in the coming year, namely FLUORO 2009 in April and Nanophotonics DownUnder 2009 in June. If you are interested in attending and are a student or ECR please see the respective information in the Conferences and Courses section (p5&6) to learn more about accessing the FABLS scholarships that are available.

In 2008, it has been our pleasure to distribute over $337,000 of funding support to members both new and old, ranging from established researchers to those at the early career stage as well as a good number of PhD students. This funding will enable numerous visits to overseas labs, sharing and learning with international experts as well as bringing some of the expertise here to Australia.

It is often disheartening to the FABLS team to think that our ARC/NHMRC funding runs out mid next year, but we are buoyed by the enthusiasm and commitment of our members and we take this chance to thank the many FABLS committee members for their tireless contributions to the Network.

We are doing our best to ensure the continuity of the Network and this will hopefully take the form of a Foundation, which will hold funds in trust to underwrite conferences for our community into the future. The inaugural conference will run in late November, 2009 and will be held in Melbourne over 3 ½ days. You will be hearing more about this as details are confirmed but the tentative program looks to cover the themes of: Advanced Optical Imaging, Fluorescent Probes and Bio-photonics.

We are currently pulling together our resources in order to submit an application now that the next CRC round has been announced. This will need to be submitted in March 2009 and we will let you know how that goes. Also around that time we will hopefully be receiving copies of the newly published FABLS book, set to be released in February or March 2009. We are anticipating that the book launch will most likely be in March and will be held in the gorgeous Garvan Galleria. Stay tuned for latest updates!

Finally, I and all the team at FABLS, would like to wish you a very merry and safe holiday season and a fantastically successful 2009!

Best regards,

Ewa Goldys
Membership

FABLS Network continues to strengthen its membership and now boasts just a couple shy of 500 members, representing the Australian and international fluorescence community.

As we head toward the end of the Research Network funding period from the ARC & NHMRC, which will be mid-2009, we are looking for ways to maintain the momentum of inter-institutional and multi-disciplinary networking ongoing in the Network. One will be the maintenance of the FABLS website. So if you would like to increase your profile or have your research area highlighted, please send through your updated 1 page Project Description or a Capability Statement so that we can place it on the website for other members to peruse and for potential collaborators to match.

Check out a new member on the FABLS website...
http://www.physics.mq.edu.au/research/fluoronet/

Also, see what other members are doing...
Click on ‘Membership’ and read a few capability statements and project descriptions.

FABLS and Monash Micro Imaging present...

On the 1st December, 2008 FABLS and the Monash Micro Imaging Centre were pleased to present a remarkable seminar given by Prof. Dan Axelrod, on “Photons have a Bright Future” at Monash University; as an adjunct to the EMU @ University of Sydney’s Jubilee Commemorative Symposium.

Professor Emeritus and Research Scientist Emeritus, based in the Physics Department at the University of Michigan, Prof. Dan Axelrod works in the field of Experimental Biophysics, with a research focus on the development of novel optical microscopy techniques useful in cell biology. His group develops novel optical microscopy techniques to study the motion and organization of biological molecules and cellular organelles near biological surfaces and are currently developing a new spatially-resolved imaging approach to DLS such that it can be used in a microscope to view the rates of molecular motions in living cells.

FABLS and MQ Photonics present...

On the 2nd December, 2008 FABLS and MQ Photonics were proud to host a fascinating seminar given by Prof. Hans Tanke, on “Novel Upconverting Phosphors” at Macquarie University.

Prof Tanke is a pioneer in the area of imaging, microscopy and fluorescence. He sits on numerous journals’ editorial boards, scientific advisory boards and in 2008 received the Membership services award from the International Society for Advanced Cytometry. He currently is Head of the Department of Molecular Cell Biology at Leiden University Medical Centre. Over the last three years, his team has developed technology for point-of-care diagnosis of infectious diseases using saliva. Hans Tanke is (co)-author of more than 300 scientific papers, and is (co)-inventor on 5 patents.
Featured Research News

All the researchers and companies (contact details provided) are interested to discuss the applications of their technology with commercial partners and interested academics, or their offered services.

“Investigating Chromophore-Protein Interactions in Coral Chromoproteins through Real and In-Silico Mutagenesis” Dr. Seth Olsen, University of Queensland

FABLS funding received in 2006 was used almost exclusively for networking and associated travel. Several trips were held between co-investigators Drs. Olsen and Prescott and between co-investigators Olsen and Martinez. Other meetings with investigators in the fields of molecular modelling and, in particular, biological modelling, were held (Prof. K. Kitaura, Prof. A. Warshel, Prof. W.H. Miller, Prof. W. VanGunsteren, Prof. N. Hush, Prof J.R. Reimers, etc.), as well as researchers in chromoprotein spectroscopy (Prof. T. Smith, Prof S.M. Meech, Prof S.B. Boxer, etc.).

Having obtained deep insight into the chromophore photophysics and now at a point where believable chromophore models can be interfaced to models of the protein environment without sacrificing sampling efficiency, it was recently established that a model composed of three valence-bond diabatic states can describe the absorbing and emitting states of chromoproteins as well as the photoisomerization reaction (which is the primary non-radiative decay mechanism). There is reason to believe this model may also be invoked to describe the excited-state proton transfer in these proteins and some of these results have been published with more in the submission process.

Publications include:

The projects’ main aims were to develop models to describe the photochemistry of the chromophores of coral chromoproteins (GFP homologues) and implement them to explore how chromophore-protein interactions control the outcomes of excitation of the chromophore. This was a very ambitious goal, because faithful representation requires being able to treat the (quantum mechanical) electronic degrees of freedom in a way that doesn’t prohibit sampling of protein conformational states are populated at ambient physiological temperatures.

Recently a major breakthrough has been achieved in the effort, by identifying a very small ‘active space’ of quantum-mechanical degrees of freedom which can form the basis of an empirical valence-bond model. This type of model can be interfaced with molecular mechanics descriptions of the protein in a way that does not sacrifice sampling accuracy. A description of the ansatz has just been submitted, and they are in the process of testing parametric force-fields based upon this ansatz.
Understanding how biomolecules control the harvest of light energy is extremely important, both from the perspective of basic biology research, but also for the development of sustainable bio-mimetic solar energy sources. We believe strongly that the family of GFP homologues is unmatched as a model system to probe this basic question. By identifying a model can describe the chromophore photophysics cheaply and realistically, we have opened the door to understanding how light energy is directed in these systems at realistic temperatures and in realistic environments.

The models developed to describe chromoprotein chromophore photophysics may also be applied to a wide range of methine dye systems. The team are currently in the process of applying similar techniques to model these systems, many of which are of interest as biological stains, nonlinear organic photonic materials, and as dyes in organic solar cells and LEDs.

**Figure 1** The models developed can be used to reproduce potential surfaces of the chromophore cheaply and accurately (top), and also describe important charge-localization effects (bottom).
Figure 1. Another important aspect of photoisomerization is the charge localization processes which occur upon twisting. Here are planar and twisted geometries of a chromophore model. At top, we show difference electron densities which show the charge-transfer. This charge-transfer is a possible mechanism for control by the protein and it must be treated in models of the photoisomerization.

Journal of Innovative Optical Health Sciences (JIOHS)

The JIOHS serves as an international forum for the publication of the latest developments in all areas of photonics in biology and medicine. JIOHS will consider for publication original papers in all disciplines of photonics in biology and medicine, including but not limited to:

- Photonic therapeutics and diagnostics
- Optical clinical technologies and systems
- Tissue optics
- Laser-tissue interaction and tissue engineering
- Biomedical spectroscopy
- Advanced microscopy and imaging
- Nanobiophotonics and optical molecular imaging
- Multimodal and hybrid biomedical imaging
- Micro/nanofabrication
- Medical microsystems
- Optical coherence tomography
- Photodynamic therapy

JIOHS provides a vehicle to help professionals, graduates, engineers, academics and researchers working in the field of intelligent photonics in biology and medicine to disseminate information on the state-of-the-art technique.

Please see our website for more information and to access copies of our journal…
http://www.worldscinet.com/jiohs/
Conferences and Courses

17 - 19 February 2000
1st Short Course on Time Resolved Microscopy & Correlation Spectroscopy
Berlin - Adlershof, Germany

This course is intended for individuals wishing an in-depth introduction to the principles of time-resolved fluorescence microscopy and its applications to the Life Sciences. Attendees are typically professionals who are using or intend to use fluorescence microscopy in their research. Most attendees have some knowledge of fluorescence, typically in a specialized area. However, other individuals, from totally different research areas and industry, will get the opportunity to enter this exciting field in a very effective way and benefit especially from the experimental section.

The event lasts three days, with lectures in the mornings and hands-on sessions in the afternoons.

Workshop Program
- Introduction to Microscopy
- Steady State Techniques
- Hardware for Time-resolved Microscopy & Data Analysis
- Fluorescence Lifetime Imaging
- Fluorescence Correlation Spectroscopy
- Förster Resonance Energy Transfer

For more information please see… http://www.picoquant.com/_mic-course.htm

Sunday 19 – Thursday 23 April 2009
FLUORO 2009...
Use of optical spectroscopic & microscopic techniques in biological & biomedical research
The University of New England, Armidale, NSW, Australia

This workshop aims to provide training and practical experience in a range of optical spectroscopic techniques (including microscopy) used in the biological and biomedical sciences. A strong emphasis will be placed on practical issues and methodologies. The target audience will be graduate research students, young postdoctoral research fellows and recently appointed junior faculty members. Registration opens in January 2009. A limited number of FABLS Scholarships are available for ECRs and PhD students.

Topics include:
• Basics of Fluorescence I & II
• Fluorescence Instrumentation
• Fluorescent Labelling
• FRET Introduction
• FRAP and FRET Microscopy
• Basics of Microscopy and Instrumentation
• Fluorescence Correlation Spectroscopy
• Multi Photons/ Fluoro Lifetime Imaging/ RICS
• Global Data Analysis/ Advances at the LFD

For more information please see… http://www.une.edu.au/fluoro/2009/
Conferences and Courses (Cont’d)

21- 24 June, 2009
Nanophotonics Down Under 2009: Devices and Applications
Melbourne Convention Centre, Melbourne, Australia

The Sir Mark Oliphant Conferences - International Frontiers of Science and Technology is a conference series under the Australian Government's International Science Linkages Programme to stage strategically significant international conferences in Australia on high priority, cutting edge, multi-disciplinary themes.

Nanophotonics Down Under 2009 Devices and Applications (SMONP 2009) will be an interdisciplinary meeting devoted to laser and light interacting with nano-dimensional objects for photonics applications such as photovoltaics, plasmonics, photonic crystals, biomedicine and data storage. Through this conference, we plan to bring together leading international specialists with the primary aim to collectively identify key challenges in the emerging applications of nanophotonics. A limited number of FABLS Scholarships are available for ECRs and PhD students.

Conference topics include:
- Photovoltaics and solar cells
- Nanomaterials
- Plasmonics
- Photonic crystals and optical circuits
- Metamaterials
- Nano-optics
- Display devices
- New generation of data storage
- Biophotonics and biosensors
- Laser tweezers and trapping

For more information on SMONP2009 such as submission, registration, accommodation and travel support please see the following web site: www.smonp2009.com

26- 29 July, 2009
Molecular Modelling 2009
Gold Coast, Queensland, Australia

The Organising Committee invited you to join the forthcoming molecular modelling (MM2009) meeting, which will be held at the Mantra Legends Hotel, Gold Coast (Surfers Paradise), Queensland, Australia from the 26th to 29th July, 2009.

The meeting will focus on the latest developments in molecular modelling in both the life sciences and materials sciences, particularly in the areas of Methodology Development; Drug Design; Materials & Nanotechnology; Dynamics & Chemical Reactivity; Self Assembly & Biomolecular Simulations; and Sustainable Energy & Environment.

MM2009 is held under the auspices of the Association of Molecular Modellers of Australasia (AMMA), the Asia/Pacific Chapter of the Molecular Graphics and Modelling Society (MGMS). Part of the charter of this organization is to present a series of national meetings, held annually, to serve the modelling community within the Australasia region.

For more information please see… http://web.aibn.uq.edu.au/mm2009/index.htm
Over the 4 years since the inception of the Network, it has been FABLS pleasure to distribute almost $1,400,000 to the Australian Fluorescence research community facilitating opportunities for collaboration and seed project development, involving well established, Early Career & student researchers.

FABLS Final Funding round has now been and gone and our Congratulations go to the 14 successful projects listed below.

<table>
<thead>
<tr>
<th>Chief Investigator</th>
<th>Project Title</th>
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<tbody>
<tr>
<td>Assoc. Prof. Filip Braet</td>
<td>Development of Smart Fluorescent Anti-Cancer Conjugates to Detect Drug Resistant Tumour Cells</td>
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<tr>
<td>Dr. Eric Hanssen</td>
<td>Correlative Fluorescence of malaria parasite</td>
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<tr>
<td>Dr. Jake Baum</td>
<td>Imaging actin dynamics in the malaria parasite: Development of live-fluorescence microscopy to visualize actin dynamics during malaria parasite cell invasion and motility</td>
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<tr>
<td>Prof. Marek Godlewski</td>
<td>Fluorescence labels based on nanosize rare earth doped oxides for in-vivo labelling of fungal hyphae</td>
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<tr>
<td>Prof. Sarah Russell</td>
<td>Development of a system for high content microscope scans of T-cells.</td>
</tr>
<tr>
<td>Mrs. Rhiannon Creasey</td>
<td>Characterisation of pathological deposits in Pseudoexfoliation Syndrome by means of antibody recognition imaging</td>
</tr>
<tr>
<td>Dr. Helen Pask</td>
<td>Lab exchanges: Macquarie University/University of Strathclyde</td>
</tr>
<tr>
<td>Mr. Tom Lawson</td>
<td>Enhancing the Detection of Bacteria and other Pathogens in Blood Using Multiplexed Temporal and Spectral Techniques</td>
</tr>
<tr>
<td>Ms. Betty Kouskousis</td>
<td>Live-Cell Superresolution Microscopy of Asymmetric T Cell Division</td>
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<tr>
<td>Prof. Jacob W. Petrich</td>
<td>Intramolecular Hydrogen Atom Transfer of the Medicinal Pigment Curcumin upon Binding with Plasma Proteins – A Time Resolved Fluorescence Study</td>
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<tr>
<td>Dr. Catherine Whitby</td>
<td>Controlled Particle Attachment at Fluid Interfaces - Confocal Microscopy</td>
</tr>
<tr>
<td>Dr. Peter Lay</td>
<td>Metal fluorescence labels. Do they confound the biochemical information they hope to provide?</td>
</tr>
<tr>
<td>Assoc. Prof. Rob Learmonth</td>
<td>Prototyping design and applications for a multi wavelength fluorometer for monitoring of industrial fermentations</td>
</tr>
<tr>
<td>Dr. Jennifer Clarke</td>
<td>Image Correlation Spectroscopy Analysis of Neuropeptide Diffusion and Binding Kinetics</td>
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For a full listing of all projects funded by FABLS over the past 4 years, please see:

Congratulations again to all FABLS members who were involved in putting together this fabulous resource for our community. For the book reference on Wiley’s website, go to…


“Fluorescence Applications in Biotechnology and Life Sciences is the first reference in this important subject area to focus on fundamental concepts and applications of fluorescence in biotechnology and life sciences. The book emphasizes the principles and focus on the ‘here and now’ rather than the ‘over the horizon’ research which might become available in the future. Featuring a fully multi-disciplinary approach, the book has broad appeal to scientists and researchers in biology, physics, chemistry, biotechnology, bioengineering and medicine. The book also raises awareness of scientific approaches, technologies and applications that may help to resolve industrially and medically relevant problems in areas such as public health, food processing and safety, and environmental monitoring.”

The launch will hopefully be held in March 2009 at the Garvan Galleria, with its spectacular spiral staircase. See: http://www.tourgarvan.org/. We will keep you informed as details come to light.

Some interesting new advances in our area…

As you are most probably aware, the Nobel Prize in Chemistry for 2008 was won by researchers, Osamu Shimomura, Martin Chalfie and Roger Y. Tsien for “the discovery and development of the green fluorescent protein, GFP”.


FABLS Members, Dr. Mark Prescott (Monash University) was interviewed by ABC radio National (live), talking to John Barren attempting to explain what all the fuss was about.

http://mpegmedia.abc.net.au/newsradio/audio/20081009-jellyfish.mp3

Scientists startled to see red fish


Cells “from space” have unusual makeup

http://www.world-science.net/exclusives/080908_redrain.htm

“Nanoparticles” may seep through skin

http://www.world-science.net/othernews/080930_nanoparticle.htm

We would like readers to also be editorial providers, so have your say, or contribute information that other members may want to hear about. The sorts of things we would like to include are:

- interesting contacts (we need to build our national database);
- equipment available for collaborative (and consultative) projects;
- latest equipment updates from industry;
- 'good news' stories.

Compiled by Leah Boucher
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